

Efficient Shopping For All: Achieving Climate Goals with Online Retail Eco Financing

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ABSTRACT

Electric energy efficiency is expected to deliver the largest greenhouse gas reductions in the building and residential sectors this decade. Efficient appliances are also at the heart of the US climate strategy for equitable building decarbonization unveiled by the White House in November 2021. Influencing the hundreds of millions of naturally occurring retail buying decisions made by consumers annually is therefore crucial to success.

This paper reports on an innovative program design – Online Retail Eco Financing® – being rolled out across the country. Instant point-of-sale Eco Financing, delivered through the online shopping channel, allows consumers to pay for energy efficient purchases with affordable monthly payments. The ecommerce platform, featuring Choice Engine® technology, augmented with Eco Financing as a payment method, eliminates important barriers and empowers consumers to buy more efficient products.

Initial results show that rebates are not needed to drive efficient purchases, that 85% of purchases are financed and that 85% of loans are going to underserved borrowers. The equity outcomes are particularly noteworthy; of those using Eco Financing loans to pay for their purchases:

- 70% qualify as low- and moderate income (LMI)
- Half are credit-challenged (with a credit score below 640)
- Over a third are both LMI and credit-challenged.

The program design taps into an efficient shopping ecosystem that brings together key market actors to transform the way we shop: an online marketplace merchant, retail and contractor fulfillment partners, a payment services provider, an FDIC-insured bank, and state government entities.

Introduction

Influencing retail buying decisions at scale is a strategic climate mitigation priority. Nationwide, hundreds of millions of appliances are purchased annually, not including lighting.¹ According to the U.S. long-term strategy to achieve net zero greenhouse gas (GHG) emissions, “...the priority in this decade is to rapidly improve energy efficiency and increase the sales share of clean and efficient electric appliances—including heat pumps for space conditioning, heat pump water heaters, electric and induction stoves, and electric clothes dryers—while also improving the affordability of energy and the equitable access to efficient appliances...” (U.S. Department of State and U.S. Executive Office of the President 2021).

¹ This statement is based on the 2020 estimated ENERGY STAR market penetration and shipment data (EPA 2021), which can be used to calculate the size of the total market.

This statement points to the need to transform consumer product markets at scale, with a view to increasing the share of efficient electrical appliances sold, in an equitable way. A recent study by The Brattle Group found that individual residential consumer actions have the potential to reduce GHG emissions by nearly twice as much as supply-side reductions and that electric efficiency measures are by far the largest component of total residential emissions reduction potential in 2030, more than rooftop solar or electric vehicles (EVs) (Sergici et al. 2021). The vast majority of the electric efficiency measures are appliances and other plug-in devices, typically bought at retail by individuals. In California, appliances and other plug loads are responsible for roughly 75% of residential electric consumption² (DNV GL Energy Insights USA, Inc. 2020), and 58% of the state's savings potential in the low-income segment is associated with these devices (Guidehouse Inc. 2021).

Conventional energy efficiency programs, such as rebate or direct-install programs, have struggled to drive efficient retail purchases at scale. Online Retail Eco Financing was designed from the ground up to do just that.

Program Overview

Online Retail Eco Financing eliminates market, cognitive, psychological, and financial barriers and empowers consumers to buy energy efficient products for their homes. The efficient shopping experience consists of the following core technology elements (Figure 1): the Enervee Commerce platform, a transactional online marketplace; embedded Choice Engine technology, which eliminates barriers and nudges shoppers towards better choices; and point-of-sale Eco Financing, to make efficient purchases affordable.

