



Deemed Energy Savings Report

GoGreen Home Energy Financing | Q3 2016 – Q4 2021 | Version 1.0

Introduction

This report estimates deemed energy savings from the GoGreen Home Energy Financing Program (GoGreen Home), administered by the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA), for the 1,709 standard loans¹ and 298 marketplace microloans² enrolled from Program inception in the third quarter of 2016 through December 31, 2021.³ Visit [the CAEATFA website](#) to view quarterly reports and monthly data summaries for GoGreen Home, and please direct any questions about this report to CHEEF@treasurer.ca.gov.

While estimated energy savings achieved thus far through GoGreen Home have been relatively small, savings are expected to increase as the Program scales, which is demonstrated by the growth observed in the data.⁴ The average annual growth rate of deemed energy savings from 2018-2021 was 32% for electric and 19% for gas. Except where otherwise mentioned, the deemed savings included in this report represent total annual savings and are not indicative of cumulative savings through the life of the program.⁵

Notes on Methodology

These deemed estimates use assumptions for pre-project baseline conditions and post-project efficient conditions combined with known factors for each individual project, such as climate zone, to produce an estimated annualized energy savings value for each eligible measure included in the report. The primary source for deemed measure characterizations used in this report is the [California Electronic Technical Reference Manual](#) (eTRM); additional references and information on the model are provided in the appendix.

Other methodology notes include:

- Further calculations have been made to translate the deemed savings to estimated greenhouse gas (GHG) reductions and other measurements. The methodologies are described in detail in the appendix.
- Decarbonization measures (which switch the customer's fuel source from gas to electric for the installed measure) are reported separately from cumulative data on overall gas and electric usage so as not to skew the larger data set, as these measures result in the displacement of gas consumption in exchange for significantly increased electric consumption.

¹ "Standard loans" refers to traditional loans for amounts up to \$50,000, enrolled by eight credit union lenders participating in GoGreen Home (as of 12/31/21). These 1,709 projects include 151 projects that contained decarbonization/fuel switching measures, which are reported on in their own section. The average size of a standard loan during the reporting period was roughly \$17,000.

² "Marketplace microloans" refers to loans offered at point-of-sale for appliance purchases via online utility marketplaces for amounts up to \$5,000, enrolled by one fintech lender participating in GoGreen Home (as of 12/31/21). The average size of a marketplace microloan during the reporting period was roughly \$1,400.

³ In August 2021, through Decision 21-08-006, the California Public Utilities Commission required that CAEATFA begin reporting on "annual estimated energy savings from installed measures funded through CHEEF programs" as part of CAEATFA's quarterly reports; this stand-alone report provides retroactive estimates for loans enrolled through GoGreen Home, and reporting for GoGreen Business will begin after loan volume has increased.

⁴ Because customers are taking on the full cost of energy efficiency measures with financing, CAEATFA has allowed customers to finance measures to code and/or that will not be repaid through bill savings. For example, windows are a high-cost item that customers install for several reasons, including keeping out dust, improving quietness, or aesthetics, as well as energy savings.

⁵ Definitions are based on the ["Energy Efficiency Over Time: Measuring and Valuing Lifetime Energy Savings in Policy and Planning" report](#) from the American Council for an Energy-Efficient Economy. "Total annual savings" evaluates the savings in a particular year from measures installed in that year, plus the savings persisting from measures installed in prior years.

- A portion of eligible measures representing 3% of total Program activity have been excluded from this report, due to there being too few projects that installed the measure or there being no known measure characterization from which to form deemed savings assumptions. A list of excluded measures is included in the appendix.

Future Reporting on Energy Savings

This report is not intended to replace an analysis of actual energy savings using measured or metered data. Because of limitations with the Investor-Owned Utilities (IOUs)’ ability to share actual energy usage data and challenges around data security, CAEATFA is providing these deemed estimates as the first step towards reporting energy savings generated by projects undertaken through GoGreen Home loans. CAEATFA hopes to conduct a normalized metered energy consumption (NMEC) analysis using actual pre- and post-project metered data in the future if data sharing with the IOUs can be achieved.

Going forward, CAEATFA will continue to refine these deemed estimates by further improving calculations, updating assumptions, incorporating measures that are currently excluded, and (if possible) comparing them with a sampling of pre- and post-project actual savings data from the IOUs, when the IOUs make such data available. Some estimates and values will change as these improvements are made; CAEATFA will release new versions of this report as needed to reflect updated calculations and make clear which version the related estimates are using.

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Deemed Energy Savings Estimates

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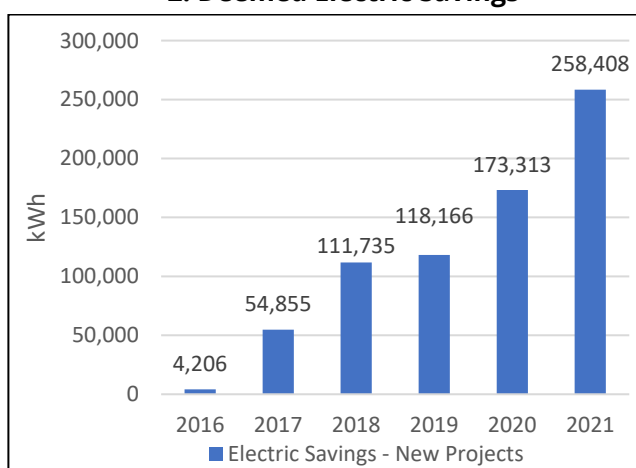
Deemed Energy Savings – Efficiency Measures (Standard Loans)

The charts on pages 3-4 report on deemed annual electric savings (in kWh), gas savings (in Therms), greenhouse gas (GHG) reductions (in tons of CO₂e), and peak demand savings (in kW) for the **1,558 projects** that were not marketplace microloans and did not include decarbonization/fuel switching measures.⁶ Reporting on decarbonization projects can be found on pages 5-6, and marketplace microloan reporting is on pages 7-8.

