



SMUD Pilot Natural Refrigerant Incentive Program

Program Summary

Powering forward. Together.



Background:

SMUD's Pilot Natural Refrigerant Incentive Program works with our existing Custom Incentive and Savings By Design Programs to provide additional incentives to commercial customers that install natural refrigeration systems or retrofit a system from a high-global warming potential (GWP) refrigerant to a natural refrigerant. Participation will be seamless with existing programs; this program will simply provide an additional incentive to recognize the natural refrigerant greenhouse gas (GHG) benefit.

Traditional refrigerants contribute considerably to climate change, and in some cases degrade the ozone layer. The refrigerants that harm the ozone layer have already been or are being phased out. However, the use of high-GWP refrigerants which are potent GHGs is growing, as is their contribution to global climate change. Refrigerant leaks which occur through the normal course of system operation, maintenance and disposal are the source of these problematic emissions.

Next generation refrigeration systems can reduce the contribution to climate change of high-GWP refrigerants through the use of natural refrigerant alternatives that have very minimal climate impacts. Upgrading or installing natural refrigerant systems also provides an opportunity to increase system performance and achieve energy efficiency savings. SMUD's new Pilot Natural Refrigerant Incentive Program builds on our existing Custom Incentive and Savings By Design Programs for



refrigeration systems by offering incentives for not only the energy savings achieved through efficiency improvements, but also the direct GHG emissions reduction achieved.

In addition to the achievement of energy and GHG benefits, one of the primary purposes of this pilot program is to conduct research that will contribute to the growing body of literature that supports refrigerant

policy and practice. By building a market and sharing insights, SMUD will help to break down barriers to broad-scale adoption of natural refrigerant systems through the Pilot Natural Refrigerant Incentive Program.

Eligibility & Program Overview

To be eligible for the Pilot Natural Refrigerant Incentive Program, commercial or industrial customers must meet the following criteria:

- Install a new natural refrigerant system that uses ammonia, CO₂, or a hydrocarbon as a refrigerant and meet the other requirements of the Custom Incentive or Savings By Design Programs; or
- Retrofit an existing refrigerant system to use a natural refrigerant (ammonia, CO₂, or a hydrocarbon) and meet the other requirements of the Custom Incentive Program¹

Additional eligibility requirements to receive an incentive can be found in the Custom Incentive and Savings By Design Program brochures². A bonus incentive equal to 25% of the calculated direct GHG emissions reduction incentive is offered for projects implemented in disadvantaged communities by small businesses, which are expected to be particularly challenged to meet new refrigerant regulations. Disadvantaged

communities are defined as those ranking in the top 25% according to CalEnviroScreen 3.0³ (the red and orange areas as seen in Figure 1). Depending on demand for the program, preference will be given to projects located in the top 10% of disadvantaged communities (the red areas shown in Figure 1). Consistent with SMUD's Supplier Education and Economic Development program⁴, small businesses are defined using the California Department of General Services (DGS) criteria⁵, though registration with DGS is not required.

In addition, SMUD will provide performance monitoring for the incentivized refrigeration system to collect energy data. Participants must agree to allow SMUD, or its designated contractors, access to the necessary refrigeration system and electrical system components to install sub-metering devices and to collect the data for a minimum of a three-year period. This data, which will be shared with the participant, will not be used to adjust the incentive provided to the participant, but rather to allow SMUD and the participant to increase their understanding of the energy performance of natural refrigerant systems. Participants

will also be asked to share annual refrigerant leak data to increase understanding of natural refrigerant system emissions performance. This can be provided directly to SMUD or by granting access to the participant's California Air Resources Board Refrigerant Management Program reports. Individual system data will not be released by SMUD to the public without prior voluntary approval from the system participant. SMUD reserves the right to publish or share aggregate level program data on natural refrigerant system performance⁶. These conditions, and others, are set out in the SMUD Pilot Natural Refrigerant Incentive Program Supplemental Application.

As this is a research-oriented Program, SMUD reserves the right to limit the refrigerant incentive to one per company (e.g., grocery chain) in order to ensure availability of funds to interested participants across a range of use conditions. Interested customers are encouraged to reach out directly to SMUD program administrators to determine whether this restriction may be applied. For applicants not already enrolled in the Program, the Program could be terminated at any time.

¹ This includes a requirement that the retrofit creates a permanent change ensuring that the system cannot switch back to a high-GWP refrigerant in the future.

