

ALAMEDA

Equitable Building Decarbonization Plan

*September 2022 Planning Board
Recommended Draft*

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Executive Summary

The City of Alameda's Equitable Building Decarbonization Plan (Plan) outlines a phased approach for equitably implementing the needed programs, policies, financing and engagement by 2030 to decarbonize existing buildings by shifting from natural gas use towards energy efficient, all-electric buildings. This Plan is driven by the City's climate goals set forth by the Climate Action and Resilience Plan (CARP) to reduce emissions by 50% below 2005 levels by 2030 and achieve carbon neutrality as soon as possible, and the City's Climate Emergency Declaration that includes a goal of becoming carbon neutral by 2030. While the timeline for this Plan is ambitious, there is momentum from the local, state and federal governments to pursue building decarbonization as a central strategy to reduce and eliminate greenhouse gas (GHG) emissions from the building sector, creating healthier, safer, and more resilient buildings. We anticipate unprecedented investment from State and Federal governments to support our work. This Plan will provide a phased approach to develop the policies and programs to ensure that building decarbonization is accessible and beneficial to all members of our community.

The Plan will first describe building decarbonization and how it fits into Alameda's sustainability and resilience goals, followed by the equity principles that ground the Plan. Then the Plan will describe the elements and implementation phases that make up the framework. Finally, the Plan includes a discussion about the electrification housing nexus and documentation of the community engagement process for development of the Plan.

Building Decarbonization

Alameda Municipal Power (AMP) began providing 100% clean, carbon free electricity to all customers in 2020. With this development, 70% of Alameda's GHG emissions come from transportation, 27% from building energy use, and 3% from other sources such as waste, water, and wastewater. Zero emission buildings are an essential strategy reach the City's carbon neutrality goals and the focus of this plan. With natural gas use in buildings accounting for all the GHG emissions from the building sector, zero emission buildings can be achieved by shifting natural gas use towards 100% clean electric energy, a process known as building decarbonization.

The decarbonization pathway is a three-step process. AMP already achieved the first step of decarbonizing the grid by providing 100% clean electric energy in 2020. The next step is to reduce energy use through improving energy efficiency in buildings through insulation, sealing building envelopes and switching to LED lighting. Finally, the last step is to convert natural gas use to 100% clean electric energy by replacing gas appliances with electric ones for such applications as water heaters, furnaces, cooktops and ranges, and clothes dryers. Residents and building owners can learn more about the process of decarbonizing their buildings and available rebates and incentives at www.alamedaca.gov/BuildingElectrification and <https://www.alamedamp.com/31/Sustainability>.

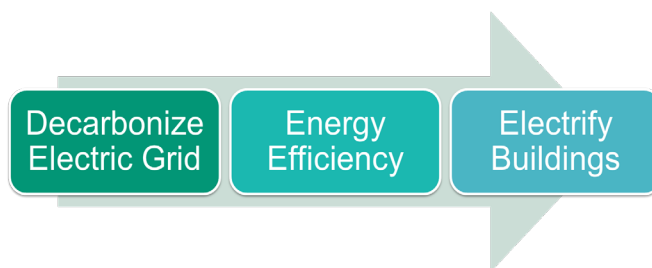


Figure 1: Building Decarbonization Pathway

Achieving net zero buildings will not only further the City’s climate and equity goals, it creates a healthier, safer, and more resilient community for everyone by reducing indoor air pollutants and reducing the risk of burns, house fires and pipeline ruptures in an earthquake. Energy efficient, all-electric homes save money on energy bills, reducing utility costs for Alameda families. This Plan also recognizes that Alameda’s old building stock, many with health and safety challenges and deferred maintenance, may need to address health and safety issues first before energy efficiency or building electrification. Through a holistic approach towards safe, green, healthy buildings, there are opportunities to address health and safety, while including resilience and other decarbonization efforts in the process.

Equity Principles

The following equity principles serve as guardrails to ensure that Plan promotes equity in its development, implementation, and outcomes:

- Everyone, especially low to moderate income households, should be able to affordably switch to modern electric equipment, reducing their energy burden.
- Ensure building decarbonization policies and programs do not have disproportionate impacts on low income households and communities of color.
- Electrification policy should also support healthy, safe, affordable housing and quality, good paying jobs.
- The electrification process should be as simple and seamless as possible.
- We should act ambitiously and expeditiously while being also realistic about the challenges we face in transitioning Alameda’s buildings.

Elements and Phases

Elements

Each of the following elements are critical components of how Alameda will decarbonize its existing buildings and they come together to create the long-term strategy for transitioning to energy efficient, all-electric buildings.

- **Education and Outreach:** Provide the community with the knowledge of energy efficiency and electrification technology and the process involved and equip community members to engage in policy co-creation.
- **Policies and Programs:** Develop a suite of policy options and programs to target different points of intervention such as the permit process, appliance end of life, and others.
- **Financing and Funding:** Identify financing mechanisms to reduce barriers to electrification through raising new revenue or taking advantage of bill savings.

Education &
Outreach

Policies &
Programs

Financing &
Funding

Alameda
Municipal
Power

- **Alameda Municipal Power:** Deliver reliable, 100% clean electric energy and provide programing, rate design, rebates, education and outreach to encourage electrification.

Phases

The Plan includes three phases: Immediate (2022 – 2023), Near Term (2024 – 2025), and Long Term (2026 – 2030) which includes recommended actions or projects for each of the four elements. The Near Term and Long Term phases intentionally have less specificity in the recommended activities to provide the needed flexibility to adapt to rapidly changing market conditions and policy landscapes.

Immediate: 2022-2023

This phase involves immediately cost-effective policy measures. Other actions in this phase center around education and outreach, and doing research and analysis to support implementation in future phases.

Education & Outreach	<ul style="list-style-type: none">■ Develop electrification educational material including website, information sheet, and workshop curriculum■ Develop a decarbonization social marketing campaign■ Conduct public engagement on draft plan■ Conduct public meetings about new policy proposals■ Conduct targeted stakeholder meetings
Policies & Programs	<ul style="list-style-type: none">■ Support voluntary adoption of energy efficiency and electrification measures<ul style="list-style-type: none">— Develop website with detailed information and education— Develop and implement innovative pilot programs that measure electrification benefits for different types of housing and test financing mechanisms— Conduct community outreach and education about available technologies, rebates and technical assistance■ Explore ordinances requiring certain electrification and energy efficiency measures when renovating or upgrading appliances for already cost-effective electrification measures, with certain exceptions■ Re-adopt city's ordinance for all new electric buildings for 2023 building code cycle■ Coordinate with City staff and Alameda community concerning the impact of electrification on landlords and tenants
Financing & Funding	<ul style="list-style-type: none">■ Explore revenue measures such as bonds or taxes that could support low- and moderate-income owners, and small landlords■ Evaluate state and federal grant opportunities to support buildings owners with decarbonization measures

AMP	<ul style="list-style-type: none"> ■ Continue targeted education and outreach through website, newsletters, bill inserts and social media ■ Develop technical assistance services tailored specifically for EV charging infrastructure for multi-family customers ■ Continue market rate rebate programs and introduce new rebates for: <ul style="list-style-type: none"> — Residential heat pump space heating — Expanding micro-mobility options for customers such as e-bikes ■ Consider additional equity focused elements in program design such as program accessibility, outreach efforts, and increased amounts for income qualified customers ■ Coordinate with other agencies to streamline customers experience with rebates and program offerings ■ Explore expanding Home Energy Review program to include electrification and provide technical assistance to support community members with energy efficiency and electrification upgrades ■ Evaluate the Alameda Green Survey responses to guide development of an alternative voluntary sustainability focused program
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Near Term: 2024-2025

This phase involves policy measures that are anticipated to be cost effective in the near term as the market develops and new rebates become available. Hence, policies, programs and actions in this phase may evolve depending on the development in the previous phase and market changes.

Education & Outreach	<ul style="list-style-type: none"> ■ Continue targeted community education with focus on low- and moderate-income households and small landlords ■ Public meetings about new policy proposals ■ Continue stakeholder meetings
Policies & Programs	<ul style="list-style-type: none"> ■ Evaluate energy audit requirement at time of sale requirements ■ Consider building code compliance measures ■ Consider benchmarking requirements as a pre-cursor to Building Performance Standards ■ Continue and/or expand direct install program with a focus on affordable housing ■ Evaluate policies and specific needs for industrial building decarbonization

Financing & Funding	<ul style="list-style-type: none"> ■ Consider split user's utility tax, refundable transfer tax for energy efficiency, electrification and/or seismic and flood retrofits, and other available financing options ■ Evaluate state and federal grant opportunities
AMP	<ul style="list-style-type: none"> ■ Consider rate design to support building electrification ■ Evaluate outcomes of TECH Clean California Tariffed On-Bill Pilot ■ Expand targeted rebate programs for income qualified customers ■ Evaluate the feasibility of an energy advisor service and a home electrification technical assistance program to guide customers through their electrification journey

Long Term: 2026-2030

This phase involves policy measures anticipated to become cost effective in the long term. Specific policies, programs and actions in this phase are more difficult to predict at this time and will depend on the developments in the previous phase and market changes.

Education & Outreach	<ul style="list-style-type: none"> ■ Continue broad community education ■ Public meetings about new policy proposals ■ Continue stakeholder meetings
Policies & Programs	<ul style="list-style-type: none"> ■ Consider Building Performance Standards ■ Consider gas pruning measures in partnership with PG&E or alternative uses for existing gas infrastructure ■ Consider space heating upgrade requirement without existing A/C upgrade
Financing & Funding	<ul style="list-style-type: none"> ■ Identify additional revenue measures ■ Evaluate state and federal grant opportunities
AMP	<ul style="list-style-type: none"> ■ Consider neighborhood-based upgrades to service and panels ■ Targeted direct replacement of gas appliances for income qualified customers ■ Re-evaluate community needs and barriers

Electrification Housing Nexus

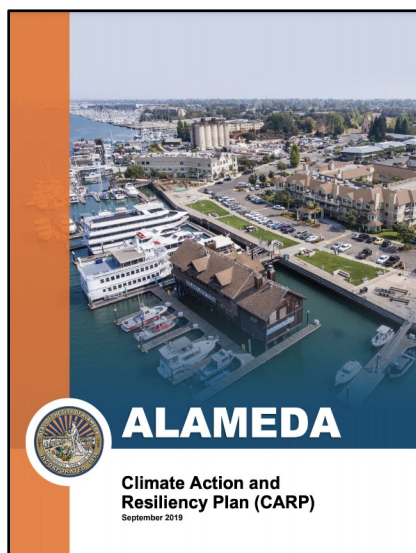
Since building decarbonization impacts buildings, it inherently impacts housing as well. With Alameda and the greater Bay Area facing a housing affordability crisis, climate strategies like building decarbonization should support housing affordability goals to keep our communities safe, healthy, and resilient. While building decarbonization can greatly improve the quality of life for renters, it is important to approach building decarbonization thoughtfully to avoid potential unintended negative consequences for renters and small landlords. However, leaving rental buildings out of building decarbonization will exacerbate inequality, with renters missing out on the health and resilience benefits of electrification and left to pay increasing natural gas prices. Hence, policy and program development must ensure that building decarbonization does not contribute to rent burden and displacement for low-moderate-income residents.

Developing the Plan

To ensure that the Plan reflects community values and priorities, multiple forms of community engagement were conducted to incorporate community knowledge and feedback in the development of the plan. These engagement opportunities were publicized on the City's social media channels, Sustainability and Resilience Newsletter, Alameda Sun and Alameda Farmers' Market. Staff conducted an electrification workshop series held from March – May 2022, comprised of seven total workshops covering Electrification 101, Plan Brainstorm, and Draft Plan + Ordinance. An electrification survey in English, Spanish, and Chinese was available online from March – May 2022 on [the City's building electrification landing page](#) and was advertised through a variety of outreach channels.

Introduction

The Equitable Building Decarbonization Plan (Plan) lays out the process for shifting natural gas use in existing buildings toward clean, energy efficient all-electric buildings in accordance with the City's climate and equity goals. Meeting these goals requires making substantial progress toward equitably decarbonizing residential, commercial and municipal buildings citywide through implementation of programs, policies, financing and engagement by 2030.



In 2019, Alameda adopted the Climate Action and Resiliency Plan (CARP) and set a goal to reduce emissions by 50% below 2005 levels by 2030 and achieve carbon neutrality as soon as possible. In the same year, Alameda City Council also declared a Climate Emergency, which includes a goal of becoming carbon neutral by 2030. Scientists tell us that to limit global warming to 1.5° C and avert the most catastrophic outcomes of climate change, we must make significant progress towards reducing GHG emissions by 2030.¹ CARP also recognizes that despite our best efforts to reduce emissions, Alameda is already experiencing the impacts of climate change and that it will intensify in the coming years and pose a significant threat to Alameda's future. CARP outlines a strategy to equitably adapt to flooding, sea level and groundwater rise, drought, extreme heat, hazardous air quality, and earthquakes in tandem

¹ IPCC. (2018). 2018: Global Warming of 1.5°C. Retrieved from <https://www.ipcc.ch/sr15/>

with our GHG reduction efforts to help secure our future on this island.

AMP began providing 100% clean electric energy in 2020, which was an important foundational step towards decarbonizing the transportation and building sector. With this development, 70% of GHG emissions produced locally come from transportation, 27% from natural gas use in buildings, and 3% from other sources such as waste, water, and wastewater.

