PY 2014 Finance Residential Market Baseline Study Report
Volume I of II

Energy Division
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PY 2014 FINANCE RESIDENTIAL MARKET BASELINE STUDY REPORT (VOLUME I OF II)

Prepared under the direction of the **Energy Division** for the

California Public Utilities Commission

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1. Executive Summary

This report presents findings from a Finance Residential Market Baseline Study completed by Opinion Dynamics and Dunsky Energy Consulting. The purpose of this study is to support the California Public Utilities Commission (CPUC) and the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) by characterizing the market for financing products for energy efficient upgrades. As a "baseline", this study provides a "snapshot" of the market before the Statewide Residential Energy Efficiency Financing Pilots (Pilots) launch. This study helps to understand the market for energy efficiency financing and provides a baseline measurement of the market that will help assess market transformation over time. Further, because the Pilots are not yet finalized, this study has the potential to inform their design.

To develop the findings in this report, the Evaluation Team conducted online research to determine the types of financing available, reviewed statewide data on customer credit worthiness, and interviewed financial institutions, HVAC and general contractors, and homeowners. We begin by presenting findings on the "supply-side" of the market, such as what financing products are available today and their loan volume. We then present findings on the "demand-side" of the market, such as customer awareness and use of financing for energy efficient upgrades. We briefly summarize those findings below.

Financing energy efficiency (EE) upgrades is not necessarily new as homeowners have for many years financed home renovations, including EE measures, through conventional term loans and home equity loans, or short term lending through credit cards. However, only in the last five years have we seen financing products developed specifically to encourage homeowners to invest in energy efficiency.

Demand for Energy Efficient Financing Products among Homeowners

- **About one-third of homeowners completed energy-related upgrades in the last two years, but only a small fraction of them (one-quarter) used any type of financing.**
- **Customers typically used conventional financing rather than energy efficiency-specific financing.** Among survey respondents who used financing for energy-related upgrades to their home, 81% used conventional financing options that have no energy efficiency requirements. These most often included credit cards and bank loans. In comparison, 14% used an energy efficient financing option like PACE or energy efficient terms loans.
- **Awareness of energy efficient financing is low among homeowners.** Our homeowner survey found that just one in three homeowners is aware of some form of energy efficient financing and only one in ten is currently aware of PACE.
- **The opportunity for financing to help fund and grow energy-related projects in the near future is significant.** Four in ten homeowners said that they are likely to make an energy-related upgrade in the next two years, and 27% are at least somewhat likely to use financing. Over half of homeowners surveyed (54%) agreed that high upfront cost is why they might not make an energy-related upgrade, and a third of homeowners stated that a loan could help overcome the costs.
- **High interest rates prevent many homeowners from using financing, but the upcoming Pilots may help overcome this barrier.** About two-thirds of the homeowners (62%) felt that the interest rates available to them are too high and about 41% feel that it would be difficult to obtain a loan. These barriers are larger among customers with low income or low credit scores. One of the Pilots, the Residential Energy Efficiency Loan (REEL) program, presents a potential solution to this challenge as it will offer lower-than-market interest rates.

Energy Efficient Financing Products Available in the Market

- **Three common types of energy efficiency financing products are currently available in the market:** (1) *home equity loans*, (2) *term loans* (i.e., term loans from financial institutions that can be either secured or unsecured against equipment), and (3) *Property Assessed Clean Energy (PACE) loans*.

- **The requirements and definitions for what qualifies as "energy efficient upgrades" are not consistent among financing products.** Many financing products that specifically fund energy efficiency do not have strict requirements or standards for energy efficiency. Some products may use very liberal definitions of what constitutes energy efficiency and some may have more conservative definitions. How strictly the products define what qualifies as energy efficiency will likely have an impact on the outcomes from various products.

- **PACE financing dominates energy efficient financing volume, so far.** In 2014, customers borrowed $218 million in energy efficient financing. PACE represents 90% of that volume, or $196 million, while energy efficiency term loans represent 8%, and energy efficiency home equity loans represent 2%. However, the homeowner survey results suggest that the conventional financing market for energy-related upgrades is likely four times greater than the 2014 EEFP loan volume[1] resulting in an estimated $850M-$1B of energy-related upgrades being support by conventional financing in 2014.

Contractor Support for Energy Efficient Financing Products

- **Contractors are aware of energy efficient financing options, but only a small portion directly promote them.** According to our interviews, three in four contractors say that they are aware of at least one specific type of energy efficient financing option. However, only some (15%) actually promote energy efficient financing (i.e., mention it to customers). The contractors that do promote energy efficiency financing options to customers now tend to be larger firms who offer solar installation services in addition to energy efficiency upgrades. When these contractors promote energy efficiency financing to their customers, they are most commonly promoting PACE.

- **Most contractors are not promoting financing to customers now due to a perceived lack of capacity to promote financing and a perceived lack of need for financing among their customers.** Most contractors we interviewed (85%) are not promoting financing to customers currently. Some contractors do not perceive financing as a dimension of their business, while others do not think their customers need financing (44%) based on their experience with their customers so far. Additionally, others think they lack the capacity to promote financing based on their perception of how much time, knowledge, and/or staff resources are needed to promote it (40%).

The Pilots are intended to offer financing that can encourage homeowners to make energy efficient upgrades that are larger or that they would not have carried out otherwise. Based on our findings, we conclude that for the Pilots to meet this objective, they will need to appeal to market segments that are being underserved by

[1] Estimated conventional loan volume for energy-related upgrades in 2014 is based on residential homeowners' self-report of 81% using conventional financing, while 14% reporting dedicated EE financing. This would indicate that conventional financing volume is roughly 6 times the size of EEFP loan volume. However, Table 7 shows average financed value of $25,714 for dedicated EEFP financed projects but a lower average amount, $16,599, for conventional financed projects. Accounting for the reduced average loan size of conventional financing, we estimate the overall ratio for total dollar volume for conventional financing of about 4 to 1. Given the limited size of the homeowner survey, and uncertainty over the respondents' use and understanding of the concepts of "energy efficient" and "financing", it is our opinion that there is a great deal of uncertainty to this result. This may warrant further demand-side study to establish a more precise estimate of the volume of EE improvements supported through conventional financing product.

existing financing products. The Pilots will also need to offer financing under conditions that encourage homeowners to carry out energy efficient projects that they would not have undertaken with their own cash on hand or through the other financing available to them. Finally, they will need to ensure that homeowners are aware of the Pilots and understand how the Pilots can support energy efficient upgrades. This study captured multiple supply-side and demand-side market conditions that can be tracked over time to measure the market effects from the investment in Residential Energy Efficiency Financing. A full inventory of the baseline market conditions is provided in Chapter 7 and in the tables below.

Table 1. Potential Supply-Side Market Baseline Metrics & Characterization Data

Potential Metric/Data	Definition	2014 Baseline	Source	Where Pilots Could Make an Impact
Number of types of EEFPs	Number of different types of EE loan offerings	Three key types: PACE, term loans, and EEMs/HELOCs	Secondary research and FI interviews	Increase the number of different types of EEFPs
Number of FIs offering EEFPs	Number of FIs who offer EE-specific financing products	93 total 10 PACE providers 60 EEMs/HELOCs: 48 FHA-approved lenders offer EEM program loans; 4 PowerSaver Lenders; 8 non-FHA EE home equity loans and mortgages 23 EE-specific term loan providers	Secondary research and FI interviews	Increase the number of FIs offering EE-specific term loans and/or the number of FIs offering EEFPs
Loan volume of EEFPs	Volume of EE loans (deducting solar/renewable portion of loans)	Total: $218M PACE: $196M (90%) EE-specific term loans: $18M (8%) EEMs/HELOCS: $3M (2%)	Secondary research and FI interviews	Increase the EE-specific loan volume
Number of EEFP loans	Number of EE loans	Total: 10,681 loans PACE: 9,279 EE-specific term loans: 1,179 EEMs/HELOCs: 223	Secondary research and FI interviews	Increase the number of EE-specific term loans offered
Interest rates offered for EEFPs (minimum range)	Range of minimum interest rates offered for EE loans	PACE: 6.00%–8.00% EE-specific term loans: 4.99%–8.00% EEMs/HELOCs: 3.49–6.80%	Secondary research and FI interviews	Provide affordable interest rates for lower FICO borrowers
Loan terms offered for EEFPs (maximum range)	Range of maximum terms offered for EE loans	PACE: 240-300 months EE-specific term loans: 60-180 months EEMs/HELOCs: 360 months	Secondary research and FI interviews	Provide longer payback period for borrowers
Average loan amount	Average loan amount given	PACE: $21K EE-specific term loans: $15K EEMs/HELOCs: $15K	Secondary research and FI interviews	Increase in the average loan size, reflecting larger projects
Qualification criteria	Information lenders require to approve the loan	PACE: Sufficient equity/payment history EE-specific term loans: FICO score EEMs/HELOCs: D/I ratio, property value, FICO score, equity	Secondary research and FI interviews	Alter qualification criteria required for EE-specific term loans (e.g., consider payment history for customers who either do not have FICO scores or have low FICO scores)

Potential Metric/Data	Definition	2014 Baseline	Source	Where Pilots Could Make an Impact
Qualifying target market	Minimum FICO score required for loan approval	EE-specific term loans: Zero loans for FICO < 580; most EE-specific term loans require a FICO of at least 680 PACE/EEMs/HELOCs: Exact qualifying criteria unknown	Mystery borrower interviews, secondary research, and FI interviews	Increase EE-specific term loans to borrowers with lower credit scores (as low as 580)
% who qualify	The % who qualify for current EE-specific term loans based on FICO score requirements	EE-specific term loans: 79% of population has FICO of at least 680 and could qualify	FICO Score Analysis	Increase the % of customers who qualify for EE-specific term loans by lowering risk to lower-FICO-score borrowers
Payment mechanism	How customers pay back the loan	PACE: Property taxes EE-specific term loans: Direct to lender EEMs/HELOCs: Direct to lender	Secondary research and FI interviews	Alter loan payback mechanism (e.g., on-bill repayment through the EFLIC program)
Contractor awareness	Awareness of types of EE-specific financing	Any type: 26% unaided, 71% aided PACE: 24% EE-specific term loans: 34% EEMs/HELOCs: 26%	Contractor survey	Increase contractor awareness overall and of specific types of EE-specific financing
Contractor promotion	Percentage of contractors that promote EE-specific financing	Any type of EEFP: 15% PACE: 11% EE-specific term loans: 7% EEMs/HELOCs: 2%	Contractor survey	Increase contractor promotion overall and of specific types of EE-specific financing
Contractor barriers to promoting EEFPs	Percentage of contractors with any barriers to promoting EEFPs	85% have barriers 44% don't think customers need financing for EE upgrades 40% do not have capacity to do it 38% are not aware of available financing options	Contractor survey	Decrease barriers to contractors promoting EEFPs

Table 2. Demand-Side Baseline Market Metrics and Characterization Data [a]

Potential Metric/Data	Definition	2014 Baseline	Where Pilots could make an impact
Conventional financing awareness [b]	% of homeowners who know where to obtain a loan for energy-related upgrades	70%	Increase due to financing marketing
	% of low-income homeowners who know where to obtain a loan for energy-related upgrades	51%	
EEFP financing awareness	% of homeowners aware of any EEFPs	35%	Increase due to financing marketing
	% of homeowners aware of PACE	12%	Could also help overall increase due to financing marketing
	% of homeowners aware of EE Term Loans	1.1%	Could also help overall increase due to financing marketing
Current demand for energy-related home upgrades	% who made energy-related upgrades in the last 2 years (least conservative estimate)	36%	Increase over time
	% who made high-efficiency energy-related upgrades in the last 2 years (moderately conservative estimate)	24%	
	% who made energy-related upgrades in the last 2 years (most conservative estimate)	8%	
Customer demand/uptake for EEFPs [b]	% of homeowners who used any type of EEFP (amongst those who made an energy-related upgrade using the least conservative definition)	3.5%	Increase over time
	% of homeowners who used a PACE loan (amongst those who made an energy-related upgrade using the least conservative definition)	2.4%	Increase over time
	% of homeowners who used an EE Term Loan (amongst those who made an energy-related upgrade using the least conservative definition)	1.1%	Increase over time
Project size/depth [b]	% who made multiple energy-related upgrades in the last 2 years at the same time	9.0%	Increase in customers who do larger and more in-depth retrofits of their home that cost enough to justify financing
	% who upgraded (1) appliances, (2) envelope, and (3) central cooling, heating, and/or water heating	7.9%	
	% who upgraded (1) envelope and (2) central cooling, heating, and/or water heating	11.4%	

