County of Contra Costa, California

Clean Energy Roadmap for Existing Buildings

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GLOSSARY

ABAG: Association of Bay Area Governments

AC: Air Conditioning

AEA: Association for Energy Affordability

BAAD: Bay Area Air District

BayREN: Bay Area Regional Energy Network

BOS: Board of Supervisors

CARB: California Air Resources Board

CAP: 2015 Climate Action Plan

CAAP: Updated 2024 Climate Action and Adaptation Plan

CAISO: California Independent System Operator

CCA: Community Choice Aggregator

CCHS: Contra Costa Health Services

CEC: California Energy Commission

CO_2: Carbon Dioxide

CPUC: California Public Utilities Commission

DER: Distributed Energy Resources

EPA: Environmental Protection Agency

EV: Electric Vehicle

GHG: Greenhouse Gas

HPWH: Heat Pump Water Heater

HVAC: Heating, Ventilation, and Air Conditioning

IOU: Investor-Owned Utility

LEED: Leadership in Energy and Environmental Design

MCE: Community choice energy provider for most of Contra Costa County.

NOx: Nitrogen Oxide

NO_2: Nitrogen Dioxide

PSPS: Public Safety Power Shutoff

Executive Summary

Energy usage from existing buildings is one of the largest contributors of greenhouse gas (GHG) emissions, responsible for approximately 30 percent of all the annual GHG emissions in unincorporated Contra Costa County. Transitioning existing buildings to use clean energy to reduce GHG emissions is a complex issue that requires a thoughtful, strategic approach that will not overburden our population. The most common approach to reducing GHG emissions in buildings is to transition buildings away from using gas as the building's fuel source.

The Clean Energy Roadmap for Existing Buildings is an action item specified in Strategy BE-2 of the County's Climate Action and Adaptation Plan 2024 Update (CAAP) adopted on November 5, 2024, by the County Board of Supervisors. The roadmap provides an initial assessment of the existing landscape in California for transitioning buildings to all-electric and highlights existing all-electric policies and plans at the local, regional, and State levels. The roadmap also highlights the many benefits that come with all-electric homes such as enhanced health and safety in homes as well as improved community resilience to the impacts of climate change. A strategic community engagement strategy is also outlined that centers on equity to inform our impacted communities in the County on the benefits of buildings operating on clean energy.

Below is a summary of the research and analysis conducted as well as a summary of the recommendations and next steps included in the County's Clean Energy Roadmap.

INITIAL RESEARCH RESULTS

The research and analysis conducted by County staff for this roadmap is preliminary and serves as a framework for more comprehensive analyses in the future on the existing building stock characteristics, the costs associated with transitioning buildings to be all-electric, the current challenges and barriers to evaluate, and the policies that have been deployed successfully in other jurisdictions. Each research topic summarized below provides insight into the factors that influence the transition of existing buildings to all-electric and supports efforts to have buildings use clean energy that reduces or eliminates cardon dioxide emissions, therefore reducing GHG emissions and improving health.

Building Inventory – An initial building inventory was conducted for all the residential buildings in unincorporated Contra Costa County. It identified key characteristics such as building typology, vintage, and total square footage. The initial assessment found that 93 percent of all the residential buildings in the County are single-family homes and that 56 percent of those homes were constructed prior to 1978.

Cost Analysis – A brief overview of the issues around the cost of transitioning a building to all-electric is provided. This includes the factors that influence the cost of transitioning buildings to all-electric, such new equipment, operational costs, and other unique factors. A comprehensive study specific to the County's region will need to be conducted to better understand how all these variables impact the cost of transitioning a home to be all-electric.

Facilitating an Equitable Transition –The roadmap highlights a number of issues to resolve to be equitable for County residents. This includes insufficient electrical panel capacity or outdated panel compatibility, outdated wiring in the home, prohibitive costs of adding solar panels and battery storage, and the landlord/tenant dilemma for making tenant improvements.

Policy Options and Other Strategies – A brief overview of the policy options and other approaches other jurisdictions have implemented is provided. This includes actions that trigger, through permitting, and require an upgrade to all-electric (e.g., major renovations) as well as a discussion on how these options through permitting are no longer feasible due to a recent court ruling. Also included is a strategy on decommissioning the gas distribution system through collaboration with investor-owned utilities (IOUs) and community choice aggregators (CCAs).