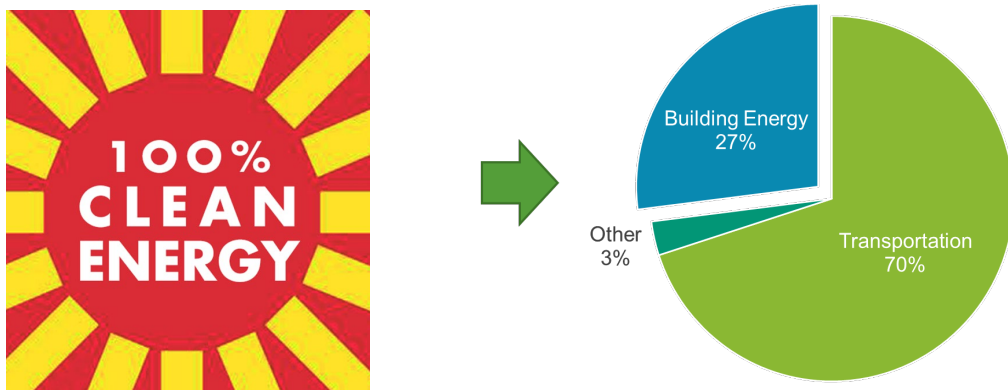


Figure 2: Alameda's Emissions Sources after 100% Clean Electricity

With AMP's clean electric energy source, Alameda has a unique opportunity to shift all end uses in the building and transportation sectors from fossil fuels to clean, carbon-free electricity and to further invest in Alameda's community owned utility. Alameda took the first step towards reducing our building emissions in 2021 by requiring all new development to be all-electric with certain exceptions. The next step is to tackle existing buildings.

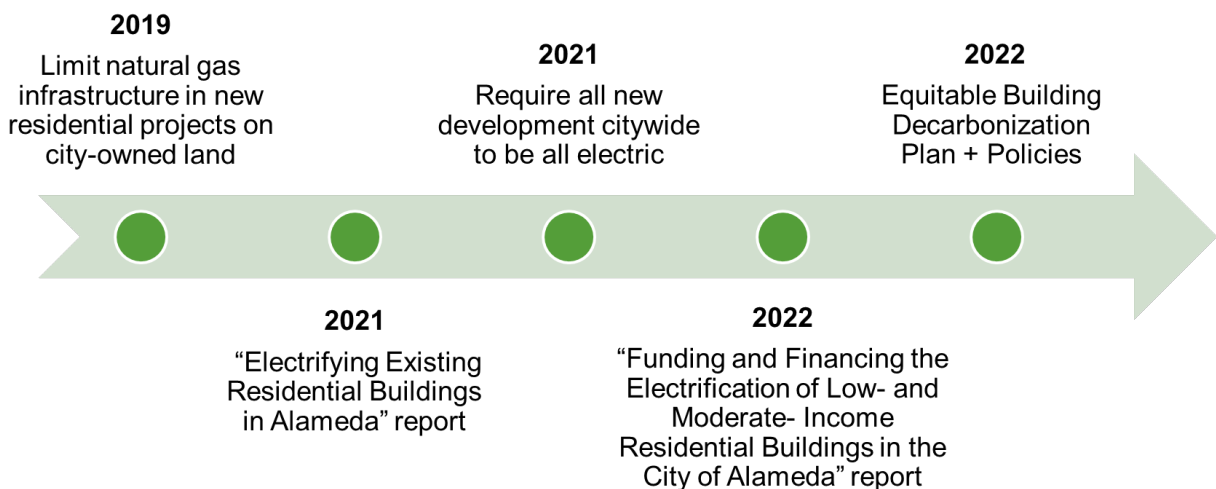


Figure 3: Timeline of Alameda Building Decarbonization

Reaching the City's carbon neutrality goal will require net zero emission buildings that do not burn natural gas. With 100% clean electric energy provided by AMP, electrifying all existing buildings would eliminate 27% of GHG emissions associated with natural gas use in buildings. The Plan recommends a process for equitably implementing the needed programs, policies, financing and engagement by 2030 to

decarbonize existing buildings by shifting from natural gas use towards energy efficient, all-electric buildings. Delaying action will increase costs for the city and residents, increase the impacts we will experience from sea level rise, extreme heat, drought and other impacts, and prolong public health and air quality disparities in our community. Accelerating building decarbonization will require strong support from the community and unprecedented investment in Alameda's buildings to ensure that all members of the community have the opportunity and resources necessary to make this transition. We also anticipate unprecedented investment from State and Federal governments with California's budget surplus, the Federal Infrastructure Investment and Jobs Act and Inflation Reduction Act. The path to net zero buildings is not fully clear yet, but with the nation, state, growing number of cities, and organizations working toward a similar strategy, we are confident that we can make significant progress over the coming eight years by setting in place the necessary policies and programs to support the transition.

The Plan provides a phased approach that includes new policies and programs, financing options, expanded rebates, and community education and outreach. The Plan will align with other citywide efforts to create affordable, safe, healthy and resilient housing and prepare the City to leverage grants and funds as they become available. The Plan also focuses on supporting Alameda's low-income communities who risk bearing the heaviest financial burden if they are left maintaining gas service after most others have made the transition to electric.

Regional, State, and National Efforts

Building electrification is increasingly recognized and pursued by local, regional, state and national governments as a central strategy to reduce and eliminate GHG emissions from the building sector. In Alameda, this sector is responsible for 27% of GHG emissions. Policies and programs from the regional, state and national level are critical to supporting building electrification at the local level. They create synergies, catalyze the market to adopt electrification technologies faster, and support the development of a green workforce. The following list highlights some of the recent developments in this space at the regional, state and national levels.

Regional

- The City of Berkeley adopted the *Existing Buildings Electrification Strategy* in November 2021.
- The City of San Jose adopted *Electrify San José: A Framework for Existing Building Electrification* in June 2022.
- The City of Piedmont adopted reach codes in June 2021 for electrifying existing low-rise residential buildings and Home Energy Assessment Policy that requires sellers to provide an energy assessment during a home sale.²
 - The reach code requires energy efficiency measure or electrification of space/water heating during a major renovation and require electrification readiness for kitchen and laundry areas if they are part of the renovation.³
- Other Bay Area cities, including Menlo Park, San Francisco and Oakland are in the process of developing strategies to electrify existing buildings.

² City of Piedmont. (2021). ORDINANCE NO. 751 N.S. Retrieved from <https://piedmont.ca.gov/common/pages/DisplayFile.aspx?itemId=17426430>

³ City of Piedmont. (2021). ORDINANCE NO. 750 N.S. Retrieved from <https://piedmont.ca.gov/common/pages/DisplayFile.aspx?itemId=17426428>

- The Bay Area Regional Energy Network (BayREN) implements programs that target energy efficiency and electrification across single family homes, multifamily buildings and businesses.
 - BayREN also supports local workforce development through training contractors to become energy efficiency and electrification professionals, and pairing rebates with vetted contractors.⁴
- The Bay Area Air Quality Management District (BAAQMD) is considering a zero-emission requirement for the sale of new residential and commercial appliances by 2027 for small water heaters, 2029 for furnaces, and 2031 for large water heaters and boilers. These requirements could effectively end the sale of gas-powered appliances in the Bay Area.⁵
- High Road to Building Decarbonization in the San Francisco Bay Area is a High Road Training Partnership project under California Workforce Development Board led by Rising Sun Center for Opportunity with key partners in the Bay Area. The project will help prepare the building decarbonization industry and workforce to meet incoming demand while ensuring that these are high quality careers for local residents.⁶

State

- California has set a goal of reducing GHG emissions by 40 percent below 1990 levels by 2030 and becoming carbon-neutral by 2045, including having a carbon-free electric grid and transitioning all building appliances to electric ones.⁷ With AMP providing 100% clean electricity since 2020, Alameda is well positioned to beat this goal and transition faster than the state.
- The California Air Resources Board Draft 2022 Scoping Plan outlines a technologically feasible, cost-effective path to achieve carbon neutrality by 2045 or earlier, including a plan to decarbonize all buildings.⁸
- Across the state, from 2019 to 2022, 55 jurisdictions, including Alameda, have adopted “reach codes” that go beyond state building codes in requiring electric appliances in new buildings.⁹
- California Public Utilities Commission (CPUC) implements the following programs under the Senate Bill 1477, which provide technical support, workforce development, and funds to assist the transition.¹⁰
 - Building Initiative for Low-Emissions Development (BUILD)
 - Technology and Equipment for Clean Heating (TECH)

⁴ BayREN. (2022). For Licensed Contractors – Become an Energy Expert. Retrieved from <https://www.bayren.org/partner-us/contractors>

⁵ Bay Area Air Quality Management District (BAAQMD). (2022). Rules 9-4 and 9-6 Building Appliances. Retrieved from <https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances>.

⁶ California Workforce Development Board. (2022). High Road to Building Decarbonization in the San Francisco Bay Area. Retrieved from https://cwdb.ca.gov/wp-content/uploads/sites/43/2021/04/2021.HRTP_RisingSun_ACCESSIBLE.pdf

⁷ Governor Gavin Newsom. (2021). California’s Electricity System of the Future. Retrieved from <https://www.gov.ca.gov/wp-content/uploads/2021/07/Electricity-System-of-the-Future-7.30.21.pdf>

⁸ California Air Resource Board. (2022). Draft 2022 Scoping Plan Retrieved from <https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents>

⁹ Sierra Club. (2022). California’s Cities Lead the Way on Pollution-Free Homes and Buildings. Retrieved from <https://www.sierraclub.org/articles/2021/07/californias-cities-lead-way-pollution-free-homes-and-buildings>

¹⁰ California Public Utilities Commission. Building Decarbonization. Retrieved from <https://www.cpuc.ca.gov/about-cpuc/divisions/energy-division/building-decarbonization>

- The California Energy Commission (CEC) adopted the 2022 Energy Code (Title 24) which focuses on the following:¹¹
 - Encouraging electric heat pump technology
 - Establishing electric-ready requirement
 - Expanding PV systems and storage standards
- The Building Decarbonization Coalition launched a statewide campaign, the [Switch is On](#), to increase awareness about the benefits of building electrification and existing rebate and incentive programs.

National

- The Inflation Reduction Act (IRA) of 2022 includes \$369 billion for “Energy Security and Climate Change,” including consumer rebates and tax credits for energy efficiency and electrification retrofits and funds to address affordable housing and climate change issues, such as energy or water efficiency of affordable housing.¹²
- President Biden’s Executive Order 14057, *Catalyzing American Clean Energy Industries and Jobs Through Federal Sustainability*, includes a goal of net-zero emissions buildings by 2045 with implementing a Federal Building Performance Standard as a key action.¹³
- President Biden authorized use of the Defense Production Act in 2022 to accelerate domestic production of clean energy productions including heat pumps, solar panels and building insulations.¹⁴
- The Infrastructure Investment and Jobs Act includes a \$6.5 billion investment in energy efficiency and building infrastructure. \$3.5 billion will go towards weatherization assistance programs that improve energy efficiency for homes.¹⁵
- The U.S. Department of Health and Human Services assists eligible low-income households with their heating and cooling energy costs, bill payment assistance, energy crisis assistance, weatherization and energy-related home repairs through the [Low Income Home Energy Assistance Program](#) (LIHEAP). In 2022, Alameda County is anticipated to receive \$506,000 in funding through the program.
- Since 1976, the U.S. Department of Energy [Weatherization Assistance Program](#) (WAP) has provided funds for households to reduce energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring their health and safety.

¹¹ California Energy Commission. (2021) 2022 Building Energy Efficiency Standards. Retrieved from <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency>

¹² Senate Democrats. (2022). Summary of the Energy Security and Climate Change Investments in the Inflation Reduction Act of 2022. Retrieved from https://www.democrats.senate.gov/imo/media/doc/summary_of_the_energy_security_and_climate_change_investments_in_the_inflation_reduction_act_of_2022.pdf

¹³ The White House. (2021). Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability. Retrieved from <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/08/executive-order-on-catalyzing-clean-energy-industries-and-jobs-through-federal-sustainability/>

¹⁴ The White House. (2022). Face Sheet: President Biden Takes Bold Executive Action to Spur Domestic Clean Energy Manufacturing. Retrieved from <https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/06/fact-sheet-president-biden-takes-bold-executive-action-to-spur-domestic-clean-energy-manufacturing/>

¹⁵ Brookings. Brookings Federal Infrastructure Hub. Retrieved from <https://www.brookings.edu/interactives/brookings-federal-infrastructure-hub/#section0>

What is Building Decarbonization?

Decarbonization Pathway

The decarbonization pathway is a three-step process:

- **Decarbonize Electric Grid:** Provide carbon free electricity that is 100% clean. Alameda already completed this step with AMP providing 100% clean electric energy, beginning in 2020. AMP sources its electricity from a mix of clean energy sources such as geothermal, hydroelectric, wind and landfill gas.¹⁶
- **Energy Efficiency:** Reduce building energy use, energy bills and emissions through weatherization, building insulation, and more efficient appliances.
- **Electrify Buildings:** Replace gas appliances in buildings with electric ones for space heating, water heating, clothes drying, and cooking.