Potential Metric/Data	Definition	2014 Baseline	Where Pilots could make an impact
Project cost among those that make energy-related upgrades [b]	Average project cost among those who made an energy-related upgrade in the last 2 years	$14,220	Increase in project costs (demand) for larger projects within the market for energy-related upgrades
Use of financing among those who made an energy-related upgrade [b]	% of customers who used any type of financing for energy-related upgrades in the last 2 years	25%	Increase over time
Barriers for energy-related upgrades [b]	% of customers who considered making upgrades over the past 2 years but did not primarily due to the high upfront costs of the upgrades.	16%	Decrease barriers by offering reasonable interest rates to low-income customers and those with lower credit scores
	% of customers who find it difficult to obtain a loan (among general population homeowners) % of customers who find it difficult to obtain a loan (among low-income customers) % of customers who find it difficult to obtain a loan (among customers with FICO scores < 640)	41% 77% 57%	
	% of customers who find the interest rates available to them are too high (among general population homeowners) % of customers who find the interest rates are too high (among low-income customers) % of customers who find the interest rates are too high (among customers with FICO scores < 640)	62% 72% 69%	
	% of customers who perceive first-cost as a barrier	13%	
Future demand for energy-related upgrades [b]	% who are likely to make an energy-related upgrade in the next 2 years	44%	Increase over time
Future demand for financing energy-related upgrades [b]	% who are likely to make an energy-related upgrade in the next 2 years and to use financing to pay for it	27%	Increase over time

Potential Metric/Data	Definition	2014 Baseline	Where Pilots could make an impact
Median interest rates paid for EEFPs	Median interest rate customers are paying for EEFPs compared to relevant annual interest rate index	PACE: 6-7% EE-Term: 6.0% EEM/HELOC:4.5% Total: 5.5% 30-year average fixed rate mortgage: 4.17%[c]	Decrease interest rates paid and provide affordable interest rates for lower FICO borrowers
Average number of measures per project	Average number of energy-related measures per project	PACE: 3 EE-Term: 3 EEMs/HELOCs: 4	Increase the number of measures per project

[a] Source: General Population Homeowner Survey
[b] These metrics are all based on the least conservative definition of an energy-related upgrade that was used in the participant survey.
[c] Source: 2014 average of monthly fixed rate mortgage interest rates. Federal Home Loan Mortgage Corporation's (Freddie Mac) Weekly Primary Mortgage Market Survey (PMMS), Monthly Average Values

2. Structure of This Report

The 2014 Finance Residential Marketing Baseline Study has two Volumes. Volume I, contained in this document, provides a summary of the main findings and conclusions from the entire study. Volume II is in a separate document and contains the detailed methods, findings, and data collection instruments for each distinct data collection effort.

3. Study Purpose and Context

In September 2013, the California Public Utilities Commission (CPUC) adopted Decision 13-09-044 to pave the way for the Statewide Finance Pilots. The CPUC directed the state's Investor-Owned Utilities[2] (IOUs) to implement several pilot programs to finance energy efficiency (EE) projects in the residential and non-residential sectors, and test market incentives for attracting private capital through investment of limited ratepayer funds. The Decision described two key goals for the Finance Pilots:

1. "Stimulate deeper EE projects than previously achieved through traditional program approaches (e.g., audits, rebates, information)"; and
2. "Provide incentives to lenders to extend or improve credit terms for EE projects[3]".

The CPUC requested that the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) serve as the central administrator of the Pilots. As such, CAEATFA acts as the Pilots' California Hub for Energy Efficiency Financing (CHEEF). In July 2014, CAEATFA received expenditure and reimbursement authority for the funds necessary to carry out the Pilots. The two goals outlined in the Decision indicate that the Pilots intend to have an impact on both the customer demand for and uptake of EE projects and the supply of attractive financing options to fund EE projects. In support of these goals, this residential-focused study aims to:

- Characterize the use of financing to support residential EE upgrades, with a focus on financial products designed specifically to encourage investments in EE measures;
- Help stakeholders understand the current EE financing products (EEFPs) in the residential market prior to the implementation of the Pilots; and
- Identify potential market impacts that may be exerted by the residential Pilots after implementation.

The residential Pilots ("the Pilots") have a short-term goal of achieving energy savings and longer-term goals of increasing awareness of options, bringing down barriers, and leveraging private capital to supplement or substitute for incentive payments (or a combination of the two). They will also work directly with upstream and midstream market actors (financing institutions and contractors, respectively) to change the market structure and offerings by encouraging more market actors to enter the market place. Based on the Program Implementation Plan (PIP), "the primary goals of the residential Pilots are to increase the volume of EE financing to attract capital providers and attract new market participants, to increase the number and comprehensiveness of EE projects, to increase the rate at which contractors can close a sale of EE equipment, to reach low- and moderate–income (LMI) customers, and to support the new database that includes project and financial product performance".

This Finance Residential Market Baseline Study (referred to henceforth as the "study") is critical for measuring longer-term market changes that may occur, and for providing EE financing market information that may inform policy development and Pilot program design. Notably, all conclusions and implications presented in this study are based on the Evaluation Team's current understanding of the Pilots' design (i.e., prior to actual implementation).

[2] The IOUs include the Pacific Gas & Electric Company (PG&E), Southern California Edison (SCE), the Southern California Gas Company (SCG), and San Diego Gas & Electric (SDG&E).
[3] CPUC Decision 13-09-044, September 19, 2013. Page 3.

3.1 California's Residential Financing Pilots

Decision 13-09-044 called on CAEATFA and the IOUs to implement two residential financing Pilots for the single-family residential market.[4] The Decision outlined several Pilot goals. The evaluation team interprets the Decision language as establishing the following primary goals of the residential Pilots:

1. To increase the volume of energy efficiency (EE) financing to attract capital providers and attract new market participants;
2. To increase the number and comprehensiveness of EE projects; and
3. To reach LMI customers.

Secondarily, the Pilots also hope to increase the rate at which contractors can close a sale of EE equipment; and support a new database that includes project and financial product performance.

To this end, a statewide Pilot and a sub-pilot with limited geographical coverage are planned.[5]

- **The Residential Energy Efficiency Loan (REEL) Assistance Program:** The REEL Assistance Program offers a loan loss reserve (LLR) for enrolled lenders who offer loans of up to $50,000 to single-family residential customers (including residential buildings with 4 or less units, with a $50,000 loan per unit) to carry out EE upgrades. The LLR will cover 90% of capital losses resulting from Charge Offs on enrolled loans, which will help reduce lender risk and ideally lead to reduced capital costs for borrowers[6] and broader market coverage in the low- and moderate-income and low-FICO-score segments. At least 70% of the total loan for a given project must be used to pay for Eligible EE Measures (EEEMs) which correspond to the EEEM definitions used by IOU incentive/rebate programs in the corresponding service territory.

- **Energy Finance Line Item Charge (EFLIC) Program:** The EFLIC program is a sub-pilot of the REEL Assistance Program that will be implemented only in Pacific Gas & Electric Company's (PG&E) service area. It will allow loan payments to appear as an itemized charge on the utility bill and is designed to test whether including the loan payment as a line item charge has a positive effect on debt service performance.

The residential Pilots have a target of disbursing approximately one-third of the total credit enhancements to serve LMI single family residents. This is supported through two REEL Assistance Program design features[7]:

- The LLR for LMI borrowers will be set at 20% of the loan value, while it is set at just 11% for other borrowers (to provide a stronger risk mitigation tool for the LMI market).

[4] The Pilots define single family residential buildings as those that contain no more than four units. The Pilots also include a multi-family unit building financing program, but from a financing perspective this program is better considered in light of the non-residential market baseline.

[5] The Pilots were approved in 2013, but CAEATFA's funding to establish the CHEEF and prepare the Pilot regulations was only approved in July of 2014. At the time of writing, it is anticipated that the REEL Pilot will begin enrolling participants in Q4-2015.

[6] The REEL regulations state that interest rates on enrolled loans must not exceed 750 basis points over the US Government's 10-year treasury rate.

[7] California Code of Regulations Title 4 Business Regulations, Division 13. California Alternative Energy and Advanced Transportation Financing Authority. Regulations Implementing the Residential Energy Efficiency Loan Assistance Program. Effective September 8, 2015. <http://www.treasurer.ca.gov/caeatfa/cheef/reel/regulations/20150909/regulations.pdf>. Notably, these regulations are currently under review and program design features may change based on the review.

- Borrowers with FICO scores as low as 580 will be considered for loans under the Pilot. However, for applicants with FICO scores between 580 and 640 the lender must verify the borrower's income as part of the underwriting process.

The Pilots also include an important investment in contractor training and marketing outreach. Enrolled lenders will be responsible for developing their own origination processes. It remains unclear how many lenders will be enrolled and if they will employ contractor-based origination[8].

3.2 California's Residential EE Financing Market

Financing EE upgrades is not necessarily new as homeowners have for many years financed home renovations, including EE measures, through conventional term loans and home equity loans, or short term lending through credit cards. However, only in the last five years have we seen financing products developed specifically to encourage homeowners to invest in energy efficiency.

While the Pilots were not yet operating in 2014, several other EEFPs were available in the residential marketplace, supported by other private and public funding sources. These included the American Recovery and Reinvestment Act of 2009 (ARRA)-originated finance programs, other local and regional finance programs, and Property Assessed Clean Energy (PACE) programs.

Table 3 summarizes the residential EE finance programs that were in the operating or planning stages in 2014.[9] Beyond these programs, there is also a number of specialized EEFPs offered by private lenders, including EE term loans and home equity loans. Identifying and characterizing the full range of EEFPs available in California's residential market comprised a significant portion of this study's efforts.

When implemented, the Pilots will enter the market alongside these existing EEFPs and may in some cases compete with these existing offers. They may also increase the overall use of financing for EE upgrades by increasing awareness of the benefits of EE financing among homeowners, contractors, and lenders.

[8] Notably, the Pilots have enrolled one FI that will employ a contractor-based model.

[9] Note that this is the original classification based on the program implementation plans (PIPs) and information provided by the CPUC.