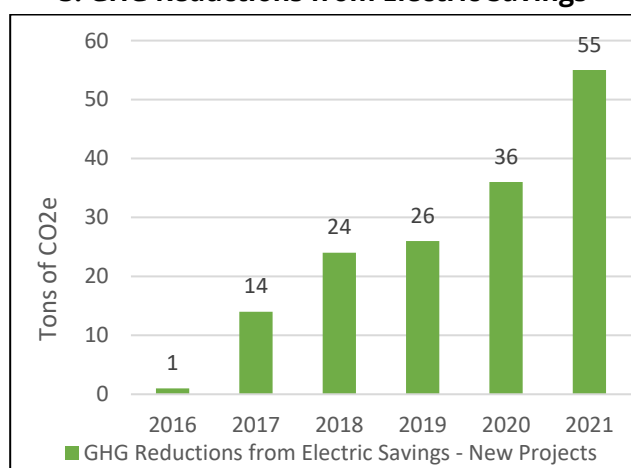
1. Total Annual Energy Savings – 2021

Electric Savings	Gas Savings	GHG Reductions	Peak Demand Savings
720,700 kWh	58,000 Therms	500 Tons CO ₂ e	850 kW

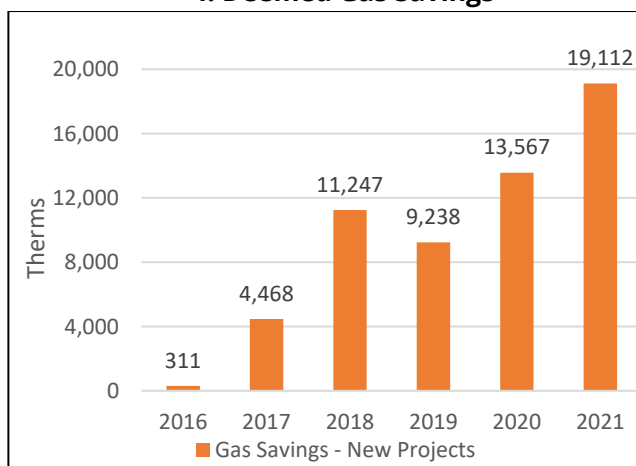
2. Deemed Electric Savings



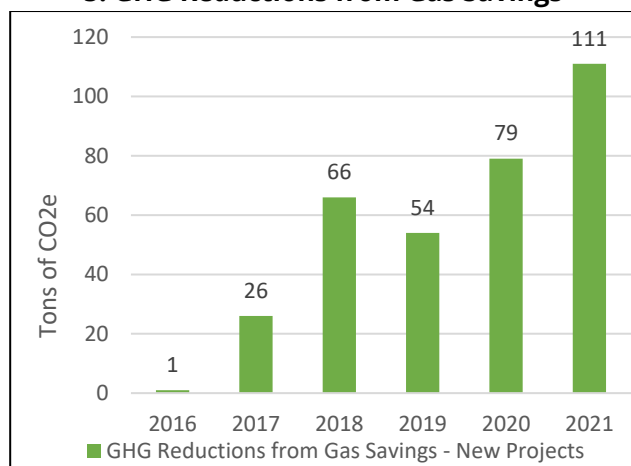
3. GHG Reductions from Electric Savings⁷



4. Deemed Gas Savings



5. GHG Reductions from Gas Savings⁸

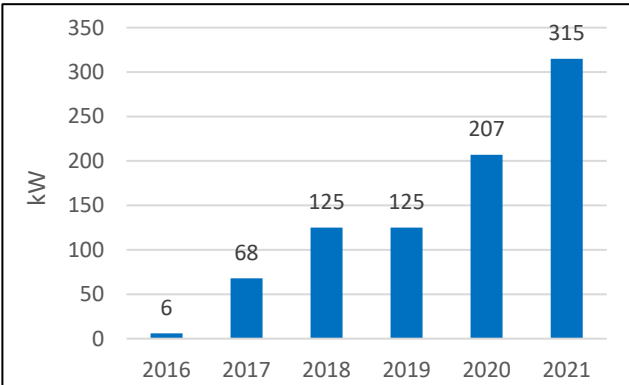


⁶ Decarbonization/fuel substitution measures, such as heat pumps, always result in negative electric savings and positive gas savings, which skews the overall data significantly when included alongside other measures. For this reason, these measures are reported on only in their own section on page 5.

⁷ GHG reductions for electric savings are based on IOU power content labels sourced from the [California Energy Commission](#). Calculations assume that the borrower is part of the base rate plan offered by their IOU(s).

⁸ GHG reductions for gas savings are based on CO₂ emissions coefficient data from the [US Energy Information Administration](#).

6. Electric Peak Demand Savings⁹



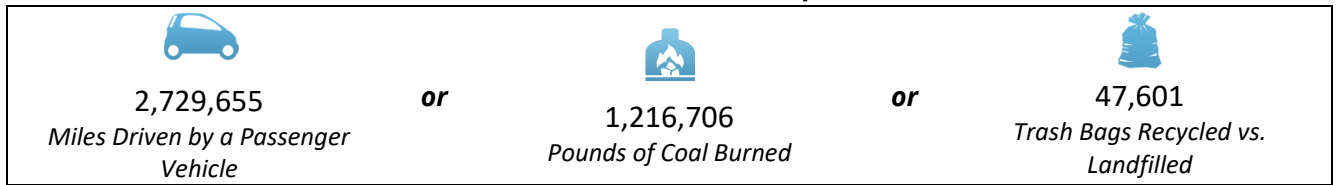
7. Breakdown of Total Annual Energy Savings by IOU – 2021¹⁰

