Key Program Learnings: Heat Pump Water Heater Contractor Incentive Program – One Year In

Program Overview and Goals

***Introduction**: Launched in May 2020, the Regional Heat Pump Water Heater Contractor Incentive Program provides incentives to contractors who install HPWHs in eligible customers' homes in five of the nine Bay Area counties. We want to share some learnings from the past year: barriers that were not entirely overcome, and successes that we are celebrating. These lessons may help inform other incentive programs, or other programs supporting electrification in the residential space. We had ambitious goals for this market development program – and have faced multiple challenges, including the pandemic. This is not a formal evaluation of the program, just a one year temperature check. We welcome your feedback to continue the conversation. Send any comments to Jennifer West at jwest@stopwaste.org.*

***Problem to solve**: Heat pump water heaters (HPWHs) currently make up a very small portion of the water heater market in the Bay Area, despite our mild climate and their incredible efficiency. Our program's goal is to increase market share, starting from a less than 1% market share by HPWHs. Electrifying water heating in homes reduces gas use throughout the calendar year. This report won't cover all the reasons why HPWHs are so important to reducing energy use and greenhouse gas emissions from our homes, but there is abundant material to share including the resources at the end of this report.*

Background: In 2018, the Bay Area Regional Energy Network (BayREN) and StopWaste applied for a grant provided by the Bay Area Air Quality Management District (BAAQMD)'s Climate Protection Program. After the grant was awarded in 2019, work began to design a midstream, contractor-facing incentive program for HPWHs to be promoted across the nine-county region. That program launched in May 2020 in five of the nine counties – territories covered by MCE and East Bay Community Energy (EBCE), including Marin, Napa, Solano, Contra Costa and Alameda Counties. The program most recently expanded to include residents in the City of Santa Clara as Silicon Valley Power joined the program on May 3, 2021. The funding by BAAQMD was crucial to building this program, and incentives are provided directly by Community Choice Aggregators (CCAs), which will keep the program going once the grant is completed late in 2021. BayREN led a regional effort to support Decarbonization with energy efficiency; both BayREN's single family program (Home+), and its multifamily program (BAMBE) have integrated electrification incentives, and BayREN collaborates with other municipalities and CCAs on their efforts as well. Thanks to other CCA HPWH programs now offered, the regional market for HPWHs benefits from a nearly complete coverage of incentive programs across all nine counties.

Energy Solutions is the program provider, implementing outreach and administering incentives. As the lead agency on the Technology and Equipment for Clean Heating (TECH) initiative under the CPUC's Decarbonization proceeding implementing SB 1477, Energy Solutions has proven to be a thought partner on this work, looking to take the lessons learned through this program to future plans. The CPUC has outlined over $400 million for HPWH incentives over the next few years.

Photo courtesy of Bradford White

The HPWH program has engaged all levels of the market – from manufacturers and distributors, to contractors, to the end users/customers. We

understand the forces impacting the market, along with the contractor and resident needs, and we are promoting HPWHs to each audience. This program adjusts as issues come up.

Partners to acknowledge and appreciate: Other organizations that have contributed to the HPWH/electrification space and collaborated with us on these efforts should be recognized here, as they have provided resources we have relied on. Electrify Marin published a report on their BAAQMD grant supporting electrification, Silicon Valley Clean Energy (SVCE) has publicly shared data on HPWH installations, as well as provided an excellent buyer's guide, and San Jose (both the city and San Jose Clean Energy) has also delivered incentives for many HPWHs installed in their city. Partners have met regularly to share resources and ideas. Finally, SMUD's generous $3,000 HPWH incentives in 2019 set a high bar and explicitly linked those funds to the value of the revenue and electrical load HPWHs would deliver to the utility over the lifetime of the unit, SMUD also hosted events that brought interested parties together (pre-pandemic), and individual staff spent hours discussing their HPWH incentive program's "lessons learned" with us.

Program Mission: Our program aims to transform the HPWH market and engage with the following key audiences: 1. Installation contractors who receive incentives, and 2. Residential customers, both single family and multifamily, who are replacing unitary gas water heaters with a HPWH.

Outside of scope: This program does not address the retail sector, or residents who install a HPWH themselves.

This program is developing a promising market in CA. We have participated in and contributed to statewide groups working on electrification: the Advanced Water Heating Initiative, the Building Decarbonization Coalition, and the CA Building Decarbonization group.