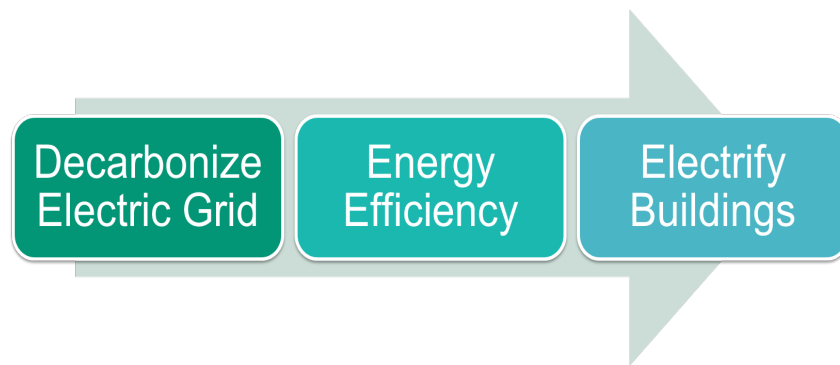


Figure 4: Building Decarbonization Pathway

Building Decarbonization vs Building Electrification?

Oftentimes, these two terms are used interchangeably and do often mean the same thing. Building decarbonization focuses on the carbon free aspect of an all-electric building running on clean electric energy, while building electrification focuses on the transition away from gas appliances in the buildings to all-electric buildings.

¹⁶ <https://www.alamedamp.com/336/Power-Content-Label>

Case Study:

West End Library Electrification and Weatherization Project

Built in 1936, the West End Library underwent an electrification project to serve as a Clean Air and Cooling Center in 2022. The electrification project replaced its gas furnace and gas water heater. The project also included energy efficiency measures of window sealing and weather-stripping doors.



Energy Efficiency Measures

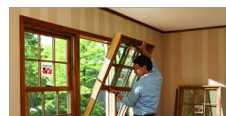
Energy efficiency is the second step in the building electrification pathway. Energy audits can provide an analysis on energy use in the building and identify energy efficiency recommendations. Home Energy Scores (HES) provides home owners, potential buyers or renters information about a home's energy performance and includes energy efficiency recommendations to improve the HES. Energy efficiency measures focus on sealing the building envelope, insulating the building, ducts, and pipes and switching to energy efficient appliances. In addition to reducing energy use and GHG emissions, energy efficiency measures have a wealth of co-benefits including reducing energy bills and improving health, comfort and quality of life in a building. The figure below highlights all the energy efficiency measures available to a building owner to reduce overall energy use, which can help avoid the need for panel upgrades during the electrification process.



Wall, Attic, and Raise Floor Insulation



Air Sealing and Weather-Stripping



Window Replacement



Upgrade to LED bulbs



Duct Sealing, New Ducts, and Duct Insulation



Water Heater Blanket



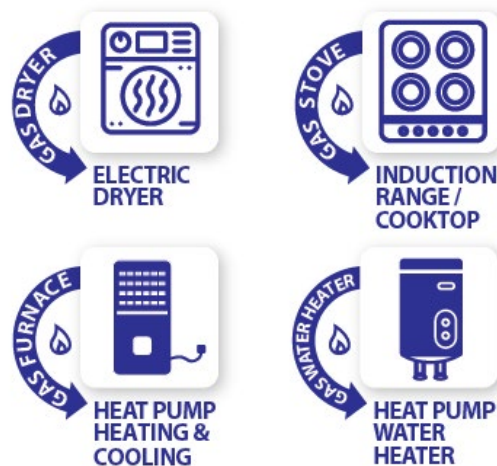
Hot Water Pipe Insulation

Figure 5: Energy Efficiency Measures

Electrification Measures

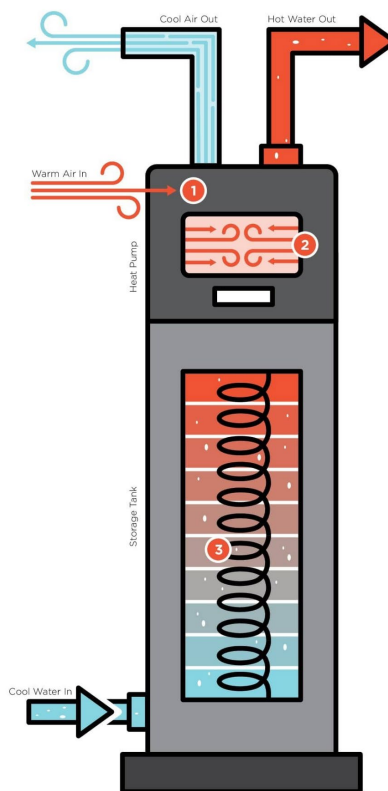
For most buildings in Alameda, space heating, water heating, cooking and clothes drying are the main sources of natural gas use. Gas water heating and space heating are the most significant contributors to indoor pollutants in the home and to GHG emissions. For each of these appliances, there are modern electric alternatives currently on the market that are highly energy efficient.

- **Electric dryers** include heat pump and electric resistance options.
- **Induction cooking** uses electromagnetic fields to directly heat metal pots and pans.
- **Heat pump heating and cooling** use a heat pump with reversible valves to transfer heat in either direction to provide both heating and cooling.
- **Heat pump water heating** uses a heat pump to transfer heat to the water storage tank.



What is a heat pump?

Heat pump technology provides an efficient alternative to electric coil heating or gas heating. It uses electricity to move heat between the air, water and ground rather than generating heat. One heat pump appliance that you are already familiar with is your refrigerator. It moves heat outside your refrigerator so that the inside is cold for your food. Likewise, in space heating and cooling and water heating, heat pumps transfer heat from one place to another.



HOW DO HEAT PUMPS WORK?

By transferring heat rather than creating it, heat pumps deliver hot water **3-4 times more efficiently** than conventional water heaters.

- 1 Heat pump pulls warmth from the air.
- 2 Warm air is compressed, increasing its temperature.
- 3 Condenser coils transfer heat to the water.



Figure 6: How Heat Pumps Work

Low Cost and Interim Options

There are also lower cost, easy to implement electrification options that can provide immediate benefits to residents.¹⁷ These options are especially great for renters and people who are not ready or able to take on more significant electrification measures. These options include:

- Window or mobile heat pump for heating and cooling
- Portable induction burner for cooking
- Electric cooking appliances: electric water kettle, toaster oven, slow-cooker, rice cooker, crock pot, instant pot, electric wok
- Focus on energy efficiency measures such as air sealing, weather-stripping, attic insulation, duct sealing, insulation

Building Decarbonization Benefits

In addition to reducing GHG emissions from natural gas use, decarbonizing buildings provides important health and safety benefits that improve the comfort and quality of life for all Alamedans.

Health

- Gas appliances emit indoor pollutants and increase risk of respiratory illness, cardiovascular disease, and other long-term illness.
- Children living in homes with gas stoves are 42% more likely to develop asthma.¹⁸
- Sealing building envelopes helps maintain the building at desired temperatures with less energy use.

Safety

- Removing gas infrastructure reduces the risk of fires in the event of an earthquake. Electrical service is also expected to return faster than gas service following a disaster.¹⁹
- Induction cooktops reduce burn risk, and many automatically turn off when not in use, eliminating a leading cause of house fires.

Climate

- Switching gas appliances to electric ones reduces methane emissions from natural gas use in buildings, which is 86 times stronger than carbon dioxide as a greenhouse gas.
- Energy efficiency reduces energy use, thereby reducing energy bills and GHG emissions.
- Electrification lets the community tap into AMP's 100% clean electric energy, supporting green jobs and the fight against climate change.

¹⁷ Redwood Energy. (2021). A Pocket Guide to All-Electric Retrofits of Single-Family Homes. Retrieved from https://drive.google.com/file/d/1yb6W1KJ1BpkIIPF_HT_z7uE3hVgrjrDB/view

¹⁸ Zhu, Y., Connolly, R., Lin, Y., Mathews, T., & Wang, Z. (2020). Effects of Residential Gas Appliances on Indoor and Outdoor Air Quality and Public Health in California. Retrieved from <https://coeh.ph.ucla.edu/effects-of-residential-gas-appliances-on-indoor-and-outdoor-air-quality-and-public-health-in-california/>

¹⁹ City and County of San Francisco (2020). "Lifelines Restoration Performance Project". Retrieved from <https://www.onesanfrancisco.org/sites/default/files/inline-files/Lifelines%20Restoration%20Performance%20Report%20Final-03-02-21.pdf>

Holistic Approach to Safe, Green and Healthy Buildings

While fully electric, energy efficient buildings are the focus of this plan, building electrification should be viewed in the context of other building improvements for healthy, safe and resilient homes and buildings. Alameda's older building stock also has many other health and safety challenges and deferred maintenance. We acknowledge that prior to building electrification and even energy efficiency upgrades, health and safety issues should be addressed first. This includes:

- **Mold, asbestos, and lead paint removal** to promote health and safety in the home.
 - Services are provided through the [Alameda County Healthy Homes](#) program and Alameda's Residential Rehabilitation programs
- **Seismic and flood retrofits** to increase resilience and reduce damage during a disaster
 - California Earthquake Authority's [Brace + Bolt Program](#) provides grants for seismic retrofits of single-family homes.²⁰
- **Solar and/or battery storage** to increase resilience and prepare for electrification.
 - AMP customers who install solar systems are placed on AMP's [Eligible Renewable Generation \(ERG\) plan](#).
- **Electric vehicle and charging** to reduce transportation pollution and the lifetime cost of driving
 - [AMP provides rebates](#) for electric vehicle chargers and used electric vehicles.

[Alameda's Residential Rehabilitation Programs](#) offer low-interest loans and grants to eligible homeowners in Alameda and rental property owners whose units are occupied by 51% or more low income renters to make repairs and property improvements, including energy upgrades, seismic retrofits and mold, asbestos and lead paint removal. Senior and disabled households may be eligible for additional assistance.²¹

Leading with Equity

Equity is the idea that one's race, ethnicity, nationality, gender, age, disability, sexual orientation should not determine their opportunities or outcomes and should not have an effect on the distribution resources, including housing, access to jobs and education, food, or environmental exposure. It is a central tenet of CARP and fundamental to a just transition referred to in Alameda's Climate Emergency Declaration.

The alignment of both GHG emissions reduction goals and racial equity goals in CARP implementation is crucial to the facilitation of a just transition into a more sustainable future. In the context of building electrification, the process, programs, policies and outcomes should be accessible, beneficial, and reduce the inequality gap for vulnerable communities.

To date, many clean energy programs promoting solar and battery, energy efficiency, and EV adoption have left out vulnerable communities because of their market-based deployment. The lack of upfront capital, low homeownership, language, history of predatory lending, home repair or building structure needs, and complexity of program navigation all pose accessibility barriers to these communities. This

²⁰ <https://www.earthquakebracebolt.com/>

²¹ <https://www.alamedaca.gov/Departments/Community-Development/Community-Housing-Resources>

leaves vulnerable communities with less wealth, higher energy burden, lower quality of housing, and worse air quality. If vulnerable communities become late adopters of building electrification, they will be left out of the health and safety benefits and will face increasing costs of maintaining gas infrastructure with a shrinking customer base. Therefore, policies and programs for building electrification as well as other clean energy programs must seek to remove existing barriers and target vulnerable communities.

Building electrification also has the potential to provide new high-quality jobs that improve the lives of vulnerable residents. Building electrification in California is anticipated to result in a net increase of 64,200 to 104,100 jobs annually, after accounting for losses in the gas industry. The areas of greatest increase are in building retrofits and renewable energy construction and the greatest decrease is in gas distribution. Three out of five jobs required to meet building electrification goals will be in “high-road” sectors that offer family-sustaining wages, benefits and job security. The two out of five “low road jobs” are primarily in residential and small commercial construction, so considerations will need to be given in Alameda to improve the quality of these jobs and engage more highly skilled workers and support the upskilling of workers.²²

Furthermore, policies and programs for building decarbonization should promote community stability and housing affordability. Building decarbonization inherently impacts housing. The Electrification Housing Nexus section later in this Plan will provide a more detailed analysis of the intersectionality and complexities. As much as building improvements can greatly benefit the quality of life for renters, those benefits can only be realized if they have the ability to remain in their homes and communities. As Alameda and the greater Bay Area is facing a housing affordability crisis, policies and programs for building electrification must not contribute to rent burden and displacement for low-moderate-income residents. Healthy, high-efficiency, electric homes can also be affordable. Alameda should prioritize policies that mutually support healthy, sustainable and affordable housing for low-and moderate-income families.²³

Equity Principles

The Plan’s equity principles serve as guardrails and metrics in the decarbonization process to promote equity. Participants in the Plan Brainstorm workshops contributed to development of these principles that are reflective of our community values.

- Everyone, especially low to moderate income households, should be able to affordably switch to modern electric equipment, reducing their energy burden.
- Ensure building decarbonization policies and programs do not have disproportionate impacts on low income households and communities of color.
- Electrification policy should also support healthy, safe, affordable housing and quality, good paying jobs.
- The electrification process should be as simple and seamless as possible.

²² California Workforce Development Board. (2022). High Road to Building Decarbonization in the San Francisco Bay Area. Retrieved from https://cwdb.ca.gov/wp-content/uploads/sites/43/2021/04/2021.HRTP_RisingSun_ACCESSIBLE.pdf

²³ Hayes, S., M. MacPherson, C. Gerbode, and L. Ross. 2022. Pathways to Healthy, Affordable, Decarbonized Housing: A State Scorecard. Washington, DC: American Council for an Energy-Efficient Economy. www.aceee.org/research-report/h2201

- We should act ambitiously and expeditiously while being also realistic about the challenges we face in transitioning Alameda’s buildings.

Implementation Phases

The process of transitioning all of Alameda’s buildings to be fully electric is a long-term initiative and we will take a phased approach. The phasing will be determined by the cost effectiveness of the policy measures to ensure that other elements are coordinated with policy adoption for a smooth process. This also ensures that we seize all the opportunities to target already cost-effective measures and lay the groundwork to seize future opportunities as they become cost effective, or initiate the necessary programs and financing to make them cost effective.