	Electric Savings	Gas Savings
Pacific Gas & Electric	41%	58%
Southern California Edison	54%	N/A
Southern California Gas	N/A	39%
San Diego Gas & Electric	5%	3%






8. Average Savings by Project

Average Electric Savings	437 kWh per project <i>-6% est. annual electric usage change per property¹¹</i>
Average Gas Savings	35 Therms per project <i>-8% est. annual gas usage change per property¹¹</i>
Average GHG Reductions	0.3 Tons CO ₂ e per project
Average Peak Electric Demand Savings	0.5 kW per project

9. Cumulative GHG Reduction Equivalencies¹²



10. Total Annual Energy Savings by Top 5 Measures Installed – 2021

				
HVAC Equipment	Windows	HVAC Ductwork	Insulation	Cool Roofs
342,136 kWh	191,749 kWh	54,246 kWh	23,951 kWh	64,143 kWh
19,288 Therms	4,386 Therms	13,763 Therms	10,656 Therms	231 Projects
1,127 Projects	434 Projects	364 Projects	286 Projects	

⁹ Electric peak demand savings are estimated for each electric measure using pre-determined values from the California eTRM and other sources. For more information, please see the appendix.

¹⁰ Gas savings are not reported for Southern California Edison because the utility offers very limited gas service. Similarly, there are no electric savings reported for Southern California Gas because they do not offer electric service.

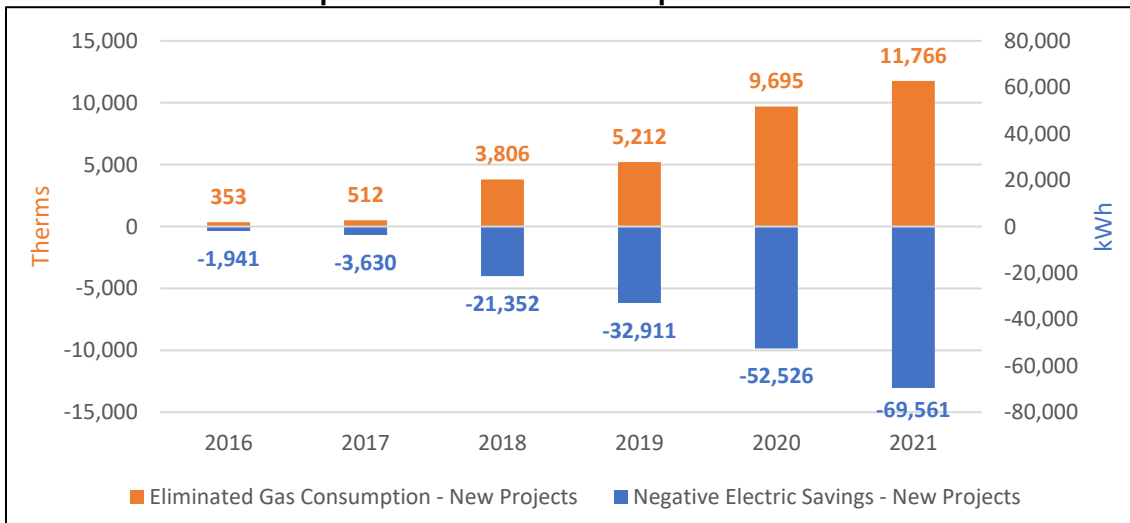
¹¹ Estimates are based on California household energy consumption figures from the [US Energy Information Administration](#).

¹² GHG reduction equivalency values are calculated via the US Environmental Protection Agency's [Greenhouse Gas Equivalencies Calculator](#), based on 1,212.2 US tons of CO₂e saved (combined GHG reduction estimates for electric and gas savings, not including decarbonization measures). These values reflect the cumulative savings that have persisted over the Program's lifetime.

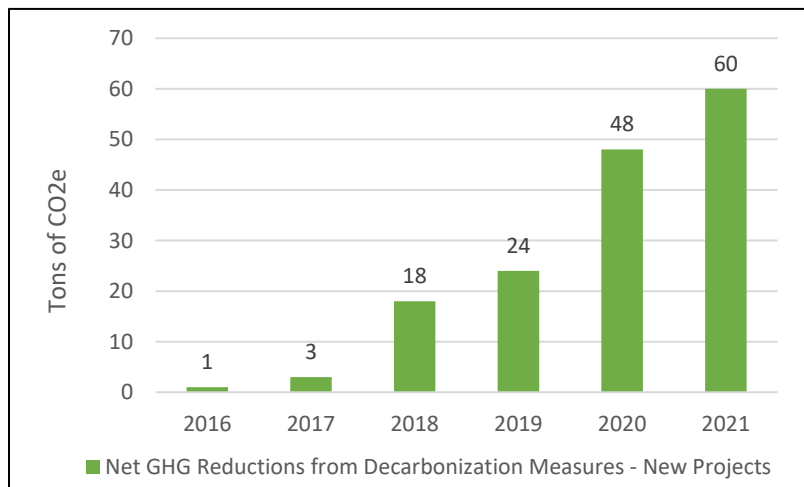
Deemed Energy Savings – Decarbonization/Fuel Substitution Measures (Standard Loans)

Decarbonization measures contribute towards the State’s goal of greenhouse gas reduction by substituting gas-fueled measures with electric-fueled measures that can more readily take advantage of clean power sources. The below tables provide estimated energy savings and GHG emissions reductions for the **151 projects** that installed decarbonization measures (heat pumps, ductless mini splits with heat pumps, heat pump water heaters, and induction ranges) through GoGreen Home during the reporting period. Because these measures switch the customer’s fuel source from gas to electric, they result in eliminated gas consumption and increased electric usage that skews data when included with other measures. For this reason, energy savings data for these measures is reported separately here.