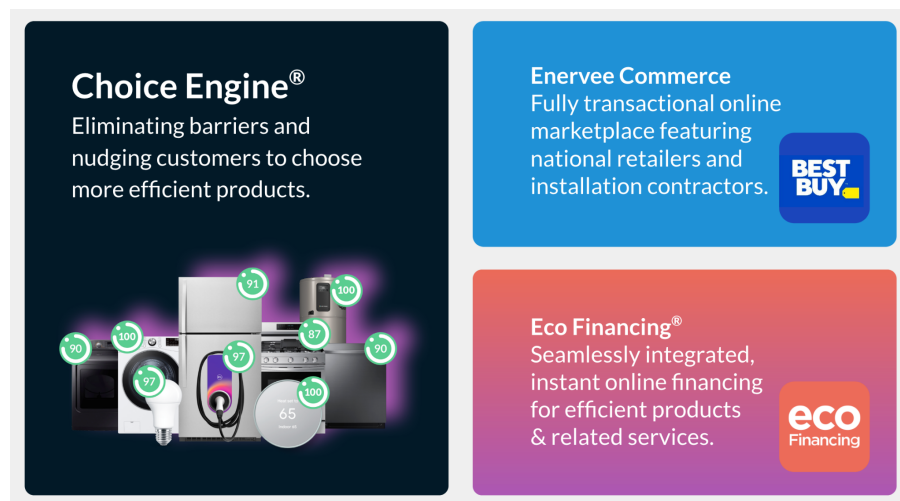


Figure 1. Core technology components of the Online Retail Eco Financing program

² Nationally, roughly 50 to 65% of residential electricity consumption can be attributed to plug loads, based on the 2015 Residential Energy Consumption Survey (EIA 2018).

The SoCalGas Marketplace, operating on Enervee's new transactional Commerce platform and offering Eco Financing, soft launched in Q3 2021 as the first of its kind³ (Figure 2), with subsequent 2022 deployments planned for the New York State Energy Research & Development Authority (NYSERDA) and Southern California Edison.⁴

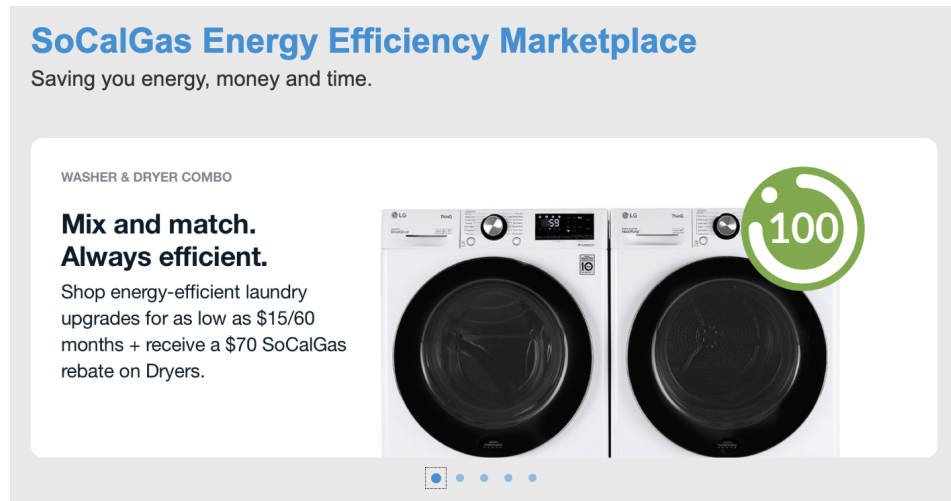


Figure 2. SoCalGas Energy Efficiency Marketplace landing page

These marketplace financing programs are proving successful at meeting the needs of traditionally hard-to-reach consumer segments, including low- and moderate-income, people without access to credit and renters, while saving energy and reducing peak demand and greenhouse gas emissions.

Program Design – Online Retail Eco Financing

The program represents a major evolution from previous online stores provided by utilities. Enervee's Commerce platform is an online transactional marketplace that features over 40 energy-related product categories (both electric and natural gas): kitchen and laundry appliances; water and space heating/cooling equipment; electronics; LED light bulbs; pool, lawn and garden equipment; EVs and chargers; backup generators/power stations; water efficiency devices; and controls like smart thermostats. Utility online stores are typically limited to less than 10 categories, excluding major domestic appliances.

Unlike typical utility online stores, Choice Engine technology is embedded into the marketplace, eliminating market, cognitive and psychological barriers and nudging shoppers towards efficient purchases – without the need for incentives (Arquit Niederberger 2022; Arquit Niederberger 2020). Consumer-facing features include the Enervee Score[®] and personalized estimates of energy bill savings and total cost of ownership, which have been proven to influence product choices (Arquit Niederberger and Champniss 2018). Choice Engine technology presents

³ Enervee is the only company offering Choice Engine and Eco Financing technology embedded into an online marketplace, with a view to eliminating barriers to energy efficient purchases; other vendors offer online utility stores, featuring rebates, for a limited selection of products (Arquit Niederberger 2020).

