Local Government Programs and Policies for Existing Building Decarbonization

Outcomes and Lessons Learned from the
Electrify Marin Natural Gas Appliance Replacement Rebate Program

Prepared by the County of Marin Sustainability Team
January 2021

INTRODUCTION

This report summarizes the outcomes and lessons learned from implementing the Electrify Marin Natural Gas Appliance Replacement Rebate Program from January 2019 through December 2020. This program was funded by a grant from the Bay Area Air Quality Management District (BAAQMD) and administered by the County of Marin Sustainability Team.

Over the program term, Electrify Marin paid out a total of $152,750 in direct homeowner incentives for gas-to-electric appliance upgrades for water heating, space heating, and induction cooking, as well as an additional rebate for projects that required an upgrade to the home's electrical service panel. For all rebate categories except cooking appliances, higher rebate amounts were available to homeowners who qualified as "low income" based on the U.S. Department of Housing and Urban Development (HUD) Area Median Income Limits for Marin County.

129 appliance upgrades were completed and incentivized through Electrify Marin during 2019 and 2020. These upgrades will result in an estimated 2-year GHG savings (years 2020-2022) of 269.0 metric tons of carbon dioxide equivalent (MTCO2e) and an estimated 5-year GHG savings (years 2020-2025) of 565.6 MTCO2e.

OUTREACH ACTIVITIES

Program outreach began in January 2019 with the launch of the Electrify Marin webpage (www.marincounty.org/electrify). Ongoing outreach activities were directed to homeowners, local government, and the local building community. Following are some highlights from each of these outreach categories:

Incentive Outreach

Program staff created the Marin County Electric Home Guide (*see Appendix A*) to use as an educational tool for the community, providing information about the benefits of electrification, the appliances that Electrify Marin was incentivizing, and rebate program structure. The Electric Home Guide was distributed via the program webpage and social media, at in-person and virtual events, and through local building departments. This proved to be a highly useful tool to educate the public about gas-to-electric appliance upgrades.

Direct mail campaigns were sent to addresses for which solar permits had been pulled from local building departments. This proved to be among our most effective strategies to reach homeowners, as those who had already adopted solar were likely to have upgraded service panels and excess electrical capacity. Solar permit data was collected for unincorporated Marin as well as most municipalities in in the County.

An incentive was created to encourage rebate recipients to share social media posts about their appliance upgrades and rebates. Posts from homeowners on Nextdoor and Facebook proved to be an effective way for us to spread the word about the program through those who had participated as people tend to lend great value to referrals and recommendations from their friends and neighbors. Those who posted received a $25 gift card to a local coffee shop or grocery store. Outreach staff

promoted the rebates at numerous in-person and virtual events. These included forums produced by nonprofits and climate action groups, local government festivals and events, conferences, and merchant association events (*see Appendix B for a summary of outreach activities*).

Additional regional rebates for heat pump water heaters became available through the Bay Area Regional Energy Network (BayREN) after Electrify Marin launched. New outreach to homeowners highlighted the opportunity to take advantage of multiple rebates for a single appliance upgrade.

Local Government Outreach

We sought support from municipalities through our participation in the Marin Climate and Energy Partnership (MCEP). Local cities and towns were supportive and promoted the rebate program via their websites, newsletters, and building departments, and local events.

In effort to clarify and streamline the permitting process for electrification projects across municipalities, program staff created guide for Permitting Electrification Projects (*see Appendix C*). This was helpful to prepare local building departments for a possible increase in permit applications for gas-to-electric appliance upgrades and provide a reference to standardize permitting requirements.

Outreach to the Building Community

The support of local contractors was important to the success of the program. Ongoing communication with builders gave us valuable insight into practical aspects of the program, including rebate amounts and new equipment requirements (*see Appendix D*).

Contractor outreach included direct mail, email, phone calls, and participation in events hosted by the Marin Builder's Association. We found that contractors already participating in the BayREN Home+ Program were likely to be enthused about the additional rebates provided by Electrify Marin.

The opportunity to "stack" heat pump water heater rebates with regional rebates offered by BayREN was heavily promoted to plumbing contractors through direct mail, email, and phone calls.

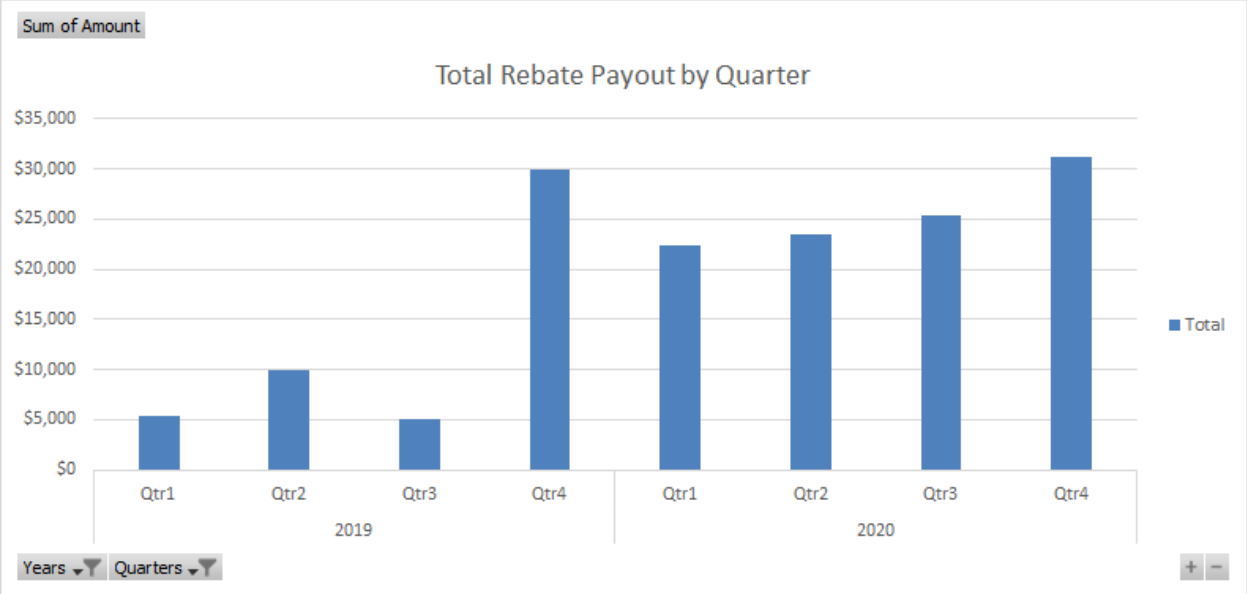
We also provided a training for contractors on heat pump water installation, presented by the BayREN Codes and Standards Program. The event was well-attended, confirming our hope that contractors would take advantage of the opportunity to learn more about efficient electric appliances if the opportunity was provided in a free and concise way.

PAYOUT OF REBATES OVER TIME

Intake of rebate applications began at a slow pace through the first three quarters of 2019 (see Figure 1). By Q4 of 2019, the program experienced a significant uptick in completed projects. While there appeared to be some slowing in these projects at the beginning of 2020, possibly due to the COVID-19 pandemic and related shutdowns, momentum remained strong throughout the second year.

Q4 of 2020 saw the highest total payout for the two-year period, suggesting that our outreach efforts had effectively reached homeowners and the building community, and demonstrating a continued interest in gas-to-electric appliance upgrades in Marin County.

Figure 1. Total Rebate Payout by Quarter, 2019-2020



REBATES ISSUED BY APPLIANCE TYPE

We launched the program with the expectation that the higher demand rebates would be those for water heating and space heating, and that proved to be the case throughout the duration of the program. We saw slightly fewer applications for induction cooking appliances than expected, which could be attributed to smaller rebate amounts, high cost of permits relative to rebate amount, the strong attachment to gas cooking we observed in the community, and concerns about power shutoffs.