The Plan includes three phases: Immediate (2022 – 2023), Near Term (2024 – 2025), and Long Term (2026 – 2030) which includes recommended actions or projects for each of the four elements. While the plan provides a greater degree of specificity about programs and policies in the next few years, it is intentionally less specific about programs and policies in the later years to provide the necessary flexibility to respond to rapidly changing conditions. This includes market changes with availability and cost of technologies, emerging new technologies, and the state and federal policy landscapes.

Each of the proposed policies and programs will require research, evaluation and include opportunities for public comment and participation throughout their development, as well as City Council and/or Public Utility Board approval for implementation.

Elements of the Plan

The Plan has four elements: Education & Outreach, Policies & Programs, Financing, and Alameda Municipal Power. Each of these elements are critical components to how Alameda will decarbonize its existing buildings and they come together to create the long-term strategy for transitioning to carbon free all-electric buildings. In 2021, a team of UC Berkeley Goldman School of Public Policy graduate students developed the [Electrifying Existing Residential Buildings in Alameda](https://www.alamedaca.gov/files/sharedassets/public/public-works/climate-action-page/electrifying-existing-residential-buildings-in-alameda_final.pdf) report which laid out these four elements and provided analysis about the opportunities and challenges for building electrification in Alameda.²⁴

Education & Outreach

Policies & Programs

Financing & Funding

Alameda Municipal Power

Education & Outreach

Equitably electrifying all of Alameda’s buildings requires significant community support and involvement. Ongoing education and community outreach are vital in this process.

Education provides the community with the knowledge of electrification technology and process that is necessary to confidently switch to electric appliances when the opportunity presents itself. Education also

²⁴ Choi, Y., Sadler, J., & Zimmerman, Z. (2021) Electrifying Existing Residential Buildings in Alameda. Retrieved from https://www.alamedaca.gov/files/sharedassets/public/public-works/climate-action-page/electrifying-existing-residential-buildings-in-alameda_final.pdf

builds capacity for the community to engage in policy co-creation, which helps ensure that the policies and programs developed reflect community priorities and address community concerns, challenges and barriers. Continued community outreach throughout the process, through different mediums allows engagement with a wider range of the community and supports the community in engaging in the co-creation process. The City will continue to educate and engage the community and to meet members where they are in the process.

Website

The City created a webpage at www.alamedaca.gov/BuildingElectrification as the city's landing page for all things building electrification and decarbonization related. It includes key documents, information on rebates and incentives, and presentation slides from past workshops.

Survey

The City published an electrification survey in March 2022 on the building electrification webpage, which was designed to understand where the community is with regards to electrification. It includes questions about familiarity with electrification, potential concerns and opportunities, and awareness of currently available rebates and incentives. Survey responses helped inform the development of this plan and related engagement material. Future electrification surveys may help to continue to understand community concerns and experiences with electrification as well as seek community feedback on policy and program options.

Workshops

During the development process of this plan, the City initiated an electrification workshop series with AMP consisting of education, brainstorming, and feedback sessions. Workshops and forums are vital to delivering information and diving deeper into relevant topics and issues. The Electrification 101 workshop that provides community members information about building electrification, what it looks like in their home and the available rebates and incentives will be an ongoing workshop in the community.

Targeted Stakeholder Engagement

In addition to broadly engaging the community, engaging with specific stakeholders is important to ensure a coordinated electrification process that is beneficial to our entire community. In our plan development process and ongoing, the City has engaged with a variety of community organizations and will continue to identify partners and community organizations, especially those that work with frontline communities, to contribute to ongoing education and outreach and policy development.

Policies & Programs

Policy Levers

In order to reach the plan's goals, we will need a suite of policies that target different points of intervention for building decarbonization. BayREN developed a Policy Calculator for local governments to estimate and visualize GHG emissions reduction from a suite of policy options. The BayREN Policy Calculator demonstrates that upgrades at time of major renovation and at time of equipment replacement are the

two most impactful policy measures.²⁵ Although this calculator only demonstrates the impact for electrifying existing single-family homes, we expect it to show similar trends for other building types.

With AMP's 100% clean electric energy, Alameda has the opportunity to achieve net zero building emissions. The following are available policy tools that the City can consider adopting to incentivize or require building electrification.

Time of Renovation or Remodel

When a building is undergoing a permitted renovation or remodel, the City can incentivize or require energy efficiency and/or electrification measures, such as:

- Reducing electric permit fees or increase gas permit fees
- Requiring upgrades by permit value or project type
- Requirements associated with A/C, solar and panel upgrades

The City has an online “over the counter” permitting process for many potential energy efficiency and electrification projects including converting gas furnace to heat pump systems, installing heat pump water heaters, electrical panel upgrades, EV charger installations, converting gas ranges to electric, and more. This online system allows city staff to significantly expedite permit processing for many building decarbonization permit types.

In the immediate term, staff is considering an ordinance to require electrification or electrification readiness when the scope of work already includes a gas appliance or related space and it is cost-effective to do so. Other upgrades that may not currently be cost-effective may be considered in the long term, as we anticipate these technologies and process to become increasingly affordable over time.

Code Compliance

The City can consider code compliance to bring any unpermitted work up to code. The scope for code compliance would exceed electrification policies but enhances the impact of policies and ensures that Alameda's building stock meets minimum building codes and health, fire, and life-safety regulations.

In the near term, staff will consider the feasibility of a code compliance measure.

Time of Sale

When a building changes owner, the City can also set requirements or offer incentives for energy efficiency and/or electrification measures prior to a listing or a certain time period after sale.

- Require energy audit or score
- Require electrification element or improved energy efficiency
- Provide a refundable transfer tax for energy efficiency, electrification or seismic retrofits
- Require code compliance where any previous unpermitted work in the building should be brought up to code

²⁵ BayREN. (2021). BayREN Policy Calculator. Retrieved from <https://www.bayren.org/how-adopt-reach-code/addressing-existing-buildings>

In the near term, staff will evaluate an energy audit requirement during the time of sale process. This would increase awareness of energy efficiency and electrification measures for new building owners who are beginning to invest in their building. Staff will also evaluate the feasibility of pairing a refundable transfer tax to further incentivize energy efficiency, electrification or seismic retrofits.

End of Useful Life Replacement

When an older appliance breaks down and needs replacement, this is a natural point of intervention. For some appliances, such as water heaters and furnaces, where a permit process is involved, the city can require an electric replacement. For other appliances where a like for like replacement does not trigger a permit process, such as a stove or dryer, switching to electric alternatives will depend primarily on community awareness and education.

Building Performance Standards

To systematically shift all buildings towards electricity in the long term, the City will consider setting Building Performance Standards (BPS) that require buildings to meet minimum energy efficiency goals and require all electric appliances. As a precursor to BPS, the City will consider requirements to benchmark energy use in large and medium size buildings in the near term which will provide a better understanding of the current building stock and their performance.

Gas Line Pruning

As buildings successfully transition away from natural gas, the maintenance of legacy gas infrastructure becomes costlier. While shutting down the gas system is not proposed in this plan, the City will partner with PG&E to strategically reduce the size of gas infrastructure in the City as needed and where appropriate, especially at the end points of the system. The City can also consider a neighborhood approach to electrifying entire neighborhoods in a coordinated way and reduce the need to maintain gas infrastructure and its associated costs. This will be a long-term strategy.

As part of this strategy, the City may also consider alternative uses for the existing natural gas infrastructure as emerging new technology develops, such as delivering clean hydrogen, to support a sustainable, healthy and resilient Alameda.

Pilots and Programs

In addition to policies, pilots and programs are also necessary to move us quickly towards decarbonized buildings.

Direct install programs can provide holistic support to implementing whole building upgrades for energy efficiency and electrification from start to finish, including building energy evaluations, project management, contractor engagement, and support with rebates and financing. Programs can also be designed to evaluate home health hazards and resilience needs for earthquake or flood retrofits. This holistic approach for health, safety, and building decarbonization upgrades will ease the process for building owners. These programs can also support workforce development and transitions to green jobs through engagement and training with minority contractors.

To prioritize vulnerable communities and affordable housing, the City will seek opportunities to conduct a direct install pilot with affordable housing units. This pilot will serve as a case study and learning opportunity to better understand the cost, process and potential barriers in residential building electrification, especially in affordable housing and multifamily housing. This understanding will allow the City to center affordable housing in electrification policies to ensure that it includes everyone.

In the long term, the City can partner with direct install programs to provide targeted outreach and services to Alameda residents, particularly low and moderate households and affordable housing.

Financing and Funding

Decarbonizing our buildings will require unprecedented investment from our community, the City, state and federal governments. There are a multitude of rebates and incentives available from AMP, BayREN, and previously, TECH Clean California, to ease the cost of building decarbonization. After factoring in these available incentives, the funding gap for low and moderate-income residential building decarbonization was estimated at ~\$650 million.²⁶ Since TECH Clean California incentives were temporarily suspended in 2022 due to the program being oversubscribed, the funding gap would be even greater than the previous estimate. However, the 2022 Inflation Reduction Act (IRA) will make a significant dent in closing the funding gap, providing an estimated \$10,000 to \$20,000 per household in clean building energy and transportation investments.²⁷ In addition to building decarbonization, make-ready improvements such as seismic and flood retrofits, lead, paint and/or asbestos removal will require additional investment to address the underlying health and safety needs of Alameda's aging building stock. The cost of these upgrades poses a significant challenge for some members of our community because of their credit score, income, or because they rent.

Given the inability of most low- and moderate-income households to pay for the upfront costs of electrification, ensuring that these residents do not miss out on the benefits of electrification will be a significant lift for the City. In alignment with our commitment to equity and the Equity Principles outlined in this Plan, the City will prioritize available funding and resources towards vulnerable communities and reducing barriers to access. Proactively planning for, funding, and/or financing this transition will bring quantifiable benefits for our community, including long-term utility bill savings, improved health and well-being, meaningful reduction in GHG emissions, and alignment with state goals.

In 2022, a team of UC Berkeley Goldman Public Policy students developed the "[Funding and Financing the Electrification of Low- and Moderate-Income Residential Buildings in the City of Alameda](#)", which analyzed the available funding and financing mechanisms and made recommendations for the City to reduce financial barriers in electrification of low- and moderate-income homes. Recommendations include supporting low- and moderate-income households to take advantage of available rebates and incentives, leverage private capital, consider tariffed on-bill financing programs, and raising additional capital through bonds and or taxes such as a climate bond.

Rebates and Incentives


Rebates and incentives can provide customers with a one-time payment to reduce the upfront cost of electrification. Currently, there are a number of rebates available for energy efficiency and building electrification from BayREN and AMP with others anticipated in the future. **Table 1** highlights the residential rebates currently available from AMP. These rebates and incentives are pivotal to creating affordability for electrification measures. While most rebates and incentives are broadly available, targeted ones provide vulnerable communities with more resources to access energy efficiency and building electrification. The process and outreach for rebates and incentives should also be inclusive and

²⁶ Brint, B., Harwood, M., Matos, J., Omogo, M. (2022). Funding and Financing the Electrification of Low- and Moderate-Income Residential Buildings in the City of Alameda. Retrieved from <https://www.alamedaca.gov/files/assets/public/city-manager/documents/building-electrification/funding-and-financing-building-electrification.pdf>

²⁷ Rewiring America IRA calculator. <https://www.rewiringamerica.org/app/ira-calculator>

accessible to ensure participation from vulnerable communities. Providing in-language materials and one-on-one technical assistance can also help increase participation.

Table 1: Alameda Municipal Power Residential Electrification Rebates

	Heat Pump Water Heater	Heat Pump Space Heating	Electric Dryer	Electric Panel Upgrade
 ALAMEDA MUNICIPAL POWER	\$1,500	Coming Soon, 2022	\$100	\$2,500

During the time this Plan was being developed, funds for the TECH Clean California rebates for heat pump HVAC systems, water heaters, and electric panel upgrades were temporarily suspended in the PG&E territory due to higher than anticipated demand. While it is good news that there was high interest in this program, these funds were critical to making the switch to electric appliances cost-effective. As this transition is a priority for California, it is anticipated that new funds will be made available for rebates in the near future. TECH Clean California will continue to provide Quick Start grants to cities to jumpstart large scale opportunities and address barriers to adoption of modern electric technology and workforce education and training.

In late 2022 or early 2023, the California Self-Generation Incentive Program (SGIP), is anticipated to launch a heat pump water heater incentive for multi-family households with a total program budget of \$44.6 million. Low income homeowners and renters are also eligible for energy efficiency and weatherization upgrades through the federal Low Income Home Energy Assistance Savings Program (LIHEAP) and the Weatherization Assistance Program (WAP).

Tariffed On-Bill Financing

On-bill financing allows customers to obtain loans from their utility to pay for the upfront cost of energy efficiency and/or building electrification projects. On-bill financing is designed to use energy savings from a project to pay back the loan over time while reducing the overall utility bill. Like on-bill financing, tariffed on-bill (TOB) financing or inclusive financing also provides upfront capital for retrofit projects. In a TOB, the utility pays the upfront cost for the retrofit at a specific utility meter location and expects to recover the cost overtime through the “tariff” on the utility bill. This would allow for the cost to be recovered through future utility customers who would continue to benefit from the project upgrades and reduce the cost burden on current utility customers.