⁴ The Implementation Plan for the Enervee Marketplace for SCE can be found [here](#).

consumers with a fundamentally different choice architecture than other online marketplaces like Amazon or traditional retailer marketplaces – or utility online stores. For instance, it includes dynamic efficient product recommendations (Figure 3), tailored to the search preferences set by each individual (e.g., price range, size, brand), to make appliance shopping quick and easy.

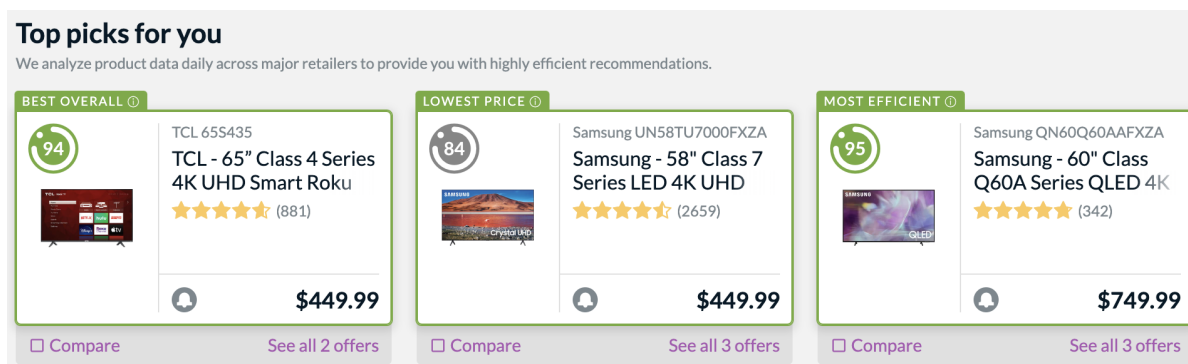


Figure 3. Television recommendations for models with 55"-65" screen: best overall, lowest price and most efficient.

In an industry first, Eco Financing launched in August 2021. Eco Financing is an online point-of-sale payment option that overcomes the up-front purchase price barrier by instantly underwriting term loans, resulting in fixed monthly payments (Figure 4). When backed by a loan loss reserve, financing can be extended to consumers with credit scores as low as 580.

Introducing... ecoFinancing®

- Instant online underwriting
- Efficient products only
- Purchases as low as \$200
- Bundle installation, haul-away and recycling services
- Affordable monthly payments (low APR, 60-month loan term)
- Inclusive, for people with credit scores as low as 580
- No hard credit check, build good personal credit

Figure 4. Key features of Eco Financing

The California State Treasurer (2021), Fiona Ma, announced that marketplace merchant Enervue, fintech lender One and utility SoCalGas had partnered to offer the first microloans available through the Residential Energy Efficiency Loan (REEL) program⁵, administered by the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA). With Eco Financing, online retail shoppers can buy energy-efficient appliances up to \$5,000 with no money down, instant rebates and favorable loan terms, with no penalty for early repayment.

⁵ REEL has since been renamed GoGreen Home.

GoGreen Home provides a loan loss reserve (LLR) that covers 90% of eligible losses on the remaining loan balance in the event of a default. This added risk mitigation allows the program to extend credit to borrowers with credit scores as low as 580, as well as to offer Californians longer loan terms (60 months) and rates significantly lower than credit cards, regardless of credit score.⁶ This results in low monthly payments: An energy-efficient appliance with a total cost of \$1,000, for example, can be paid back with monthly installments of less than \$25, while helping the borrower save on energy bills.

Both market research (survey of 1,000 people) and participant surveys conducted by Enervee show that low or affordable monthly payments are the top reason why this loan offer is attractive to traditionally underserved borrowers. According to State Treasurer Fiona Ma: “This partnership has the capacity to help many more Californians save energy and reduce expenses and to assist California in making progress on its fight against climate change” (California State Treasurer 2021).