There was also considerably less utilization of the service panel upgrade rebates than we expected. Since so many of our rebate applicants lived in homes with rooftop solar, many had already upgraded their main panels and had the capacity available for new additional electric appliances. In other cases, the high cost of a service panel upgrade (even with the rebate we were offering) may have discouraged homeowners from moving forward with electrification projects.

Figure 2. Rebates Issued by Appliance Type, 2019-2020

Appliance Type	Quantity	Incentives Paid
Induction Range/Cooktop	17	$ 7,750
Heat Pump Water Heater	38	$ 49,000
Central Air Source Heat Pump	22	$ 43,000
Mini Split Heat Pump	27	$ 37,000
Service Panel Upgrade Kicker	25	$ 16,000
Total	**129**	**$ 152,750**

REBATE AMOUNTS AND PROJECT COSTS

In setting the rebate amounts for this program, our goal was to create cost parity between a new gas-fueled appliance replacement and an efficient electric one. Rebate amounts were set using market data for new equipment costs, since total project cost data for the local area was unavailable.

Since the gas-to-electric upgrades we incentivized were often bundled with other home upgrades, such as kitchen remodels or solar installations, we used selected data (*see Appendix E*) to calculate estimates of average project cost by appliance type. As we began to review project costs data, we observed the following:

- In many cases, contractor labor was the majority of the project cost.
- Homeowners who self-installed appliances saw a much higher percentage of their project cost recouped by the rebate than those who hired contractors.
- Project cost varied widely from contractor to contractor.
- Minisplit projects ranged widely in costs, depending on configuration (ducted vs. ductless) and number of heating zones.
- Heat pump water heater rebates covered the highest percentage of average project cost, across appliance types.
- Induction cooking appliances range widely in cost, depending on the manufacturer.
- In some cases, rebates for induction cooktops covered only permitting costs.

Overall, the rebates covered a smaller percentage of the appliance upgrade than we expected. Using total project cost data (rather than equipment cost data) to set rebate amounts could increase the impact of rebates. Jurisdictions could also consider rebate amounts based on a percentage of project cost, with a dollar cap for each appliance type. Adding permit costs to the total rebate could be another way to strengthen the incentives.

Figure 3. Rebate Amounts as a Percentage of Total Project Costs, by Appliance Type

Appliance Type	Rebate Amount	Avg. Project Cost	% Covered by Rebate
Induction Cooktop	$250	$1,661	15%
Induction Range	$500	$3,267	15%
Heat Pump Water Heater	$1,000	$3,731	27%
Heat Pump Water Heater (low income)	$2,000	$3,731	54%
Central Air Source Heat Pump	$1,000	$19,070	5%
Central Air Source Heat Pump (low income)	$4,500	$19,070	24%
Mini Split Heat Pump	$800	$13,443	6%
Mini Split Heat Pump (low income)	$3,000	$13,443	22%
Service Panel Upgrade Kicker	$500	$3,904	13%
Service Panel Upgrade Kicker (low income)	$1,200	$3,904	31%

ENERGY EFFICIENCY REQUIREMENTS FOR NEW APPLIANCES

To encourage installation of the more efficient models of the incentivized appliances, energy efficiency requirements were created for new appliances. Throughout the program, we encouraged homeowners to verify eligibility of new equipment with program staff before it was installed. Following are new equipment requirements that were used, and notes on how well they worked for each appliance type:

Figure 4. New Equipment Requirements by Appliance Type

Appliance Type	New Equipment Requirements
Induction Cooktop/Range	• Cooktop must be entirely induction • Cannot be dual-fuel (both cooktop and oven must be entirely powered by electricity)
Heat Pump Water Heater	• Must meet NEEA Tier 3 Advanced Water Heater Specification or higher • Must have a Uniform Energy Factor (UEF) of 3.0 or higher
Central Air Source Heat Pump	• Must be certified by the Air Conditioning, Heating and Refrigeration Institute (AHRI) • Must have SEER of 16.0 or greater and HSPF of 8.5 or greater • Both the condenser unit and the air handler are new and installed together
Mini-Split Heat Pumps (ductless or ducted)	• Must be certified by the Air Conditioning, Heating and Refrigeration Institute (AHRI) and the matched assembly is a model combination that is listed in the AHRI Directory of Certified Equipment • All units must meet or exceed SEER 16.0 and HSPF 8.5
Service Panel Upgrade	• Electrical service equipment shall be installed in accordance with the manufacturer's installation instructions, the current California Electrical Code, Article 230, and PG&E rules and regulations • Must replace the home's main electric service panel

Induction Cooktop/Range: We did not have any challenges with these requirements. A higher rate of rejected applications was seen in this category, but these were the result of not meeting the basic requirement of removing a natural gas appliance or because the new equipment was electric resistance rather than induction.

Heat Pump Water Heater: Many of the widely available and low-priced heat pump water heaters met these standards, often exceeding NEEA Tier 3 requirements. In some cases, the NEEA UEF calculations were lower than ENERGY STAR's UEF estimate. The ENERGY STAR figure was accepted in these instances.

Heat Pumps for Space Heating (Central Air Source and Mini-Split): Initially the new equipment SEER requirement was set at 18.0 for heat pump systems. Feedback from contractors and homeowners led us to discover that the cost differential between SEER 16 and SEER 18 system was much higher than our rebate amount, making a SEER 18 system difficult to justify from a cost perspective. After evaluating the benefits of SEER 16 systems, we lowered our requirement to SEER 16. This resulted in increased support from contractors and a higher number of applications received. We also found that the AHRI's SEER and HSPF ratings were often lower than ENERGY STAR estimates, and accepted the ENERGY STAR figures in those cases.

Service Panel Upgrade: We received many applications that described the addition of subpanels or dedicated circuits. Although these were required to accommodate the new appliance, they did not add

to the overall electrical capacity of the home and were ineligible for our rebate. To add clarity, we specified that the home's main panel must be replaced in order to qualify.

GREENHOUSE GAS EMISSIONS REDUCTIONS

To calculate the potential for GHG reduction, annual energy use for existing natural gas and new all-electric appliances were determined using various available sources. These per appliance annual energy use estimates were then multiplied by their corresponding emission factors, which were provided by BAAQMD and MCE. Using this methodology, the estimated 5-year (2020-2025) emissions savings from this program are as follows:

Figure 5: Estimated 5-Year Emissions Reductions (2020-2025)

Appliance Type	Quantity	Incentives Paid	Total 5 yr GHG Savings (MTCO2e)	% of total GHG Savings
Induction Range/Cooktop	17	$7,750	18.3	3%
Water Heater Heat Pump	38	$49,000	226.4	40%
Central Air Source Heat Pump	22	$43,000	151.7	27%
Mini Split Heat Pump	27	$37,000	169.1	30%
Service Panel Upgrade Kicker	25	$16,000	-	-
Total	129	$152,750	565.6	100%

REBATES FOR LOW INCOME HOUSEHOLDS

Higher rebate amounts were paid to applicants who demonstrated that they met the income limits for "low income" as defined by the U.S. Department of Housing and Urban Development (HUD) Area Median Income Limits for Marin County. Of the 129 total rebates paid out over the two-year program period, 22 percent qualified for the higher rebate amounts reserved for low income households.

Figure 6. Distribution of Income Qualified Rebates Among Total Rebates Paid

Rebate Type	Rebate Amount	Qty Paid	Total Paid
Induction Range (all households)	$ 500.00	14	$ 7,000
Induction Cooktop (all households)	$ 250.00	3	$ 750
Heat Pump Water Heater - Standard	$ 1,000.00	27	$ 27,000
Heat Pump Water Heater - Income Qualified	$ 2,000.00	11	$ 22,000
Central Air Source Heat Pump - Standard	$ 1,000.00	16	$ 16,000
Central Air Source Heat Pump - Income Qualified	$ 4,500.00	6	$ 27,000
Mini Split Heat Pump - Standard	$ 800.00	20	$ 16,000
Mini Split Heat Pump - Income Qualified	$ 3,000.00	7	$ 21,000
Service Panel Upgrade - Standard	$ 500.00	20	$ 10,000
Service Panel Upgrade - Income Qualified	$ 1,200.00	5	$ 6,000
Total Rebates Paid		**129**	**$ 152,750**
Total Income Qualified	**22%**	**29**	**$ 76,000**

We observed that these households were generally on a fixed income below the HUD limit but still owned property of high value. Including additional criteria, such as some evaluation of assets, could be effective to ensure that low income rebates are distributed to those with the highest need. Other tools such as the California Healthy Places Index (HPI) could be used to increase rebates to households living in census tracts that are identified as experiencing geographic socioeconomic disadvantage.