RECOMMENDATIONS AND NEXT STEPS

This Roadmap includes specific recommendations and next steps based on the research and information collected for this report. Below is a summary of the recommendations and next steps. All recommended actions are intended to support staff in the ongoing effort to transition existing buildings to all-electric so that the County can reach the emission reduction goals outlined in its CAAP.

Regional and State Collaboration: Work with the County's Legislation Committee and Board of Supervisors to develop a policy framework that allows staff to establish new and/or expand existing relationships with regulatory agencies to support the goal of transitioning existing buildings to all-electric. It would enable staff to formally participate in public hearings, provide comments during the regulatory decision-making process, and petition for rulemaking from regulatory agencies like the California Energy Commission (CEC). It also includes collaborating with the IOUs, such as PG&E, and CCAs, such as MCE that service our region to gain a better understanding of the existing gas distribution system as well as explore the process and feasibility of decommissioning gas lines at a neighborhood/community scale.

Additional Analysis: Conduct additional analysis to expand on the work presented in this roadmap. This includes an expanded building inventory that will provide more data on the

condition of the existing building stock and more research on the costs of transitioning existing buildings to all-electric in the County.

Outreach and Engagement

A specific outreach and engagement strategy is needed to communicate and collaborate with the residents of Contra Costa County that ensures that historically marginalized and unrepresented communities have a voice in planning for a clean energy transition. The roadmap outlines a specific framework for staff to follow to ensure that efforts around transitioning existing buildings to all-electric extend to all unincorporated communities throughout the County. This includes working with community-based organizations to engage and collaborate with our communities to further develop the various strategies that will provide better health outcomes and a more resilient future.

Other Actions

There are other actions included in the roadmap that will strengthen the County's ability to succeed in this transition. These actions include seeking approval from the Board of Supervisors (BOS) to continuously pursue funding for this effort as well as further analysis of the policy options and issues related to facilitating an equitable transition for converting existing buildings to all-electric. It also includes implementing pilot projects, where appropriate.

1.0 Introduction

Climate change is one of the greatest challenges the world faces today.[1] The continued use of fossil fuels as an energy source has caused a build-up of greenhouse gases (GHG) such as carbon dioxide, nitrous oxide, and methane in the atmosphere. These gases and others are altering the chemical composition of the atmosphere and leading to a rise in the overall global temperature.

In 2015, Contra Costa County adopted its first Climate Action Plan (CAP) for the unincorporated areas of the County. The 2015 CAP states that the County is expected to experience more extreme heat events, reduced air quality, changes in sea level, less predictable water supply, and an increase in storm severity and frequency of flood events.

Since the adoption of its first CAP, the County has actively been working to mitigate its GHG emissions to reduce the severity of these expected impacts as well as help meet State and County climate goals. The County has made progress in meeting the goals of the 2015 CAP. Some major activities include providing marketing and outreach support for Bay Area Regional Energy Network (BayREN) programs to promote energy efficiency and all-electric retrofits, ongoing implementation of the County's low-income Weatherization Program, and piloting programs like the County's Asthma Initiative that links health impacts with energy efficiency. The County also has three LEED Gold certified County Administration Buildings, one of which also has a Total Resource Use and Efficiency (TRUE) building certification. In 2018, the County received grant funding through the California Strategic Growth Council to conduct a renewable resource potential study to identify more opportunities for renewable energy in the County and in 2020 adopted a solar overlay zone which allows ground-mounted solar in certain areas outside of the urban limit line. In addition, the County has installed solar and is upgrading to energy efficient lighting in County facilities on an ongoing basis.

On September 22, 2020, the Contra Costa County Board of Supervisors (BOS) passed Resolution 2020/256 which endorsed a declaration of a climate emergency in Contra Costa County, formally addressing the need for immediate action to combat climate change. The Climate Emergency Resolution included a range of initiatives, including that the County prioritize the implementation of its CAP and that the County should develop policies to require all new construction to be fully electric through the adoption of reach building codes. The Climate Emergency Resolution also acknowledges the process of updating its General Plan, Climate Action Plan (now the Climate Action and Adaptation Plan, or CAAP, and zoning codes, which provide an opportunity to follow State guidance for reducing greenhouse gas emissions for the unincorporated areas of Contra Costa County.