Table 3. Operating California Residential Energy Efficiency Finance Programs in 2014

Program Administrator	Finance Program Name	Total Loan Value
Local and Regional Finance Pilots/Programs		
IOU (PG&E)	GSFA Residential Energy Retrofit Program (previously California Homebuyers Fund)	$4,800,000 [b]
IOU (PG&E, SCE, and SCG)	emPower Central Coast	$417,591 [b]
IOU (SDG&E)	Contractor Marketing	N/A
Marin Energy Authority	On-Bill Repayment for Single Family [a]	N/A
Bay Area Regional Energy Network (BayREN)	Pay as You Save (City of Hayward)	N/A
Southern California Regional Energy Network (SoCalREN)	Energy Upside California Residential Loan Loss Reserve	$2,557,300 [b]
PACE Program		
Local/City Government	Home Energy Renovation Opportunity (HERO)	$268,000,000
Local/City Government	mPower	$19,500,000
Local/City Government	Palm Desert PACE program	Unknown
Local/City Government	Sonoma County Energy Independence Program (SCEIP)	$3,600,000
Local/City Government	CaliforniaFIRST	$6,870,000
Local/City Government	Clean Energy Sacramento	Unknown

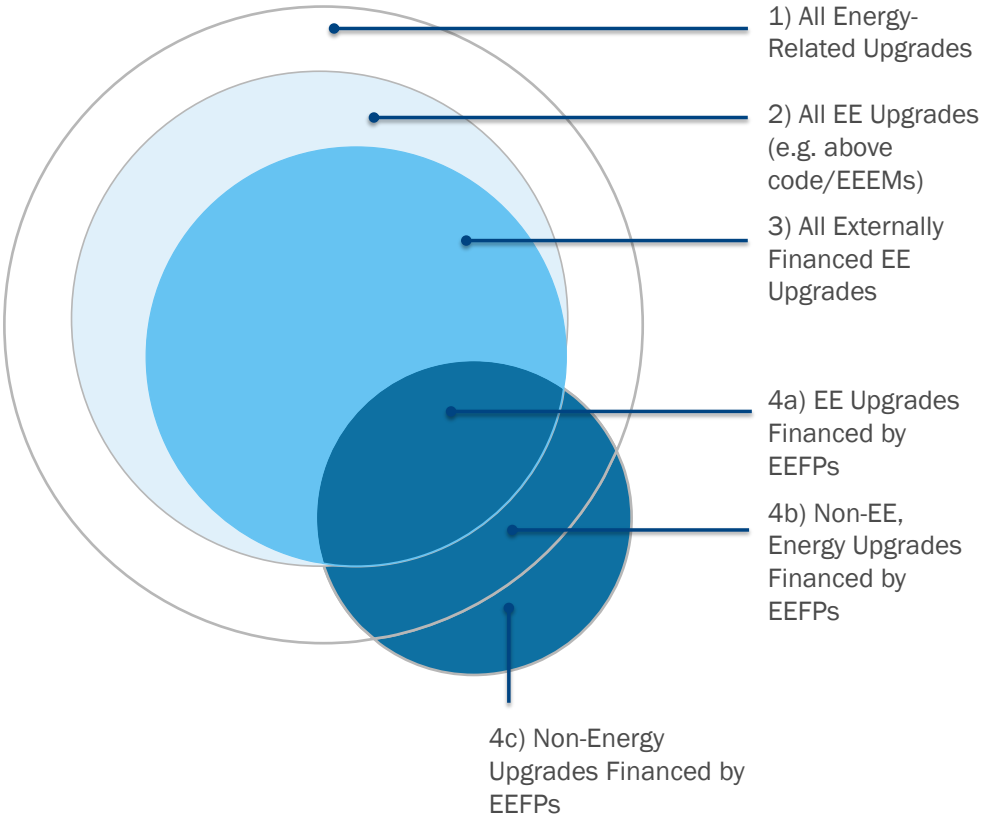
Note: Programs that facilitate marketing or program design do not contribute directly to loan volume and thus are shown as 'N/A'
[a] This program enrolled only one loan and as such was closed in Q4 2015.
[b] Total loan value is for the 2013-2014 program cycle.

3.3 EE Measure Definitions used in this Study

In support of California's state EE goals, the eligible EE measures (EEEM) for the REEL program correspond to the measures eligible for the IOU incentive/rebate programs, which exceed California's 2013 Building Energy Efficiency Standards. As part of this baseline market research, we have developed a picture of how EEFP lending fits within the broader energy upgrade and financing markets and how it may overlap with the Pilots' target market. By clarifying how these various energy upgrade subsets interrelate, we have established consistent language to connect findings among the various research tasks and to identify where the baseline EE projects and financing would be eligible for financing through the residential Pilots.

Figure 1 below shows the relative connection among the various energy upgrade and financing definitions. It is intended to present the logical interrelations among energy upgrade financing market definitions, but not to indicate the relative volume of activity in each subsector. Thus, the relative size of the circles does not represent an estimate of the relative size of each market segment.

Figure 1. Energy-Upgrade Financing Market Definitions



- **Energy-Related Upgrades:** Circle 1 represents that largest universe for EE lending, which includes all energy upgrades performed, regardless of whether they adhere to the Pilot Energy Efficiency Eligible Measures (EEEM) list or not. These energy-related upgrades can include replacing energy consuming or saving equipment (such as televisions and refrigerators, regardless of efficiency levels) as well as renewable energy equipment, such as rooftop solar PV arrays.

- **EE Upgrades:** Circle 2 represents the sub-set of energy upgrades that would be classified as energy efficiency upgrades under the Pilots and as found in the EEEM list (i.e., all EE upgrades that would meet the REEL Assistance program technical underwriting criteria)[10].

- **Externally-Financed EE Upgrades:** Circle 3 represents the portion of EE upgrades for which the homeowner used external financing (i.e., using financing other than cash on-hand). This includes the use of both conventional financing (such as retailer financing) and EEFPs (such as an energy-efficiency specific term loan from a bank).

- **All EEFP Volume**: Circle 4 captures the volume of EEFP lending in California for which this study estimates the overall volume, and lending conditions in 2014. Subset 4a captures EEFP lending that is directed to Pilot EEEMs, while subsets 4b and 4c represent EEFP lending for non-EE upgrades and non-energy upgrades respectively. Many EEFPs allow a portion of the financing to be used for non-

[10] The EEMs list can be found here: http://eeems.azurewebsites.net/

energy related or non-EE measures to allow customers to finance multi-faceted projects under one product.

Throughout this study, we have attempted to establish consistent definitions of the terms outlined above in order to relate the demand findings to the supply findings. Because the data sources for demand-side and supply-side information came from varying and multiple sources, consistent definitions are crucial to ensure that the information relates to each other to provide a full picture of the market. We use the term energy-related home upgrades to refer to the broadest definition of potential energy saving projects, regardless of whether they adhere to the Pilot EEEMs (i.e., Circle 1). We then use EE Upgrades to refer specifically to projects or measures that would be eligible for the financing through Pilots (i.e., Circle 2).

3.4 Purpose of this Study

This study serves as a market baseline that can be referenced in future efforts to help identify and measure the Pilots' impact on the residential EE financing market. It captures key market indicators, or metrics, from both the supply side (financial institutions [FIs] and contractors) and the demand side of the market for EE financing. The primary purpose of the study is to document the key demand and supply side metrics as defined in the 2013–2014 Evaluation, Measurement, and Verification (EM&V) Finance Roadmap related to EE financing for residential customers prior to the rollout of the Pilots. The metrics were developed based on the intended design and goals of the forthcoming Pilots. The baseline metrics are summarized in Table 4 below, and the specific results are summarized in Table 17 and Table 18 toward the end of this report.

Table 4. Supply Side and Demand Side Metrics Measured in this Study

Supply Side Metrics	Demand Side Metrics
Types of EEFP available	Customer awareness and uptake of EEFPs
EEFP loan volumes by type	Conventional and EEFP financing awareness
EEFP interest rates and terms	Demand for energy-related home upgrades
EEFP qualification criteria and target markets	Project size and depth of energy-related home upgrades
EEFP project sizes and EE requirements	Use of any kind of financing for energy-related home upgrades
Number of Lenders offering EEFPs	Barriers to energy-related home upgrades
Contractor awareness, promotion and barriers related to EEFPs	Future demand for energy-related home upgrades and future demand for financing energy-related home upgrades

It is anticipated that future studies will be conducted after the Pilots' launch and/or at end of the Pilots' program cycle (or at any future date after implementation) that will seek to measure changes in the metrics outlined herein. However, two possible trends may impact future attempts to measure changes in the metrics *vis-à-vis* the baseline values presented in this study.

- **The Pilots' implementation plans may change**: The Evaluation Team established and measured multiple demand and supply market characteristics that aligned with the forthcoming plan for the Pilots and their goals. However, it is possible that the Pilots may change their design or implementation strategies over the course of implementation. As such, it remains to be seen precisely how the Pilots will intervene in the market and what impact they can expect to have.

- **The market may change on its own:** It is likely that the residential EE financing market will evolve during the Pilot implementation period and that there will be changes in the market metrics that are not directly attributable to the Pilots' influence on the market themselves. This must be taken into account

when conducting follow-up research to this study, and methods will need to be developed to separate which changes in metrics are attributable to the Pilots and which are the result of other external market influences.

This study represents a baseline of EEFP use in California prior to the roll out of the Pilots and thereby offers important insights into the market that the Pilots are entering.

4. Methodology

This study includes results from a range of research tasks that combined secondary data review with semi-structured interviews and surveys. Table 5 summarizes the specific research tasks undertaken to conduct this residential baseline study. This is followed by a brief overview of the methodology applied to accomplish each task. A detailed description of each research task (including sample data collection instruments used) along with the comprehensive findings and collection instruments can be found in Volume II.

Table 5. Summary of Data Collection Tasks

Research Task	Number of Respondents	Target	Method	Timing
Supply-Side Baseline Efforts				
Review of secondary data	N/A	EEFPs	Online research	June–July 2014
FI interviews	28	FIs	Telephone interview	January–March 2015
Contractor interviews	156	Residential general and HVAC contractors	Telephone survey	January–February 2015
Mystery borrower interviews	153	FIs	Telephone interview	October–December 2014
Demand-Side Baseline Efforts				
Residential general population credit score analysis	N/A	Residential single-family homeowners	Database analysis	January 2015
Residential general population survey	1,298	Residential single-family homeowners	Telephone survey	February 2, 2015–March 22, 2015
Questions on existing residential surveys [a]	Pending	Residential program participants	Telephone survey	Pending

[a] The Evaluation Team is adding finance questions to other on-going surveys with residential IOU program participants. As such, the results are dependent on the timeline of the other studies.

4.1 Identifying EEFPs in California's Residential Market

The Evaluation Team conducted a secondary data review through online research to identify and document lending products available in California's market place that are specifically designed to finance energy efficiency and renewable energy upgrades. Our approach to preparing the EEFP list was to identify various channels through which EEFPs are developed and then to compile a comprehensive list of all EEFPs delivered through these channels, including federal, state, IOU, and municipal EE financing programs. We then looked at other products offered by the participating FIs and scanned for additional private lenders who may offer their own EEFPs such as banks and credit unions.

For the purposes of this study, we defined an EEFP as a lending product that included any one (or more) of the following criteria:

1. Require the inclusion of specified EE equipment within the financed work or project
2. Require the achievement of an energy savings threshold to be eligible for the financing offer
3. Include energy savings calculations in the financing product underwriting criteria

To identify available EEFPs, we first identified public institutions that are supporting rate-payer financing programs and then determined (where relevant) which private lenders delivered these publicly supported

EEFPs. We then scanned private lender (banks, credit unions and CDFIs) websites and marketing materials to identify any EEFPs that are offered by FIs outside of government programs.

We focused on identifying front-line EEFPs offered through financing vendors (consumer lenders) in the California market. The EEFP list was compiled from information available in public reports and through FI and program websites, and may not capture all EE financing offered into the market place, such as those products that are targeted directly to mid-stream actors (equipment vendors, contractors, etc.) or EE financing transactions in secondary markets (where loans or leases are repackaged and resold to investment banks and other specialized lenders). Further identification of EEFPs that may not be advertised or posted publicly was performed as part of the primary data collection with FIs and program administrators.

4.2 Financial Institution Interviews

After compiling a list of EEFPs, we then gathered top-down information from the publicly supported programs, which often covered lending from many FIs. We then contacted each FI that we identified as originating EEFP lending, both those within the publicly supported programs and those operating independently, as well as a selection of private lenders who did not appear to offer EEFPs (e.g., none advertised, not included in public programs).

The sample frame was established by identifying all private lenders (banks, credit unions, CDFIs) active in the California market, as well as any public institutions who originate residential EEFPs. Out of a sample frame of 213 active FIs, we completed interviews with 28, which often involved several telephone conversations followed-up with data requests.