From an equity perspective, it's important to note that this program was specifically designed for single-family homeowners to accompany electrification initiatives implemented by BayREN and MCE for multifamily properties. In order to distribute the benefits of decarbonization more equitably, efforts should be made to encourage gas-to-electric appliance replacements in both single family and rental/multifamily housing either through one comprehensive program or complimentary efforts with other program implementers

RESULTS OF HOMEOWNER SURVEY

The Electrify Marin Homeowner Survey (*see Appendix F*) was delivered to all homeowners who received rebates though the program between January 2019 and December 2020. The survey link was provided via email to the rebate recipient at the time their rebate application was approved. In total, 34 homeowners responded to the survey. The survey proved to be extremely helpful to gain insight into homeowner motivations around electrification, challenges with contractors and local building departments, experience with the rebate application process, level of satisfaction with new appliances, and other impressions about local homeowners' experience with gas-to-electric appliance upgrades. Following are some lessons learned from survey results. Full survey results, including comments from homeowners, can be accessed at https://www.surveymonkey.com/results/SM-H8LW8Z957/.

Motivations for Gas-to-Electric Appliance Upgrades

Over 90 percent of respondents reported that reducing the home's carbon footprint was one of the motivations for replacing gas appliances with efficient electric ones. This was consistent with our impressions that environmentally motivated homeowners were more likely to take advantage of Electrify Marin incentives, and served to guide our outreach efforts.

The second most highly selected motivator (69 percent) was a desire to reduce utility bills. This was surprising to see, since home electrification is not often a clear strategy to reduce overall utility costs. In our efforts to educate the community about the appliances we were incentivizing, we were very cautious when discussing operational cost differences one should expect from gas-to-electric appliance upgrades. Some of these respondents may have been in parts of the County that are using propane, in which case we would expect to see notable utility cost savings.

Over 50 percent of respondents stated that they were motivated to use the excess electrical capacity provided by their on-site PV system. This supported our early strategy of directing outreach efforts to homes that had pulled solar permits from local building departments around the County, as this group was likely to be environmentally motivated and could expect some savings as a result of moving away from natural gas.

Local Availability of Contractors for Gas-to-Electric Projects

In order to give homeowners the opportunity to work with the contractor of their choice or self-install appliances, Electrify Marin did not include approved or recommended contractors.

Nearly 45 percent of survey respondents reported some level of challenge finding an experienced contractor who was willing and able to perform the desired gas-to-electric appliance upgrade. Homeowners reported encountering the following challenges through comments on this topic:

- A lack of understanding among local contractors about electrification and the benefits of switching from gas to electric appliances.
- Limited level of familiarity and comfort with installing heat pump appliances among plumbing and HVAC contractors, as well as resistance to learning about them.
- Appliance upgrade projects often took a lot longer than the homeowner had hoped, due to the time it took to schedule initial estimates and the project itself.

These experiences highlight the importance of providing education and training to the local contractor community.

Ease of Obtaining Building Permits

Most applicants (over 90 percent) reported no challenges with obtaining the required permits for their upgrade from their local building department. In most cases, building permits and inspections were handled by the contractor. Those who reported challenges identified the following issues:

- A noise ordinance in one of our local municipalities limited homeowner's choices of what kind of heat pump HVAC equipment could be installed.
- Permits pulled by contractors were not routinely seen through to final inspection, requiring homeowners to follow up on the final approval on their own or to reach out to contractors to complete the process.

Satisfaction with New Appliances

Survey respondents reported an overwhelmingly high level of satisfaction with their new appliance(s). Although this data is limited by the fact that it was collected immediately after project completion, respondents provided the following specific positive impressions of their new appliances:

- Ease of cleaning, safety, and control of induction cooking appliances
- Wi-Fi connectivity and ease of configuration for heat pump appliances
- Ability to schedule high demand time on heat pump water heaters
- Added air-conditioning function of heat pump space heating appliances
- Low energy usage
- Reduced carbon footprint/new appliances powered by renewable electricity

Familiarity with Incentivized Technology

The vast majority (nearly 97 percent) of respondents reported that they had some level of familiarity with the technologies the program was incentivizing prior to learning about the rebate program. Homeowners commented that independent internet research, education from contractors and Electrify Marin staff, and experiencing the technology in other people's homes all contributed to their familiarity and comfort level with these new appliances.

Moving Toward All-Electric Homes

While under 9 percent of respondents indicated that their home is now all-electric as a result of their gas-to-electric appliance upgrade, over 55 percent said that they were working toward an all-electric home. 35 percent reported that they plan to keep some natural gas appliances in place.

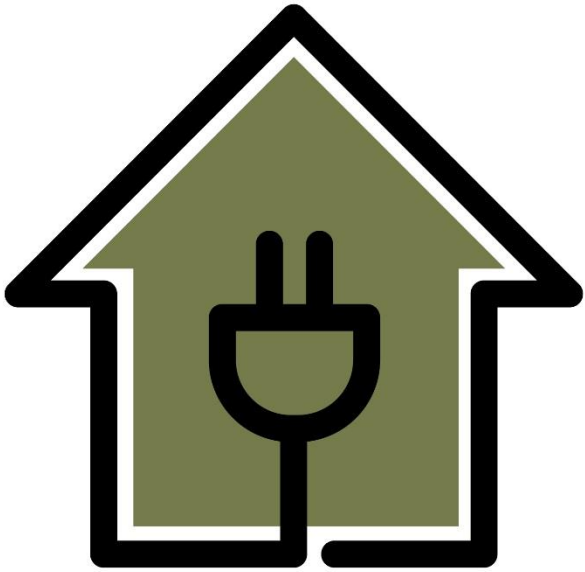
Several homeowners commented that their remaining gas appliances were too new to justify replacing at this time, but they were planning for an electric replacement at end of life. Others reported that their gas-to-electric appliance upgrades would be completed one-by-one, over time, due to the high cost of doing these projects all at once. Electrical service panel capacity was cited as a barrier to going all-electric for some homeowners who faced particularly expensive service panel upgrade costs due to requirements from PG&E or local building departments.

Some of the resistance we encountered to going all-electric was due to concerns about power outages. Marin County experienced extensive Public Safety Power Shutoff (PSPS) events in both 2019 and 2020. With these events fresh in the minds of the community, we did receive some challenges to our support of gas-to-electric retrofits. Our strategy was to educate the community about battery storage as a resiliency solution through a series of Solar + Battery classes for homeowners. We also learned that heat pump water heaters performed better than some homeowners expected during PSPS events due to their effective insulation.

CONCLUSION

The Electrify Marin rebate program was well-received in the community and proved to be an effective strategy to reduce GHG emissions resulting from residential natural gas and propane use. Extensive outreach was key to educating the community about the benefits of electrification and the technologies that exist to facilitate the transition away from domestic fossil fuel use. Ongoing engagement with local contractors helped to spread the word about these incentives to homeowners and ensured local builders were prepared and available to complete gas-to-electric upgrades. This program received recognition as an effective climate solution in the County of Marin's 2020 Climate Action Plan Update and the Drawdown: Marin Strategic Plan. Electrify Marin will continue issuing these rebates using matching funds from the County of Marin through June 2021.