² See <https://www.smud.org/en/business/save-energy/>

³ OEHHA, CalEnviroScreen. Online at: <http://oehha.ca.gov/calenviroscreen/>

⁴ See <https://www.smud.org/en/do-business-with-smud/small-business-incentive-program/>

⁵ DGS, Small Business Eligibility Requirements. Online at: <http://www.dgs.ca.gov/pd/Programs/OSDS/SBEligibilityBenefits.aspx>

⁶ See Supplemental Application example

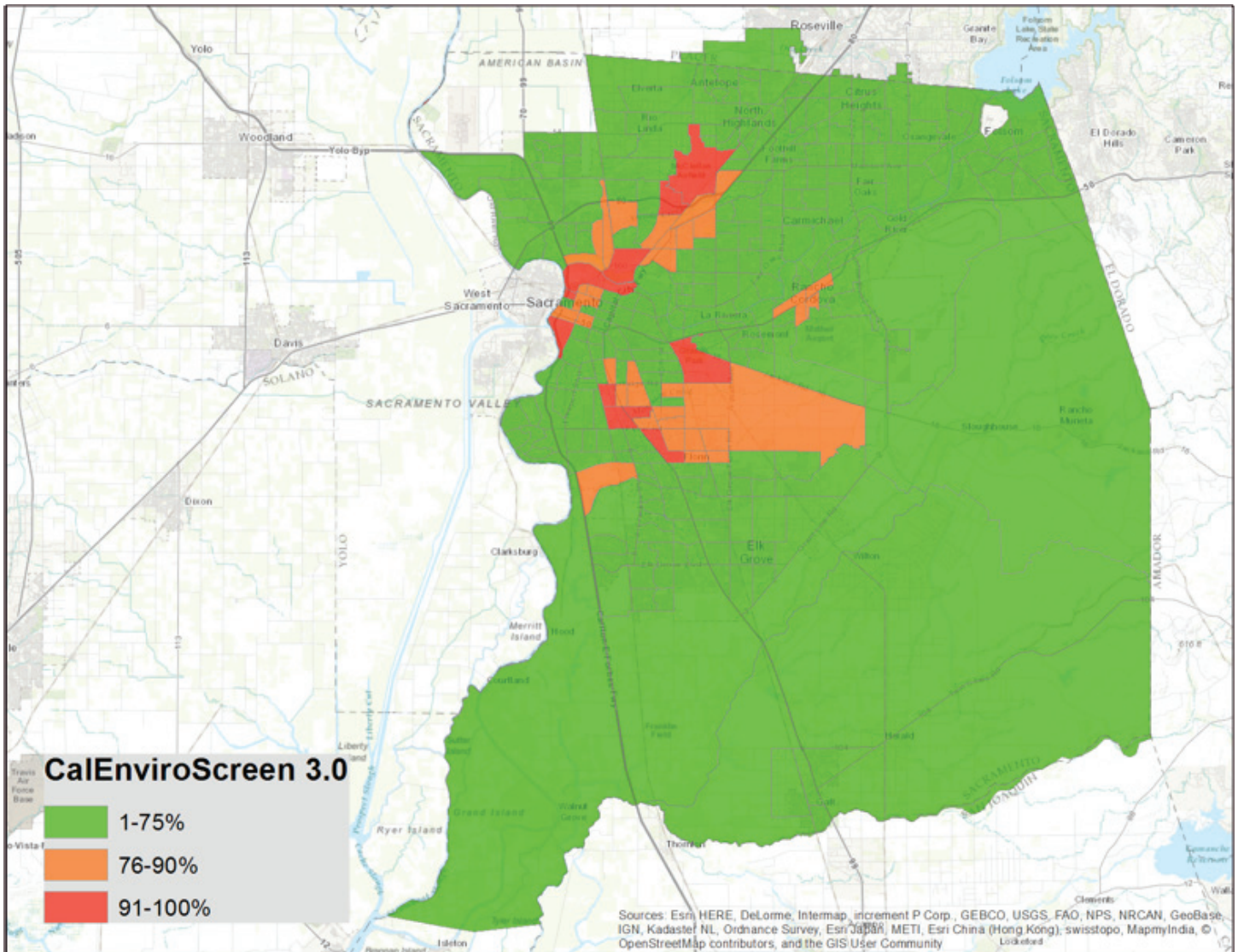


Figure 1. CalEnviroScreen3.0 scores within SMUD service territory. The 25% incentive bonus is available to all small or medium sized customers in census tracts that score above 75% (i.e. located in orange or red areas of the map).

Incentive Levels

The incentive will be administered through either the existing Custom Incentive Program for retrofit or replacement projects, or through the existing Savings By Design Program for new construction projects. The total incentive for participants will consist of two components that are calculated separately: an energy savings incentive payment and a direct GHG emissions reduction incentive payment.

Direct GHG Emissions Reductions Incentive

Incentives are based on decreasing direct GHG emissions from refrigerants over the system lifetime:

- \$25/MtCO₂e emissions reduction from refrigerants
- All projects located in disadvantaged communities (with preference for those in the top 10%) and implemented by small businesses will receive a 25% incentive bonus.
- Total incentive limited to 30% of project cost or \$150,000, whichever is less

Energy Savings Incentive

Eligible projects can qualify for energy efficiency incentives of up to \$150,000. Please refer to the Custom Incentive and Savings By Design Program requirements for the respective current incentive structures.