In New York, Eco Financing is backed by NYSERDA’s new Loan Loss Reserve⁷ and offers similar loan terms. A minimum of 35% of loans by dollar amount must be to residential customers with a credit score of 680 or less, or to consumers at or below 80% of AMI, or SMI, whichever is greater. Results for California show that over half of Eco Financing loans have gone to borrowers with credit scores below 640, significantly overperforming against NYSERDA’s LLR equity goal.

Layered incentives and digital marketing, to drive in-market shoppers to the marketplace, round out the program. Incentives may be available and can be tied to product characteristics, customer segment, location or other requirements. The program leverages product incentives from retail fulfillment partners in the hundreds of dollars per unit, and the digital platform supports layering with various other incentives, such as demand response (DR) pre-enrollment or instant utility rebates, to reduce the purchase price.

Program Theory – Focus on Barrier Removal

Barriers

According to the U.S. long-term strategy to achieve net zero GHG emissions (U.S. Department of State and U.S. Executive Office of the President 2021), the 2019 California Energy Efficiency Action Plan (Kenney, Bird and Rosales 2019) and other research (e.g., Sergici et al. (2021)), plug loads represent a major opportunity in the residential sector. Multiple barriers prevent consumers from buying energy efficient products, including:

- Lack of market transparency with respect to product efficiency (market barrier);
- Cognitive and psychological barriers that can lead to poor buying decisions;
- Lack of access to capital and/or the incremental cost of efficient products (financial barrier).

The first two groups of barriers prevent residential customers from choosing energy efficient products in the first place; in addition, some residential customers are unable to follow through with an efficient purchase for financial reasons tied to the up-front

⁶ Interest rates are capped at the interest rate on new 10-year Treasury bonds plus 750 basis points.

⁷ [NYSERDA Loan Loss Reserve Program](#)

purchase price. Table 1 outlines how the Online Retail Eco Financing program eliminates barriers, making energy efficiency products and services more accessible and empowering customers to better manage their energy.

Table 1. Barriers, barrier elimination strategies and Online Retail Eco Financing program innovations to execute strategies

Barrier	Strategy	Examples of program innovation
Market intransparency with respect to product efficiency	• Make product efficiency visible & actionable • Nudge customers towards more efficient choices without monetary incentives	• Enervee's proprietary Choice Engine technology, featuring the patented zero to 100 Enervee Score makes efficiency visible to consumers • The Enervee Score is used as a dynamic technology forcing specification to influence manufacturers and retailers to speed innovation cycles
Cognitive & psychological barriers	• Apply behavioral science theory & insights in all aspects of marketplace design to close the attitude – behavior gap • Tailor marketing messaging to customer and buying context; refine via A/B testing	• Product cards designed to circumvent the lay theory that efficient products necessarily cost more and vice versa. • Based on dual-processing decision model, provide both heuristic decision aids (Enervee Score) and quantitative tools (personalized energy bill impact and total cost of ownership) to influence the full gamut of buying decisions
Financial barriers	• Offer inclusive financing to eliminate the up-front purchase price barrier • Provide special incentives for qualified customers	• Instant online Eco Financing integrated into the Enervee Marketplace buying journey • Special instant rebates or concessional financing terms at point-of-sale for qualified customers (such as low- and moderate income or disadvantaged communities)

Activities

Enervee's role in orchestrating this efficient shopping ecosystem includes: developing, hosting and continually improving the Enervee Commerce platform; partnering with retailers, manufacturers, lenders, and governmental agencies to make efficient purchases simple and compelling; conducting digital marketing campaigns to drive traffic and site engagement; tracking online behavior and purchase transactions for optimization and reporting.

Outputs

The program delivers the following outputs to eliminate barriers to energy efficient purchases:

- An energy-aware choice architecture. Choice Engine technology injects actionable energy efficiency information into the shopping journey, with a view to eliminating barriers and closing the attitude – behavior gap. The impacts of various marketplace

design elements on consumer decision-making have been well documented (Arquit Niederberger 2020).