MARIN COUNTY ELECTRIC HOME GUIDE



Electrify Marin
Natural Gas Appliance
Replacement Rebate Program

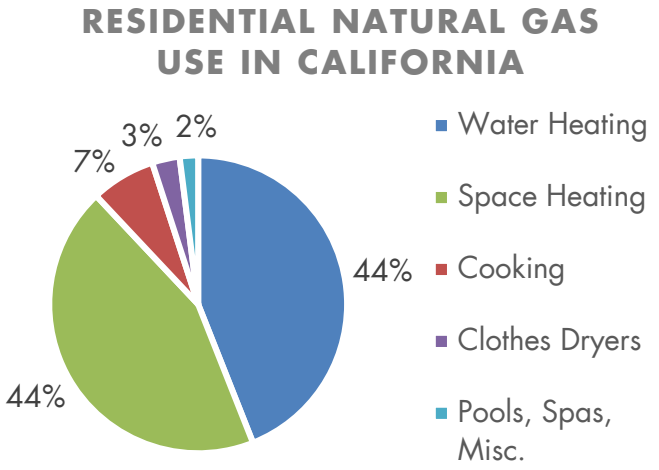
www.marincounty.org/electrify

FOSSIL FUELS IN YOUR HOME

Burning fossil fuels generates emissions that contribute to climate change. You may know that fossil fuels are burned in Marin County by gas and diesel vehicles, but did you know that this also extends to natural gas and propane use inside of homes?

The most common gas-fueled home appliances are:

- Water Heaters
- Space Heaters
- Ranges and Cooktops
- Clothes Dryers



Source: California Energy Commission

Reducing or eliminating natural gas and propane from your home will reduce greenhouse gas emissions and improve indoor air quality, contributing to a safer, healthier home and environment.

WHAT CAN YOU DO?

There are actions you can take to reduce fossil fuel consumption in your home, starting with removing the appliances that depend on natural gas or propane and replacing them with electric models. All-electric alternatives are available for most home appliances that use fossils fuels. The County of Marin is now offering rebates to homeowners who replace gas appliances with efficient electric ones. Replacing natural gas appliances will benefit your household and your community. Learn more at www.marincounty.org/electrify.

BENEFITS OF ELECTRIFIED HOMES

WHY ELECTRIFY?

Environmental Benefit

Gas appliances are fueled by natural gas or propane, but the power for electric appliances comes from a more complex set of energy sources. Electricity can be, and historically has been, generated by fossil fuels including coal, oil, and natural gas. In recent years, State legislation and environmental motivation have driven more of California's electric supply to come from renewables, such as wind and solar. The current statewide goal is for 100% of electricity to come from carbon-free sources by 2045. In Marin, both MCE and PG&E offer programs which allow customers to purchase electricity from 100% renewable sources. Installing on-site solar is another way to bring renewable electricity into your home. An all-electric home that is powered by renewable electricity will not produce greenhouse gas emissions that contribute to climate change, unlike homes with fossil fuel appliances.

Health and Safety

Natural gas use in homes impacts indoor air quality and presents a risk of gas leaks and combustion-related injury. Burning gas in enclosed spaces can result in unhealthy levels of nitrogen dioxide, carbon monoxide, and formaldehyde. While exhaust systems can help, switching to electric appliances will remove the sources of these emissions entirely. Cooking with natural gas has also recently been found to be a cause of childhood asthma. Leaks are a pervasive problem with gas infrastructure, which can be especially dangerous in earthquake and fire-prone areas such as ours. For more information about these and other health and safety risks associated with natural gas use, visit the *Resources and Links* section of the Electrify Marin website at www.marincounty.org/electrify.

In Marin, much of our electricity is generated from renewable sources such as solar and wind, making electricity a cleaner alternative to natural gas and propane.

Cutting-Edge Technology

In recent years, huge improvements have been made to electric water heating, space heating, and cooking appliances. Many of the most modern, high-tech, and efficient appliances on the market today are all-electric. For example, heat pumps for water heating and space heating move heat from one place to another rather than generating heat directly, using far less energy than traditional appliances. Induction cooking systems use electromagnetic energy to heat iron cookware directly, rather than generating heat and transferring it to the cookware indirectly. This creates a faster, more seamless cooking experience. These and other emerging technologies can make our homes safer, more energy efficient, and more fun!

Financial Incentives

The County of Marin's **Electrify Marin** rebate program is currently offering rebates of $250 to $1,000 per replaced gas appliance for qualifying all-electric models, with higher rates available for low-income households. Supplemental rebates are available for electric service panel upgrades when adding electrical capacity is required to accommodate new electric appliances. Additional incentive programs may become available in the future. To learn more, visit www.marincounty.org/electrify.

Equipment Type	Standard Rebate	Low-Income Rebate
Heat Pump Water Heater	$1,000	$2,000
Central Air Source Heat Pump	$1,000	$4,500
Mini-Split Heat Pump	$800	$3,000
Induction Range	$500	$500
Induction Cooktop	$250	$250
Service Panel Upgrade	$500	$1,200

PLANNING FOR AN ELECTRIFIED HOME

Prioritizing and financing home upgrades isn't always feasible, but a good way to start is by evaluating your use of natural gas and propane and finding out what electric alternatives are available. Here are some steps you can take to plan for an electrified home:

1. Assess Your Natural Gas Use: You can begin by creating an inventory of the gas-fueled appliances in your home. Refer to the chart at the beginning of this guide to determine which ones are using the most gas. Furnaces and water heaters are generally the biggest gas users, but gas used by smaller appliances adds up as well.

2. Plan for Upgrades: Factors such as the age, performance, and efficiency of an appliance can help you prioritize. For example, if your water heater is teetering on 15 years old, it may need to be replaced soon. Instead of waiting until your appliance breaks, planning what you will replace it with ahead of time can make it easier to choose the right replacement and allow time for a quality upgrade.

3. Evaluate Your Electrical Capacity: Switching from gas to electric appliances, adding an EV charger, or installing solar may require additional electric service panel capacity. Consult with your contractor to determine if a service panel upgrade is needed, and plan for additional gas to electric swaps you may want to make in the future – you can add the capacity now and avoid having to upgrade again down the road.

4. Consult with Your Contractor: Some of the most efficient electric appliances are emerging technologies, so not all contractors have experience installing them. Talk with your contractor about their comfort level with the appliances you're considering installing.

YOUR HOME'S ELECTRICAL CAPACITY

Most homes in Marin are equipped with a 100-amp electrical service panel, though some older homes that haven't been upgraded may still have 60-amp panels. New homes are generally built with 200-amp panels.

Switching to electric appliances, adding an EV charger, or installing solar may require an upgrade to your existing electric service panel, especially in older homes. Your electrical contractor can help you determine how much electrical capacity your home may need, now and in the future.

The following are general electrical requirements for some of the more efficient electric appliances that could be viable alternatives to your gas appliances. *Requirements may differ for certain models, so you should always consult with an experienced electrical contractor.*

APPLIANCE	ELECTRICAL REQUIREMENTS
Heat Pump Water Heater	220/240 volt circuit 30 amp breaker
Central Air Heat Pump	220/240 volt circuit 30-40 amp breaker
Mini-Split Heat Pump	220/240 volt circuit 15-30 amp breaker
Induction Range	220/240 volt circuit 40 amp breaker
Induction Cooktop	120/240 volt circuit 30 amp breaker
Heat Pump Clothes Dryer	120/240 volt circuit 30 amp breaker
Vented Electric Dryer	220/240 volt circuit 30 amp breaker
Electric Vehicle Charger	220/240 volt circuit 40 amp breaker

EFFICIENT ELECTRIC APPLIANCES

HOT WATER HEATING

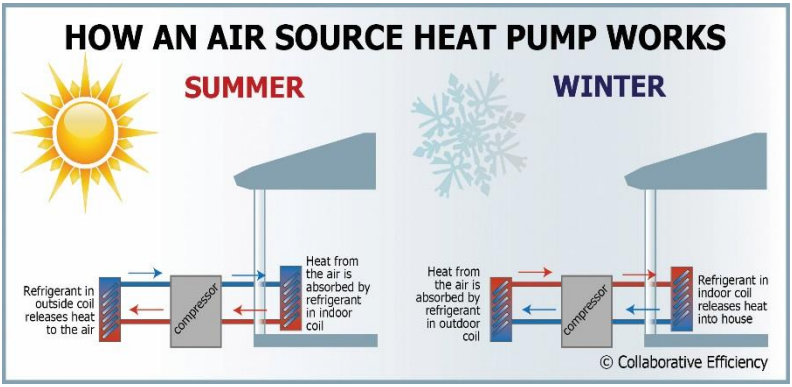
Of the different types of electric water heaters on the market today, heat pump water heaters are the most energy efficient by far. These use the same technology as refrigerators but in reverse – moving heat from the surrounding air into a water tank. Heat pump water heaters can use less than half the energy required by traditional electric resistance models. Space and airflow requirements differ from gas-fueled water heaters, so check with your contractor whether a heat pump water heater is right for your home.