[1] www.nrdc.org/stories/what-are-effects-climate-change#weather

On November 5, 2024, the County Board of Supervisors (BOS) adopted the Contra Costa County 2045 General Plan and Contra Costa County Climate Action and Adaptation Plan (CAAP) 2024 Update. Consistent with the State's GHG emission reduction goals, the County's updated 2024 CAAP includes GHG reduction goals to 40 percent below 1990 levels by 2030 and achieve net carbon neutrality by 2045.[2]

The purpose of this roadmap is to facilitate the implementation of CAAP Strategy BE-2, which includes an implementation action to create a detailed County roadmap to convert existing homes and businesses to use low-carbon or carbon-free appliances. It also states that the roadmap should include steps to support converting buildings to rely on low-carbon or carbon-free energy using an equitable framework that minimizes the risk of displacement or significant disruptions to existing tenants.

Although the goal of the roadmap is to convert existing homes and businesses to use low-carbon or carbon-free appliances, such as having buildings be all-electric, the initial focus will be on residential buildings because they comprise a majority of the existing structures in the unincorporated areas of the County. This roadmap includes an overview of the benefits and challenges, an examination of what buildings have low-carbon or carbon-free appliances at the local and state level and a preliminary analysis of the costs associated with converting existing buildings to be all-electric. It also includes ways to center equity in all aspects of a transition to all-electric buildings and explore policy options and next steps to meet the County's CAAP goals for existing buildings.

[2] www.contracosta.ca.gov/8683/Update-of-the-Climate-Action-Plan

2.0 Benefits of All-Electric Buildings

Existing buildings are responsible for approximately 30 percent of all the annual GHG emissions for unincorporated Contra Costa County, 19 percent of which come from residential buildings and 11 percent from non-residential buildings. Transitioning away from the use of fossil fuel infrastructure, such as gas in residential, commercial, and industrial buildings, has many health, safety, and climate resiliency benefits.

2.1 Health

The County has approximately 300,000 residents living in census tracts that rank in the 95th percentile or higher statewide for asthma-related emergency department visits; these census tracts are located primarily along the County's northern waterfront.[3] This is higher than any other county in California.

On average, Californians spend approximately 90 percent of their time indoors where the air quality can be more polluted than outdoors. Gas appliances emit harmful amounts of carbon dioxide (CO_2) and nitrogen dioxide (NO_2) which become trapped in the home, causing lasting health ramifications to occupants. For example, gas stoves in homes produce NO_2 concentrations that are 50-400 percent higher than homes with electric stoves.[4] These spikes often cause indoor air quality to far exceed the standards for outdoor air pollution. Children living in homes with gas stoves are 42 percent more likely to suffer asthma symptoms than those living in homes with electric stoves.[5] Particularly for those with moderate to severe asthma, eliminating the use of gas stoves and other appliances that use gas in the home are known to improve health outcomes.

2.2 Safety

California has one of the oldest gas distribution infrastructures in the United States. As the system continues to age, it becomes more vulnerable to gas leaks or complete failure. The U.S. Environmental Protection Agency (EPA) found that unplanned gas leaks, also known as fugitive gas leaks, occur in all parts of the gas distribution infrastructure.[6] The majority of the gas lost through leakage is methane, which is 25

[3] www.greenandhealthyhomes.org/publication/contra-costa-asthma-initiative/
[4] www.rmi.org/press-release/health-air-quality-impacts-of-cooking-with-gas/
[5] www.rmi.org/indoor-air-pollution-the-link-between-climate-and-health/
[6] www.epa.gov/natural-gas-star-program/primary-sources-methane-emissions

times more potent in its impact to the atmosphere than carbon dioxide.[7] Another safety risk associated with the gas infrastructure is accidental explosions caused during maintenance or excavation near gas pipelines.

Contra Costa County is also located in an area at high risk for earthquakes, near numerous earthquake faults including the San Andreas Fault, and all or portions of the Hayward, Calaveras, Concord, Antioch, Mt. Diablo, and other lesser faults. A study released in 2015 by the Working Group of California Earthquake Probabilities predicts that for the San Francisco region, the 30-year likelihood of at least one earthquake or more measuring/ 6.7 or larger magnitude is 72 percent. Scientists, therefore, believe that an earthquake of a magnitude 6.7 or larger is now slightly more than twice as likely to occur as to not occur in, approximately, the next 30 years. The California Seismic Safety Commission reported that 20-50 percent of post-earthquake fires can be directly attributed to leaks in the gas infrastructure.[8] The elimination of gas infrastructure in buildings would reduce the hazards associated with gas leaks during seismic events.