11. Eliminated Gas Consumption and Electric Grid Impacts from Decarbonization Measures¹³



12. Net GHG Reductions from Decarbonization Measures¹⁴



¹³ The eliminated gas consumption in Therms and increased electric consumption in kWh are both reported here to demonstrate the grid impacts, both positive and negative, from decarbonization/fuel substitution measures.

¹⁴ Data in this chart reflects the net value of GHG reductions resulting from eliminated gas consumption from decarbonization measures minus the GHG impact from new electric consumption generated by those measures.




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13. Average and Total Annual Gas Savings and Net GHG Reductions from Decarbonization Measures

Gas Savings		Net GHG Reductions	
208 Therms <i>Average per Project</i>	31,344 Therms <i>Total Annual Savings - 2021</i>	1.02 Tons of CO2e <i>Average per Project</i>	154 Tons of CO2e <i>Total Annual Savings - 2021</i>

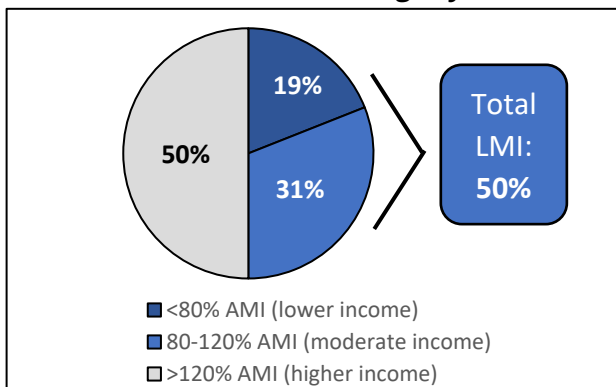
14. Cumulative Net GHG Reduction Equivalencies for Decarbonization Measures¹⁵

 725,761 <i>Miles Driven by a Passenger Vehicle</i>	<i>or</i>	 323,498 <i>Pounds of Coal Burned</i>	<i>or</i>	 12,656 <i>Trash Bags Recycled vs. Landfilled</i>
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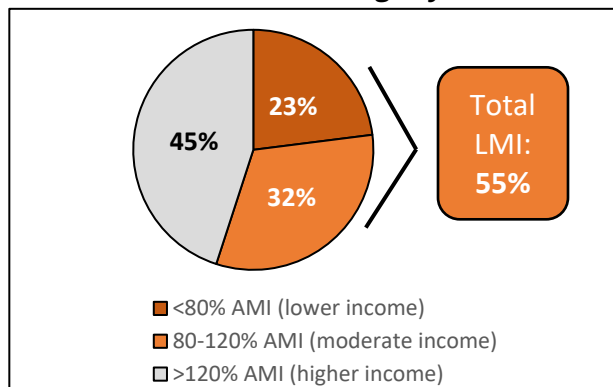
Deemed Energy Savings – Underserved Borrowers (Standard Loans)

The below tables break down the energy savings estimates by income level¹⁶ of each property's census tract for the **1,558 projects** that were not marketplace microloans and did not include decarbonization/fuel switching measures. During the reporting period, properties in census tracts with lower incomes (<80% of the Area Median Income [AMI]) accounted for 19% of loan dollars enrolled; moderate incomes (80-120% AMI) accounted for 33% of loan dollars enrolled; and higher incomes (>120% AMI) accounted for 48% of loan dollars enrolled.

15. Breakdown of Electric Savings by Income Level



16. Breakdown of Gas Savings by Income Level



The below tables break down the energy savings estimates by CalEnviroScreen score¹⁷ of each property's census tract for the **1,558 projects** that were not marketplace microloans and did not include decarbonization/fuel switching measures. During the reporting period, properties in census tracts with CalEnviroScreen scores between

¹⁵ GHG reduction equivalency values are calculated via the US Environmental Protection Agency's [Greenhouse Gas Equivalencies Calculator](#), based on 322.3 US tons of CO2e saved (combined GHG reduction estimates for electric and gas savings from decarbonization measures). These values reflect the cumulative savings that have persisted over the Program's lifetime.

¹⁶ Low-to-Moderate Income (LMI) census tracts, for the purpose of this reporting, includes tracts with a median income that falls below 120% of the Area Median Income (AMI).

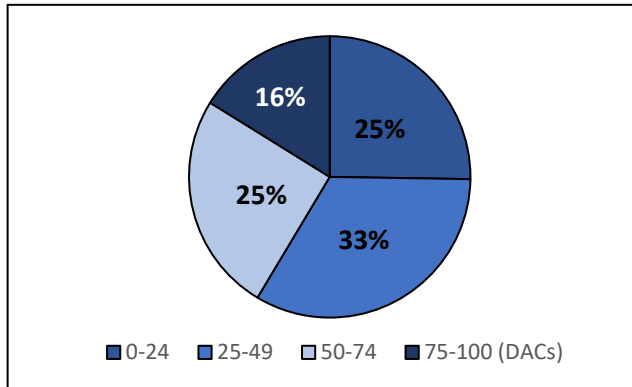
¹⁷ CAEATFA reports loans for properties in tracts scoring in the top [CalEnviroScreen](#) quartile (75-100%) as loans for projects in disadvantaged communities (DACs).

Deemed Energy Savings Estimates

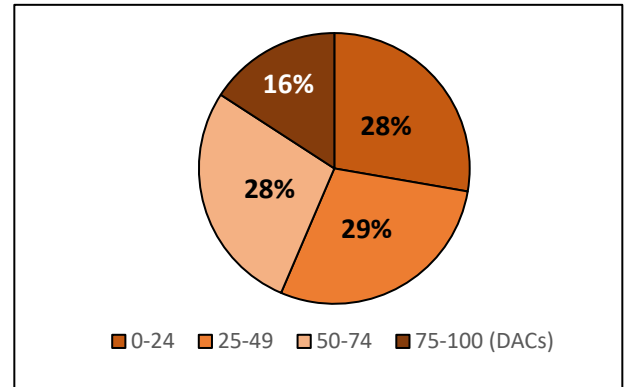
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0-24 accounted for 27% of loan dollars enrolled; scores between 25-49 accounted for 32% of loan dollars enrolled; scores between 50-74 accounted for 25% of loan dollars enrolled; and scores between 75-100 accounted for 16% of loan dollars enrolled.