SPACE HEATING

For homeowners switching from a gas furnace or heating system, the most energy efficient electric replacement will be a heat pump system. Heat pumps move heat from outside the home indoors and can be run in reverse in the summer to provide cooling. Even on cold winter days, heat pumps use a refrigerant to amplify what little ambient heat is present and move it indoors to heat your home. Heat pump systems work efficiently down to a temperature of 25°F, making them an ideal choice for Marin's mild climate. There are different options available for homes with and without existing duct systems:

Central Air Source Heat Pumps can be installed in homes with ventilation systems already in place, replacing a central gas furnace.

Mini-Split Heat Pumps are smaller systems that can be ideal for retrofitting houses with non-ducted systems, or for building additions when installing ductwork isn't feasible.



Heat pump systems move heat from the outdoors into your home in the winter, operating most efficiently in mild climates such as ours.

COOKING

There are a variety of electric alternatives to gas cooking equipment. The most efficient electric cooking method is induction, which uses electromagnetic energy to heat up cookware instead of directly generating heat. Induction cooking requires iron cookware – you can test your cookware with a magnet to see if it's compatible. Induction cooktops are fast, easy to clean, have less risk of burns, and won't heat up your home on a hot day. Electric kettles can be an energy efficient alternative to boiling water on a cooktop, and microwaves and pressure cookers can save energy by reducing cooking time.

CLOTHES DRYERS

Of course, the most energy efficient solution would be to line-dry your clothes whenever possible, but there are several types of electric clothes dryers available. Heat pump dryers are the most energy efficient, but they can be expensive and take longer to get your clothes dry. Vented electric dryers are inexpensive and relatively efficient but require ventilation to the outdoors. Electric condenser dryers don't require outside ventilation but are not energy

efficient. Factors such as the unit's location within the home, and the availability of outside ventilation will help you determine which electric model is best for you.

OTHER GAS-FUELED EQUIPMENT

Some of the other common uses for gas and propane in homes include fireplaces, heating systems for swimming pools and spas, and barbeques/grills. In general, looking into whether electricity can get the same job done as gas can be a good place to start. Solar heating for pools and spas can be an ideal solution that is both sustainable and cost-saving. An efficient electric space heating system, for example, may replace the need for a gas-powered fireplace in your home. New technologies are constantly emerging, so there may be electric alternatives that you are not yet aware of.

Your electrical contractor can help you determine what's best for your home and budget. Always consult with an experienced contractor when planning home upgrades.

MARIN COUNTY BUILDING DEPARTMENTS

Most home electrification projects will require permits from your local building department. Electrical and plumbing permits can usually be pulled instantly online. You can save money by bundling permit applications, pulling a single permit to perform multiple upgrades at the same time. Contact your local building department for the permitting requirements in your area.

Belvedere 450 San Rafael Ave Belvedere, CA 94920 (415) 435-3838 cityofbelvedere.org	**Corte Madera** 300 Tamalpais Drive Corte Madera, CA 94925 (415) 927-5062 townofcortemadera.org	**Fairfax** 142 Bolinas Road Fairfax, CA 94930 (415) 453-1584 townoffairfax.org
Larkspur 400 Magnolia Ave Larkspur, CA 94939 (415) 927-5038 ci.larkspur.ca.us	**Marin County** 3501 Civic Center Drive Suite 308 San Rafael, CA 94903 (415) 473-6550 marincounty.org	**Mill Valley** 23 Corte Madera Ave Mill Valley, CA 94941 (415) 388-4033 cityofmillvalley.org
Novato 922 Machin Ave Novato, CA 94945 (415) 899-8989 novato.org	**Ross** 31 Sir Francis Drake Bl Ross, CA 94957 (415) 453-1453 townofross.org	**San Anselmo** 525 San Anselmo Ave San Anselmo, CA 94957 (415) 258-4616 townofsananselmo.org
San Rafael 1400 Fifth Ave San Rafael, CA 94901 (415) 485-3367 cityofsanrafael.org	**Sausalito** 420 Litho Street Sausalito, CA 94965 (415) 289-4128 sausalito.gov	**Tiburon** 1505 Tiburon Blvd Tiburon, CA 94920 (415) 435-7380 townoftiburon.org

QUESTIONS?

County of Marin staff is always available to answer questions and point you in the right direction on your home electrification project. You can reach us directly at (415) 473-3069 or energy@marincounty.org.

Electrify
MARIN

Marin Community Development Agency
3501Civic Center Drive, Suite 308
San Rafael, CA 94903

Tel: (415) 473-3069
Fax: (415) 473-7880
energy@marincounty.org

www.marincounty.org/electrify

APPENDIX B - OUTREACH SUMMARY

ELECTRIFY MARIN OUTREACH SUMMARY

Outreach for Electrify Marin included multiple activities aimed at reaching homeowners, local contractors, and local government. Following were some of the more impactful activities which other jurisdictions may want to consider for replication.

Direct Mail Campaigns

- Solar Property Owners: Solar permitting data was obtained from local building departments to reach homeowners with PV systems
- Local HVAC and Plumbing Contractors: Program summaries and periodic updates were mailed to all local plumbing and HVAC contractors
- Local Solar Contractors: Program summaries were mailed to solar contractors, to encourage electrification among homeowners with excess capacity from their PV systems
- Heat Pump Water Heater Promotion: Information about the opportunity to stack Electrify Marin rebates with other regional rebates were sent to local addresses

Selected Presentations

Presentations were given at a wide variety of in-person and virtual events, including the following:

- Novato Green Living Festival, Apr 2019
- Marin Sustainable Enterprise Conference, Sept 2019
- Green Change “Greening Your Home” meetup, Apr 2020
- BayREN Homeowner Workshop on Indoor Air Quality, Jul 2020
- Marin Sangha Climate Retreat, Aug 2020
- Sustainable Fairfax Community Chats (4-part series), Sept 2020

Selected Community Events

Rebates were promoted at the following in-person and virtual events, at which collateral such as the Marin County Electric Home Guide and the Electrify Marin program summary were distributed:

- Rebuild Green Expo, Feb 2019
- Marin Builders Association Morning Mixer, Mar 2019
- Greenbrae Heritage Day, May 2019
- Marin County Fair (in partnership with Drawdown: Marin), Jul 2019
- Drive Clean Marin EV Test Drive Event, Sept 2019
- Marin Association of Realtors Holiday Luncheon, Dec 2019
- Environmental Forum of Marin Community Microgrid Event, Feb 2020
- Marin County Climate Action Plan Workshop, Feb 2020
- San Rafael Chamber of Commerce Business Showcase Event, Sept 2020

Promotion by Local Government

Electrify Marin was promoted through the following local government publications:

- City of Mill Valley Newsletter
- City of San Anselmo Newsletter
- City of Novato Newsletter
- San Rafael City Manager Newsletter
- Marin Climate and Energy Partnership (MCEP) Friday Memo
- Marin County Sustainability Team Newsletter

Digital Marketing Efforts

- Ongoing promotion though the Marin County Sustainability Team and Drawdown: Marin Facebook and Instagram accounts
- Periodic boosted Facebook posts promoting rebates for specific technologies
- Ongoing Google Search ads based on search terms relevant to incentivized appliances
- $25 incentive for rebate recipients who post about their appliance upgrade and rebate on Nextdoor/Facebook

Rebate Databases

Electrify Marin rebates were added to the following directories of rebate listings:

- DSIRE: Database of State Incentives for Renewables & Efficiency
- EcoRebates: Product offer platform used by major retailers including Home Depot and Lowe's
- Clean Energy Authority: Directory of solar rebates and incentives
- Switch Is On: Index of local electrification rebates presented by the Building Decarbonization Coalition (BDC)

Permitting Electrification Projects

A guide for building department staff

In response to local greenhouse gas emission reduction goals, jurisdictions across Marin are encouraging residents to replace natural gas and propane appliances with efficient, all-electric alternatives. The checklist below is designed to help building department staff ensure that these projects are completed safely and with the appropriate permits.