- Affordable Eco Financing & instant incentives for online retail product purchases. The program integrates Eco Financing and layers in a variety of incentives that may be available at the time of purchase (e.g., TECH Initiative incentives for heat pump water heaters in California, promotional pricing negotiated with retailers, manufacturers or other market actors), reducing monthly payments.
- Visits by in-market shoppers. It goes without saying that the program will only be effective if customers become aware of and take advantage of the online marketplace. Digital marketing acquires and engages people actively shopping for energy-using consumer products.

Outcomes

The above program outputs eliminate barriers and empower consumers to choose and purchase more efficient products. As the program scales, we will see greater private investment into and demand for efficient products (resulting in downward price pressure) and significant utility and societal energy and non-energy benefits.

Ultimately, the program creates ongoing market demand for manufacturers to develop increasingly efficient appliances and for retailers to stock and promote them, serving a technology forcing function. The Enervee Score functions as a dynamic “technology-forcing” performance specification, which allows us to engage manufacturers and retailers to speed market adoption of ever more efficient and affordable products (e.g., Enervee has negotiated special discounts on efficient products from retailers and manufacturers). This can speed the product innovation cycle and allow for more rapid and aggressive updates to minimum energy performance standards.

By relying on eliminating barriers to private investment, the program can scale cost-effectively, even in jurisdictions where rebates on many electric plug load devices are no longer cost-effective, due to declining unit energy savings and assumed participant costs, such as in California.

Efficient Shopping Ecosystem Partners

Our efficient shopping ecosystem brings together all of the public and private partners needed to support better consumer buying decisions on one online platform (Figure 5):

- Enervee orchestrates the participation of all partners, is the marketplace merchant of record and conducts comprehensive digital marketing (email, paid search, paid social...).
- Retailers and installation contractors fulfill orders and provide related installation, haul-away and recycling services. Current partners include national retailers Best Buy and lightbulbs.com, and regional installation contractor Water Heater Warehouse, with more in the pipeline. Retailers and manufacturers also provide product discounts for special promotions to reduce the purchase price.
- Lending partners carry loans on their balance sheet.
- Government entities, including state energy offices and green banks, may host statewide marketplaces and/or provide resources for demonstrations, credit enhancements, incentives for target audiences, and marketing. Examples include CAEATFA, which

administers the utility ratepayer-funded GoGreen Home loan loss reserve, and NYSEERDA, which is funding market tests for a statewide low- and moderate-income marketplace and operating its own LLR program.

- Utilities and other entities may procure Enervee's program to meet clean energy obligations or internal ESG goals.

Who's who for Eco Financing?



Figure 5. Efficient shopping ecosystem partners

With all of these partners, Enervee has developed deep data integrations, relying on a mix of API and flat file exchanges, that make the user experience quick and simple, despite the backend complexity of this new program offering.

Program Results and Potential to Scale

Tapping into Normal Replacement Cycles to Leverage Private Investment

Enervee low- and moderate-income market research conducted in September 2020 on 400 people with household incomes below \$75,000 in California and below \$100,000 in New York has revealed that:

- 97% research product purchases online before buying at least some of the time (50-80% always research online);
- 40% often buy used products, which are typically less efficient than the best new products;
- Only 10% would be unable to pay a copay to obtain an energy efficient product, and 65% could pay at least half of the purchase price, up to 100%, suggesting that no-cost giveaway programs may not be the most judicious program design to scale LMI program impact.

- Roughly 40% would choose to pay for a \$500 energy efficient product purchase with monthly payments of \$16 by taking out a 3-year government-backed, low-interest loan (\$565 total cost of principal + interest), rather than paying the \$500 price with cash or credit card.

In the past, most low-income energy efficiency programs were no-cost direct install programs. However, these programs are only serving a single digit share of income qualified customers each year. In 2021, for example, only 7% of Californian’s enrolled in the State’s low-income rate plan (California Alternate Rates for Energy) participated in the Energy Savings Assistance direct install program, and income-qualified customers received no assistance to purchase efficient products on their own when they need to be replaced. The online marketplace with Eco Financing is designed to capture the massive missed opportunity to leverage investment dollars being spent by consumers in the course of normal replacement, outside of direct install programs.

