

**SVCE’s HPWH Program
Project Summary
BAAQMD Climate Protection Grant Program**

1. Quantification of GHG emissions reductions.

The overall metered (gross) and program-attributable (net) impacts are summarized in the table below. The “whole program” entries combine the results of all 102 Pilot participants.

Program Savings Impacts

		kWh Increase	Therms Decrease	GHG Reduction (lbs.)
Gross Impact	Per-participant	928	179	2,088
	Whole program	94,656	18,258	212,976
Net Impact	Per-participant	856	165	1,925
	Whole program	87,273	16,834	196,364

Methodology for calculation of GHG emissions reduction:

GHG emissions for gas consumption was estimated using 11.68 lbs. of CO₂ per therm as derived from the EPA Greenhouse Gas Equivalencies Calculator.¹ GHG emissions for electric energy consumption varied depending on whether SVCE customers were enrolled in SVCE’s GreenStart or GreenPrime product. GHG emissions for GreenStart customers were estimated at 0.0023 lbs. of CO₂ per kWh and 0 lbs. of CO₂ per kWh for GreenPrime customers.

SVCE provided electric billing data for 81 participants. Of these 81 participants, 33 were enrolled in the GreenPrime product. Thus, the weighted average GHG emission for this Pilot was estimated as 0.0014 lbs. of CO₂ per kWh.

GHG emissions savings was thus calculated as the difference in emissions from the gas water heaters versus HPWH water heaters. The following equation provides an example of this calculation:

$$\Delta GHG = \left(11.68 \frac{\text{lbs. of } CO_2}{\text{therm}} \cdot NGWH \right) - \left(0.0014 \frac{\text{lbs. of } CO_2}{\text{kWh}} \cdot HPWH \right)$$

¹ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Where:

- ΔGHG is the average annual GHG savings per household in units of lbs. of CO₂;
- $NGWH$ is the average annual gas consumption per natural gas water heater in units of therms; and
- $HPWH$ is the average annual electric consumption per HPWH in units of kWh.

Using the values observed under the SVCE program, the average GHG emissions savings can now be estimated as follows:

$$\left(11.68 \frac{\text{lbs. of } CO_2}{\text{therm}} \cdot 178.86 \text{ therms}\right) - \left(0.0014 \frac{\text{lbs. of } CO_2}{\text{kWh}} \cdot 927.59 \text{ kWh}\right) = 2088 \text{ lbs. of } CO_2$$

Therefore, the GHG emissions savings is approximately 2,088 lbs. of CO₂ per unit per year. The total CO₂ reduction attributable to the program is 212,976 lbs.

Projected vs actual GHG emissions reductions

Projected GHG emissions reductions (adjusted for 102 participants): 97.92 MTCO₂

Actual GHG emissions reductions (for 102 participants): 96.6 MTCO₂

The actual reductions in GHG emissions that resulted from implementation of this program were in close alignment with SVCE's initial projections stated in the grant application. With slight differences in calculations, the post-program calculation approach was more accurate and more conservative. For example, while the original application assumed average gas water heater use to be 192 therms/year, the post-program evaluation calculation assumed a slightly lower number of 179 therms/year. The post-program calculation also accounts for the SVCE clean energy customer rate (GreenStart or GreenPrime), as well as makes other energy use adjustments. The number for GHG emissions for gas WH consumption is the same across all calculations (11.68 lbs. in the post-program evaluation, which is an equivalent to 0.005 metric ton of CO₂ in the original proposal). The post-program calculation assumptions were derived from the EPA Greenhouse Gas Equivalencies Calculator that can be found at <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.

Re-calculating the original application estimate from 150 proposed participants to 102 actual participants, we arrive at 97.92 MTCO₂ of projected GHG emissions reductions (192 therms/year x 0.005 MTCO₂E/therm x 102 water heaters) per year per unit.

For more details on post-program GHG emissions reduction calculations please refer to the *Evaluation Report: FutureFit Heat Pump Water Heater Pilot* by ADM Associates, Inc.

2. Other metrics used to evaluate SVCE's HPWH program

In addition to GHG emissions reduction analysis, the following aspects of the program performance were also monitored and are worth noting here:

Metric: Customer Enrollment

- 296 applications were submitted
- 166 approved and granted Active Reservation status
- 102 completed WH installations (of these, 37 upgraded their electrical panel as well)

The remaining 64 withdrawn from the program or were removed due to non-response. A survey with drop-out customers were conducted to better understand their barriers to participation.