Combined incentive limited to 50% of project cost or \$250,000, whichever is less.

Final incentive for each project application will be calculated by SMUD staff and presented to customers prior to project construction.

Incentive Calculations

Specific guidelines for calculating the expected energy and demand reductions from your project remain unchanged from the existing Custom Incentive Program and Savings By Design Program. More details for these incentive calculations can be found in the program brochures⁷.

For retrofits, direct GHG emission reductions will be calculated for the project’s expected life based on the difference between the baseline performance (existing system refrigerant

and default leak rate) and forecast performance of the retrofitted system. For new construction, direct GHG emission reductions will be calculated based on the difference between a pre-defined baseline (performance of the most likely cost effective alternative) and forecast performance for the new system.

The following equation will be applied:

$$Direct\ GHG\ Reduction\ (tCO_2e) = Expected\ or\ Remaining\ Life \times [(GWP_{Baseline} \times Charge_{Baseline} \times Leak\ Rate_{Baseline}) - (GWP_{New} \times Charge_{New} \times Leak\ Rate_{New})]$$

The table below includes default values that SMUD expects to use to set the baseline in incentive calculations. Default leak rates are applicable to all projects,

while default refrigerant assumptions are used only for new construction projects in the Savings By Design Program. These factors were derived from U.S. Environmental Protection Agency data by the American Carbon Registry in developing a GHG offset methodology for advanced refrigeration systems through a

public and peer-review process. The default values will be used in most incentive calculations to ensure a consistent approach for all participants.

Segment	Baseline Parameter ⁸	Factor ⁸	Reference
Commercial Refrigeration (all but Stand-Alone Commercial Refrigeration)	Refrigerant: R-407A	GWP = 2107	US EPA
	Refrigerant Charge Size	2.56 lbs (1.16 kgs) refrigerant per MBTU/hr of cooling capacity of the new system	US EPA
	Annual Leak Rate	20%	US EPA; ACR analysis
Stand-Alone Commercial Refrigeration	Refrigerant: R-404a (50%) and HFC-134a (50%)	Blended GWP = 2676	US EPA
	Refrigerant Charge Size (per unit)	0.5kg ⁹	KW
	Annual Leak Rate	8%	US EPA; ACR analysis

⁷ See <https://www.smud.org/en/business/save-energy/>

⁸ American Carbon Registry, Emission Reduction Measurement and Monitoring Methodology for Use of Certified Reclaimed HFC Refrigerants and Advanced Refrigeration Systems. October, 2015. Available at: <http://americancarbonregistry.org/carbon-accounting/standards-methodologies/use-of-reclaimed-hfc-refrigerants-and-advanced-refrigeration-systems>

⁹ Expert input from K. Witman, KW Refrigerant Management Strategy

To align with statewide investment objectives including SB 535, the direct GHG emissions reduction incentive will be increased by an additional twenty-five percent for all projects located in

disadvantaged communities as defined by the top 25% of census tracts according to CalEnviroScreen 3.0, and implemented by small businesses as defined by California DGS. Depending on demand

for the program, preference will be given to projects located in the top 10% of disadvantaged communities (the red areas shown in Figure 1).

Application Requirements

Applicants to the Pilot Natural Refrigerant Incentive Program must submit the following information in addition to the requirements of the existing Custom Incentive or Savings By Design Programs for commercial refrigeration projects. Upon project acceptance, applicants must complete and sign the Supplemental Application.



Retrofits	Full Replacement or New Systems
<p>Baseline (Existing) System</p> <ul style="list-style-type: none"> • Refrigerant and GWP • System charge • System annual leak rate based on 3 years of system maintenance or refrigerant purchase records, if available <p>Retrofit System</p> <ul style="list-style-type: none"> • Equipment Costs • Installation Costs • Refrigerant and GWP • System charge • Forecast annual leak rate based on Engineering estimates • Cooling capacity (MBTU/hr) • Expected system remaining life 	<p>New System</p> <ul style="list-style-type: none"> • Equipment Costs • Installation Costs • Refrigerant and GWP • System charge • Forecast annual leak rate based on Engineering estimates • Cooling capacity (MBTU/hr) • Expected system useful life
<p>Additional Incentive Criteria</p> <ul style="list-style-type: none"> • Project location in CalEnviroScreen Disadvantaged Community • Small Business 	
<p>In addition to the above information participants may submit their estimates of energy, demand and GHG savings with explicit documentation and explanation of how the estimates were developed. SMUD will estimate savings factoring in any participant provided data or savings calculations. The final savings on which the incentive payment is based may or may not align with participant submitted calculations.</p>	