17. Breakdown of Electric Savings by CalEnviroScreen Quartile



18. Breakdown of Gas Savings by CalEnviroScreen Quartile



Deemed Energy Savings – Marketplace Microloans

This section reports on the **298 marketplace microloans** enrolled by One Finance and Enervee, who offer a product that finances customer purchases from online utility marketplaces. Microloans, per the GoGreen Home regulations, are limited to \$5,000 and are reported separately so as not to skew data presented for standard loans. Marketplace microloans launched in the third quarter of 2021 and were only available in SoCalGas territory as of December 31, 2021, which means that only gas measures were available to finance during the reporting period.

19. Total Annual Energy Savings and GHG Reductions – Q3-Q4 2021

	Electric Savings	Gas Savings
Energy Savings	6,655 kWh	1,360 Therms
GHG Reductions	1.6 Tons of CO ₂ e	7.9 Tons of CO ₂ e

20. Average Savings by Project

Electric Savings	Gas Savings	Greenhouse Gas Reductions
22 kWh per project	4.6 Therms per project	0.03 Tons CO ₂ e per project

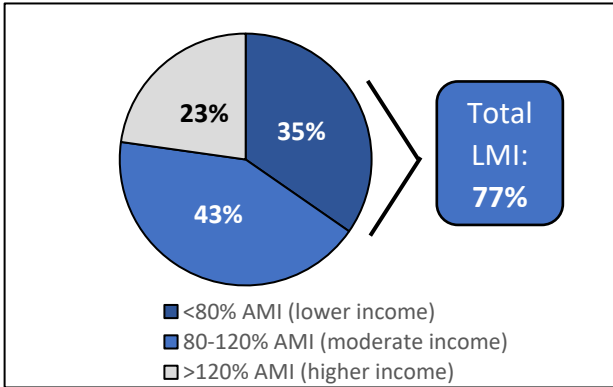
Deemed Energy Savings – Underserved Borrowers (Marketplace Microloans)

The below tables break down the energy savings estimates by income level of each property's census tract for the **298 marketplace microloans** enrolled in GoGreen Home. During the reporting period, properties in census tracts with lower incomes (<80% AMI) accounted for 30% of microloan dollars enrolled; moderate incomes (80-120% AMI) accounted for 44% of microloan dollars enrolled; and higher incomes (>120% AMI) accounted for 26% of microloan dollars enrolled.

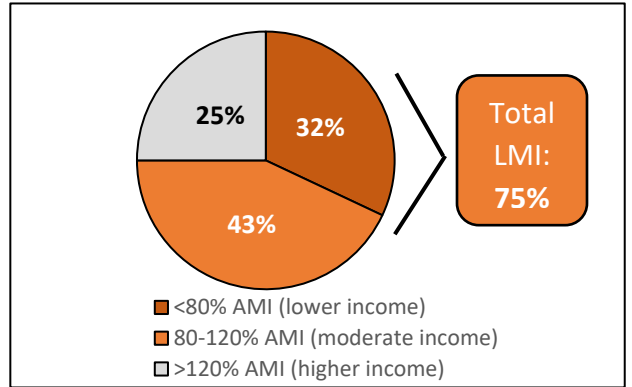
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21. Breakdown of Electric Savings by Income Level

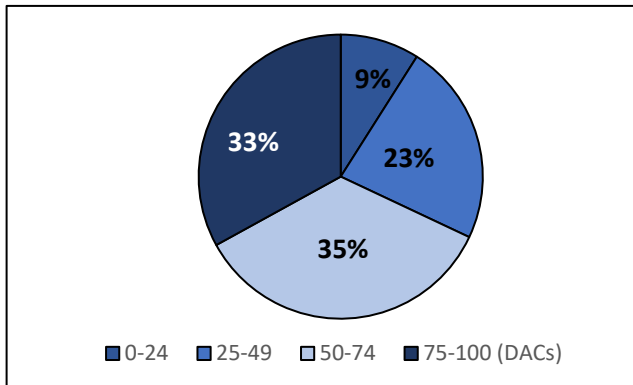


22. Breakdown of Gas Savings by Income Level

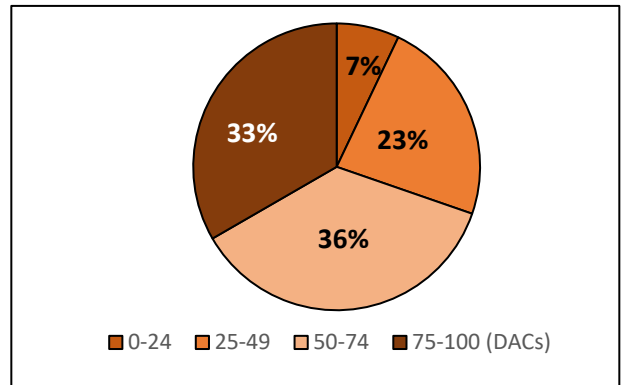


The below tables break down the energy savings estimates by CalEnviroScreen score of each property's census tract for the **298 marketplace microloans** enrolled in GoGreen Home. During the reporting period, properties in census tracts with CalEnviroScreen scores between 0-24 accounted for 7% of microloan dollars enrolled; scores between 25-49 accounted for 24% of microloan dollars enrolled; scores between 50-74 accounted for 36% of microloan dollars enrolled; and scores between 75-100 accounted for 33% of microloan dollars enrolled.