Metric: CARE/FERA Customer Tracking

The original goal of 10% of low-income customer participation proved to be very ambitious. Although, we came close to this goal on the enrollment side (8 CARE/FERA customer reservations were approved), only one completed the installation. Those customers who were unable to pursue this project, cited high upfront costs as their main reasons. SVCE made attempts to assist these customers by offering to coordinate payments with installers directly. Unfortunately, customers did not proceed. All low-income customers on SVCE HPWH program are marked for expedited rebate check processing to ensure they get the funds as soon as possible.

Category	Standard	CARE/FERA	Total
Complete	101	1	102
Withdrawn	57	7	64
Total Reservations	158	8	166

Metric: Equipment Replaced and Installed

- All 102 water heaters replaced were natural gas-powered units.
- Most participants (86) opted for Performance Package with Wi-Fi enabled units.
- Rheem-manufactured water heaters were installed most often (89), followed by A.O. Smith (12) and Sanden (1).
- 50-gallon tank was the most commonly selected size (60), followed by 65-gallon tanks (26) and 80-gallon tanks (16)

Installation Type	Low Income	Standard	Total
Performance		16	16
Without panel upgrade		13	13
With panel upgrade		3	3
Smart	1	85	86
Without panel upgrade	1	51	52
With panel upgrade		34	34
Total Installations			102

Metric: Customer Satisfaction

An online survey was sent to 83 participants (the census of participants as of June 2020) to assess customer motivations for participating and program satisfaction. Overwhelming majority of participants report positive experience with the program:

Participant Survey Results
95% have had positive experience with HPWH performance
96% are satisfied with SVCE's HPWH program
93% are satisfied with installing contractor

Metric: Participant Cost Analysis

Independent cost analysis was performed by an EM&V consultant (ADM Associates, Inc.), including calculation of the average installation cost per HPWH and the estimated annual fuel cost savings.

Average Installation Cost

Cost Type	Average Cost/Unit
Gross installation cost	\$ 6,283.12
Rebate amount	\$ 4,477.97
Net Installation Cost	\$ 1,805.15

Annual Fuel Cost Savings per Unit

Cost Type	Annual Fuel Cost/Unit
Natural gas water heater	\$ 261.72
HPWH	\$ 230.03
Annual Cost Savings	\$ \$31.69

Metric: Contractor Engagement

In total, **fifty-nine (59) contractors** had been engaged in installation work under SVCE program. This includes 41 plumbers who have gained – new or additional - experience installing HPWH technology. Contractor interviews were conducted to gain a better understand of the program impacts from the contractor perspective and to learn how contractor experience can be improved.

Metric: Inspector Engagement

Three inspector training sessions were conducted across SVCE service territory with **thirty-eight (38) inspectors** attending:

- 17 attended Milpitas session on 10/17/19
- 9 attended Morgan Hill & Gilroy session on 11/5/19
- 12 attended Cupertino session on 2/18/20

Metric: HPWH Buyer’s Guide

The Buyer’s Guide was crafted as part of HPWH program development. The Guide contains helpful information for consumers, including benefits of HPWHs, list of qualified models, description of related electrical work, and other considerations. The Guide is posted on SVCE’s website <https://www.svcleanenergy.org/water-heating/>. It continues to be actively utilized by interested customers.

3. Lessons learned:

COVID-19 Pandemic – flexibility is key.

The pandemic and shelter-in-place orders have caused a slowdown in achieving the program goals. With city offices’ closures and contractors’ putting their work on pause, many customers have reached out to SVCE to either withdraw from the program or delay their projects. SVCE team addressed this challenge by staying in constant communications with participants, letting them know that their deadlines can be extended, adjusting program requirements (from requiring in-person inspection to accepting video inspections, as well as allowing to submit inspection paperwork at a later date, after the city offices re-open). Keeping communication open, offering plenty of flexibility and personalized customer care in these difficult times while ensuring the program requirements are met is how SVCE team navigated through the pandemic.

Going forward, incorporating contactless options in program enrollment, permit application, rebate claiming, and other processes could prepare program administrators for similar challenges in the future.

The COVID-19 pandemic and shelter-in-place orders also had an impact on energy consumption evaluation. For more on that, see the full FutureFit Heat Pump Water Heater Pilot Evaluation Report.

Accurate dropout rate is critical for program enrollment projections.