Contractor Landscape

In the East Bay and Marin County, hundreds of contractors work in the fields of plumbing, HVAC, home performance and renovations. Most water heaters are replaced when they stop working, after 10-15 years. Some residents replace the water heater before it fails. Each year approximately 6 -10% of water heaters are replaced, equal to approximately 1.1 million water heaters statewide, or 200,000 in the Bay Area. Contractors enroll in our HPWH program through our direct outreach, BayREN's Home+ program, and through the distributor/manufacturer network. Our incentives can layer on other programs, and by combining outreach efforts with other programs, we enrolled 20 contractors in the first 6 months of the program. Each HPWH installed is eligible for $2,000 in incentives - $1,000 to the contractor through our program, and another $1,000 to the resident through Home+, as long as the contractor participates in both programs and the resident is eligible. A guide to all HPWH incentives in the region has helped contractors and residents alike navigate the multitude of program incentives they are eligible for.

The program has:

- Enrolled 25+ enthusiastic contractors who are trained, knowledgeable, and ready to promote HPWHs to customers
- Published a guide to the region's HPWH incentive programs.

Resident Landscape

Single Family: We are still in the "early adopter" part of the market transformation curve for HPWHs in this nascent market for single family homes. The early adopter tends to be someone who is already very interested in energy use, may have solar on their roof, has funds to pay for the infrastructure needed to support installing a HPWH (which can include a panel upgrade, running electrical service to the location, and room for a storage tank with adequate air circulation in an unconditioned space), and is eager to be the first one on their block to get it.

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Regional Program Success

- Useful model for a multi-county, multi-agency, stackable midstream incentive program
- BayREN serves as a central hub for programs in the region
- Comprehensive guide to all HPWH incentives available in the nine county Bay Area
- Coordinated programs mean ease of participation for contractors/customers

Why Midstream? We will need to get to a critical number of installations before HPWHs move into the mainstream. As the recommendations of contractors are key during this transitional period, we chose to run a midstream program. Each contractor represents many resident installations, and their confidence in recommending HPWHs will help the market develop more quickly than simply providing incentives to homeowners alone. ***We hear from contractors that having customers ask for HPWHs is key for them to increase the number of installations.***

Lesson
Midstream programs have greater impact, but marketing to contractors alone is not enough. Although program incentives go directly to contractors, we must also reach out to customers. As demand from residents rises, more contractors will change their business model to incorporate HPWHs.

Program Messaging: We provide materials to help contractors sell HPWHs. Cross promotional pieces with solar, EV charging and energy efficiency projects are available for contractors to use. A resident-facing website is available with information, ways to find a contractor, and links to other resources. Program partners MCE and EBCE are reaching their customers to inform them of these opportunities. They are initially targeting homes with high gas usage in the summer (presumably for water heating), as well as solar customers.

As our program incentives are paid directly to the contractor, our message to residents is:

- HPWHs are great!
- Find a qualified contractor to install one, and
- You are doing your part reducing greenhouse gases, and it shouldn't hurt your bank account either.

We don't mention the incentive amount directly – except to tell them about the Home+ incentive of $1,000.

For solar customers, the Net Energy Metering (NEM) rate means a potential to save money more directly, and we have created some promotional materials to share these benefits. Having the program serve multiple counties helps us market to contractors through distributors, as we know installers work in multiple cities/counties.

Direct marketing to customers is being handled most by the CCA funders directly, and will continue and expand in the future. The Building Decarbonization Coalition launched "The Switch is On" campaign, which will continue to bring greater awareness of electrification and decarbonization to the general public.

Multifamily properties: Through our BAAQMD grant, we have partnered with the BayREN Bay Area Multifamily Building Enhancement (BAMBE) Program to create a Clean Heating Pathway, with fuel substitution projects for water heating and other heat pump technologies. The BAMBE Program has installed electric heat pump technologies serving 351 units in the region, all in income-qualified areas. We anticipate completing more installations serving an additional 128 units before the grant ends in 2021. See this report by AEA and StopWaste for more information.