23. Breakdown of Electric Savings by CalEnviroScreen Quartile



24. Breakdown of Gas Savings by CalEnviroScreen Quartile



Appendix

Model Summary

The model for energy savings calculations presented in this report is developed by CAEATFA's contracted Technical Advisor, Energy Futures Group (EFG). Pre-project equipment efficiency is assumed to be typical existing or at-code performance levels, often as prescribed by the California eTRM. Post-project efficiency is based on the typical performance of the equipment installed; while exact make and model information is not collected for each installed measure, the methodology for this report incorporates expected performance based on the GoGreen Home efficiency requirements for the measure. Annualized energy savings estimates for each eligible energy efficiency measure are calculated by:

1. Identifying pre-project baseline condition assumptions relevant to the measure, such as SEER level of a pre-existing HVAC unit, based on sources including the California eTRM
2. Identifying post-project efficient condition assumptions relevant to the measure, such as the incorporation of R-38 insulation, using the same source that provided the pre-project baseline
3. Factoring in known variables, such as climate zone, building size, and operating characteristics

The basis for the energy savings estimates is the California eTRM, unless noted otherwise. Building characteristics such as square footage and heating system capacity, based on the California DEER 2020 Single Family Building Prototypes, are used when applicable to quantify savings on a household basis. Finally, project-specific inputs including unit quantity and climate zone are incorporated.

Measures Included

GoGreen Home has 58 eligible energy efficiency measures, and 47 of these measures have been installed on at least one project. Deemed energy savings have been characterized for 30 out of the 47 installed measure types, which represent 97% of all measures installed through the Program (3,529 out of the total 3,640 installed measures). Measures will continue to be added to the deemed estimates as more are installed and as additional deemed measure characterizations become available.

The 17 measure types that were installed on at least one GoGreen Home project but were not characterized for deemed estimates in this report were excluded for the following reasons:

- Seldomly installed measures (14 measure types, 35 projects) – These measure types were utilized on very few projects. Many measures, such as window film, were only installed once during the reporting period. Collectively, the seldomly installed measures were included in 1.7% of the 2,007 total projects installed (the combined total of standard loans and microloans) during the reporting period.
- Whole building air sealing (62 projects) – No known deemed measure characterization is available for California. This measure may be added to a future version of this report, pending conversion from another state's technical reference manual.
- Duct sizing/optimization (14 projects) – No known deemed measure characterization was available at the time of reporting. A characterization for this measure that was incorporated into the California eTRM in January 2022 will be captured in a future version of this report.
- Other measures qualifying through IOU, REN or CCA programs (5 projects) – Borrowers may include measures in their projects that are not on the GoGreen Home eligible measure list so long as they qualify for an IOU, REN or CCA energy efficiency or demand response program.

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However, these measures vary each time they are enrolled and thus are unable to be evaluated for energy savings estimates.

Calculation Descriptions

The table below summarizes the calculations and considerations made to develop the estimates presented in this report:

Calculation	Description
Deemed Electric Savings	Combined amount of estimated electric energy savings as calculated for each installed measure.
Deemed Gas Savings	Combined amount of estimated gas energy savings as calculated for each installed measure.
Greenhouse Gas Reductions from Electric Savings	Estimated GHG reductions resulting from the deemed electric energy savings. GHG emissions factor calculated from the CO ₂ emissions rate on the 2020 IOU power content labels. ¹⁸
Greenhouse Gas Reductions from Gas Savings	Estimated GHG reductions resulting from the deemed gas energy savings. GHG emissions factor assumes a CO ₂ emissions rate of 11.662 pounds of CO ₂ per Therm. ¹⁹
Peak Electric Demand Savings	Estimated reduction of electrical demand, at the time of system peak. ²⁰
Energy Savings by Measure (Gas and Electric)	Total amount of deemed energy savings associated with the most frequently installed measures in GoGreen Home.
Energy Savings by IOU (Gas and Electric)	Total amount of deemed energy savings from measures installed in projects enrolled within the four IOU territories.
Energy Savings by CalEnviroScreen Score (Gas and Electric)	Percentage of deemed energy savings broken down by CalEnviroScreen score quartile, based on the census tract in which each project was installed. ²¹
Energy Savings by Income Level (Gas and Electric)	Percentage of deemed energy savings broken down by income level, based on the census tract in which each project was installed. ²²

Note that energy savings estimates for fuel switching measures (heat pump technologies for space and water heating) are also calculated using the methods described in the table, but are reported separately due to the significant reduction in gas use/increase in electric use that result from these projects. The model is also built to factor in the expected useful life of all measure life cycles and savings will “roll off” when they are reached, but this does not apply to this report, as it covers approximately 5 years of Program activity and the earliest end of measure life is 9 years (for smart thermostats).

¹⁸ Power content labels are sourced from the [California Energy Commission](#). Calculations assume that the borrower is part of the base rate plan offered by their IOU(s).

¹⁹ Based on CO₂ emissions coefficient data from the [US Energy Information Administration](#).

²⁰ Values for peak demand savings estimates are derived from the California eTRM and other sources that inform measure characterization throughout the report.

²¹ [CalEnviroScreen](#) is a pollution burden mapping tool that uses environmental, health, and socioeconomic data to produce scores for every census tract in California; CAEATFA is reporting loans for properties in tracts scoring in the top quartile (75-100%) as loans for projects in disadvantaged communities (DACs).

²² Low-to-Moderate Income (LMI) census tracts are those with median incomes that fall below 120% of the Area Median Income (AMI).

Property Assumptions

Property qualities that influence calculations of deemed energy savings, such as the size of and stories within a building and the areas of attics and walls, are based on the CPUC's DEER 2020 prototypes for single family buildings, which can be reviewed in the [CPUC's READI database](#). Estimates for other area sizes needed for these calculations, including roofs and floors, were informed by data provided in the DEER 2020 prototypes. This data was then combined with [climate zone data](#) and [average heating/cooling data](#) from the US Energy Information Administration. Throughout the report, the most frequently used property assumptions are cooled/heated building area and cooling/heating capacity.