4.3 Contractor Interviews

The Evaluation Team completed 156 interviews with contractors in the residential retrofit sector to gain a better understanding of EE financing awareness and use in the California market. The sample population for this study includes contractors listed by the Contractors State License Board with one or more of three license classes: “General Building,” “Warm Air Heating, Ventilation & Air-Conditioning,” and “Weatherization and Energy Conservation” (license designations B, C-20, and D-65, respectively). However, these licenses do not differentiate between contractors who are active in the residential and non-residential markets, and thus it was necessary to conduct an initial sampling process whereby we performed “mystery calls” to establish a subset of contractors who performed residential retrofits. We then drew from that sample-frame to conduct the detailed contractor interviews, and the 1,636-contractor sample obtained through our mystery call process became our sample for the full contractor survey. The total response rate was 11% and the cooperation rate was 17%.

4.4 Mystery Borrower Interviews

Evaluation team members (or the “mystery borrowers”) acted as homeowners wishing to complete home improvement projects, including EE upgrades. The mystery borrowers spoke with 153 FI representatives and asked for general loan offerings (such as home equity loans or lines of credit, unsecured loans, and credit cards), as well as any EE-specific loan offerings that were market-based or supported by taxpayer or ratepayer dollars. To capture the range of loan offerings available in the market, the mystery borrowers asked about different cost scenarios with different credit scores during the call. The team created a sample based on the active FIs in California, including banks (national, regional, and local) and credit unions, leveraging the information obtained through the review of the secondary data review task described above.

4.5 General Population Credit Score Analysis

Because only national credit score information was available, the Evaluation Team conducted an analysis of the credit scores of residential customers in California to understand the distribution of credit scores in the state. The Evaluation Team drew a sample of customers from the 2013–2014 program claimed savings database (Energy Upgrade California Home Upgrade [Home Upgrade] participants) and the 2013–2014 Consumer Information System (CIS) (IOU ratepayers). Specifically, we analyzed data for 5,846 customers who participated in the Home Upgrade program in 2014 across all IOUs and a representative sample from the CIS data during the same timeframe (n=5,993). We purchased the "Scorex Plus" score from Experian for the aforementioned samples based on zip+4 data.[11]

4.6 Homeowner General Population Survey

The Evaluation Team completed 1,298 interviews with single-family homeowners across California, proportionally stratified by IOU territory. The survey responses help capture a snapshot of the overall landscape for EE financing for homeowners in California prior to the rollout of the residential Pilots. The sample for this effort was drawn from the 2013–2014 CIS and did not include master-metered accounts. We called a total of 57,261 customers, via telephone with experienced interviewers between February 2, 2015 and March 22, 2015, to obtain the 1,298 completed interviews. The overall response rate for this survey was 4% and the overall cooperation rate was 13%. We also augmented the completed surveys with the "Scorex Plus" score based on zip+4 data.

[11] The data are appended at the zip+4 level and are thus an approximate score for the block rather than for each individual customer. The "Scorex Plus" score is a proxy credit rating score estimated by Experian. For more information, refer to https://www.experian.com/products/scorex_plus.html.

5. Market Baseline Findings

This study focused on the use of EEFPs to support energy-related upgrades within California's single-family residential market. Our research into residential financing products revealed that EEFPs can be broadly classified into three general categories depending largely on the security backing the loans:

1. **Home equity loans (mortgages and lines of credit):** These can be either second mortgages or first mortgages that incorporate energy-efficient upgrade costs in the overall mortgage value. The most prominent of these are the FHA PowerSaver and Energy Efficiency Mortgage (EEM) programs that guarantee private lender EEMs.

2. **Term loans:** These tend to be shorter term loans that can either be secured against the financed equipment itself or not secured. Term loan lenders typically underwrite their loans based on the borrower's credit worthiness, often expressed through their FICO score, as well as other indicators such as the debt to income ratio. Our research revealed little impact on minimum interest rates and maximum term lengths between secured or unsecured term loan products.

3. **Property Assessed Clean Energy (PACE) loans:** PACE loans are offered by municipalities and counties or through a third party provider working under agreement with the local government. Customers repay residential PACE loans through a tax assessment on the property, which exercises a lien on the property along with the existing mortgage (if there is one).

In the discussion that follows we apply these three EEFP definitions consistently and gather the combined findings from the market baseline research tasks, tying together important market trends and observations.

5.1 Definitions of EE upgrades are not consistent among EEFPs

The definition of an EE measure or project varies significantly among EEFPs. Moreover, not all EEFP volume represents projects or measures that would be eligible for Pilot program financing. Our research found that:

- **Conventional financing products do not currently track lending for EE measures:** The FI interviews did not identify any lender who tracked project characteristics for conventional loans.

- **Many EEFPs do not have strict, or even well-defined definitions of EE measures:** Many of the EEFPs do not publish clear technical underwriting requirements and, when interviewed, the FI representatives were not always able to demonstrate that clear and consistent standards for EE measures and performance were being applied when underwriting EE loans.

- **There is a significant portion of EEFP lending that is directed to upgrades that would not qualify as EEEMs under the Pilots:** For example, during the FI interviews, one bank indicated that for a loan to qualify for their EEFP just 50% + $1 of the loan value must be for the EE measures. Even publicly supported programs do not always apply EE measure definitions that adhere to the State's EE targets. For example, PACE programs (such as HERO) will typically finance equipment that provide energy savings relative to the host building's current performance, regardless as to whether the measure fits with the state's applicable EEEM lists

Homeowners, lenders, and contractors had difficulty answering survey questions with any further granularity than the broadest definition of energy-related home upgrades. Homeowners in particular do not typically have the technical knowledge required to self-report with certainty that measures they purchased in the last two

years were above California's 2013 Building Energy Efficiency Standards. Further, this study did not have the capacity to visit a representative sample of homeowners and confirm that measures meet California' energy efficiency requirements.

To address this challenge in the General Population Survey of Homeowners, we attempted three different ways to ask customers about their projects to determine the potential level of energy efficiency.

- We first asked homeowners whether they had any major energy equipment purchases or upgrades in the last 2 years, including added square footage, building envelope, renewables, heating, cooling, and major household appliances.
- We then asked if customer paid more for a more efficient measure than a standard option giving a moderately conservative estimate.
- Finally, we asked if customers received a rebate for the measures which provides the most conservative estimate. This likely corresponds to projects that include Pilots EEEMs, and thus we assumed that these projects are represented under the Pilots.

Table 6 below shows the breakdown of energy-related and EE upgrades reported by California homeowners over the past two years. These results suggest that at least 22% (105/464) of energy-related projects include EEEMs and would likely be eligible for Pilot financing. We chose the least conservative definition for this baseline report given that customers can use a portion of the Pilot financing for non-energy efficiency home improvements.

Table 6. Proportion of Homeowners who did an Energy Project with Multiple Definitions

Energy Efficiency Project Definition	Percentage of homeowners over last 2 years who did a project as defined (n=1,298)
Energy-related upgrade projects [a] (least conservative estimate)	36% (n=464)
High-efficiency energy-related upgrade projects [b] (moderately conservative estimate)	24% (n=317)
EE upgrade projects [c] (most conservative estimate)	8% (n=105)

[a] Any energy-related upgrade captured through the survey.
[b] Energy-related upgrade for which customers say that they paid more for a more-efficient measure than the standard option.
[c] Energy-related home improvement for which customers say that they received a rebate for the project, indicating that it was likely above energy code and would likely meet the Pilot EEEM criteria.

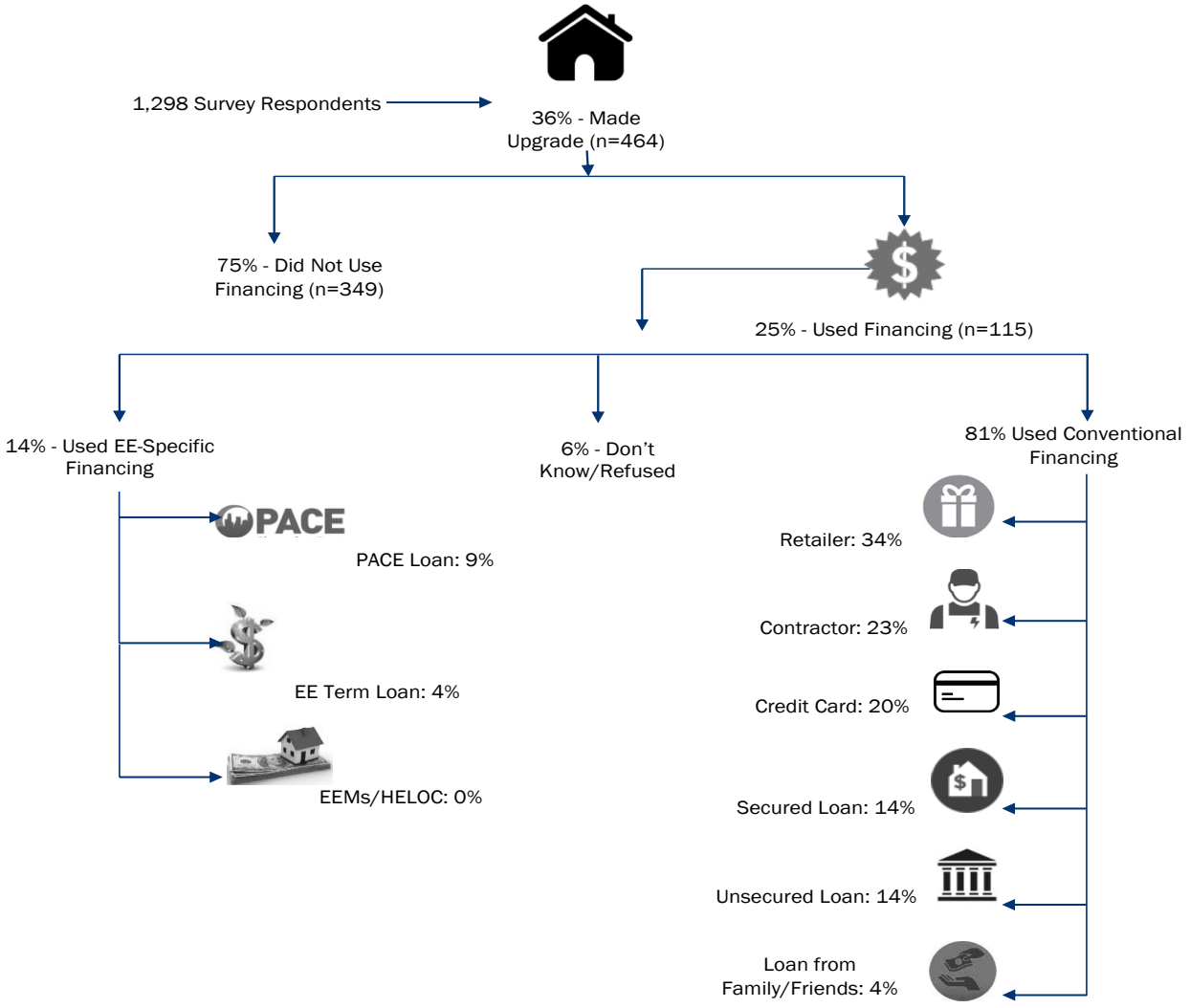
5.2 EEFPs represent a small fraction of how homeowners pay for energy-related home upgrades

Through the general population survey of California homeowners, we found that over the last two years 36% of respondents reported making an energy-related upgrade, a quarter of which used financing to pay for a portion or all of the project.

There are many financing options available to California residential customers to fund home improvements. Figure 2 below provides an overview of California homeowners' reported use and sources of financing for

energy-related projects (notably, the figure shows the least conservative estimate as presented in Table 6 above). Among homeowners who reported using financing to fund an energy-related upgrade, a vast majority (over 80%) used conventional (non-EE-specific) financing, such as loans offered through retailers, contractors, and credit cards, while just 14% used an EEFP. Thus, the use of EEFPs represented just 1% of homeowners in general and a little over 3% of homeowners who performed an energy related upgrade.