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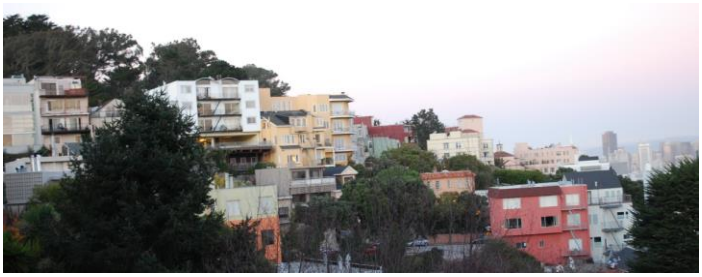

Lessons Learned: Program Structure

Due to the ever-changing landscape of decarbonization programs, some of our initial assumptions during the design and launch phase of this program shifted. Accordingly, this program has adjusted during the course of the past year.

- Despite the known market benefits of having a uniform, regional program, as of now, there are nine separate HPWH incentive programs in the region. However, some customers are able to layer or combine incentives from different programs seamlessly.
- We had a goal of 50 contractors enrolled in the program by now, but are at 26 as of May 2021. We have learned a great deal about the barriers contractors face in entering the HPWH market.
- Contractors who are enrolled are not installing as many HPWHs as originally expected. Customer demand is key, and contractors report that electrical system upgrade costs and siting issues continue to be barriers to additional projects. Many contractors in our program are not high volume water heater contractors, but are doing more time intensive, larger home renovation projects.
- The program ramped up contractor trainings and has to date offered nine trainings. However, it can be hard for contractors to find time to participate, and some don't yet see a clear business case for HPWHs (watch this great video by Efficiency First CA). We have heard some contractors prefer to stick with a gas water heater installation business model that is familiar to them.
- Permitting should be getting easier, as BayREN has trained over 400 building department staff on HPWHs. Permits still take time and cost money, though, and we have heard that requiring finalized permits before paying out incentives is a barrier to participation. We are reconsidering that requirement in some territories at this time.
- With so many HPWH programs in the region, we are glad that many programs layer on top of each other to amplify efforts. However, different providers/implementers mean slight variations in requirements, and layering is still more challenging than a single program would be. We ensured that our contractor incentive program integrates with the Home+ program, and that means contractors can complete a single application to access both incentives. Our program currently covers five counties, and plans to expand to San Francisco in the future, with the City of Santa Clara added as well.

Contractor Involvement and Obstacles

Contractor Profiles

The program has enrolled **26 contractors to date**. Of those, most are home performance contractors who hold General B and/or C-20 (HVAC) and C-36 (plumbing) licenses while three hold only a plumbers

license. Of the enrolled contractors, half have said they complete up to five WH replacements per month, five install 5-15 per month, with the remaining installing 20 or more. **In total, this represents a maximum potential of 230 HPWHs installed each month if each contractor installed HPWHs for all water heater replacement projects.**

Similar to the enrolled contractor totals, most of the installations have been done by home performance contractors, with very few done by larger volume contractors. Recent contractor outreach has primarily focused, therefore, on increasing the number of **large volume** replacement contractors. We continue to see a number of interested home performance contractors, partially due to the coordinated outreach with the Home+ program which includes incentives for many other energy efficiency improvements.

Of the 26 enrolled contractors, **twelve are active** (meaning they have submitted at least 1 project), while the remaining 14 have yet to submit a project. Of those who are active, six have submitted more than a single project (with one contractor submitting ten so far).

The project team has a continued focus not only on increasing the total number of contractors (specifically large volume contractors), but also increasing the ratio of active to inactive enrolled contractors. Overall, the enrolled contractors represent a strong base to grow from, and allows the program team to garner feedback necessary to inform the future of the program. It also represents a strong starting point for the TECH initiative, which will provide significantly more contractor outreach and engagement support later in 2021.

Not captured in the numbers above are the 150+ contractors included on a list of potential program participants, developed in partnership with stakeholders such as county representatives and other program administrators. These lists contain many plumbers and HVAC contractors focused on emergency replacements. The program outreach team checks in with these contractors through emails sharing training opportunities and including individualized outreach efforts -- **many times a contractor needs to be contacted five or more times before they respond,** due to their high workload. Through this outreach we are building awareness and laying seeds for the future.

Barriers to Adoption Expressed by Contractors

Contractors have shared that the number one barrier to adoption is a lack of consumer demand. Contractors who are already installing HPWHs have said that once customer demand increases, more contractors will get involved in the space due to the highly competitive nature of the trade.