Tariffed on-bill financing is intended to remove barriers posed by traditional loan options and traditional on-bill financing options faced by renters and low-income communities, tying eligibility for the loan to on-time bill payment rather than traditional credit reports. Any retrofit project would still need consent and involvement from the building owner. With the high upfront capital cost of whole building holistic upgrades, other sources of funding may be necessary to buy down the loan to prevent bill increases for low- and moderate-income households.

Municipal Taxes and Bonds

In order for the City to support low- and moderate-income households and the greater Alameda community with building decarbonization upgrades, the City may need to source new capital through municipal taxes and/or bonds. These new sources of capital can also be expanded to include other climate and resilience initiatives.

Municipal tax policy can include Sales, Carbon, Utility User Tax (UUT) or Refundable Transfer Tax. Some of these tax policies can be effective in incentivizing building electrification while also raising new capital to support City programs projects. UUT is a tax on the use of goods such as electricity and gas. A split UUT would increase the UUT on gas while decreasing the UUT on electricity, creating an incentive to voluntary switch to electric appliances. A refundable transfer tax would increase the current transfer tax by a percentage and refund the increased amount upon completion of energy efficiency, building electrification and/or seismic or flood retrofit within a certain time after sale. The tax policy design process should consider the potential impact on low- and moderate-income households and vulnerable communities. Universal tax structures can be highly regressive and should be paired with adequate exemptions, protection for low- and moderate-income households, and ensure that the distribution of funding prioritizes investment into low- and moderate-income communities.

Municipal bonds can include General Obligation (GO) bonds, revenue bonds, green or climate bonds. These bonds allow the city to raise debt from investors to fund project and programs. GO bonds are backed by general revenue while revenue bonds use revenue from a specific source. Green or climate bonds can be structured as either GO or revenue bond but the capital raised is specifically used for climate focused projects such as building decarbonization.

Alameda Municipal Power

Alameda Municipal Power (AMP) has been providing affordable, reliable energy to the community for a long time and began providing 100% clean electric energy in 2020. To further reduce GHG emissions, AMP provides rebates and education to promote decarbonization. With common goals of sustainability and equity, collaboration between the City and AMP can lead to a robust electrification process for the Alameda community and demonstrate leadership at the forefront of climate action. AMP plays an integral role in this process through programming, rate design, rebates and public education and outreach.

Going electric with AMP keeps dollars in our community! For every dollar paid to AMP, 8 cents go back to the City's General Fund.

Deliver Reliable Electricity

As we shift away from natural gas towards electricity, AMP will be prepared for additional electricity demand and provide reliable electricity. AMP has forecasted additional load from building electrification and is confident in their capacity to accommodate additional projected load.

For reliability, AMP has two redundant electricity lines feeding in power from PG&E. Each of those lines are capable of handling electricity demand for the entire City which can help reduce the likelihood of long power outages. However, California as whole is facing continued stress on the statewide electrical grid and the potential for rolling State-ordered blackouts is expected to continue for all California customers, including AMP customers, for the near future.

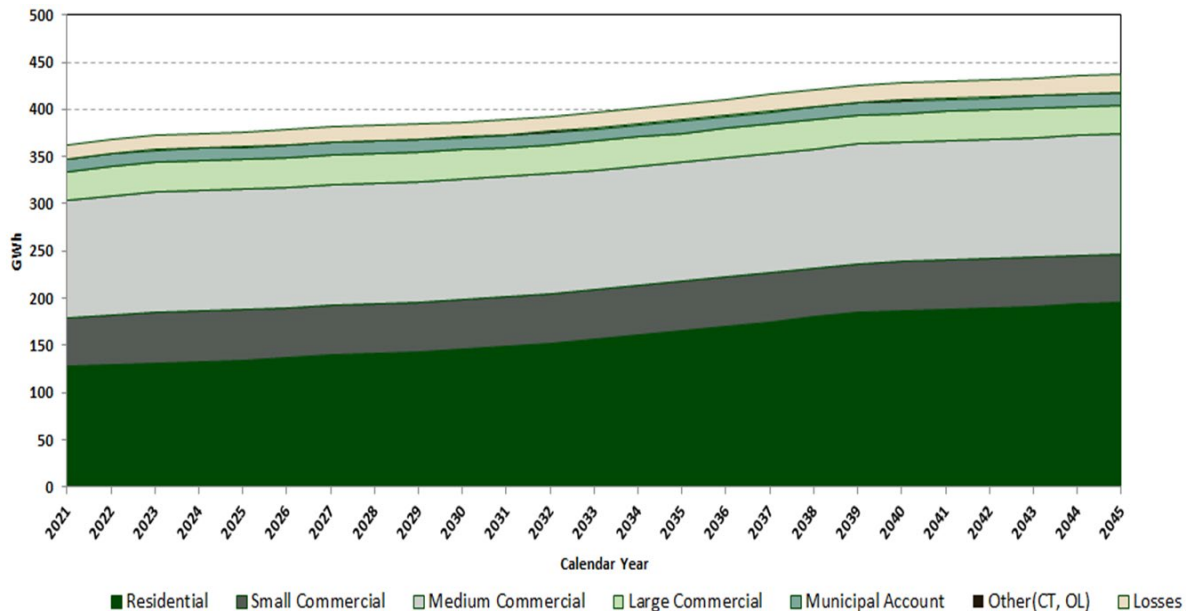


Figure 7: Alameda Municipal Power Electricity Load Forecast by Customer Class

Rate Design

AMP has a Time-of-Use rate specifically to support transportation electrification. Other rate designs may also be used to support building electrification efforts subject to approval by the Public Utilities Board (PUB). Alameda is well positioned to be an early adopter of electrification technology because of AMP's affordable rates, which are on average about 30% lower than PG&E's.

Rebates

AMP has a long history of energy efficiency rebates, incentives and programs, including direct install programs for income-qualified customers. More recently, AMP has shifted its focus to building and transportation electrification programs, incentives and rebates, including bonuses for income qualified customers. AMP is particularly focused on low- and moderate-income customers who may live in multi-family dwellings and/or rental homes and continually evaluates its offerings to make them more effective.

Current rebates include heat pump water heaters, electric dryers, and electric panel upgrades for residential customers. AMP also offers heat pump water heater and electric cooking appliance rebates for commercial customers. AMP will begin a new heat pump furnace space heater program in summer 2022.

Education and Outreach

AMP also does a lot of public education and outreach around building electrification. This is provided through workshops, webinars, demos, campaigns, bill inserts and events to familiarize customers with electrification technologies.

BayREN offers a Home Advisor Program to provide a virtual consultation to support residents with energy efficiency and electrification upgrades.

Technical Assistance

The electrification process for each building is unique and can be confusing for individuals. AMP can develop a technical advisor program to provide Alameda residents targeted technical support as they navigate their unique electrification journey.

Reimagine Alameda Green

Initiated in 2012, Alameda Green was a voluntary program available to all AMP residential and business customers to purchase 100% clean electric energy. For residents, the additional monthly cost to participate was about 2 cents more per kWh, or about \$6.65 for the average Alameda household. In 2020, AMP began providing 100% clean electric energy to all customers and began to sunset the Alameda Green program in May of 2022. Between 2012 and 2022, Alameda Green contributed enough renewable energy to power more than 26,900 homes for a year. This program demonstrated Alamedans' willingness to invest in clean electric energy. As the City moves toward greater utilization of AMP's clean electric energy supply, there is an opportunity for AMP to reimagine the Alameda Green program to support local investment in new clean electric energy projects.

Implementation Plan

Immediate: 2022-2023

This phase involves immediately cost-effective policy measures. Other actions in this phase center around education and outreach, and doing research and analysis to support implementation in future phases.

Education & Outreach	<ul style="list-style-type: none"> ■ Develop electrification educational material including website, information sheet, and workshop curriculum ■ Develop a decarbonization social marketing campaign ■ Conduct public engagement on draft plan ■ Conduct public meetings about new policy proposals ■ Conduct targeted stakeholder meetings
Policies & Programs	<ul style="list-style-type: none"> ■ Support voluntary adoption of energy efficiency and electrification measures <ul style="list-style-type: none"> — Develop website with detailed information and education — Develop and implement innovative pilot programs that measure electrification benefits for different types of housing and test financing mechanisms. — Conduct community outreach and education about available technologies, rebates and technical assistance ■ Explore ordinances requiring certain electrification and energy efficiency measures when renovating or upgrading appliances for already cost-effective electrification measures, with certain exceptions ■ Re-adopt city's ordinance for all new electric buildings for 2023 building code cycle ■ Coordinate with Alameda City staff and the Alameda community concerning the impact of electrification on landlords and tenants
Financing & Funding	<ul style="list-style-type: none"> ■ Explore revenue measures such as bonds or taxes that could support low- and moderate-income owners, and small landlords ■ Evaluate state and federal grant opportunities to support buildings owners with decarbonization measures
AMP	<ul style="list-style-type: none"> ■ Continue targeted education and outreach through website, newsletters, bill inserts and social media ■ Develop technical assistance services tailored specifically for EV charging infrastructure for multi-family customers

	<ul style="list-style-type: none"> ■ Continue market rate rebate programs and introduce new rebates for: <ul style="list-style-type: none"> — Residential heat pump space heating — Expanding micro-mobility options for customers such as e-bikes ■ Consider additional equity focused elements in program design such as program accessibility, outreach efforts, and increased amounts for income qualified customers ■ Coordinate with other agencies to streamline customers experience with rebates and program offerings ■ Explore expanding Home Energy Review program to include electrification and provide technical assistance to support community members with energy efficiency and electrification upgrades ■ Evaluate the Alameda Green Survey responses to guide development of an alternative voluntary sustainability focused program
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Near Term: 2024-2025

This phase involves policy measures that are anticipated to be cost effective in the near term as the market develops and new rebates become available. Hence, policies, programs and actions in this phase may evolve depending on the development in the previous phase and market changes.

Education & Outreach	<ul style="list-style-type: none"> ■ Continue targeted community education with focus on low- and moderate-income households and small landlords ■ Public meetings about new policy proposals ■ Continue stakeholder meetings
Policies & Programs	<ul style="list-style-type: none"> ■ Evaluate energy audit requirement at time of sale requirements ■ Consider building code compliance measures ■ Consider benchmarking requirements as a pre-cursor to Building Performance Standards ■ Continue and/or expand direct install program with a focus on affordable housing ■ Evaluate policies and specific needs for industrial building decarbonization
Financing & Funding	<ul style="list-style-type: none"> ■ Consider split user's utility tax, refundable transfer tax for energy efficiency, electrification and/or seismic and flood retrofits, and other available financing options ■ Evaluate state and federal grant opportunities

AMP	<ul style="list-style-type: none"> ■ Consider rate design to support building electrification ■ Evaluate outcomes of TECH Clean California Tariffed On-Bill Pilot ■ Expand targeted rebate programs for income qualified customers ■ Evaluate the feasibility of an energy advisor service and a home electrification technical assistance program to guide customers through their electrification journey
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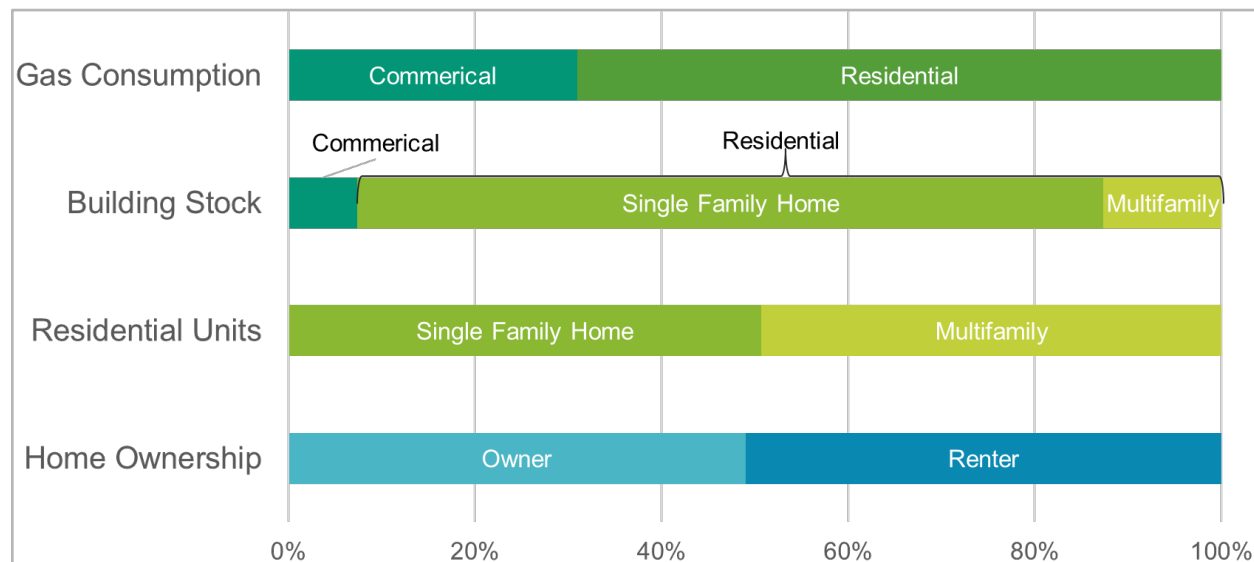
Long Term: 2026-2030

This phase involves policy measures anticipated to become cost effective in the long term. Specific policies, programs and actions in this phase are more difficult to predict at this time and will depend on the developments in the previous phase and market changes.