Electrify MARIN

Project Type: Gas Water Heater to Heat Pump Water Heater

- ☐ Electrical Permit
- ☐ Plumbing Permit
- ☐ Partial floor or site plan of the heat pump water heater (HPWH) placement, as well as seismic bracing details.
- ☐ Manufacturer's specification sheet with installation instructions
- ☐ Existing main panel rating with a dedicated circuit with capacity for the HPWH as confirmed by a licensed electrical contractor. Include details if an electrical panel upgrade is required
- ☐ An electrical disconnect (circuit breaker or a lockable switch) for the HPWH that is within sight of the appliance
- ☐ If installed in an attic or other elevated floor space:
  - ☐ Provide verification that the existing framing members will support the proposed dead loads of the HPWH;
  - ☐ Specify accessibility for service;
  - ☐ Specify drainage system; and;
  - ☐ Specify vacuum relief valves when the HPWH is installed above the hot water plumbing fixtures
- ☐ Title 24, Part 6 of the California Energy Code may use either of the methods below:
  - ☐ Prescriptive Certificate of Compliance Form CEC-CF1R-ALT-050-E (or paper version), showing the HPWH meets minimum Energy Factor requirement of 3.0, or
  - ☐ Performance Certificates of Compliance reporting modeling whole-home energy usage (more likely if the HPWH installation is part of a larger renovation project)

Project Type: Induction Cooktops & Ranges

- ☐ Electrical Permit
- ☐ Manufacturer's specification sheet with installation instructions
- ☐ Existing main panel rating with a dedicated circuit with necessary capacity as confirmed by a licensed electrical contractor. Include details if an electrical panel upgrade is required.

Project Type: Gas Space Heater to Heat Pump Space Heater (Mini-Split OR Central Furnace)

- ☐ Electrical Permit
- ☐ Mechanical Permit (to replace a furnace or change ductwork)
- ☐ Manufacturer's specification sheet with installation instructions
- ☐ Existing main panel rating with a dedicated circuit with necessary capacity as confirmed by a licensed electrical contractor. Include details if an electrical panel upgrade is required
- ☐ An electrical disconnect (circuit breaker or a lockable switch) for the heat pump that is within sight of the appliance
- ☐ Title 24, Part 6 of the California Energy Code may use either of the methods below:
    - ☐ Prescriptive Certificate of Compliance Form CEC-CF1R-ALT-050-E (or paper version), or
    - ☐ Performance Certificates of Compliance reporting modeling whole-home energy usage (more likely if the heat pump installation is part of a larger renovation project)

Project Type: Service Panel Upgrade

- ☐ Electrical Permit

If you have questions about the program, please visit www.marincounty.org/electrify or contact Mark Chhabria at mchhabria@marincounty.org. Please feel free to let applicants know about the program if you see an application for a natural gas to electric appliance swap!

CONTRACTOR FEEDBACK

Rather than implementing a formal survey for contractors, we decided to remain in ongoing communication with the local contractors who were performing the projects incentivized by Electrify Marin. Our initial connection began with a review of local permit data to determine who was doing this work, followed by outreach, in-person engagement at building association events, and continued conversations via phone and email. Developing relationships with local contractors yielded valuable real-time feedback about the rebate program, as well as the opportunity to educate contractors about electrification and provide training on incentivized technology.

ENERGY EFFICIENCY REQUIREMENTS

Among most valuable things we learned from contractor feedback early in the program related to our original requirement of a SEER rating of 18.0 or above for heat pumps for space heating (HPSH). Contractor feedback suggested that the cost difference between a SEER 16 and SEER 18 system could be around $4,000 and that the rebate of $1,000 did not help them justify installing the more efficient system. Additional market research validated this concern. After analyzing the benefits of incentivizing SEER 16 systems, we ultimately decided to lower the requirement to be more in line with the experience of our contractors. As a result, we gained increased support from local contractors and higher number of applications for HPSH incentives coming in.

EASE OF PARTICIPATION

We learned that some local contractors are reluctant to participate in or promote rebate programs because of added administrative burden. Contractors appreciated our direct-to-homeowner model of rebates because they were not required to undergo any kind of onboarding, complete applications, or wait for reimbursement. As a result, some contractors who normally avoid rebate programs became willing to promote ours.

FINALED PERMIT REQUIREMENT

We also received feedback that our requirement that a project pass final inspection from the local building department was a challenge for some contractors, who normally apply for permits but do not see them through to final inspection. Although we did not alter this requirement, it was valuable to learn that some contractors felt burdened by it.

APPENDIX E - PROJECT COST DATA

Rebate ID	Appliance Type	Gross Project Cost
2	Heat Pump Water Heater	$2,536.12
5	Heat Pump Water Heater	$2,863.23
8	Heat Pump Water Heater	$2,078.11
15	Heat Pump Water Heater	$2,829.52
17	Heat Pump Water Heater	$4,953.00
27	Heat Pump Water Heater	$5,452.75
32	Heat Pump Water Heater	$3,949.69
36	Heat Pump Water Heater	$2,100.00
37	Heat Pump Water Heater	$2,447.91
38	Heat Pump Water Heater	$4,986.50
47	Heat Pump Water Heater	$4,206.00
51	Heat Pump Water Heater	$2,497.82
52	Heat Pump Water Heater	$2,757.15
53	Heat Pump Water Heater	$7,417.06
55	Heat Pump Water Heater	$3,438.77
61	Heat Pump Water Heater	$3,600.00
62	Heat Pump Water Heater	$3,900.00
75	Heat Pump Water Heater	$3,233.98
84	Heat Pump Water Heater	$3,500.00
93	Heat Pump Water Heater	$5,398.00
100	Heat Pump Water Heater	$5,427.00
101	Heat Pump Water Heater	$2,508.84
	HPWH Average Project Cost	**$3,730.98**
13	Induction Range	$2,299.00
22	Induction Range	$1,140.49
25	Induction Range	$8,467.78
30	Induction Range	$2,165.93
49	Induction Range	$2,787.00
50	Induction Range	$2,134.01
58	Induction Range	$3,780.14
74	Induction Range	$3,364.49
	RANGE Average Project Cost	**$3,267.36**
20	Induction Cooktop	$1,659.52
23	Induction Cooktop	$2,349.00
66	Induction Cooktop	$973.00
	COOKTOP Average Project Cost	**$1,660.51**
116	Central Air Source Heat Pump	$17,017.79
96	Central Air Source Heat Pump	$17,189.44
95	Central Air Source Heat Pump	$23,084.00
92	Central Air Source Heat Pump	$17,152.00
83	Central Air Source Heat Pump	$19,269.00
79	Central Air Source Heat Pump	$19,500.00
76	Central Air Source Heat Pump	$19,289.00

68	Central Air Source Heat Pump	$15,979.31
67	Central Air Source Heat Pump	$15,750.00
34	Central Air Source Heat Pump	$22,585.00
11	Central Air Source Heat Pump	$22,955.00
	ASHP Average Project Cost	**$19,070.05**