Sources

The below sources were used to develop the measure characterizations and assumptions that contributed to the calculation of deemed energy savings throughout this report:

- [Berkeley Lab RESFEN Window Analysis Tool](#)
- [California eTRM](#)
- [California Municipal Utilities Association Savings Estimation TRM](#)
- [California Public Utilities Commission Remote Ex-Ante Database Interface \(READI\)](#)
- [Indiana TRM](#) (see duct insulation in the measure characterization assumptions table below for more information on how this source was used)
- [Oakridge National Laboratory Cool Roof Calculator](#)

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Measure Characterization Assumptions

GoGreen Home Measure Code	Measure Name	Baseline Condition	Efficient Condition	Additional Assumptions	Source
AP-ACLN	Air Cleaner/Purifier	Standard, air cleaner, 100-150 CADR	Efficient, room air cleaner, 100-150 CADR, ENERGY STAR +30% (2.6 CADR/watt)	Single family, normal replacement.	California eTRM Measure ID SWAP008-01
BE-INSA	Attic Insulation	Customer existing insulation	R-38 insulation added to existing insulation level	Single family, add-on equipment. DEER 2020 building prototype attic area, central AC with gas furnace.	California eTRM Measure ID SWBE006-01
HV-AC14, HV-AC15, HV-AC16, HV-AC17, HV-AC18, HV-CACS ²³	Central Air Conditioning Unit	Residential central AC, SEER <= 14	Residential central AC, SEER 14-18	Single family, accelerated replacement, split system, <45 kBtu/hr, DEER 2020 building prototype cooling capacity. Savings for HV-AC14 (14 SEER) based on 50% of HV-AC15 (15 SEER).	California eTRM Measure ID SWHC049-02
HV-CHAC ²⁴	Central Heating (Furnace) and Air Conditioning System	N/A	N/A	N/A	N/A
AP-DRYE	Clothes Dryer (Electric)	Standard-size clothes dryer, electric, vented	ENERGY STAR basic tier, standard-size electric clothes dryer, vented	Single family, normal replacement.	California eTRM Measure ID SWAP003-03
AP-DRYG	Clothes Dryer (Gas)	Standard-size clothes dryer, gas, vented	ENERGY STAR basic and advanced tier, standard-size electric clothes dryer, vented	Single family, normal replacement.	California eTRM Measure ID SWAP003-03
AP-WASH	Clothes Washer	Standard clothes washer, front or top loading, dwelling	ENERGY STAR front and top loading washer	Single family, normal replacement. Savings are the average of front and top loading washers.	California eTRM Measure ID SWAP004-02
AP-CVGR	Convection Gas Oven	Standard efficiency residential gas oven with preheat energy consumption > 2200 Btu and cooking efficiency < 30%	High energy efficiency residential gas oven with preheat energy consumption <= 2200 Btu and cooking efficiency >= 30%	Single family, normal replacement.	California eTRM Measure ID SWAP017-02

²³ Due to consolidations made to the GoGreen Home measure list, some HVAC-related measures are calculated by arithmetic, not pre- and post-project energy use. Savings for HV-CACS are the average of HV-AC14 through HV-AC18.

²⁴ HV-CHAC is the sum of HV-CACS and HV-FURR.

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BE-ROOF	Cool Roof	Flat black roof	Cool roof with solar reflectance = 85 and infrared emittance = 43	Electric savings calculated from ORNL Cool Roof Calculator tool for city within/nearest the respective climate zone. Cool roof performance of SR-85 and IE-43 assumed based on average of CRRC product database. Existing conditions assumed R-20 ceiling and SEER 13 (3.8 COP) air conditioning system. Peak demand savings calculated using the load factor from BE-WIND.	Oakridge National Laboratory Cool Roof Calculator
AP-DISH	Dishwasher	Standard residential dishwasher, 307 kWh annual energy use	Efficient residential dishwasher, <= 199 kWh annual energy use	Single family, normal replacement.	California eTRM Measure ID SWAP006-03
HV-DUCI	Duct Insulation	Uninsulated ducts (25%) and R-4.2 duct insulation (75%), with average duct leakage, in unconditioned attic	R-8 duct insulation, with average duct leakage, in unconditioned attic	Single family, add-on equipment. Electric and gas savings calculations performed according to the Indiana TRM v2.2. Custom equivalent full-load hours (EFLH) for cooling and heating were calculated for each California climate zone. DEER 2020 building prototype cooling and heating capacity. Peak demand savings calculated using the load factor from HV-CACS.	Custom conversion based on figures from the Indiana TRM ²⁵
HV-DUCX	Duct Sealing	Existing residential duct system, 24-40% leakage, central AC with gas furnace, building year < 2006	Ducts sealed and tested to 12% leakage	Single family, building year < 2006, average of 24% and 40% existing leakage, duct seal and test to 12% leakage, DEER 2020 building prototype cooling capacity central A/C with gas furnace.	California eTRM Measure ID SWSV001-04
HV-EVAP	Evaporative Cooling	13 SEER (11.09 EER) Split System Air Conditioner	Direct-Indirect Evaporative Cooler	Single family, normal replacement.	California READI Measure ID D03-407
BE-INSF	Floor Insulation	Vented, unconditioned crawl space	Unvented, conditioned crawl space insulated to R-19	Single family, add-on equipment. DEER 2020 building prototype floor area, central AC with gas furnace. Savings for climate zones 1-14 and 16 are calculated using cooling degree days and heating degree days for each climate zone.	California eTRM Measure ID SWWB006-03
HV-FR80, HV-FR90, HV-FR94,	Furnace - Residential Central Heating	Existing residential furnace, AFUE 80%	Residential furnace 92-97% AFUE with variable speed fan	Single family, normal replacement, 92-97% AFUE, replacing 80% AFUE furnace. Savings for HV-FR80	California eTRM Measure ID SWHC031-0

²⁵ A California-specific resource for the measure characterization of duct insulation is not available, so estimates are based on the methodology used in the Indiana TRM, which was applied to California properties by calculating the deemed estimate based on climate zone and associated heating/cooling degree days.