This is all the more urgent, given concerns about increasing electricity bills: “In order to avoid large increases in energy bills, customers will need to adopt technologies that require large up-front investments. In the absence of subsidies and low-cost financing options, this could create equity concerns for low- to moderate-income households and exacerbate existing disparities in electricity affordability” (CPUC 2021).

Empowering the Underserved to Buy Efficient Products

In developing this new program, our goal was to eliminate financial barriers and ensure equitable access to energy efficient products by offering instant online Eco Financing. To date, we have seen the following results:

- 85% of purchases financed
- Average cart value nearly \$1,400, meaning that people are able to finance major domestic appliances
- 85% of Eco Financing loans to “underserved borrowers”, as defined by the GoGreen Home regulations⁸
- 26% of loans to renters
- 37% of purchases include haul-away and recycling of the old unit.

Figure 6 shows that among previously underserved borrowers participating in the program, 70% qualify as low- and moderate income (meaning they live in a census tract with average income below 120% of area median income, AMI) and over half as credit-challenged (with a credit score below 640). Thirty-six percent of borrowers are both LMI and credit-challenged. It is also noteworthy that 30% of all loans have gone to people living in census tracts with an average income below 80% of AMI.

⁸ [GoGreen Home Energy Financing Program Regulations](#) (effective Aug. 25, 2021)

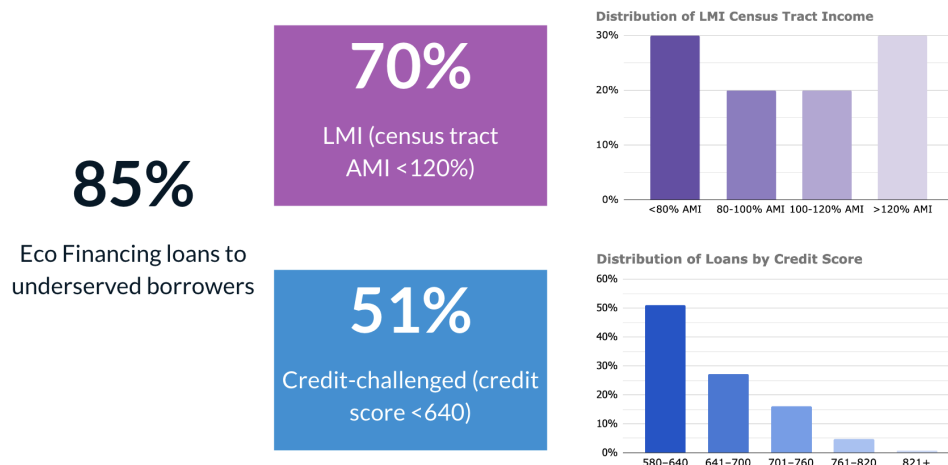


Figure 6. Equity impact of online retail Eco Financing

An Eco Financing participant survey conducted in January 2022 provides further evidence that the program is helping hard-to-reach consumers buy energy efficient products and realize related benefits:

- The Eco Financing attributes that were most attractive to borrowers were: low monthly payments, no hard credit check and the online application process.
- Seventy percent somewhat or strongly agreed that they would not have been able to buy the efficient product they did without Eco Financing;
- Seventy-two percent were very or completely satisfied with their marketplace shopping experience overall.

Renters are another underserved customer segment. Of the 13 million occupied dwellings in California, an estimated 44.7% house renters (nationwide, renters occupy 35.6% of the 122 million dwellings) (U.S. Census Bureau 2020). There is a commonly held belief that tenants generally don't purchase large appliances that cost hundreds to thousands of dollars themselves. However – despite the fact that the SoCalGas Marketplace only offers Eco Financing on four major domestic appliance categories (ranges, clothes washers & dryers and dishwashers) – 26% of loans have gone to renters. This is identical to the aggregate share of these four categories in the installed base in rentals in California (Arquit Niederberger 2022). According to a market characterization study performed for Marin Clean Energy, 72% of single-family renters said they have authority for appliance purchases, along with 26% of multi-family renters (Apex Analytics 2022). Plug loads account for the majority of residential electricity consumption nationwide, so this is a large, untapped opportunity.