One of the key learnings of the program was an unexpectedly high drop-out rate of 38%. Even though SVCE team had anticipated that some customers will not see their installation projects through completion, the number of customers who withdrew from the program was higher than initially anticipated. The COVID pandemic was one of the contributing factors. Other reasons for withdrawal included: high installation costs, difficulty finding the right contractor, physical space limitations, and more. A large portion of the participants were removed from the program for non-response, i.e., they failed to respond to multiple requests for update on their project. To that end, addressing the barriers to participation that customers mentioned could improve program participation numbers and decrease the number of dropouts.

Resolution: Once this issue was identified, SVCE team re-opened enrollment to oversubscribe the program to account for anticipated withdrawals (from 100 enrollments to 166 enrollments). See the next section 4. Replication for more suggestions on the topic.

Greater coordination between rebate issuing entities – everyone wins!

Streamlining referrals to other entities offering rebates simplifies program administrator tasks (with a simple handover to another entity) and greatly improves customer experience (applicants are re-routed directly to the entity that can help without having to do any additional work). SVCE has developed a great relationship with the team over at City of San Jose where similar HPWH rebates are offered. Interested customers who lived outside SVCE service territory- ineligible for SVCE rebates - were grateful to be referred to the right folks. Going forward, it would be helpful to develop similar relationships with other neighboring entities that offer rebates to ensure smooth customer handover.

Electrification and Equity – Keeping Higher Efficiency Available to All

SVCE designed their heat pump water heater program with an eye to keeping electrification approachable and affordable for all. An additional monetary incentive was offered to low-income qualified (CARE/FERA) customers in an attempt to alleviate the majority of the cost burden of these upgrades. Despite earmarking 10% of program reservations for low-income customers and performing dedicated outreach to this customer segment, SVCE was only able to pay incentives to one customer that completed an installation.

Several CARE/FERA customers were forced to drop out of the program citing high upfront costs as their main barrier to participation. Going forward, SVCE plans to go to greater lengths to engage this important customer segment and address the underlying issues regarding large upfront investments on electrification technology. Currently SVCE is considering program design aspects for future electrification rebates that would pay contractors directly, resulting in immediate savings to the customer and a smaller out-of-pocket expense.

4. Replication:

SVCE successfully continues to offer the HPWH rebate program to its customers. The program is now in its second phase and is half-way to its new installation goals. SVCE has applied multiple valuable learnings from Phase 1 to this new stage of program implementation. Below, we offer several recommendations – both from SVCE and from the independent EM&V consultant - about program expansion and replication. They also include suggestions that can help increase emissions reductions:

Consider simplifying program processes for easy, quick, and enjoyable customer experience.

Since the launch of Phase 2 of the program, SVCE drastically simplified the application form, as well as the rebate claim form. Additionally, SVCE converted rebate paperwork submission from emailed-by-request format to online self-service format, that way customers can complete the rebate claim form at their convenience through a secure DocuSign portal.

Consider offering electrification rebates for other end uses. Multiple customers have inquired about other electrification rebates, particularly for space heating & cooling equipment. This is an area of opportunity.

Develop a trusted contractor list. Sixteen percent of respondents noted that they would have found it helpful if they were provided with a list of vetted contractors. This aligns with program practices seen by the Bay Area Regional Energy Network (BayREN), City of Palo Alto Utilities, and Silicon Valley Power.

Conduct follow-up marketing or check-ins with panel upgrade customers. Through EM&V process, it was discovered that of the 10 panel upgrade participants surveyed, three completed additional electrification improvements; two of which stated that this would not have been considered without their 200A panel upgrade. As other decarbonization options are developed, panel upgrade participants from the program could be a primary target for new offerings.

Develop permitting checklists/FAQs for the program. Though the SVCE program webpage mentions applying for a permit, a more comprehensive permitting checklist for customers, developed in collaboration with member cities, could be a helpful tool for the program participants. This is more difficult for a Community Choice Aggregator than for a municipal utility as there is a greater range of code requirements to address. However, to the extent feasible, addressing this would remove a “pain point” mentioned by survey participants and would improve clarity about the permitting process. If resources are limited, addressing high-volume cities first could expedite this process in terms of providing value to potential participants.

For detailed Evaluation, Measurement & Valuation results, please refer to *Evaluation Report: FutureFit Heat Pump Water Heater Pilot* by ADM Associates, Inc.