Fire is also a risk. Highly combustible dry grass, weeds, and brush are common in the hilly and open space areas in the County for 6 to 8 months of each year. Many of these combustible areas are adjacent to developed locations and are shown in the lates Fire Hazard Severity Zone Maps published in April 2024 by the California Department of Forestry and Fire Protection.[9] These areas are more prone to wildland fires, which threaten nearby buildings, particularly those with wood roofs, or sidings. This condition can be found throughout Contra Costa County, especially in developed and developing areas of the County. Earthquake gas fires due to gas line ruptures can ignite grasslands and stress resources to combat fires. The elimination of gas infrastructure in buildings would also reduce fire hazards of buildings located near highly combustible dry land areas.

2.3 Climate Resilience

As temperatures in Contra Costa County increase in the coming decades, so will our demand for energy. Air conditioning systems will run more frequently and for longer periods of time. Transitioning buildings to be all-electric will lead to an overall increase in electricity consumption. Increasing the level of community resilience to the various impacts associated with climate change is imperative and working to identify solutions that address multiple problems and present multiple benefits is a clear way to

[7] www.epa.gov/ghgemissions/overview-greenhouse-gases#methane
[8] www.ssc.ca.gov/wp-content/uploads/sites/9/2020/08/cssc_2002-03_natural_gas_safety.pdf
[9] www.osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones/fire-hazard-severity-zones-maps

accomplish this. Converting all appliances to electricity enhances resiliency to climate change through improved health and comfort in homes. Adding distributed energy resources (DERs), such as battery storage and solar panels also helps mitigate the impacts from an increased electricity load on the grid and furthers resiliency by adding protection against loss of power and public safety power shutoff (PSPS) events during high wildfire risk events. This is especially important for those in the community that are medically dependent on power. A common misconception with gas is that it serves as a redundant system during power loss events, however many gas appliances still require electricity to power fans and function.[10] Back-up generators that operate on diesel are a convenient option during loss of power; however, they cause more air pollution and create additional fire risk, further exacerbating climate change.

Eliminating the use of gas in existing buildings is a key strategy to reinforce community resiliency against climate change. Including battery storage and solar panels only serves to add to a household's overall resiliency. Unfortunately, many members in the community, especially those who live in areas disproportionately burdened by pollution, don't have adequate funding or resources to make these investments. Most also lack the authority to initiate the transition to all-electric due to different motivations for tenants and landlords to invest in these upgrades.[11] For the purposes of this roadmap and consistent with the County's General Plan, these burdened communities will be referred to as "impacted communities." To improve resiliency in the unincorporated County, especially our impacted communities, focus must be given to addressing these barriers so that these communities can experience the benefits that come with all-electric buildings.

[10] www.peninsulacleanenergy.com/myths-and-facts-about-gas-appliances-during-a-power-outage/

[11] The "split incentive" or "tenant-landlord dilemma" refers to the situation where building owners do not directly benefit from increased comfort, better indoor air quality, and utility bill savings that can result from investments in energy efficiency upgrades. Tenants, who would benefit, usually lack the authority and the financing to make these investments.

3.0 Existing All-Electric Policies and Programs

There are numerous policies and programs in place at the state, regional, and local levels that are either planned or are currently being implemented that support local agencies in adopting policies or initiatives to help convert existing buildings to all-electric. Below is an overview of the government actions being taken throughout the State and in Contra Costa County.

3.1 Statewide Policies and Plans

Transitioning existing buildings to all-electric is a strategy being deployed by California. These efforts, some of which are provided below, work collectively to position the State and the jurisdictions within it to convert our sources of electricity and the building stock to be less carbon intensive.

Building Energy Efficiency Standards (Title 24) (1978): California's building code for all new construction. The energy code is updated every three years and sets the requirements around energy efficiency and electrification. The most recent code became effective in January 2023 with updates that include requiring new homes installed with gas infrastructure to be electric-ready as well as standardizing electric heat pumps for water and space heating.[12]

Assembly Bill 32 (2006): The California Global Warming Solutions Act of 2006 formed the basis for subsequent policy, both through executive orders and legislation. Assembly Bill (AB) 32 required California to reduce its GHG emissions to 1990 levels by 2020. This is a reduction of 15 percent below emissions expected under a "business as usual" scenario with reductions coming from virtually all sectors of the economy through policies, planning, direct regulations, market approaches, incentives, and voluntary efforts. AB 32 was a success as target reductions across the state were achieved in 2016.[13]

Senate Bill 350 (2015): The Clean Energy and Pollution Reduction Act, which is implemented by the California Energy Commission (CEC), establishes more stringent clean energy and GHG reduction targets, including reducing GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.[14]