Renters are financing major appliance purchases with a cart value of just under \$1,400 on average. According to the Smart Energy Consumer Collaborative (SECC 2021), “In some markets, more affluent tenants don't mind and might even try to find ways to improve energy efficiency in their own unit.” While that may contribute to the 15% of purchases made with credit cards, 70% of Eco Financed loans have gone to low- and moderate-income borrowers. The data from our SoCal program in Figure 7 suggest that the availability of financing triples the rate of renter participation. One hypothesis is that many renters may not be able to afford the up-front

cost of buying new energy efficient appliances, while Eco Financing – which results in affordable monthly payments – empowers them to make efficient purchases they otherwise would not be able to.

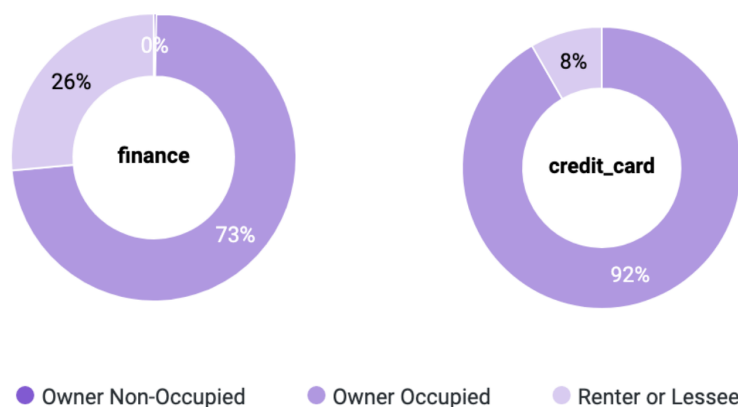


Figure 7. Share of purchases by tenure and payment method (Eco Financing, credit card)

The fact that the Online Retail Eco Financing program is reaching renters roughly in proportion to the total share of these four appliances found in rented homes is a surprising, welcome and impressive result for an energy efficiency program that did not target the notoriously hard-to-reach renter segment.

A Viable Alternative to Rebates and Direct Install?

Purchases of dishwashers, clothes washers and gas dryers made using the online marketplace featuring Choice Engine technology and integrated Eco Financing are highly energy efficient. Eighty-nine percent of these appliances purchased to date on the SoCalGas Marketplace had Enervee Scores of 80+ (Figure 8). The average score was 88 and the median was 90, despite the fact that products with scores as low as the 60s were eligible for Eco Financing. In addition, 14% of products scored 100, meaning they were among the most efficient available the day they were purchased.

Data also suggest that rebates may not be necessary to drive energy efficient purchases. Both washers and gas dryers are featured on the SoCalGas Marketplace, and the utility has offered a \$70 rebate on dryers. Only 3% fewer washers have been sold, and both the average and median Enervee Scores of the washers purchased are higher (91/94) than those for the rebated dryers (89/90).

In addition, for both washers and dryers, the average scores are higher for financed purchases than for purchases paid for with a credit card, as is the share of 80+ scoring products. Given that the vast majority of loans have gone to underserved borrowers (see previous section), this program is proving successful at driving highly efficient purchases by people with lower incomes, lack of access to credit and renters.

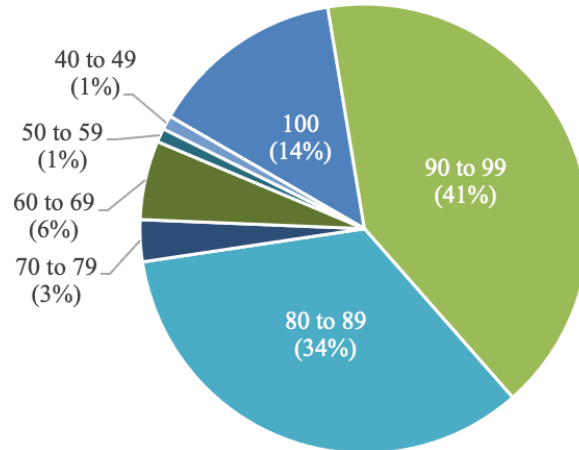


Figure 8. Enervee Score distribution of purchases

While customers with lower incomes face numerous barriers to participation in efficiency programs (ACEEE 2021), they are able to participate in Eco Financing. Table 2 illustrates why this is the case, based on the example of a typical instant rebate program. To purchase a \$1,000 appliance, even with a \$70 rebate applied at the point of sale, a customer would still have to pay \$930 at checkout. In contrast, Eco Financing requires no money down, and monthly payments are less than \$21 at current interest rates (including \$4 to cover the cost of financing), affordable to many. Adding a \$70 rebate on top of Eco Financing would only reduce the monthly payment by \$1.46 per month, to \$19.31.