Figure 2. Breakdown of Financing Use among Homeowners Who Made an Energy-Related Upgrade (Based on Least Conservative Estimate of % Who Made Energy-Related Upgrades)



In general, regardless of the financing used, homeowners reported using financing to support an average of three upgrades, and three-quarters of homeowners who used any type of financing reported that it allowed them to do a larger upgrade (i.e., higher project costs) or purchase higher quality equipment than what they would have if they had used cash on hand. However, homeowners who used EEFPs spent over 50% more on their energy-related upgrade projects than those who used conventional financing (see Table 7 below). While we cannot test for causality, through analyzing the self-reported cost of energy-related upgrades (see Table 7

below) we find evidence that suggests that homeowners who use an EEFP are more likely to undertake a larger project than those who use conventional financing.

Table 7. Average Reported Cost for Energy-Related Upgrades

Project Type	Average Cost for Project
All Energy-Related Upgrades (with and without financing)	$14,220
Non-Financed Energy-Related Upgrades	$13,816
Financed Energy-Related Upgrades	$17,873
Using EEFPs	$25,714
Using Conventional Financing	$16,599

However, it is noted that the homeowner self-reported EEFP average loan size is larger than was reported by the lenders ($20,000 average as presented in Table 9 below). Considering that solar PV loans were removed from the FI reported loan volumes (# and $ values) this discrepancy may show the impact of solar PV projects to push EE loans to larger values. Overall, this does not contradict the finding that EEFP financed projects appear to be of a larger average value than energy-related upgrades financed through conventional products.

Table 8 below presents the portion of homeowners surveyed who used conventional financing or an EFFP for a variety of specific energy-related measures. Our findings indicate that a high portion of homeowners who used an EEFP invested in larger (or "big ticket") energy saving measures such as solar PV, weatherization, window replacement, central cooling and heating systems. On the other hand, conventional financing included higher rates of use for water heaters and appliances. This further supports the finding that EEFPs are in general used for larger projects, even if they do not necessarily encompass a greater number of measures.

Table 8. Measures Financed Using EEFPs and Conventional Loans (multiple response)

Upgrade Types	Used Financing (n=115)	
	EE-Specific Financing (14%)	Conventional Financing (81%)
Renewable Energy Sources	47%	27%
Weatherization	47%	35%
Refrigerator/Freezer	47%	41%
Heating System	47%	31%
Central Cooling System	40%	28%
Windows	40%	29%
Water Heater	13%	40%[a]
Washing Machine/Dryer/Dishwasher	7%	59%[a]

Note: The base used for all calculation is homeowners and given that homeowners could have gotten multiple upgrades, the totals for the types of financing used does not add up to 100%.
[a] Indicates statistically different percentage at 90/10 confidence

EEFPs clearly make up a small portion of the EE upgrade financing market and an even smaller portion of the energy-related upgrade financing market, which suggests that there may be room for the Pilots to grow the use of financing for EE-upgrades. However, other factors such as the need, awareness, and interest in EEFPs among homeowners considering upgrade projects, which are discussed in the following sections, will ultimately impact the potential market for EEFPs.

5.3 Conventional Lending and Self-Financing Support the Vast Majority of Energy-Related Upgrades

Amongst the 36% of homeowners who purchased an energy-related upgrade in the last two years, the vast majority (75%) did not use any form of external financing. Only 25% of customers used external financing at all and even fewer (20%) used conventional financing.

The mystery borrower results indicate that conventional loans (term loans and HELOCs) may carry higher interest rates, and be largely unattainable for less creditworthy customers, which may explain the low rate of reported use (20%) of conventional financing in general for energy-related upgrades. It is also possible that many energy-related projects are self-financed, because they are small and/or require urgent payment (i.e., emergency equipment replacement).

Tracking EE lending through conventional lending products is challenging via supply-side sources. Our study revealed that little or no information on the use of conventional financing products for EE improvements was available through lenders. This is due to the nature of residential lending underwriting practices that focus almost exclusively on the borrower's credit-worthiness, with little or no information required on the intended use of the loan beyond the high-level categories of home improvement, consumer loan, or automobile loans.

However, the homeowner survey results suggest that the conventional financing market for energy-related upgrades is likely four times greater than the 2014 EEFP loan volume[12] resulting in an estimated $850M-$1B of energy-related upgrades being support by conventional financing in 2014.

Homeowners have a variety of conventional financing options from which to choose. Commonly used conventional financing products that can be used to support residential improvements include (we provide some details here but more comprehensive findings can be found in Volume II):

- **Credit cards:** Customers can finance energy-related upgrades through numerous credit card options with varying credit limits and interest rates. Interest rates paid are entirely dependent on how long the customer carries the credit card debt. There are also a number of home improvement-specific credit cards such as Wells Fargo's Home Projects® Visa® Credit Card Program which offers a credit card specifically for home improvement projects.

- **Term loans (secured or not):** Terms loans (including consumer loans) are available to customers for a variety of purposes and some homeowners choose to use these to fund energy-related upgrades. Homeowners we surveyed who used conventional term loans to finance their projects mentioned paying average interest rates ranging from 4.5% to 5.5%. However, interest rates offered to homeowners from lenders throughout CA show a wide variety of options available. Mystery borrower calls to lenders revealed that lenders offer conventional term loans to customers for home improvement projects with average interest rates ranging from 5.18% to 16.54% depending on FICO scores, loan amount and security type (see Figure 3).

[12] Estimated conventional loan volume for energy-related upgrades in 2014 is based on residential homeowners' self-report of 81% using conventional financing, while 14% reporting dedicated EE financing. This would indicate that conventional financing volume is roughly 6 times the size of EEFP loan volume. However, Table 7 shows average financed value of $25,714 for dedicated EEFP financed projects but a lower average amount, $16,599, for conventional financed projects. Accounting for the reduced average loan size of conventional financing, we estimate the overall ratio for total dollar volume for conventional financing of about 4 to 1. Given the limited size of the homeowner survey, and uncertainty over the respondents' use and understanding of the concepts of "energy efficient" and "financing", it is our opinion that there is a great deal of uncertainty to this result. This may warrant further demand side study to establish a more precise estimate of the volume of EE improvements supported through conventional financing product.

- **HELOCs (not energy efficiency specific):** Home equity lines of credit are available to homeowners for a variety of purposes some homeowners choose to use these to fund energy-related upgrades. Information collected through the Mystery Borrower effort shows that customers are able to get HELOCs at a median interest rate of 3.8% - 6.5% depending on FICO scores.

- **Retailer offerings:** Major retailers such as Sears and Best Buy offer financing options for energy-related products such as major home appliances. For example, Best Buy offers a credit card that allows customers to purchase major appliances amounting to $599 or more and allows customers to repay the loan interest-free for 18 months. In addition, Homeowners who used retailer financing mentioned having received a median rate of 7.5% for an average loan term of 27 months.

Homeowners also mentioned lending from contractors and personal loans from family/friends. We include these data points in our estimate of conventional lending above but do not think they accurately fit the definition of conventional lending products.[13]

5.4 The Pilots are entering an EEFP market dominated by PACE

While EEFPs themselves may make up a small portion of the energy-related upgrade financing market, within the EEFP market itself, PACE is by far the most successful product. Table 9 shows the three types of EEFPs currently active in California's residential market, along with their performance and loan characteristics that were gathered through interviews with financial institutions (FIs), and a review of secondary data.

From this research, a few key findings emerge:

- Among the three types of EEFPs, PACE dominates the market accounting for 90% of EEFP loan volume[14] in 2014. PACE models, which often includes vendor-driven origination and marketing, have been shown to be successful compared to many competing EEFPs that rely on marketing and origination at bank and credit union branches, which tend to see much lower loan volumes[15].

- The volume of EE-specific term loans is low compared to the volume of PACE lending, accounting for only 8% of EEFP lending volume. Moreover, the vast majority of EE-specific term loans is delivered by credit unions, with banks generally doing very little with this type of product.

- EE home equity loans (EE mortgages and HELOCs) represent the smallest fraction of the EEFP market, accounting for only 2% of EEFP loans. EE Mortgages and HELOCs have not gained much traction in the market in comparison to PACE and term loans, despite the large number of FIs registered with the FHA to offer PowerSaver and EEM loans.[16] This indicates that the market opportunity for these loans is limited (perhaps due to qualification criteria), the loans lack sufficient marketing support, or the current design characteristics of these loans are not attractive to customers.

[13] Homeowners mentioned getting financing through a contractor but surveys with contractors showed that none of them directly offer a financing product and instead help promote or sell other financing products such as PACE. Some contractors also offer payment plans to help customers afford the total cost. Customer may perceive these options as financing through a contractor but it may not be technically accurate.
[14] Totals excluding lending for Solar PV.
[15] Notably, the Financial Institution currently signed up for the REEL Pilot will offer a vendor-driven origination and marketing model.
[16] 60 FIs are registered with the FHA to deliver PowerSaver loans in California.

Table 9. 2014 EE Financing Market Baseline Characteristics

	Category	PACE	EE-Specific Term Loans	EEMs/HELOCs	Total EE Financing Market Size
Product Performance	Loan volume	$196M (90%)	$18M (8%)	$3M (2%)	$218M
	Number of loans	9,279	1,179	223	10,681
	Average loan amount	$21K	$15K	$15K	$20K
	Median interest rate customers are paying	6.0-7.0%	6.0%	4.5%	5.5%
	Average number of measures per project	3	3	4	3
	Top two most common measures	Weatherization and renewable energy sources	Central cooling/ heating and refrigerators/ freezers	Unknown	Weatherization and renewable energy sources
Product Design	Number of FIs offering loan type	10	23 (primarily credit unions)	60 (primarily FHA PowerSaver and private lender supported)	
	Range of minimum interest rates offered	6.00%–8.00%	4.99%–8.00%	3.49%–6.80%	
	Security type	Priority lien leading to Tax Impact	Equipment/ unsecured	Mortgage lien	
	Underwriting requirements	Equity/ability to pay	Creditworthy/ FICO score	Equity/ability to pay	
	Qualification criteria	Sufficient equity/ payment history	FICO score/ability to pay	D/I ratio, property value, FICO score, equity	
	Payment mechanism	Property taxes	Direct to lender	Direct to lender	

- EEFPs do not appear to carry a significantly different risk profile for lenders when compared to conventional financing. Our results indicate that borrower credit worthiness and loan security drive the lenders' perceived risk, rather than the nature of the energy-related projects. Lenders typically translate higher risk financing into higher interest rates and shorter lending terms. Comparison of EEFP interest rates and conventional lending product interest rates shows little evidence that EE lending is offered at significantly different (preferential or detrimental) rates compared to conventional financing. One bank did offer reduced fees and a 0.5% reduction for its EE loan interest rates, but this was explained as a marketing strategy.
- While PACE offers the lowest risk lending among EEFPs, attributable to the priority tax lien's security, it does not translate into PACE being the lowest interest rate product. Moreover, despite carrying higher interest rates compared to home equity loans, PACE loans still exhibit drastically higher uptake than the other EEFPs.

5.5 Only a portion of Contractors directly promote EE financing

There are approximately 55,000 contractors who hold an active General Contractor (Class B) and/or HVAC (Class C-20) licenses in California and perform work on residential properties. Our study reveals that of these contractors most are aware of EEFPs available to their customers, but few are aware of the EEFPs that contractors can promote and offer directly to their customers. Based on the survey results in Table 10 and Table 11, it can be seen that the key factors that appear to influence contractor promotion of EE financing are:

- **Awareness of financing options:** One in four contractors has heard of EE-specific financing available in general for residential customers (unaided); however, when probed with specific options, three in four contractors say that they are aware of at least one specific type of EE financing. Table 10 shows that contractors are most commonly aware of equipment leases for energy-saving equipment and yet least aware of PACE loans.

Table 10. Contractor Awareness of EEFPs (Aided Response)

"Which of the following energy efficiency-related financing products have you heard of?"	Percent of Contractors (n=156)		
	Yes	No	Don't Know
Equipment leases for energy-saving equipment	42%	56%	2%
Local credit union or bank EE loans (EE-specific term loans)	34%	66%	1%
Green mortgages/PowerSaver loans (EEMs/HELOCs)	33%	66%	1%
PACE loans	24%	76%	0%

Note: Data weighted by contractor type and size.