Education & Outreach	<ul style="list-style-type: none"> ■ Continue broad community education ■ Public meetings about new policy proposals ■ Continue stakeholder meetings
Policies & Programs	<ul style="list-style-type: none"> ■ Consider Building Performance Standards ■ Consider gas pruning measures in partnership with PG&E or alternative uses for existing gas infrastructure ■ Consider space heating upgrade requirement without existing A/C upgrade
Financing & Funding	<ul style="list-style-type: none"> ■ Identify additional revenue measures ■ Evaluate state and federal grant opportunities
AMP	<ul style="list-style-type: none"> ■ Consider neighborhood-based upgrades to service and panels ■ Targeted direct replacement of gas appliances for income qualified customers ■ Re-evaluate community needs and barriers

Building Stock Analysis

Alameda has approximately 18,900 buildings throughout the city. The figure below illustrates the connection between our buildings, natural gas usage, whom they house and who owns them.



Source: PG&E data, 2018 Alameda County Tax Assessor's and U.S. Census data

Figure 8: Alameda Building Characteristics

Commercial

There are about 1,400 commercial buildings which make up about 7% of the building stock. However, they account for approximately 30% of the natural gas consumption in the community. Although the building vintage for 60% of commercial buildings are unknown, of the known buildings, 70% of them were built pre-1978.

Residential

There are about 17,500 residential buildings, which make up about 93% of the building stock. They account for approximately 70% of the natural gas consumption in the community.

- Single Family Homes: There are about 15,000 single family homes in Alameda, accounting for 80% of the building stock, and 86% of all residential buildings. However, they only provide about 50% of Alameda's residential units. 69% of single-family homes were built before 1978, and many are much older than that.
- Multifamily: There are about 2,400 multifamily buildings in Alameda, accounting for 13% of the building stock, and 14% of all residential buildings. They provide the remaining 50% of residential units in Alameda. 75% of multi-family buildings were built before 1978.
- About 50% of Alameda's households are renters and 50% are owners.

Table 2: Residential Building Vintage

Year Built	Single Family Homes	Multifamily
Unknown	483	571
Pre-1978	10,421	1,782
1978-1991	2,654	20
1992-2010	1,426	8
2011-	104	1
<i>Total</i>	<i>15,088</i>	<i>2,382</i>

Why This Matters

- Commercial buildings have significant GHG reduction potential because of their comparatively higher use of natural gas. Industrial buildings in particular, use natural gas for energy-intensive industrial processes and have distinct energy needs—such as high temperature, continuous heat.
- Although single family homes make up the majority of the building stock, only focusing on single family homes would leave out about 50% of Alameda residents, who are renters.
- There needs to be significant efforts to support multifamily buildings and renters to ensure that building electrification is accessible to all Alameda residents.
- Most of Alameda’s building stock was built before 1978 (see **Table 2**), and before the adoption of the California Building Code. The building stock is likely not up to current energy standards with leaky building envelopes and old appliances. These buildings are most likely to need energy efficiency improvements, appliance upgrades, and other upgrades for a healthy, safe and resilient home prior to electrification. Very old buildings might present unique technical challenges to be upgraded to modern day electrical infrastructure and appliances.

The Decarbonization Housing Nexus

Since energy efficiency and building electrification impact buildings, it inherently impacts housing as well. Preservation of housing affordability is key to keeping our community safe, healthy, and resilient. Climate strategies such as energy efficiency and building electrification can and should support housing affordability and not contribute to displacement of vulnerable communities. According to Alameda’s 2021 Housing Affordability and Displacement report²⁸, Alameda is facing a severe housing affordability crisis because housing production has not kept pace with the enormous job and economic growth in the Bay Area. The influx of higher income households in Alameda who commute to higher income jobs outside the city, intensifies the local demand for housing. Housing vacancy rates have declined significantly since 2010 from 6.9% to 4% in 2019. Rental vacancy rates went from 3.7% in 2010 to 2.9% in 2019.

²⁸ Seifei Consulting & The Concord Group. (2021). Housing Affordability and Displacement. City of Alameda. Retrieved from [https://www.alamedaca.gov/files/assets/public/departments/alameda/econ-dev-amp-comm-sf\[...\].of-alameda-housing-affordability-and-displacement-report.pdf](https://www.alamedaca.gov/files/assets/public/departments/alameda/econ-dev-amp-comm-sf[...].of-alameda-housing-affordability-and-displacement-report.pdf)

As a result of high demand for local housing, housing costs in Alameda have increased at much faster rates than income. Home sale prices doubled over the decade and average rents have increased about 57% while household incomes have only increased 43%. Over 40% of local jobs provide annual earnings of \$40,000 or below and much job growth has occurred in industries that typically have lower wages. Most of the income growth in Alameda can be attributed to high income earners attracted by jobs in the greater Bay Area.

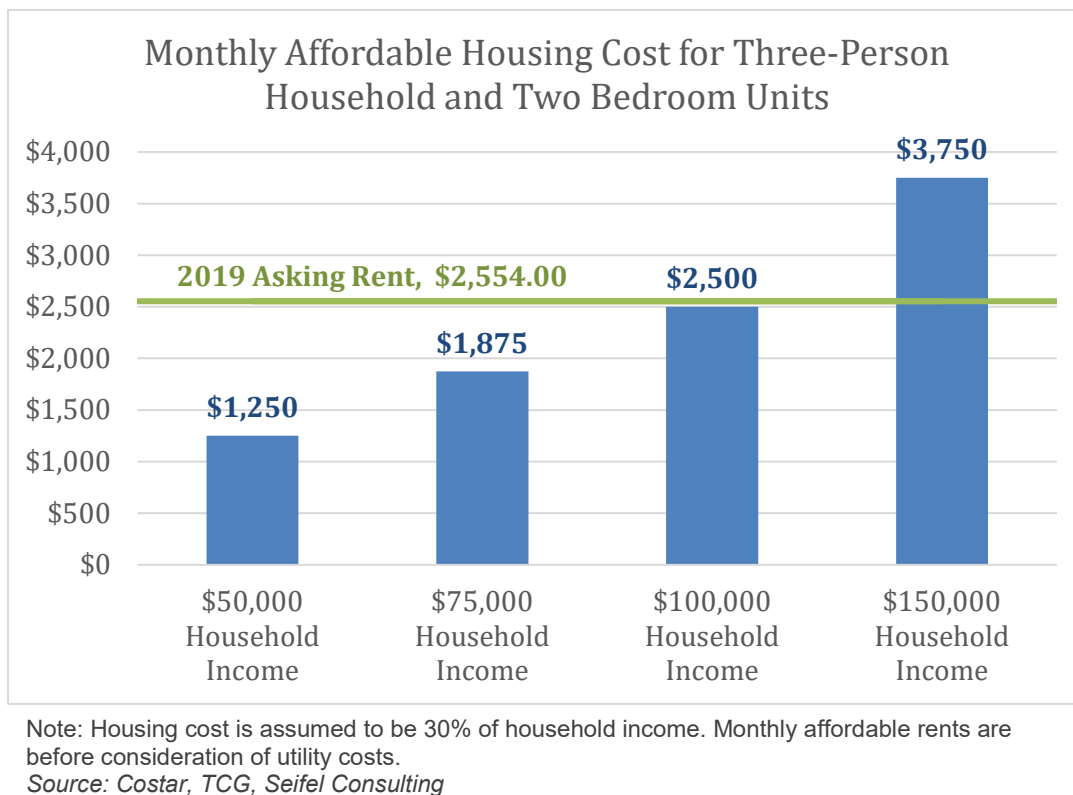


Figure 9: Average Asking Rent in Alameda and Affordable Housing Cost Based on Income

Displacement Vulnerability

With the increased demand for housing by high income earners, the increased cost of housing has intensified displacement pressures on low income households. Low income households with incomes below \$75,000 are about 37% of the City's households. The number of rent-burdened households and overcrowded households locally have been increasing at faster rates than Alameda County since 2010. Low income renter households are more likely to be households of color, single parent households, large households, seniors, and individuals with disabilities who are particularly vulnerable and negatively affected by displacement pressures.

The Urban Displacement Project has a Displacement Typology Map that allows for the visualization of where displacement and gentrification are happening geographically.²⁹ The figure below shows a map of Alameda against the displacement typology layers. Based on current housing costs, much of Alameda is at risk of excluding low income households. Areas that are becoming exclusive are areas in the City with rapidly increasing housing costs and experiencing absolute loss of low-income households between

²⁹ <https://www.urbandisplacement.org/>

2000-2018.³⁰ In 2010, households making less than \$75,000 made up about 50% of all households in the City. In 2019, that number has declined to 36%, indicating that many low-income households have been displaced. The map also shows two regions in Alameda where the population currently is low income and susceptible to displacement. Furthermore, the Urban Displacement Project and other researchers have shown that displacement has negative impacts on health, quality of life and economic households, often with long-term consequences.

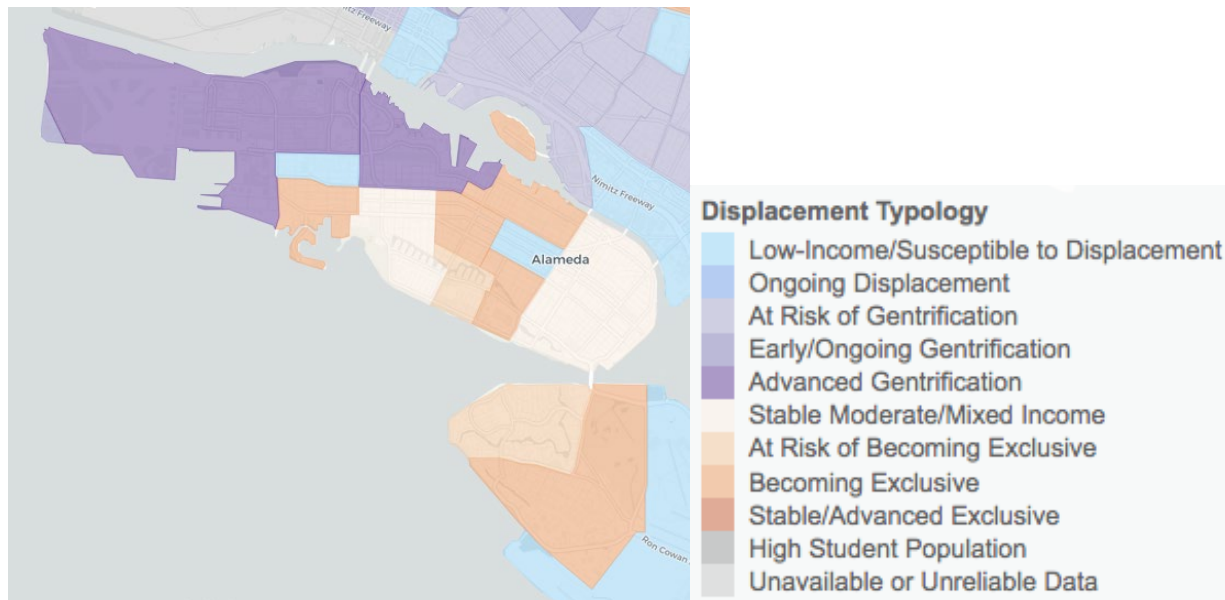


Figure 10: Map of Alameda with Displacement Typology Layers

COVID-19 Pandemic Impacts

The ongoing impacts of the COVID-19 pandemic creates further challenges for low income renter households. According to [Bay Area Equity Atlas](#), there are 33,978 households behind on debt in Alameda County, totaling to \$116.5 million in rent debt. Those behind on rent are overwhelmingly households that experienced job losses during the pandemic. 80% of households behind on debt earn less than \$75,000 yearly and 90% are people of color. Low wage jobs in businesses and industries that were hardest hit by business closers have also been the slowest to bounce back.³¹

Building Decarbonization Impacts on Housing and Rent

Building improvements such as weatherization and electrification have the opportunity to improve quality of life for renters, but only if they are able to remain in their homes and in the community. Policy and program development must explicitly address this issue and ensure that energy efficiency and electrification improvements support affordability, reduce energy burdens and do not contribute to displacement for low- and moderate-income residents. The following explores potential negative impacts

³⁰ Chapple, K., & Thomas, T., and Zuk, M. (2021). Urban Displacement Project website. Berkeley, CA: Urban Displacement Project. <https://www.urbandisplacement.org/>

³¹ Henderson, J., & Huang, M. (2021). Stabilizing Renters Is Key to Equitable Recovery: Preventing Eviction and Indebtedness in the Bay Area. Bay Area Equity Atlas. Retrieved from <https://bayareaequityatlas.org/research/BayAreaEviction>

that policies and programs must be aware of and set protections in place to prevent these impacts from materializing as a result of energy efficiency and electrification upgrades.

If energy efficiency and building electrification were required without specific protections and policy design, renters may face:

- **Increased rent burden:** If project costs for building retrofits were an allowable passthrough in the Capital Improvement Program.
- **Increased utility cost:** Although AMP has comparatively favorable rates, switching to all electric may increase the tier of electricity and lead to increased rates compared to split energy use between gas and electricity. Initial analysis estimate annual savings in total energy bills as a result of building electrification, but these estimates will need to be studied in real projects.
- **Displacement:** Displacement of renters might be triggered by increased rent or building owners converting units to condos through the Ellis Act.

Small building owners may face:

- **Pressure to sell:** High capital cost of building retrofits could force small building owners to sell their property if adequate protection measures are not in place, which could potentially be harmful for renters.
 - New property owners are more likely to enact the Ellis Act to convert buildings into condos and displace current tenants.³²
 - New property owners are also more likely to be a corporate landlord.