Other secondary barriers include the increased cost of HPWH installations and longer installation timelines - **these two barriers are more impactful if the WH needs to be replaced in an emergency scenario, which is the most common type of replacement job, occurring ~80% of the time.**

Additional barriers include potential impact to a customer's energy bill and difficulty obtaining a permit. The permitting process has been more of a barrier to program participation for contractors than as a barrier to the installations themselves, as the program has so far required proof of final inspection as part of the incentive application. In rare cases, equipment siting can be a barrier, although many existing WHs are located in places that can accommodate the increased HPWH height and venting requirements.

The following sections cover how these barriers come into play for both planned replacements (typically taking place along with more home performance measures) and emergency scenarios.

Home Upgrades/Remodels: Home performance contractors typically complete projects involving multiple

measures, including HVAC replacement, insulation, and more. These projects are often done over a longer timeline and so allow for a contractor to "push" a HPWH, making the lack of consumer demand less of an issue. However, some contractors will be wary about pushing a product not explicitly requested by the customer as they could risk losing the entire project. A longer timeline also means that it won't be an issue if the water heater replacement takes more than 1 day. In this type of project, the main barrier is **increased equipment cost.** A secondary concern some customers have is the ongoing impact on their **electrical bill**. These barriers can be addressed in various ways: with the incentive to lower the cost, a larger project to help spread the cost across, the increased likelihood that electrical upgrades would already be occurring, and the fact that a customer's bill will be decreasing overall due to building envelope improvements. Also, customers doing larger home upgrades often have more resources to spend, reducing concerns about a potentially small increase in monthly costs from water heating, especially if combined with other bill-saving upgrades. If a customer has solar, pairing with a HPWH is ideal as it can store electricity from the panels as hot water, for use after the sun goes down or to coast through peak demand and higher cost time-of-use hours.

Fast replacements: The vast majority of installations (~80%) occur during "Normal Replacement" (NR) scenarios, meaning when the customer's WH has failed and they need a replacement as soon as possible. The main barriers to adoption for HPWH in these scenarios include the increased time required to replace a natural gas WH with a HPWH due to electrical upgrades, the lack of consumer knowledge, higher costs (for equipment and installation), and inability of eager customers to find a contractor who can install a HPWH quickly. Awareness of, customer demand for and education about HPWHs are major issues when doing fast replacements because customers are less likely to have time to learn about a new product when they want their hot water back right away.

Contractors have said they use the incentive to overcome barriers: mostly to lower the cost and reassure the customer that they are getting a "good deal." Some contractors like to broadcast their involvement in these incentive programs because it helps them get more business. **However, all of them have said that the incentive is only one piece of the HPWH adoption puzzle.**

Strategies Beyond Incentives

There are numerous barriers to increasing HPWH adoption, and this year has made it very clear that an incentive alone is not enough to overcome them. Therefore, the program team identified additional program intervention strategies that have been employed in tandem with incentives.

Manufacturer and Manufacturer Representatives Engagement

All levels of the supply chain must be aligned on program goals to reach success. To achieve this, the program team engaged representatives from all three major HPWH manufacturers: Rheem, AO Smith, and Bradford White. All three manufacturers over the course of this first year invested significant time and effort towards the program, which feels like major success given the relatively small geographic area covered. Some examples of support included:

- Engaging their local manufacturer representatives to support tactical strategies with their local presence
- Providing feedback on program design
- Organizing contractor training courses, including topics directly requested by contractors during previous trainings
- Providing advance knowledge of upcoming equipment updates, including CTA-2045 communication devices and new retrofit ready products

While manufacturers have continued to be engaged, some have handed engagement off to manufacturer representatives. These manufacturer representatives provide a local presence, and are a bridge between manufacturers and distributors, while engaging the local contractor community directly. The manufacturer representatives have been tasked by the manufacturers to sell more HPWHs, and we share that goal. Support from manufacturer representatives has included day-to-day engagement on program modifications and contractor outreach, high-level strategy discussions, and support on contractor training development.

Building manufacturer and manufacturer representative relationships is a major success because increasing HPWH adoption will require a team effort. Manufacturers and manufacturer representatives have expressed a commitment to this program's success. These commitments will be instrumental in supporting growth in the second year and beyond.