3	Minisplit Heat Pump	$15,304.00
7	Minisplit Heat Pump	$5,673.89
9	Minisplit Heat Pump	$25,465.00
21	Minisplit Heat Pump	$22,235.00
24	Minisplit Heat Pump	$15,644.00
29	Minisplit Heat Pump	$1,821.00
33	Minisplit Heat Pump	$15,243.50
43	Minisplit Heat Pump	$11,027.00
48	Minisplit Heat Pump	$5,915.58
54	Minisplit Heat Pump	$9,294.00
57	Minisplit Heat Pump	$8,455.00
89	Minisplit Heat Pump	$15,900.00
90	Minisplit Heat Pump	$17,982.00
94	Minisplit Heat Pump	$13,895.00
98	Minisplit Heat Pump	$17,785.00
	MINISPLIT Average Project Cost	**$13,442.66**

12	Service Panel Upgrade	$3,500.00
16	Service Panel Upgrade	$3,860.30
31	Service Panel Upgrade	$5,506.90
35	Service Panel Upgrade	$4,476.00
40	Service Panel Upgrade	$3,595.00
42	Service Panel Upgrade	$3,500.00
44	Service Panel Upgrade	$6,330.00
45	Service Panel Upgrade	$2,500.00
46	Service Panel Upgrade	$3,300.00
64	Service Panel Upgrade	$3,500.00
70	Service Panel Upgrade	$2,780.00
72	Service Panel Upgrade	$4,500.00
73	Service Panel Upgrade	$3,400.00
	PANEL Average Project Cost	**$3,903.71**

APPENDIX F - HOMEOWNER SURVEY

Electrify Marin Rebate Program Homeowner Survey

SUMMARY → DESIGN SURVEY → PREVIEW & SCORE → COLLECT RESPONSES → ANALYZE RESULTS → PRESENT RESULTS

EXPORTS

PAID FEATURE

Export your survey data in .PDF, .XLS, .CSV, .PPTX, or SPSS format.

UPGRADE Learn more »

RESPONDENTS: 34 of 34

ADD TO DASHBOARD

QUESTION SUMMARIES | INSIGHTS AND DATA TRENDS | INDIVIDUAL RESPONSES

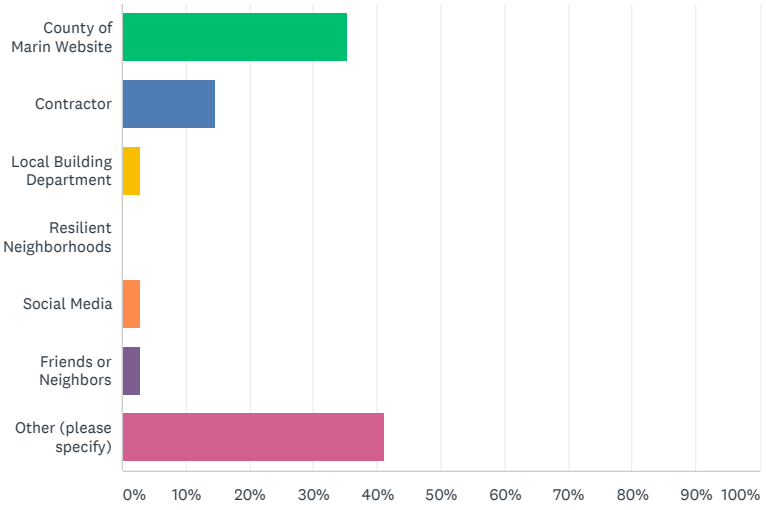
Page 1: Please take a moment to tell us about your experience with the Electrify Marin Rebate Prograr

Q1

Customiz

How did you hear about the Electrify Marin Rebate Program?

Answered: 34 Skipped: 0



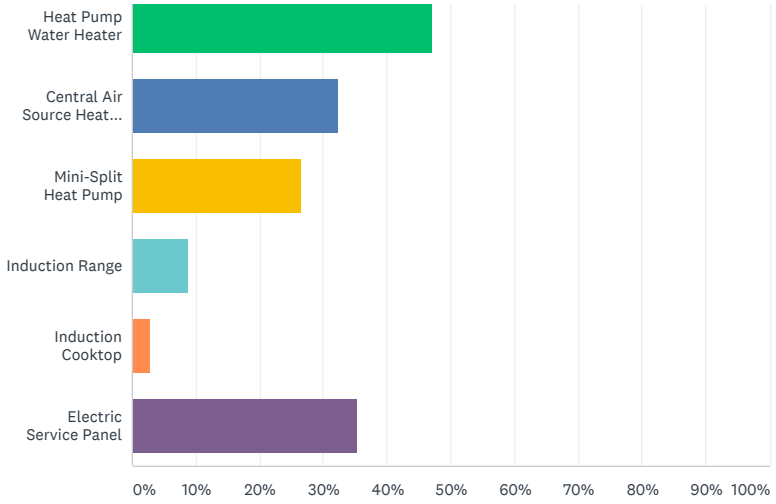
ANSWER CHOICES		RESPONSES
County of Marin Website		35.29%
Contractor		14.71%
Local Building Department		2.94%
Resilient Neighborhoods		0.00%
Social Media		2.94%
Friends or Neighbors		2.94%
Other (please specify)	Responses	41.18%
TOTAL		

Q2

Customiz

What kind of electric equipment did you receive rebates for? that apply.

Answered: 34 Skipped: 0



ANSWER CHOICES	RESPONSES
Heat Pump Water Heater	47.06%
Central Air Source Heat Pump	32.35%
Mini-Split Heat Pump	26.47%
Induction Range	8.82%
Induction Cooktop	2.94%
Electric Service Panel	35.29%

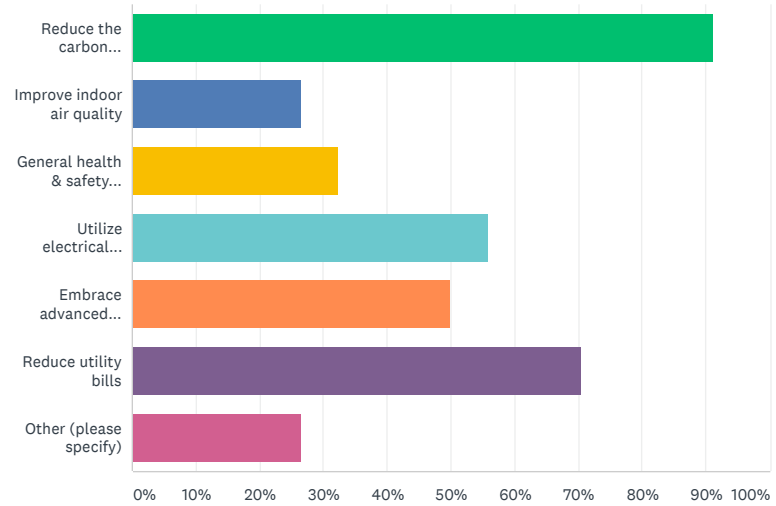
Total Respondents: 34

Q3

Customiz

What motivated you to replace your gas appliance with an efficient electric one? Select all that apply.

Answered: 34 Skipped: 0



ANSWER CHOICES	RESPONS
Reduce the carbon footprint of my home	91.18%
Improve indoor air quality	47%
General health & safety concerns	35%
Utilize electrical capacity provided by my on-site solar system	

ANSWER CHOICES RESPONS

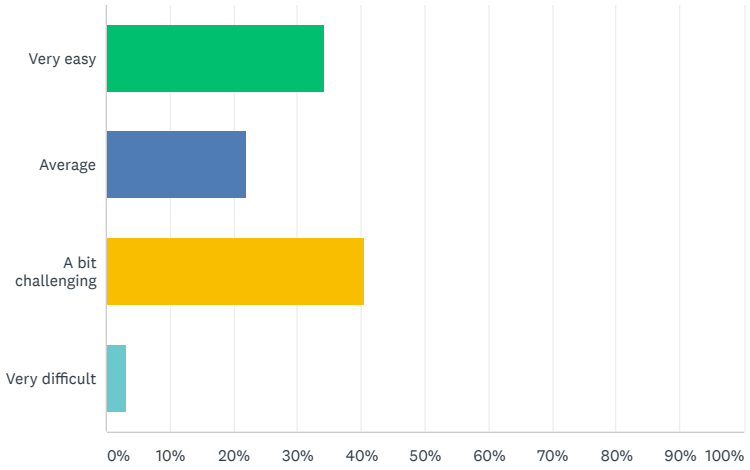
Total Respondents: 34		
Enhance advanced technology		50.00%
Reduce utility bills		70.59%
Other (please specify)	Responses	26.47%

Total Respondents: 34

Q4 Customiz

Overall, how easy was it to find an experienced contractor wi able to replace your appliance(s)?