- **Contractor size and marketing capacity:** Of the contractors who do promote financing to their customers, the vast majority are medium and large sized contractors (see Table 11) likely because they have better developed sales and marketing capacities. For instance, one contractor mentioned that they are "*a small company and the financing aspects of it get too complicated*". Another mentioned they do not promote financing "*because [they are] pretty much a one horse contractor*." However, it should be noted that the large contractors are also three times more likely than small contractors to offer solar PV equipment financing, which may contribute to their higher rates of financing promotion.

Table 11. Promotion of EEFPs by Contractor Size (Unweighted)

Characteristic	Small Contractors (n=45) (annual revenue of less than $100K) A	Medium Contractors (n=64) (annual revenue between $100K and $500K) B	Large Contractors (n=47) (annual revenue of $500K or more) C
Estimated population frequency distribution (N=55,000)[a]	29%	41%	30%
% aware of EE-specific financing options	49%	59%	79% **AB**
% who promote EE-specific financing	2%	9%	15% **A**
% who install solar services	11%	17%	30% **A**

Note: Capitalized letters in each column indicate data is significantly larger at 90/10 confidence than data in other labeled column(s).
[a] Population distribution of annual revenue and employee size estimated from survey sample respondents.

- **Availability of vendor financing:** In the residential market, equipment leases are most commonly applied to water heaters (through utility lease programs) or to solar PV equipment, which lies outside of this study's focus on EE financing. Currently the only dedicated EE vendor financing option with significant volume for California contractors are the PACE programs,[17] many of which focus on vendor driven sales channels (most notably HERO). Thus, while only 24% of contractors are aware of PACE programs, 79% of contractors who promote EEFPs are promoting PACE (see Table 12).

- **More contractors promote PACE than any other EEFP available:** One in ten contractors (11%) are promoting PACE financing (see Table 12). Amongst the few contractors promoting any type of EEFP, the majority of them are promoting PACE. PACE appears to dominate amongst contractors as it does in total EEFP loan volume.

Table 12. EE Financing Options Promoted by Contractors

EEFP Types that Contractors Are Promoting	Percentage of Contractors (multiple response, n=156)	Percentage of EEFP-Promoting Contractors (multiple response, n=14)
	Weighted by type and size	Unweighted
None	85%	N/A
PACE	11%	79%
EE Term loans	3%	36%
EEMs/HELOCs	2%	7%

Note: We based these data on open-ended responses to survey questions, our background knowledge on financial products, and reviews of contractor and financial product websites.

Adding further support to these trends are the barriers identified among 85% of contractors surveyed who do not report promoting EEFPs (see Table 13 for detail on barriers by contractor size):

- **Perceived lack of customer need for financing:** A significant portion of contractors surveyed (44%) do not think their customers generally need financing for energy efficiency upgrades. Even among only those who are aware of PACE or HERO (n=29), 41% are unsure of how useful PACE is to customers, and another third (31%) believe that it is not particularly useful to customers. However, interestingly

[17] Our research revealed some emerging EE vendor financing products in California's residential market, but these have yet to see any measurable uptake at the time of writing.

amongst homeowners who used financing for energy-related upgrades in the last 2 years, three quarters of them said that financing allowed them undertake measures that they would not have been able to carry out otherwise. Therefore, customers may have a need for financing to help fund or expand projects with contractors, but contractors may be unaware of this if they are not involved in how customers gather the funding to pay contractors.

- **Perceived lack of capacity among contractors to promote financing:** 40% of contractors reported that that they had limited capacity to promote financing.
- **Lack of awareness of financing options available:** Finally, a slightly smaller portion of contractors indicate that they are not sufficiently aware of financing options available (38%).
- **Some contractors are not interested in promoting financing:** One in seven contractors indicated that they are not interested in promoting financing to their customers, largely because they do not believe they should be involved in how a customer chooses to fund projects. One contractor articulated that "paying for the job is the customer responsibility, customers come to me when they already have the money to pay for it".

Table 13. Barriers to Promoting EE Financing by Contractor Size (Unweighted)

Question Type	Barriers	Small Contractors (n=45) (annual revenue of less than $100K) A	Medium Contractors (n=64) (annual revenue between $100K and $500K) B	Large Contractors (n=47) (annual revenue of $500K or more) C	All Contractors (n=156) (weighted by type and size)
		Multiple Response			
Faces at least one of the barriers below		**98% BC**	**89%**	**80%**	**85%**
Aided	Your company does not think your customers generally need financing for energy efficiency upgrades	27%	33%	48% A	44%
Aided	Your company does not have the capacity to promote financing to your customers	49%	47%	33%	40%
Aided	Your company is not aware of any energy efficiency financing options that can help your customers	40%	44%	32%	35%
Unaided	Lack of interest in promoting financing	24%	23%	15%	15%
Did not mention any barriers (aided or unaided)		**2%**	**9% A**	**15% A**	**15%**

Note: Capitalized letters in each column indicate data is significantly larger at 90/10 confidence than data in other labeled column(s). Percentages by contractor size are not weighted.

The majority of contractors that currently promote EEFPs are very active. As shown in Table 14, two-thirds of them actively promote EEFPs on their websites and a little over half of them always mention EEFPs when selling to prospective customers.

Table 14. How Contractors Are Promoting Financing

Question	Percentage of Those That Promote EE-Specific Financing (n=14) (unweighted)
"Does your company include [EE] finance options in any of its marketing materials or on its website?"	
Yes	64%
No	36%
"How often do you mention financing options to your customers when selling an energy efficiency project?"	
Always	57%
Frequently – More than half the time	29%
Occasionally – Less than half the time	7%
Never	7%

5.6 Increased EEFP availability could bring substantial opportunities

In general, it appears that awareness of EEFPs remains low in the market, which may contribute to the minimal use of many of these financing options. Our homeowner survey found that just one in three homeowners is aware of some form of EE-specific financing (aided survey response) and only one in ten is currently aware of PACE (aided survey response), the highest-volume EEFP currently in the marketplace.

The opportunity for financing to help fund and grow energy-related projects in the near future is significant. Four in ten homeowners said that they are likely to make an energy-related upgrade in the next two years, and 27% are at least somewhat likely to use financing, which is similar to the portion of homeowners who reported using financing for energy-related upgrades in the past two years (25%). These results do not appear to provide any substantial evidence that the market for financed EE upgrades will contract in the coming year.[18]

[18] While the portion of homeowners with the intention of performing an energy-related upgrade in the next two years (44%) is somewhat higher than the portion who did perform an energy related upgrade (36%), we do not believe that this represents a large enough spread to indicate a true growth in the market, as future intentions include a significant portion who are only "somewhat" likely to carry out the project.

Table 15. Homeowner Intentions for Financing Future Energy Related Upgrades

Likelihood of making an energy-related upgrade in the next two years	Statement best describing using financing to fund a home project (n=1,298)			
	I might take out a loan to fund a home project if interest rates and terms were favorable	I would only take out a loan if it was an emergency to fund a home project	I would never take out a loan under any circumstances to fund a home project	Don't Know/ Refused
Very likely	9%	3%	2%	0%
Somewhat likely	18%	9%	3%	0%
Not at all likely	20%	18%	15%	1%
Don't know/Refused	1%	0%	1%	0%

Note: The green and gray cells show the customers that are very or somewhat likely to make an energy-related home upgrade in the next two years.
The green-only cells show the customers that are very or somewhat likely to make an energy-related home upgrades in the next two years and likely to use financing for those upgrades.

The surveys provided further evidence that the high-upfront cost of energy-related upgrades is an important barrier for many homeowners[19]. For example:

- About half of all homeowners surveyed (54%) agreed that the higher upfront costs is why they might not buy a high-efficiency item.
- Among homeowners who did not complete any energy related upgrade in the past two years, one in six homeowners (16%) considered making an energy-related upgrades but did not primarily due to the high upfront costs of the upgrades.

Moreover, our results indicate that increased awareness of and access to EE financing may help overcome these barriers for some customers. For example:

- Over half of California homeowners surveyed reported that they strongly or somewhat agreed that cost is why they might not buy a high efficiency item, and a third of these (13% of the total sample) stated that a loan could help overcome the high upfront costs of an energy efficient product.
- Furthermore, one in ten customers who made an energy-related upgrade in the last two years said that they would have made more upgrades with financing.

However, simply increasing awareness of financing may not be sufficient to move the market. Specific barriers exist that likely hinder homeowner access to available financing.

[19] Notably, upfront cost seems to be a larger barrier than lacking the information needed to make a decision (40%), getting cooperation from others in the household (25%), time (i.e., too busy – 18%) (based on survey questions asking about each of these being a barrier).

- About two-thirds of the homeowners (62%) felt that the interest rates available to them through the market are too high[20]. This percentage increases for low-income homeowners (72%) and for low-FICO-score customers (69% with FICO below 640).
- About 41% of homeowners feel that it would be difficult to obtain a loan. This percentage increases drastically within the low-income and low-FICO-score homeowner populations (77% and 57%, respectively). Further supporting this, during the Mystery Borrower survey, a third of low-income home owners reported being rejected from a loan program, and prospective borrowers with poor credits scores (FICO 580) did not qualify for bank and credit union EEFPs (term loans and home equity loans).

Homeowners with lower income levels have a specific need for financing at affordable interest rates. While higher income homeowners are most likely to make upgrades (50%) and use financing for those upgrades (34%), a significant proportion of LMI homeowners are intending to make upgrades in the future and use financing to do it (see Table 16).

Table 16. Opportunity for Upgrades and Financing among Underserved Markets

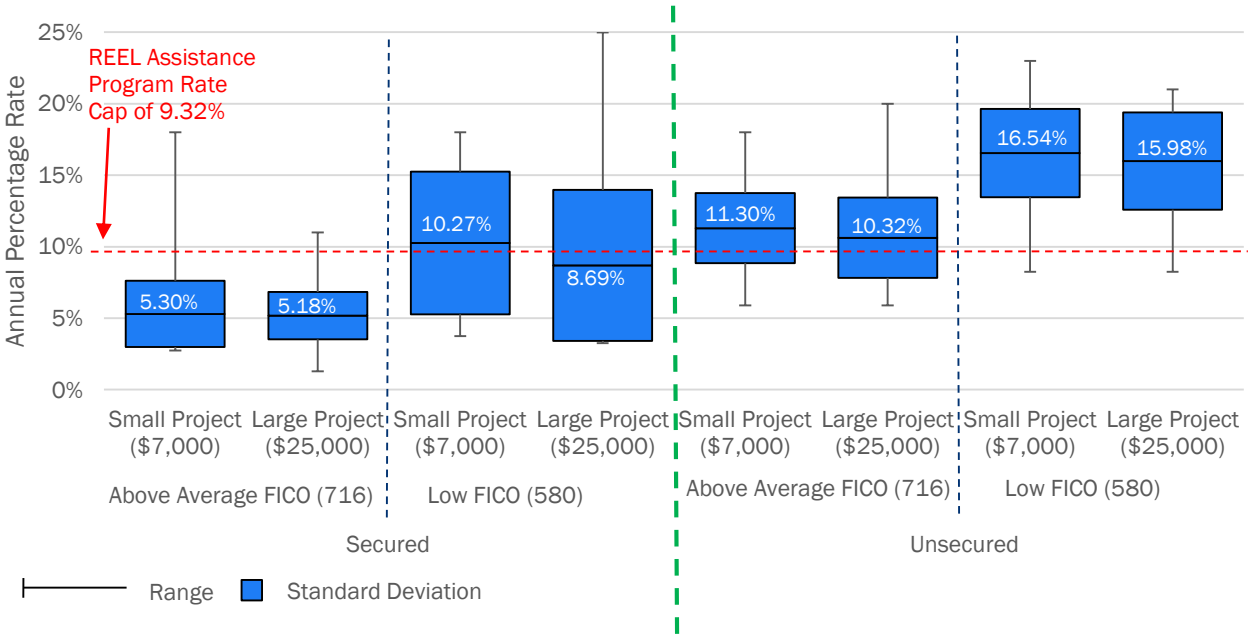
	Low (Based on household size and income level) A	Moderate (Income from $30K to $100K) B	High (Income> $100K) C	Don't Know / Refused
Estimated % of population (n=1,298)	17% (n=217)	31% (n=399)	27% (n=356)	25% (n=326)
Percentages within the Income Categories that are likely to make upgrades and use financing				
% likely to make energy-related upgrades in the next two years	42%	44%	50% AB	38%
% likely to make an energy-related upgrades and use financing	22%	26%	34% AB	24%

Note: Capitalized letters in each column indicate data is significantly larger at 90/10 confidence than data in other labeled column(s).