- **Training webinars** delivered by the program team were well attended, averaging between 15-20 contractors, and including significant engagement through Q&A sessions. The contractors who attended were primarily plumbers, with some home performance contractors.
- **Engaging plumbers** is a crucial step towards increasing the adoption of HPWHs as they complete the majority of the WH emergency replacements. Most of the questions asked during trainings came from plumbing contractors, which indicates their interest, even if not yet enrolled in the program.
- The program team also developed a calendar of training opportunities, hosted online and updated as new training sessions are available. This calendar garnered positive feedback from contractors as they were previously having trouble finding available training opportunities.

Development and Promotion of Contractor Training Opportunities

One barrier commonly expressed is that contractors who are not yet comfortable installing HPWHs don't recommend them to customers, to avoid risk in this highly competitive trade. In response, the program team set up a series of training webinars, and also promoted training courses delivered by other organizations. These trainings covered topics such as the advantages of HPWHs, installation considerations, load shifting capabilities, code requirements, and available incentive programs. Manufacturers offered remote technical trainings, which included more details about HPWHs, including sessions delivered by Bradford White "live" from their Michigan training facility. Bradford White offered an hour long training that included an overview of a functional HPWH, cutaway to see the inside components, as well as common troubleshooting tips. These trainings were well attended, and they were open to contractors throughout the country, not just from our region.

Individual Contractor Conversations

The program team conducted numerous calls with individual contractors, some of whom are enrolled in the program and others who are not. The contractors ranged from a single person operation to a large scale water heater installation company to contractors focused on home performance projects. These contractor conversations covered many topics, such as barriers to adoption and suggestions for program modification. Conversations like these are crucial at this stage because they help the program to adapt to participants' needs, increase the network of engaged contractors, and help educate all stakeholders about the specific needs of contractors in the Bay Area market. These conversations also are the building blocks for the creation of future programs.

Rate Considerations

A final barrier to consider in the adoption of heat pump water heaters is knowing whether or not they will save customers money. While heat pump water heaters are significantly more efficient than their natural gas counterparts (three times as efficient!), existing rate structures within both electricity and gas rates

disincentivize the use of additional electricity. This is a product of "baseline" electricity rates - a certain amount of electricity consumed by a customer at a lower cost - the "baseline" level of electricity. When a customer uses more electricity than their baseline allocation, the cost per unit of electricity increases in higher tiers.

While utilities provide a higher baseline allocation for customers with electric space heating, there is no adjustment to the baseline when a customer switches to electric water heating. Thus, a customer who retains natural gas for their heating needs and electrifies their water heating may face higher electricity costs that mask the efficiency gains from the heat pump water heater. This is exacerbated in the Bay Area, where available rebates are not enough to encourage older Bay Area homes to electrify their space heating and makes it unlikely to increase their baseline allocation. This is a rate **disincentive**, as heat pump water heating is currently the most cost competitive fuel substitution measure available to homeowners in the region. BayREN is working on including an incentive measure for fuel substitution in homes for electric heating without existing AC, which will defray the costs for customers who want to electrify both their space conditioning and their water heating. However, the current rate issues remain a barrier, particularly for customers who cannot afford nonessential upgrades that could possibly bring higher utility bills as well as for customers seeking an emergency water heater replacement.

The building decarbonization team at the California Public Utilities Commission recently recommended that this issue be taken up in Phase IV of the General Rate Case but as of now, it has not been scoped into that proceeding. The CPUC also conducted a rates and costs En Banc where the larger issue of increasing electric rates was addressed in detail, but the Commission has not yet addressed these issues.

Incentive Funders/Partners

Two Community Choice Aggregators (CCAs) are the funding partners for the midstream Contractor Incentive Program. In 2019 we invited all seven CCAs in the region to join, and so far only two have joined, while others have established their own programs. Below, each CCA explains how this program fits into their efforts around decarbonization. Silicon Valley Power, the municipal electricity provider for the City of Santa Clara recently joined our program as well.

MCE Partnership

As a partner CCA, MCE provides both incentive funding for the HPWHs as well as marketing and outreach support to our customers. MCE's member communities comprise all of Marin County, Napa County, and many cities in Contra Costa and Solano counties.
This partnership allows MCE to support an innovative program, further the mission of electrification in our communities, and better understand the day-to-day experience and needs of the contractors working in our communities.

Single Family Projects: So far, enrolled contractors have installed HPWHs in 20 homes within MCE's service area, with the majority of installations located in Marin and Contra Costa Counties.

Multifamily Projects: MCE's Multifamily programs may provide another referral pathway for properties with unitary heat pump systems, and several properties are exploring options to participate in this program now.