Table 2. Comparison of instant rebate and Eco Financing

	Instant Rebate	Eco Financing
Purchase price	\$1000	
Rebate	\$70	none*
Amount due at checkout	\$930	none
Monthly payment	None, if paying with cash, variable with credit card	\$20.77 fixed, 60 months

*Rebates can be combined with Eco Financing, but are optional

As noted above, the initial Eco Financing loan offer is primarily attractive to traditionally underserved borrowers, because the low monthly payments are affordable. This is backed up by a survey of 1,000 people conducted by Enervee in March 2022. Respondents with lower incomes and/or lower credit scores preferred a loan offer with affordable monthly payments, despite \$245 in interest (Option 2), to loans with higher monthly payments and zero interest (Option 1), as well as the credit card option (Figure 9). Sixty-seven percent of those who selected the 9% APR offer stated that their preference was based on the affordable monthly payments, and another 35% cited the fact that there were no penalties for early repayment.

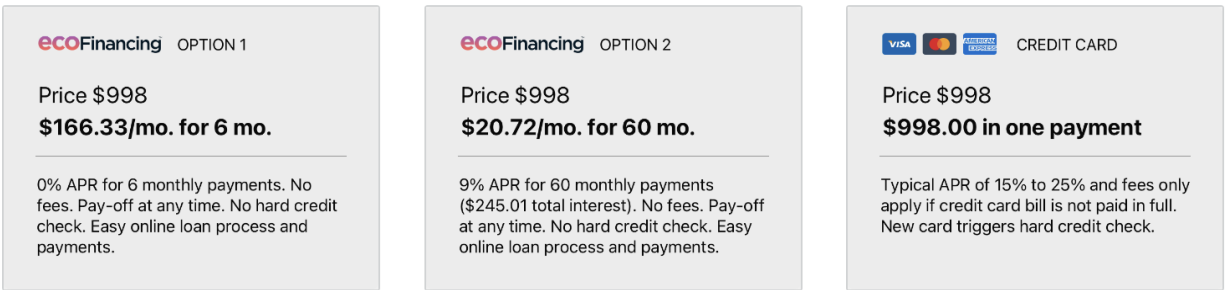


Figure 9. Payment options presented to survey respondents

Eco Financing also has potential to be more effective and scalable than traditional no-cost direct install programs targeting low- and moderate-income customers, something that Enervee is testing in partnership with NYSERDA, in a series of market tests beginning in July 2022. The Enervee/NY Marketplace will offer Eco Financing, will test various interest rates for income-qualified borrowers and will also serve as a new, online delivery channel for the EmPower New York direct install program. Direct install programs only reach a fraction of income eligible customers annually (roughly 1% in New York and 7% in California), with limited appliance coverage, and typically cover the full cost of the appliance, so new approaches are needed (Arquit Niederberger 2018).

Conclusions

Enervee's Online Retail Eco Financing program is an innovative design that is driving demand for the most energy efficient products among customers that have traditionally gone unserved by energy efficiency programs – including people with credit scores below 640, low- and moderate-income households and renters – a major achievement. This aspiration was called out by Arquit Niederberger (2018) and is now deployed across the country and delivering exciting initial results.

Delivering an effective, consumer-friendly online shopping experience requires extensive partnerships, deep digital data integrations and loan loss reserves provided by state green banks to eliminate persistent and pervasive barriers that otherwise prevent people from following through on their desire to buy the most efficient products to meet their needs. Data from existing deployments proves that even traditionally hard-to-reach customer segments are willing and able to invest in efficient products themselves, when Eco Financing is available during their online shopping journey. This opens the door to complement traditional direct install programs and scale participation by tapping into normal replacement cycles.

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