Answered: 32 Skipped: 2



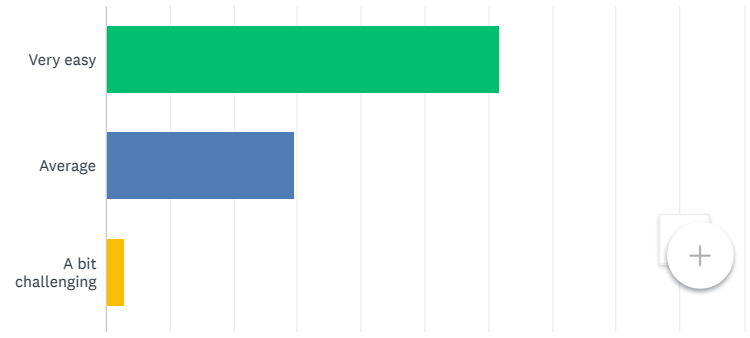
ANSWER CHOICES	RESPONSES
Very easy	34.38%
Average	21.88%
A bit challenging	40.63%
Very difficult	3.13%
TOTAL	

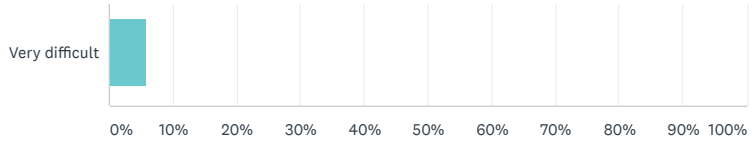
Comments (14)

Q5 Customiz

Overall, how easy was it to obtain the required permit(s) from local building department?

Answered: 34 Skipped: 0





ANSWER CHOICES	RESPONSES
Very easy	61.76%
Average	29.41%
A bit challenging	2.94%
Very difficult	5.88%
TOTAL	

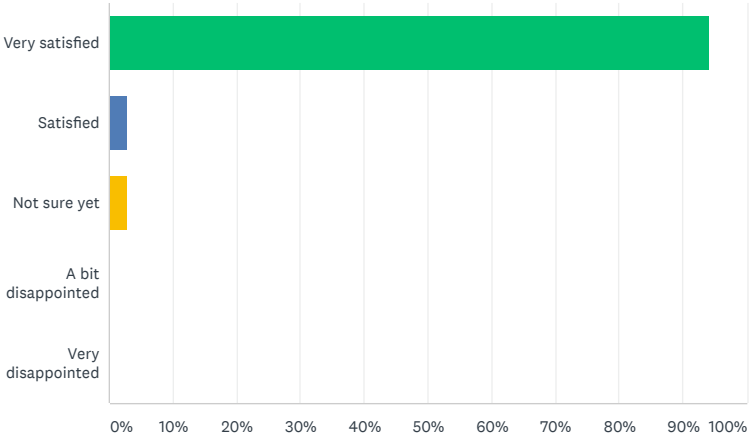
Comments (10)

Q6

Customiz

So far, how satisfied are you with the new appliance(s) you ha installed?

Answered: 34 Skipped: 0



ANSWER CHOICES	RESPONSES
Very satisfied	94.12%
Satisfied	2.94%
Not sure yet	2.94%
A bit disappointed	0.00%
Very disappointed	0.00%
TOTAL	

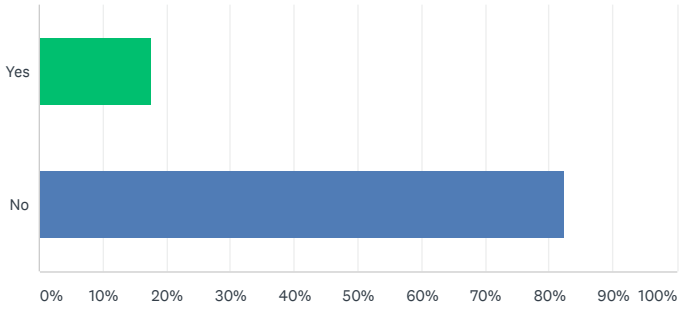
Comments (8)

Q7

Customiz

Did you experience any challenges with the appliance swap-o process? Please describe below.

Answered: 34 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	17.65%
No	82.35%
TOTAL	

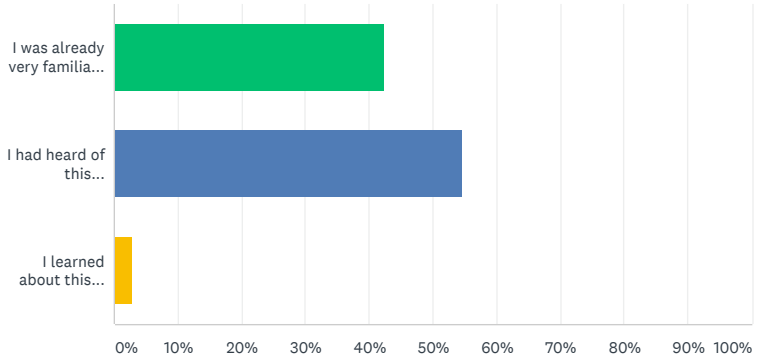
Comments (6)

Q8

Customiz

Before learning about the rebate program, how familiar were the technology (e.g., heat pumps, induction cooking) used in appliance(s)?

Answered: 33 Skipped: 1



ANSWER CHOICES	RESP
I was already very familiar with this technology.	42.4
I had heard of this technology, but learned more about it through this program.	54.5
I learned about this technology through the Electrify Marin program.	3.03
TOTAL	

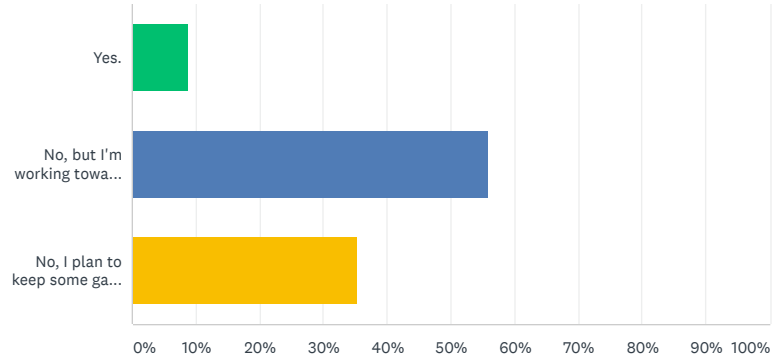
Comments (4)

Q9

Customiz

After replacing your appliance(s) through this program, is you now all-electric?

Answered: 34 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes.	8.82%
No, but I'm working toward an all-electric home.	55.88%
No, I plan to keep some gas appliances.	35.29%
TOTAL	

Comments (16)

Q10

How can we improve? Please provide feedback, suggestions, comments about your experience with the Electrify Marin reb program below.

Answered: 29 Skipped: 5

WORD CLOUD TAGS (0) Sentime

Apply to selected Filter by tag Search responses

Showing **29** responses

A seamless process & application was not difficult

1/7/2021 6:51 PM View respondent's answers

I really think it's great that the county is offering these rebates. Thanks for all of your help along the way!

1/4/2021 10:30 AM View respondent's answers

It's a bit hard to find out about this program and even contractors in Marin don't know about it.

12/3/2020 11:08 AM View respondent's answers

Make the submission process a form online. Sending all the data via snail mail is not great, sending via email is but less secure

11/23/2020 12:25 PM

View respondent's answers

ENGLISH