This program pairs well with a number of MCE's offerings, including the Workforce Education and Training Program, connecting contractors with pre-qualified job seekers participating in local workforce development programs.
There is also potential for synergy with MCE's single family and multifamily programs: the Home Energy Savings program and LIFT program have identified ways to refer customers ineligible for their programs into the HPWH program.

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EBCE Partnership

As a partner CCA, similar to MCE, EBCE provides both incentive funding for the HPWHs as well as marketing and outreach support to customers. EBCE is the electricity service provider for the unincorporated areas of Alameda County, 14 jurisdictions within Alameda County, and began providing service to the City of Tracy in San Joaquin County in April of 2021. This program is available to all EBCE customers.

Single Family Projects: So far, enrolled contractors have installed HPWHs in 16 homes within EBCE's service area.

EBCE sees this program as developing a HPWH market as the State of California implements electrification incentive. Given the very low adoption rates of HPWH in the Bay Area until now, the foundational work of developing contractor networks, training building officials, and working with local distributors to increase stocking of eligible technologies will be essential to take advantage of incentives through the TECH initiative authorized in SB 1477. As more incentives become available, EBCE may focus on unfunded gaps, such as service panel upgrades, and/or adapt incentives to tie them more closely to grid services that HPWH can provide - for example, demand response incentives.

Looking Forward

We know that 2021 is going to be a big year for the HPWH market.

- We are awaiting the launch of the TECH Program, which will address market barriers statewide, and will build directly on the experiences of programs like ours. More funds will help get the attention of all stakeholders - contractors and customers alike.
- We anticipate the launch of PG&E's Watter Saver Program, which will layer in a load management program for customers who already have a HPWH installed. This will allow HPWH customers to realize more savings on their bills.
- New plug-in HPWH models (120v) coming in Summer 2021 can simplify the installation process, and can reduce the need for expensive panel upgrades which reduce participation.
- In 2022, the Self-Generation Incentive Program will provide another $40 million for HPWHs as energy storage devices, statewide.

We hope that local governments and other regional entities like CCAs or BAAQMD will continue to provide support and funding for programs like this one. The program can be adapted to the needs of stakeholders. For example, integrating panel upgrade incentives in this program would directly benefit multiple-measure building electrification efforts at one property address, like EV charging infrastructure or heat pump space heating, not just HPWH installations. We have also considered adjusting incentives upwards for income-qualifying households to provide greater equity across our communities. Additionally, some energy providers may want to increase the incentive amount in their area.

With our partners, we are committed to continuing to develop the HPWH market - we can see how far we have to go, but also how far we have come!

More resources

BayREN's HPWH websites:
Residential customers:
https://www.bayren.org/residentialhpwh
Contractors: https://www.bayren.org/hpwh

BayREN and AEA report on Multifamily Clean Heating Pathway showing installations and upgrades (2020):
https://cbbf458e-67d0-4a11-9597-023b97b18cc4.filesusr.com/ugd/fbb014_5f394d44c3114359b36abf6afa9c460b.pdf

BayREN, StopWaste and Ardenna Energy report on "Local Government Levers for Energy policy in the Existing Single-Family Residential Sector" (2020):
https://www.bayrencodes.org/wp-content/uploads/2020/12/EE-and-Electrification-White-Paper_FINAL_12.28.2020.pdf

StopWaste and AEA report on "Accelerating Electrification of California's Multifamily Buildings" (2021):
https://www.stopwaste.org/accelerating-electrification-of-california%E2%80%99s-multifamily-buildings

New Buildings Institute: Advanced Water Heating Initiative 2020 Progress Snapshot:
https://newbuildings.org/wp-content/uploads/2021/02/AWHI_ProgressSnapshot2102.pdf and report: https://newbuildings.org/wp-content/uploads/2021/02/AWHI_PlaybookAndProgressReport202102.pdf

Electrify Marin: Outcomes and Lessons Learned, 2019-2020: https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/electrify-marin/531-lessons-learned-report.pdf?la=en

NRDC: Beneficial Electrification fact sheet:
https://www.nrdc.org/sites/default/files/flipping-the-switch-building-decarbonization-fs.pdf

Silicon Valley Clean Energy website with Buyer's Guide and Enrollment Tracker:
https://www.svcleanenergy.org/water-heating/

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May 2021

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