If rental buildings are left out of energy efficiency and building electrification policies and programs, residents may:

- **Miss out on benefits:** Energy efficiency and building electrification provide safety, health, and resilience benefits. Not being able to access these benefits can further exacerbate inequalities between communities.
- **Increasing natural gas prices:** As more households transition to all electric homes, those left behind will have to bear the cost of maintaining gas infrastructure with a shrinking customer base through increased gas prices.

Other Concerns:

- **Split Incentives:** Energy efficiency and building electrification brings benefits to both tenants and landlords yet one party may responsible for paying for these upgrades. In some cases, neither the low-income tenant nor the low-income landlord can afford the project cost.
- Many renters may want energy efficiency and building upgrades but do not have the authority to make these changes in their unit.

³² Tenants Together & The Anti-Eviction Mapping Project. (2014). The Speculator Loophole: Ellis Act Evictions in San Francisco. Retrieved from <https://www.tenantsaltogether.org/sites/tenantsaltogether.org/files/Ellis%20Act%20Report%20FINAL.pdf>

Opportunities in Energy Efficiency and Electrification

Safer and Healthier Homes

With proper guardrails in place to protect against the potential risk of building upgrades, energy efficiency, electrification and other holistic home upgrades have the potential to significantly improve the quality of life in homes and reduce the inequality gap. It can lead to better health outcomes and have a ripple effect into other aspects of life.

Workforce Development

Additionally, energy efficiency and electrification create demands for a new skilled workforce. Through workforce development, there is potential to support transition to green jobs that pay a family-sustaining wage and offer good benefits. Supporting local transition to green jobs can increase the income of local residents and potentially relieve rent burden and overcrowding conditions.

BayREN and TECH Clean California are Regional and State programs that support workforce training and development in building decarbonization by pairing rebates and incentives with contractors that undergone their training program. The High Road to Building Decarbonization in the San Francisco Bay Area project also work to ensure that workforce transition to building decarbonization creates high quality careers for local residents.

Ability to Electrify

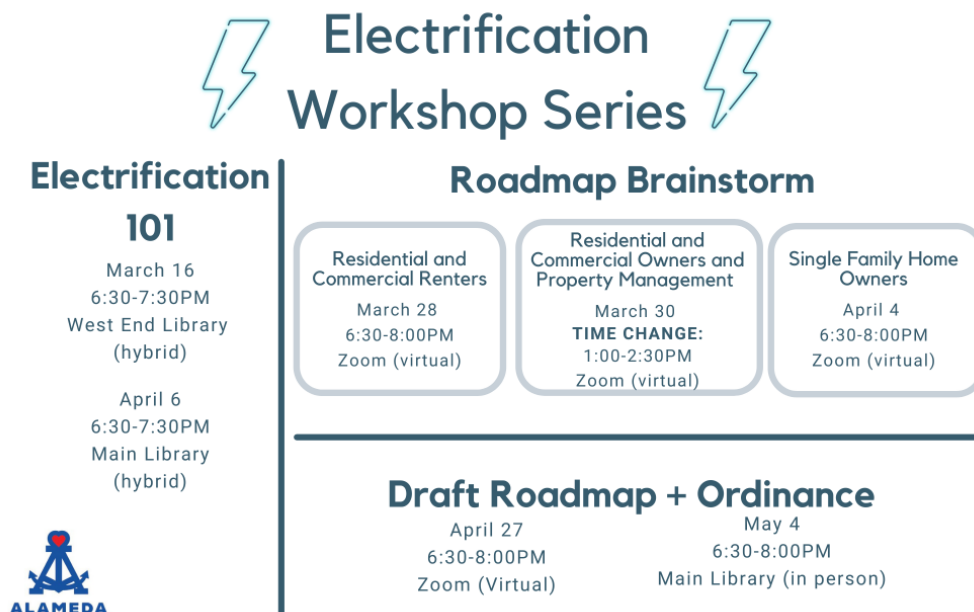
While current housing data reflect increasing housing pressures on low income populations, they also point to the increasing ability of higher income households to contribute to the citywide GHG reduction efforts through energy efficiency and building electrification.

How was the plan developed?

In order to ensure that the electrification process is equitable and beneficial to our community, especially vulnerable communities, there were multiple forms of community engagement to incorporate community knowledge and feedback. Some of which includes an electrification workshop series and an Electrification Survey from March to May 2022.

This is only the initial phase of the community engagement process. We intend to keep an open and continuous dialogue as new policies and programs take shape.

Electrification Workshop Series



A total of seven workshops were completed as part of the Electrification Workshop Series with in-person, virtual, and hybrid formats.

- **Electrification 101:** Educate the general public about what building electrification is, what it looks like in their home and what rebates and incentives are available.
- **Plan (Roadmap) Brainstorm:** Introduce the building electrification and the plan concept to specific audience groups and discuss the concerns and opportunities each audience has about building electrification.
- **Draft Plan (Roadmap) + Ordinance:** Present the public with a draft version of the plan for public feedback after incorporating community voices in the Plan Brainstorm workshops. It also includes a preview of an ordinance that will target building electrification during major renovations.

What we heard from these workshops:

- Participants expressed enthusiasm for the opportunity to further support our local community utility and the opportunity to demonstrate leadership in climate action.
- Participants confirmed the draft principles reflected of community values.
- Participants expressed concerns around the cost and ability to finance the project cost of electrification, reliance on one energy source, and the potential for one project to trigger other unforeseen projects such as electric panel upgrades.
- Renters are supportive of building electrification with its benefits but concerned about potential impacts on rent increases and displacement.
- Renters expressed concerns about building electrification as a potentially allowed improvement under the Capital Improvement Passthrough (CIP) program.

- Both renters and landlords are in favor of low cost and mobile electrification appliances that renters can bring with them as they move.
- Landlords expressed that for some of their buildings, electrification may be a significant project with significant barriers.
- Participants expressed the desire to involve more people in this process and to widely engage the community through campaigns and community building activities.
- Participants expressed excitement to better understand building electrification and for information to be more widely distributed.

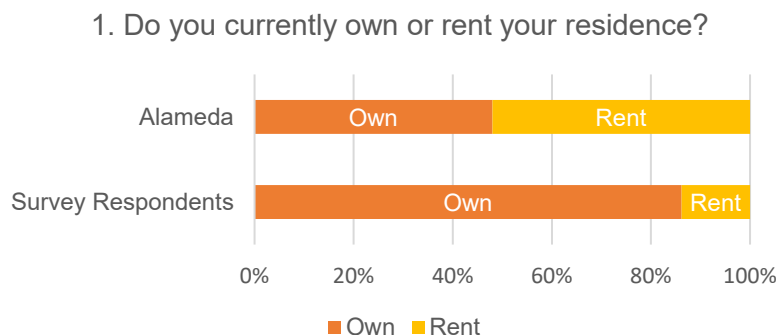
Electrification Survey

The goal of the survey was to understand home electrification barriers and opportunities in Alameda’s residential buildings. The survey was open from March 3 to May 6, 2022 on the City’s building electrification landing page and was provided in English, Spanish, and Chinese. The survey was publicized on: City’s social media platforms, Sustainability & Resilience Newsletter, Alameda Sun Electrification Article, electrification workshop series and follow up emails, Alameda Farmers Market, Old Oakland Farmers Market, and the City’s Earth Month Bingo.

A total of 87 responses were received. The results are as follows:

Owners vs. Renters

Over 85% of survey respondents own their current residence and 25% rent, compared to the City as whole with 48% homeowners and 52% renters. About 80% of the survey respondents live in single-family homes while single family homes provide about 50% of the housing units in Alameda. This suggests that there is an over representation of home owners and single-family dwellers in this survey. “Other” includes room and co-op residences.



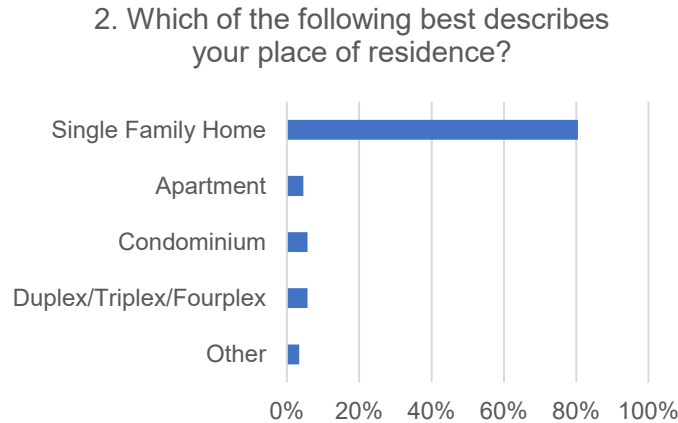


Figure 11: Respondents Who Own or Rent Their Homes Compared to Residents Citywide and the Building Type They Live In

Housing Conditions

Around 30% of homes do not need to address any of the listed items. The remaining 75% of homes need to address at least one of the listed items for a healthier, more resilient home. Nearly 60% of homes need to address weatherization and energy efficiency improvements. 25% of homes have to address other deferred maintenance that are not listed. Around 5% of homes need to address lead-based paint, mold, and/or asbestos. 15% of homes need to address earthquake retrofits.

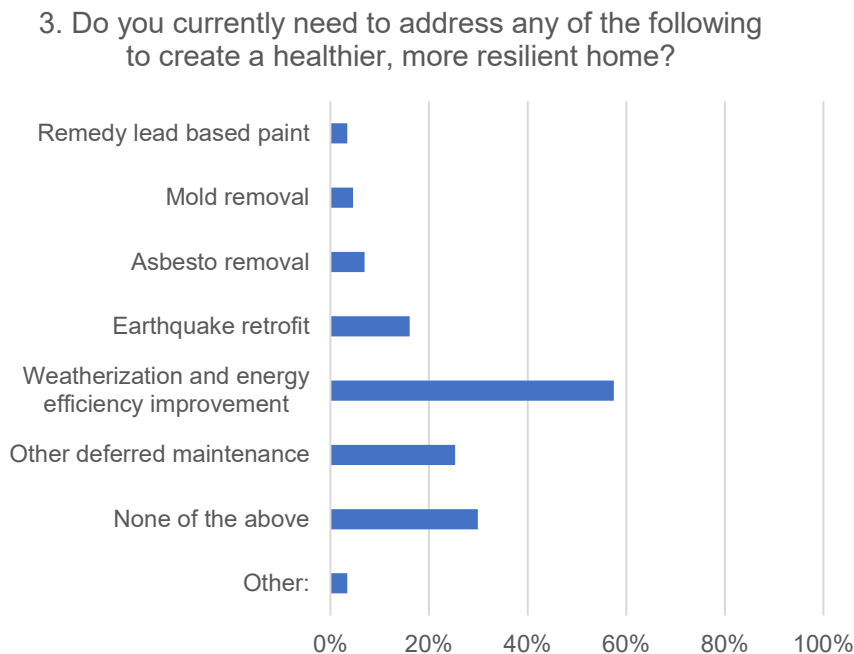


Figure 12: Actions Respondents Need to Address for a Healthier, More Resilient Home

Perception of Electrification

More than 60% of the survey respondents strongly agree or agree that living in an all-electric home is safe and comfortable, and is beneficial to them. Around 25% of the survey respondents disagree that living in an all-electric home is safe and comfortable, and beneficial to them. A small percentage of the respondents agree that living in an all-electric home is safe and comfortable but disagree that it is beneficial to them. Around 12% of respondents do not know if living in an all-electric home is safe and comfortable, or if it is beneficial to them.

Over 85% of survey respondents are concerned about the impacts of climate change and 75% are concerned about indoor air quality.

4. Please answer the following statements with Strongly Agree/ Agree/ Disagree/ Strongly Disagree/ or I Don't Know.

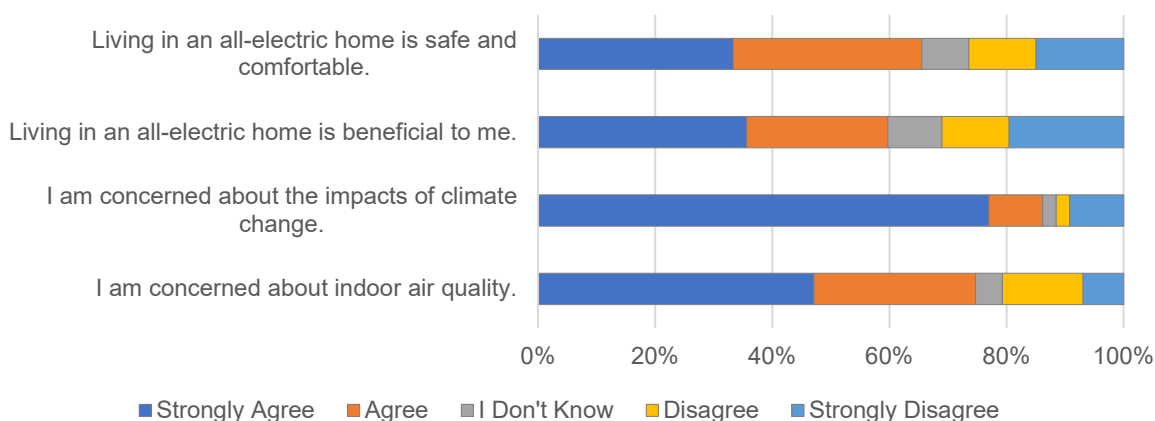


Figure 13: Respondents' Perception of Electrification

Barriers and Opportunities in Electrification

Among the barriers listed, the cost of the project including permit, product, and contractors was the top barrier for over 70% of respondents. Concerns about electric panel capacity and/or electric service capacity was a concern for 35% of respondents. Other top barriers include concerns about increased electricity bill and concerns about power outages, each at 25%. Other barriers that respondents wrote in include a preference for gas cooking, concerns around operating cost increases, and electrical grid capacity.