The Mystery Borrower survey sought to identify the interest rates that homeowners are offered in the market place, depending on the size of the project to be financed and the borrower's creditworthiness, as measured by their FICO score (see results in Figure 3 below).

[20] We looked to see whether any differences existed between customers who made an upgrade and used financing, made an upgrade and did not use financing, and did not make any upgrades. We did not find any significant difference in the response to the interest rates being too high. We also looked for differences between those who were aware of any sort of financing versus those who were not and again we did not find any significant differences.

Figure 3. Mystery Borrower Results



- Considering that the REEL program will offer financing at rates no higher than 750 basis points over the 10-year US government treasury rate, it appears that the REEL program presents a solution to overcome homeowners' reluctance to borrow due to high rates. Overall the REEL program rates are lower than market rates, especially for low-FICO-score borrowers and smaller projects.

- The Mystery Borrower research also found that among the few EEFPs that were offered by banks and credit unions[21], when called at random, customers with low-FICO-scores generally did not qualify for the loans. The credit score analysis indicated that 11% of IOU customers had "poor" or "not good" credit ratings, and therefore would not likely be able to find financing for their energy-related upgrades from banks and credit unions.

Our findings do not indicate that there will be a contraction in the demand for energy-related upgrades in the next two years (as compared with the last two years). Moreover, there may be opportunities within this market to encourage homeowners to embark on new and larger EE upgrades by offering financing at affordable interest rates.

[21] Very few were offered by the loan officers contacted without the caller prompting for a specific EE lending option.

6. Summary of Conclusions and Implications for the Residential Pilots

The Pilots are intended to offer financing that can encourage homeowners to make EE upgrades that are larger or that they would not have carried out otherwise. For the Pilots to meet this objective, they will need to appeal to market segments that are being underserved by existing EEFPs as well as conventional financing offers. They will also need to offer financing under conditions that encourage homeowners to carry-out EE projects and measures that they would not have undertaken with their own cash on hand or through the other financing offers available to them. Finally, the Pilots will need to be successfully marketed and delivered to ensure that contractors and homeowners are aware that the Pilots are available and understand how they can support EE upgrades.

There are a number of key trends and considerations identified through the baseline study that may shape the market for the Pilots. We have outlined findings that may be useful to consider in the Pilot implementation strategies.

- **Consider the Pilot opportunities given the growth of PACE financing.** PACE is relatively new to the market and yet it represents 90% of the 2014 EEFP loan volume, despite not yet being offered in all California municipalities (although its coverage is now extensive). As PACE models are demonstrated, refined, and disseminated, there is a potential that entrenched PACE lending could create an opportunity for new EEFPs including the Pilots if they target different markets and measures[22].

  While PACE is the dominant EEFP, it is still a small portion of overall energy-related financing (as observed through the Homeowner survey). However, PACE is likely to grow over time. Despite the relatively low awareness of PACE compared to other EEFPs among contractors, it is the most commonly promoted by contractors. Nearly half of contractors who are aware of PACE appear to be promoting it, which suggests that over time, if more contractors become aware of PACE and opt to register with local programs, they are likely to promote PACE financing.

  One benefit of PACE could be that it serves as an example of the power of vendor financing to sell home improvement projects in the residential market. However, the Pilots have several differentiating factors from PACE. PACE is not an option for all homeowners, such as for clients who do not have surplus equity in their homes. Additionally, an on-bill-repayment option may be preferable for some homeowners compared to the property tax payment mechanism in PACE lending. If the Pilots can communicate these differentiating benefits then the Pilots can help contractors sell projects that PACE cannot support.

- **The point-of-sale-financing origination model has the potential to drive business compared to bank originated financing, regardless of which offer lower interest rates:** Financial institutions are not necessarily in a position to sell EE financing successfully, instead it is the contractors who perceive EEFPs as a useful tool to sell home improvement projects that facilitate the lending. In many big-ticket industries (e.g., automobiles) financing is often marketed and originated at the point of sale. Since contractors are selling the energy efficiency upgrades to customers, this channel has great potential to introduce and originate financing if needed. PACE's traction so far could be due to program features like effective sales tools (aggressive administrative sales support and instant loan approval via a

[22] Given that PACE is relatively new, the program structure continues to change. As such, it is not entirely known how PACE will evolve.

website) along with a contractor point-of-sale origination model. Providing contractors with education and training around the value of EEFPs can help contractors understand how EEFPs can help sustain and grow their businesses. Further education on the other EEFP solutions in the market beyond PACE may encourage contractors to introduce further financing options to their customers who are not interested in PACE.

It seems based on interviews that the point-of-sale origination model, along with PACE's focus on the equity in the home rather than the borrower's creditworthiness and the tax repayment mechanism that is tied to the home rather than the homeowner, have allowed it to be successful in the market despite charging somewhat higher interest rates than many other EEFPs. Based on our mystery borrower calls, PACE is often described to the customer in terms of a monthly payment instead of a lump sum loan with an interest rate, similar to how cell phones are sold to users (i.e., "$10 a month for a new iPhone"). In fact, it takes a very savvy customer to figure out, in fine print, what interest rate PACE is giving them. With this approach, PACE has been able to start a successful EEFP without using the interest rate as a competitive sales tool.

The FI interviews often pointed to the vendor-financing origination strategy (such as that employed by many PACE programs) as being key to generating significant loan volume. Moreover, there is a risk that new products offered directly through bank and credit union branches will not achieve any more uptake than the current term loans and home equity loan products, many of which offer lower interest rates than PACE loans, and yet struggle to attract customers. Therefore, contractor involvement may play a central role in determining the Pilot's impact.

- **The Pilots may find a niche by offering financing that is easy for small and medium contractors to promote:** Currently, larger contractors are most aware and most involved in promoting EEFPs to their customers. However, medium-sized and small contractors make up the majority of all licensed General and HVAC contractors in California. This group is much less likely to promote financing than large contractors. Almost 50% of small and medium sized contractors felt they did not have the capacity to promote financing. Small and medium sized contractors may offer a good target if the Pilots are able to promote easy, turnkey, solutions that contractors can easily promote without needing additional resources.

- **There appears to be a need for affordable EE lending options for low- and moderate-income and poor creditworthy borrowers:** There may be underserved markets that the Pilots can help address by lowering the risk to lenders who offer loans to LMI and lower-FICO-score borrowers. Currently just 25% of all energy-related upgrades are financed, and only 14% of these are financed through an EEFP. This indicates that there may be significant room for the Pilots to increase the use of financing for energy-related upgrades, potentially by addressing underserved market segments.

  This study finds that bank and credit union EE loans are not generally available to borrowers with low-FICO-scores, and that a significant portion of low-income homeowners have had financing applications rejected. This may be addressed by REEL's offer of unsecured loans to homeowners with FICO scores as low as 580. In addition, by applying an elevated LLR ratio for LMI borrowers (set at 20% of the loan value compared to 11% for other borrowers), the REEL appears to be accounting for higher default rates among this customer segment, which may encourage lenders to offer loans to that market segment. Moreover, the Pilots may go further in offering financing without considering credit ratings by reviewing a customer's bill payment history

  Further supporting this is the apparent need among LMI borrowers and low-FICO-score borrowers to obtain loans for EE-related upgrades at more affordable rates. The Pilots' interest rate limits appear

to be significantly lower than the currently offered market rates for other unsecured lending, particularly to the segment of borrowers with a poor credit rating, who appear to be ineligible for most or all term loan products.

- **The Pilots may expand EE term-loan activity:** The Pilots are entering the EE financing market by encouraging FIs to offer new or expanded EE term loans. Term loan underwriting is based on the borrower's credit worthiness, and thus there may be a market of customers who did not qualify under a PACE program's home equity requirements, but may meet the Pilots' creditworthiness thresholds. This could lead to an increase over time in term loan EEFP activity directly attributable to the Pilots. Further, some EEFPs were very new to the market in 2014 and currently do little or no volume, but might grow significantly in the coming years. This includes a handful of residential vendor financing products that have recently been introduced.

- **A shift of EE financing from other EEFPs to the Pilots may in some cases support the Pilots' goal of contributing to State EE targets:** The existing EEFPs are not necessarily subject to the same level of energy-policy regulation and therefore the existing EEFPs do not typically require financed measures to meet the State's list of qualifying energy efficiency measures. However, the forthcoming Pilots will be regulated and therefore will require that borrowers who chose to obtain financing through the Pilots must install equipment from the State's approved list. The increased regulatory requirements associated with the Pilots may result in customers installing equipment with better EE performance as compared to what would have been installed through other EEFPs. However, the Pilots' stricter regulatory requirements may discourage some potential participants.

Overall this study indicates that the Pilots are targeting segments of the energy-related upgrade market that have limited access to EEFPs and conventional lending products. Thus, the Pilots may have the potential to unlock a stream of EE upgrades in this market segment, alongside the market segments that already access EEFPs, provided that the Pilots are delivered through effective origination and marketing approaches and are successful in engaging with customers at the point of sale.

7. Summary of Residential Energy Efficiency Financing Market Baseline Data

Table 17 and Table 18 summarize the key market residential baseline data that were captured in this study. Table 17 summarizes the supply-side baseline data for the Pilots and Table 18 summarizes the demand-side baseline data. In each table we define the data, give the baseline data point, and the source for that data. **The final column in each table provides our assessment of where the Pilots could make an impact based on what is known about the Pilots at the time of this study. These data summarize what was captured in this study to characterize the baseline market. The Pilots may not have an impact on all of these metrics, but all data has the potential to change.** In the future, these areas are where a follow-up study can look to see if changes occurred, although methods would need to be developed to determine the causality of those changes.