Deemed Energy Savings Estimates

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HV-FR96, HV-FURR ²⁶				(80-89% AFUE) based on 50% of HV-FR90 (92% AFUE).	
HV-HP14, HV-HP15, HV-HP16, HV-HP17, HV-HP18, HV-HPMP ²⁷	Heat Pump	Residential SEER-rated split AC SEER = 13 and gas furnace with AFUE 80%	Residential heat pump with SEER 15-18 and HSPF >= 8.7	Fuel switch. Single family, normal replacement, DEER 2020 building prototype cooling capacity. Electric savings for HV-HP14 (14 SEER) are extrapolated from HV-HP15 (15 SEER) and HV-HP16 (16 SEER), and gas savings are equal to HV-HP15.	California eTRM Measure ID SWHC045-01
WH-HP55	Heat Pump Water Heater	Storage natural gas water heater, 40-60 gal, UEF = 0.56-0.61	ENERGY STAR heat pump water heater, 45-75 gal, UEF = 3.31-3.33	Fuel switch. Single family, normal replacement.	California eTRM Measure ID SWWH025-04
AP-INDU	Induction Range or Cooktop	Natural gas cooktop, 50% with natural gas oven and 50% with no oven	Induction Cooktop, 50% with electric range	Fuel switch. Single family, normal replacement.	California eTRM Measure ID SWAP013-01
LI-LEDL	LED Lighting	Unweighted average halogen and CFL interior and exterior lamps	Unweighted average LED interior and exterior lamps	Single family, normal replacement, savings per lamp.	California Municipal Utilities Association Savings Estimation TRM
HV-MSPL	Mini Split Ductless AC System	Room A/C, EER 9.8	Mini-split ductless HP, SEER 18-21	Single family, normal replacement, DEER 2020 building prototype cooling capacity.	California eTRM Measure ID SWHC050-02
HV-MSHP	Mini Split with Heat Pump	Standard efficiency wall furnace (AFUE = 67%) and window AC (EER = 11)	Ductless mini-split heat pump (SEER 15-18, HSPF 8.7-9.4),	Fuel switch. Single family, normal replacement, DEER 2020 building prototype cooling capacity.	California eTRM Measure ID SWHC044-02
PP-MOTR	Pool Pump Motor	100% two speed pool pump	Variable-speed pool pump	Single family, normal replacement, self install.	California eTRM Measure ID SWRE002-01
BE-RADB	Radiant Barrier	Attic with no radiant barrier.	Radiant barrier installed in attic.	Single family, add-on equipment. 13 SEER air conditioning and 78% AFUE central furnace.	California Municipal Utilities Association Savings Estimation TRM
AP-FRIG	Refrigerator	Standard bottom freezer, with ice, large (>= 16.5 cu ft)	ENERGY STAR bottom freezer with ice.	Single family, normal replacement, large (>= 16.5 cu ft).	California eTRM Measure ID SWAP001-02

²⁶ Savings for HV-FURR are the average of HV-FR80, HV-FR90, HV-FR94, and HV-FR96.

²⁷ Savings for HV-HPMP are the average of HV-HP14 through HV-HP18.

Deemed Energy Savings Estimates

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HV-SMRT	Smart Thermostat	Non-programmable or programmable thermostat, DX w/ gas heat	Smart thermostat DX w/ gas heat	Single family, normal replacement, central AC with gas furnace.	California eTRM Measure ID SWHC039-03
WH-WHEG	Tank Storage Water Heater (Gas)	Residential storage water heater, 40-50 gal, medium-high draw, EF = 0.58	ENERGY STAR water heater, 40-50 gal, medium-high draw, UEF >= 0.80	Single family, accelerated replacement.	California eTRM Measure ID SWWH012-02
WH-GTNK	Tankless On-Demand Water Heater (Gas)	Residential storage water heater, 40 gal, 0.58 UEF	Residential instantaneous water heater, <= 200 kBtu/hr, 0.87-0.95 UEF	Single family, normal replacement, medium draw. Savings are the average of 0.87 UEF and 0.95 UEF.	California eTRM Measure ID SWWH013-02
BE-INSW	Wall Insulation	2x4 Wall with R-0 Insulation	Wall Blow-In R-0 to R-13 Insulation	Single family, add-on equipment. DEER 2020 building prototype wall area, central AC with gas furnace. The California eTRM only provides an existing condition scenario of uninsulated walls. Savings are derated by 50% to account for homes that already have partially insulated walls.	California eTRM Measure ID SWBE007-01
HV-HFAN	Whole House Fan	No whole house fan	Whole house fan, 1.5-3.0 CFM, ECM motor	Single family, add-on equipment. Airflow >= 1.5 CFM per Title 24. No savings for climate zone 1.	California eTRM Measure ID SWHC030-01
BE-WIND	Windows	37% single pane, non-metal frame, clear, U-factor 0.88, SHGC 0.64; 63% double pane, non-metal frame, clear, U-factor 0.52, SHGC 0.57	ENERGY STAR, 2-pane, non-metal frame, low-E, U-factor 0.28, SHGC 0.20-0.50 by climate zone	Savings calculated by climate zone using LBNL RESFEN. Equal orientation, existing 1-story house, 300 sq. ft. total window area (16.7% of floor area), typical shading assumed. Unit savings assume typical window size of 30" x 48".	Berkeley Lab RESFEN Window Analysis Tool