5. What are the top 3 barriers to starting or expanding your home Electrification journey?

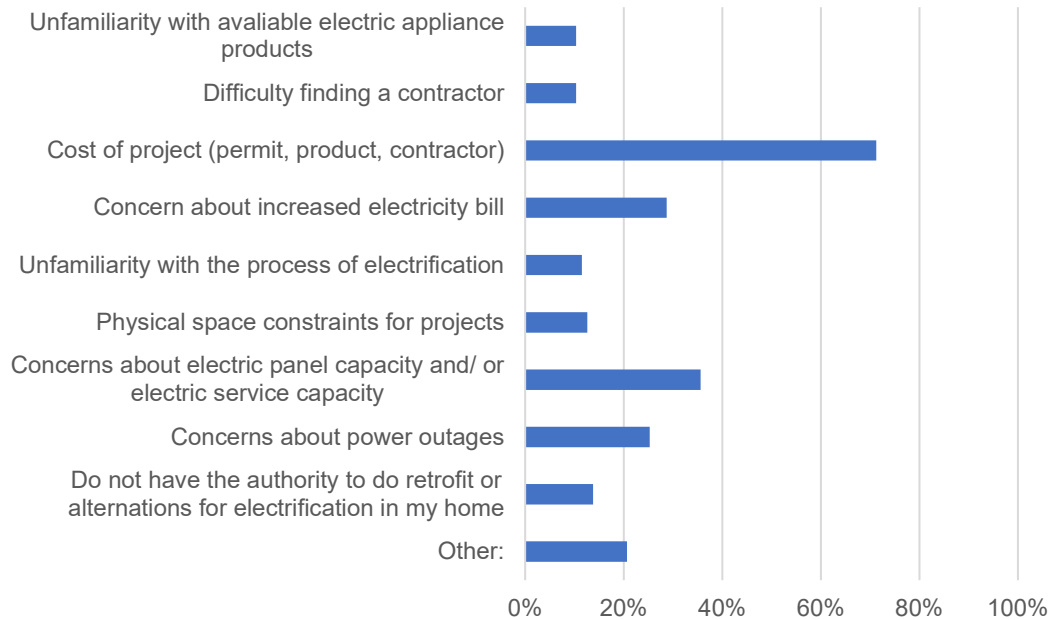


Figure 14: Respondents' Top Barriers in Electrification

Among the incentives listed, additional rebates for appliances was a top choice incentive for nearly 60% of respondents. More information on electrification and a database of contractors trained to install heat pump equipment were chosen by 40% of respondents. There are two available databases from BayREN and the Switch is On. Other incentives include reducing the cost in various areas such as permits and lower electricity rates or to demonstrate bill savings.

6. Select the top 3 choices that would incentivize you the most to electrify your home.

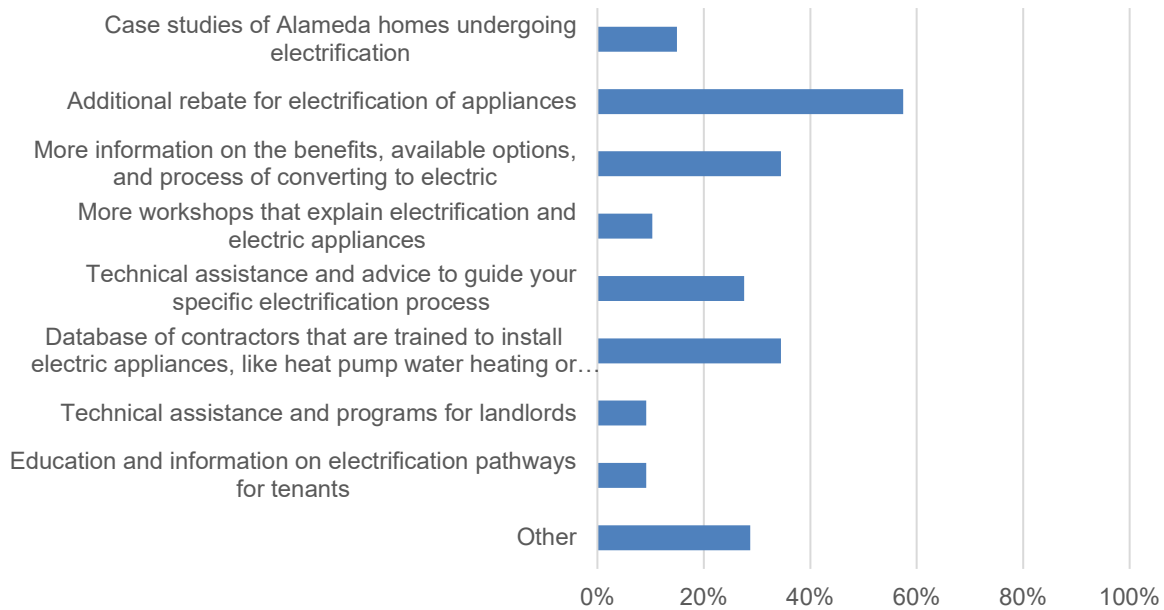


Figure 15: Respondents' Top Incentives to Act on Electrification

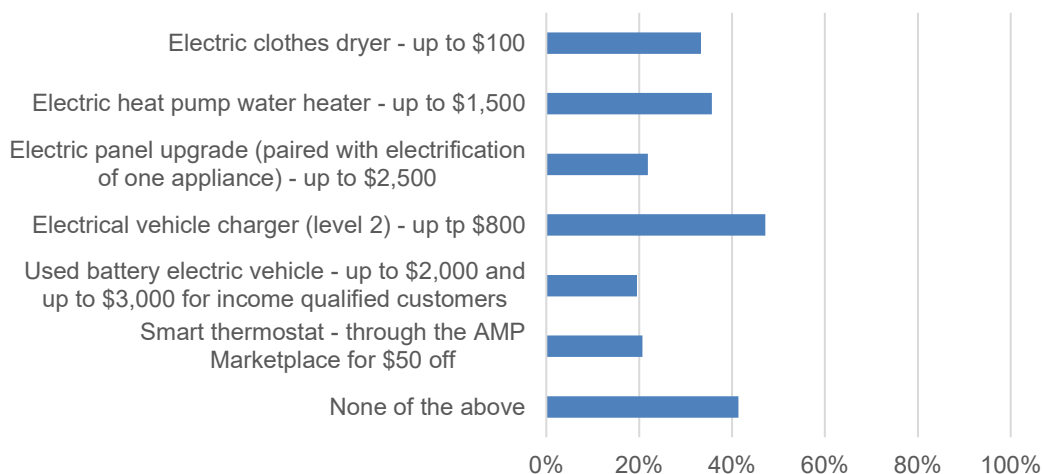
Awareness of Available Rebates and Incentives

For AMP rebates, 40% of respondents were not aware of any rebates offered. Respondents were most aware of AMP's rebate for EV chargers at nearly 50%. More than 30% of respondents were aware of each rebate for electric clothes dryer and electric heat pump water heater. Overall, many of the survey respondents were not aware of the wide range of rebates offered by AMP.

For TECH incentives, nearly 80% of the respondents were not aware of any of the incentives. This might be attributed to TECH being a relatively new program that launched in December 2021. There are small variations in awareness of the different incentives.

Note: The TECH Clean California program has temporarily run out of funds and has been suspended since May 18, 2022.

7. Which of the following Alameda Municipal Power rebates are you aware of? (Check all that apply)



8. Which of the following TECH incentives are you aware of? (Check all that apply)

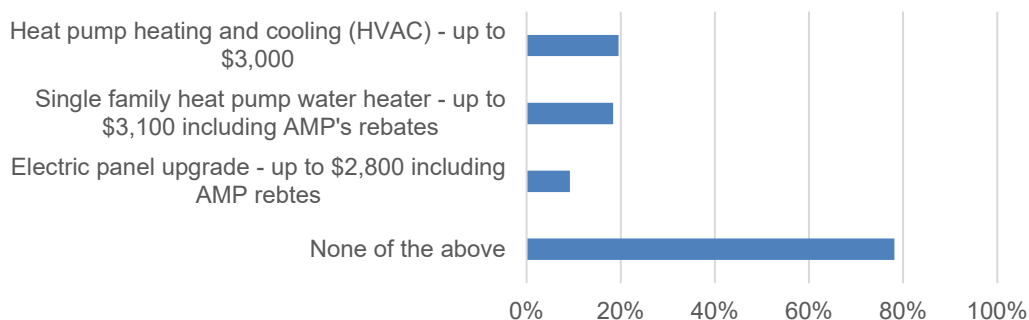


Figure 16: Respondents' Awareness of Alameda Municipal Power and TECH Rebates and Incentives

Other Support for Electrification

The survey also included an optional open-ended question for respondents to suggest community spaces where they would like staff to host in-person Electrification 101 workshops. Responses include the Main Library, West End Library, Bay Farm Library, Mastick Senior Center, public parks, local schools, churches and virtual options.

Survey respondents also responded to another open-ended question: What else can the City/ AMP do to support your home electrification journey? Many respondents would like more support to ease the cost of electrification. Others responses would like better guidance and more information on how to electrify their homes including websites and home assessments. Some would like to see a streamlining of the electrification process. There is also a desire for the City to encourage and work with landlords to electrify rental units.

Demographic Information

Demographic information was collected to help us understand who was responding to our survey and how much representation we were getting from each group compared to the diversity in Alameda. The survey respondents are over represented by individuals that identify as Caucasian, White compared to Alameda residents overall. Other race and/or ethnic groups are underrepresented in this survey.

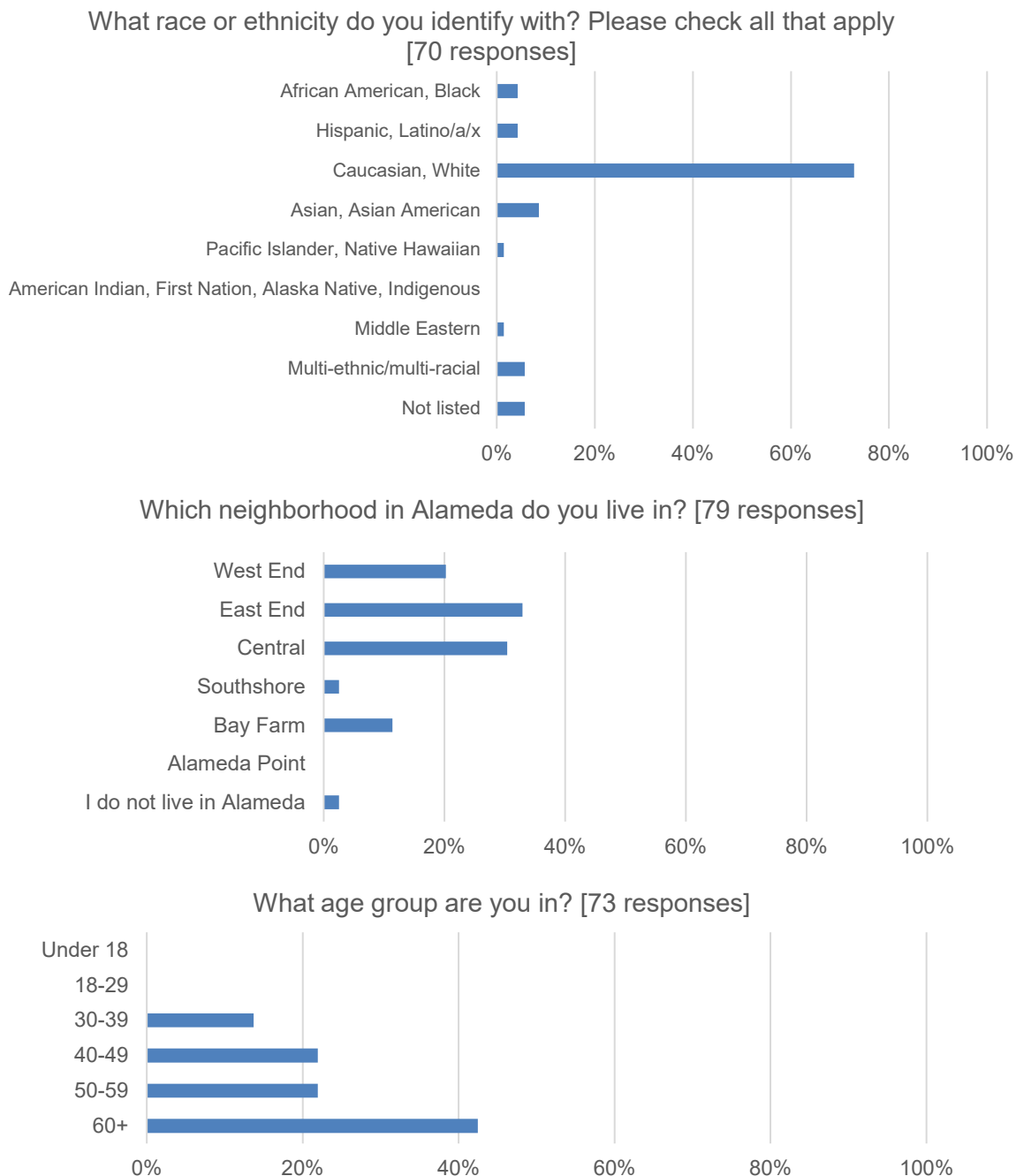


Figure 17: Demographic of Survey Respondents (Race and/or Ethnicity, Neighborhood and Age)

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