Table 17. Potential Supply-Side Market Baseline Metrics & Characterization Data

Potential Metric/Data	Definition	2014 Baseline	Source	Where Pilots Could Make an Impact
Number of types of EEFPs	The number different types of EE loan offerings	Three key types: PACE, term loans, and EEMs/HELOCs	Secondary research and FI interviews	Increase the number of different types of EEFPs
Number of FIs offering EEFPs	Number of FIs who offer EE-specific financing products	93 total 10 PACE providers 60 EEMs/HELOCs: 48 FHA-approved lenders offer EEM program loans; 4 PowerSaver Lenders; 8 non-FHA EE home equity loans and mortgages 23 EE-specific term loan providers	Secondary research and FI interviews	Increase the number of FIs offering EE-specific term loans and/or the number of FIs offering EEFPs
Loan volume of EEFPs	Volume of EE loans (deducting solar/renewable portion of loans)	Total: $218M PACE: $196M (90%) EE-specific term loans: $18M (8%) EEMs/HELOCS: $3M (2%)	Secondary research and FI interviews	Increase the EE-specific loan volume
Number of EEFP loans	Number of EE loans	Total: 10,681 loans PACE: 9,279 EE-specific term loans: 1,179 EEMs/HELOCs: 223	Secondary research and FI interviews	Increase the number of EE-specific term loans offered
Interest rates offered for EEFPs (minimum range)	Range of minimum interest rates offered for EE loans	PACE: 6.00%–8.00% EE-specific term loans: 4.99%–8.00% EEMs/HELOCs: 3.49–6.80%	Secondary research and FI interviews	Provide affordable interest rates for lower FICO borrowers
Loan terms offered for EEFPs (maximum range)	Range of maximum terms offered for EE loans	PACE: 240-300 months EE-specific term loans: 60-180 months EEMs/HELOCs: 360 months	Secondary research and FI interviews	Provide longer payback period for borrowers

Summary of Residential Energy Efficiency Financing Market Baseline Data

Potential Metric/Data	Definition	2014 Baseline	Source	Where Pilots Could Make an Impact
Average loan amount	Average loan amount given	PACE: $21K EE-specific term loans: $15K EEMs/HELOCs: $15K	Secondary research and FI interviews	Increase in the average loan size, reflecting larger projects
Qualification criteria	Information lenders require to approve the loan	PACE: Sufficient equity/payment history EE-specific term loans: FICO score EEMs/HELOCs: D/I ratio, property value, FICO score, equity	Secondary research and FI interviews	Alter qualification criteria required for EE-specific term loans (e.g., consider payment history for customers who either do not have FICO scores or have low FICO scores)
Qualifying target market	Minimum FICO score required for loan approval	EE-specific term loans: Zero loans for FICO < 580; most EE-specific term loans require a FICO of at least 680 PACE/EEMs/HELOCs: FICO score is collected in application process but exact qualifying criteria unknown	Mystery borrower interviews, secondary research, and FI interviews	Increase EE-specific term loans to borrowers with lower credit scores (as low as 580)
% who qualify	The % who qualify for current EE-specific term loans based on FICO score requirements	EE-specific term loans: 79% of population has FICO of at least 680 and could qualify	FICO Score Analysis	Increase the % of customers who qualify for EE-specific term loans by lowering risk to lower-FICO-score borrowers
Payment mechanism	How customers pay back the loan	PACE: Property taxes EE-specific term loans: Direct to lender EEMs/HELOCs: Direct to lender	Secondary research and FI interviews	Alter loan payback mechanism (e.g., on-bill repayment through the EFLIC program)
Contractor awareness	Awareness of types of EE-specific financing	Any type: 26% unaided, 71% aided PACE: 24% EE-specific term loans: 34% EEMs/HELOCs: 26%	Contractor survey	Increase contractor awareness overall and of specific types of EE-specific financing
Contractor promotion	Percentage of contractors that promote EE-specific financing	Any type of EEFP: 15% PACE: 11% EE-specific term loans: 7% EEMs/HELOCs: 2%	Contractor survey	Increase contractor promotion overall and of specific types of EE-specific financing
Contractor barriers to promoting EEFPs	Percentage of contractors with any barriers to promoting EEFPs	85% have barriers 44% don't think customers need financing for EE upgrades 40% do not have capacity to do it 38% are not aware of available financing options	Contractor survey	Decrease barriers to contractors promoting EEFPs

Table 18. Demand-Side Baseline Market Metrics and Characterization Data [a]

Potential Metric/Data	Definition	2014 Baseline	Where Pilots could make an impact
Conventional financing awareness [b]	% of homeowners who know where to obtain a loan for energy-related upgrades	70%	Increase due to financing marketing
	% of low-income homeowners who know where to obtain a loan for energy-related upgrades	51%	
EEFP financing awareness	% of homeowners aware of any EEFPs	35%	Increase due to financing marketing
	% of homeowners aware of PACE	12%	Could also help overall increase due to financing marketing
	% of homeowners aware of EE Term Loans	1.1%	Could also help overall increase due to financing marketing
Current demand for energy-related home upgrades	% who made energy-related upgrades in the last 2 years (least conservative estimate)	36%	Increase over time
	% who made high-efficiency energy-related upgrades in the last 2 years (moderately conservative estimate)	24%	
	% who made energy-related upgrades in the last 2 years (most conservative estimate)	8%	
Customer demand/uptake for EEFPs [b]	% of homeowners who used any type of EEFP (amongst those who made an energy-related upgrade using the least conservative definition)	3.5%	Increase over time
	% of homeowners who used a PACE loan (amongst those who made an energy-related upgrade using the least conservative definition)	2.4%	Increase over time
	% of homeowners who used an EE Term Loan (amongst those who made an energy-related upgrade using the least conservative definition)	1.1%	Increase over time
Project size/depth [b]	% who made multiple energy-related upgrades in the last 2 years at the same time	9.0%	Increase in customers who do larger and more in-depth

Summary of Residential Energy Efficiency Financing Market Baseline Data

Potential Metric/Data	Definition	2014 Baseline	Where Pilots could make an impact
	% who upgraded (1) appliances, (2) envelope, and (3) central cooling, heating, and/or water heating	7.9%	retrofits of their home that cost enough to justify financing
	% who upgraded (1) envelope and (2) central cooling, heating, and/or water heating	11.4%	
Project cost among those that make energy-related upgrades [b]	Average project cost among those who made an energy-related upgrade in the last 2 years	$14,220	Increase in project costs (demand) for larger projects within the market for energy-related upgrades
Use of financing among those who made an energy-related upgrade [b]	% of customers who used any type of financing for energy-related upgrades in the last 2 years	25%	Increase over time
Barriers for energy-related upgrades [b]	% of customers who considered making upgrades over the past 2 years but did not primarily due to the high upfront costs of the upgrades.	16%	Decrease barriers by offering reasonable interest rates to low-income customers and those with lower credit scores
	% of customers who find it difficult to obtain a loan (among general population homeowners) % of customers who find it difficult to obtain a loan (among low-income customers) % of customers who find it difficult to obtain a loan (among customers with FICO scores < 640)	41% 77% 57%	
	% of customers who find the interest rates available to them are too high (among general population homeowners) % of customers who find the interest rates are too high (among low-income customers) % of customers who find the interest rates are too high (among customers with FICO scores < 640)	62% 72% 69%	
	% of customers who perceive first-cost as a barrier	13%	
Future demand for energy-related upgrades [b]	% who are likely to make an energy-related upgrade in the next 2 years	44%	Increase over time

Summary of Residential Energy Efficiency Financing Market Baseline Data

Potential Metric/Data	Definition	2014 Baseline	Where Pilots could make an impact
Future demand for financing energy-related upgrades [b]	% who are likely to make an energy-related upgrade in the next 2 years and to use financing to pay for it	27%	Increase over time
Median interest rates paid for EEFPs	Median interest rate customers are paying for EEFPs compared to relevant annual interest rate index	PACE: 6-7% EE-Term: 6.0% EEM/HELOC:4.5% Total: 5.5% 30-year average fixed rate mortgage: 4.17%[c]	Decrease interest rates paid Provide affordable interest rates for lower FICO borrowers
Average number of measures per project	Average number of energy-related measures per project	PACE: 3 EE-Term: 3 EEMs/HELOCs: 4	Increase the number of measures per project

[a] Source: General Population Homeowner Survey
[b] These metrics are all based on the least conservative definition of an energy-related upgrade that was used in the participant survey.
[c] Source: 2014 average of monthly fixed rate mortgage interest rates. Federal Home Loan Mortgage Corporation's (Freddie Mac) Weekly Primary Mortgage Market Survey (PMMS), Monthly Average Values

Additional Demand-Side Baseline Data

We gathered a few additional data points from other sources to shed further light on the baseline for these Pilots. These data points may also be considered in future market trending studies related to the Pilots.

Table 19. Additional Demand-Side Baseline Market Data

Potential Metric/Data	Definition	Baseline	Source
Use of financing among Home Upgrade participants	% of Home Upgrade/Whole Home Program participants who use financing	21%	2012 Data. PG&E Whole House Retrofit Program Phase II Process Evaluation Study. SBW Consulting, Inc., in association with ASW Engineering Management Consultants, Inc., and Opinion Dynamics. 2013. Report ID: PGE302.07
Residential sector savings (ex-ante)	Gross and net reported energy savings (GWh) from IOU/REN programs targeting the residential sector	**Gross:**650.90 **Net:** 429.80	2014 Data. EESTATS Monthly Tracking Data - Data Viewer (http://eestats.cpuc.ca.gov/Views/EEDataPortal.aspx). Last accessed 2.25.16
	Gross and net reported demand reduction (MW) from IOU/REN programs targeting the residential sector	**Gross:** 125.3 **Net:** 84.6	
	Gross and net reported gas savings (MMTherms) from IOU/REN programs targeting the residential sector	**Gross:** 6.29 **Net:** 4.84	
Number of homes with heating and cooling systems	% of homes with at least one heating system	98%	2012 California Residential Lighting and Appliance Saturation Study (CLASS 2012). Kema, Inc. November 2014. CALMAC ID: CPU0095.01
	% of homes with a cooling system	65%	
	Number of homes with at least one heating systems	12.33 million [a]	
	Number of homes with a cooling system	8.18 million [a]	
Market penetration of energy efficient equipment	% of lighting meeting Energy Star® requirements (% of sockets)	30.3%	2012 California Residential Lighting and Appliance Saturation Study (CLASS 2012). Kema, Inc. November 2014. CALMAC ID: CPU0095.01 Please refer to Volume Two of this study, Section 2.3, for a full table by equipment type (within these categories) and with notes on sources and Energy Star® requirements.
	% of refrigerators meeting Energy Star® requirements (% of units)	51.3%	
	% of self-standing freezers meeting Energy Star® requirements (% of units)	94.2%	
	% of gas heating systems meeting Energy Star® requirements (% of units)	8.5%	
	% of cooling systems meeting Energy Star® requirements (% of units)	7.0%	
	% of gas water heaters meeting Energy Star® requirements (% of units)	3.7%	
	% of clothes washers meeting Energy Star® requirements (% of units)	48.7%	
	% of dishwashers meeting Energy Star® requirements (% of units)	68.4%	
	% of homes with windows meeting Energy Star® requirements (% of homes)	29.3%	

Summary of Residential Energy Efficiency Financing Market Baseline Data

Potential Metric/Data	Definition	Baseline	Source
	% of homes with attic insulation meeting Energy Star® requirements (% of homes)	21.1%	

[a] Based on the 2010 U.S. Census' estimate of 12.58 million homes in California multiplied by the CLASS report's estimate of percentage of homes with heating and cooling systems.

8. Study Limitations

The study was limited by what information we were able to obtain through the secondary data review, interviews, and surveys, and as a result it was not possible to collect all pertinent market metrics. Specifically for the supply-side metrics, the following are the relevant data points for which we were unable to obtain data:

- **Average energy savings per loan or per dollar of financing:** Lenders did not always keep track of specific measures (type, models, etc.) included in EEFP projects or were not willing to share this information (for individual projects or in aggregate). Therefore, it was not possible to estimate deemed savings for various EEFPs and the financed projects. Moreover, lenders were not able to share borrower lists to allow for billing analysis to be performed at a later date.

- **Loan volumes for various qualifying criteria FICO scores (for each EEFP):** In most cases lenders provided only their standard minimum qualifying criteria (FICO scores, debt-to-income ratios or household income) but not loan volume data stratified by borrower creditworthiness criteria. Thus, it was not possible to compare which borrower market segments currently use which products. (e.g., it was not possible to determine what portion of PACE loans went to customers with a 680 FICO score or moderate household income.)

- **Effective interest rates:** Our research was able to determine minimum standard interest rates offered through the FI interviews and average offered interest rates through the mystery borrower interviews. However, we were not able to determine the average actual rates for current EEFP lending volumes, by lender or by borrower category. Moreover, the impact of tax deductions (which are likely applicable to home equity loans) and application fees was not assessed to determine the effective interest rate (average or minimum) of each product to the borrower.

However, since the Pilots will work from a specified EEEM list and data pertaining to the loan underwriting, results, and processing fees will likely be gathered by CAEATFA and the IOUs during the Pilot implementation period, it may be possible to measure these impacts among Pilot participants in the absence of baseline metric values.