[12] www.dgs.ca.gov/BSC/About/History-of-the-California-Building-Code--Title-24-Part-2
[13] www.ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006
[14] www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350

Senate Bill 32 (2016): The California Global Warming Solutions Act of 2016 builds on AB 32 by requiring the California Air Resources Board (CARB) to reduce GHG emissions to 40 percent below the 1990 levels by 2030.[15]

Executive Order B-55-18 (2018): Governor Brown issued Executive Order B-55-18, which established an additional statewide goal of achieving carbon neutrality (no net GHG emissions) by 2045. Under this goal, any GHGs that are emitted by California must be fully offset by other activities by 2045. Though this goal does not yet have the force of law, it does indicate the direction in which the State is moving and may be a reference point for future legislative action.[16]

Assembly Bill 3232 (2018): The Low Carbon Buildings bill directs the CEC to prepare a Building Decarbonization Assessment in conjunction with the California Public Utilities Commission (CPUC), CARB, and the California Independent System Operator (CAISO). This report, which was published in August 2021, assesses the potential for California to reduce GHG emissions from buildings by 40 percent below 1990 levels by 2030.[17]

Senate Bill 100 (2018): The 100 Percent Clean Energy Act requires renewable energy and zero-carbon resources to supply 100 percent of electric retail sales to end-use customers by 2045. To help accomplish this, the bill updated the State's Renewables Portfolio Standard to ensure that at least 60 percent of California's electricity is renewable by 2030. The bill also established a requirement for the CEC, CPUC, and CARB to use programs under existing laws to achieve 100 percent clean electricity and issue a joint policy report which includes an initial assessment of additional energy resources and resource building rates needed to achieve 100 percent clean electricity. The first report was issued in 2021, and subsequent reports will be released every four years.[18]

Senate Bill 1477 (2018): The Clean Homes to Californians bill requires the CPUC to allocate $50 million per year from cap-and-trade revenue until 2023 to support the Building Initiative for Low-Emissions Development (BUILD) and the Technology and Equipment for Clean Heating (TECH) pilot programs.[19]

[15] www.clear.ucdavis.edu/explainers/how-california-working-reduce-greenhouse-gas-emissions
[16] www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf
[17] www.leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB3232
[18] www.energy.ca.gov/sb100
[19] www.nrdc.org/bio/merrian-borgeson/governor-signs-sb-1477-delivers-clean-homes-californians

3.2 Regional Programs, Plans, and Studies

The San Francisco Bay Area has always been proactive in addressing climate change. The Bay Area Air District (BAAD), the regional authority for setting rules and planning around air quality in the Bay Area, routinely sets regulations to improve air quality and reduce GHG emissions. Below are some of the agency's recent actions focused on reducing GHG emissions.

Clean Air Plan (2017): BAAD developed the Clean Air Plan as a regional strategy to protect public health and address climate change. The plan defines a vision for transitioning the region to a post-carbon economy so that the region can meet identified GHG reduction targets for 2030 and 2050. Specific to all-electric buildings, the plan addresses ways to accelerate low carbon buildings, eliminate methane leaks, increase building energy efficiency, and convert space and water heating in buildings to all-electric.[20]

BAAD Rules 9-4 and 9-6 Amendments (March 2023): BAAD adopted amendments to appliance rules 9-4 and 9-6 which govern nitrogen oxide (NOx) emissions from fan type residential central furnaces and gas-fired boilers and water heaters. The 9-4 rule changes aim to lower the NOx emission limits in central furnaces in the short term and expand applicability of the rule to include non-residential settings. The rule bans the purchase of NOx emitting water heaters (i.e. gas water heaters) in the BAAD territory for residential buildings or standard commercial and industrial spaces starting in 2027. The ruling also bans the purchase of NOx emitting furnaces (i.e. gas burning furnaces) starting in 2029 with a ban on the purchase of NOx emitting larger commercial water heaters beginning 2031.[21]

3.3 California Jurisdictions with Adopted All-Electric Building Plans

While state and regional policies help support transitioning existing buildings to be all-electric, local government policy actions also have a key role in shaping future State and regional policy. This includes the adoption of local codes that either encourage or require buildings to become all-electric as well as other actions, such as the adoption of a local plan or initiative to reduce GHG emissions from existing buildings. Provided

[20] www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf

[21] www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances

below are some of the jurisdictions in California that have already adopted these types of plans or policies that support this effort.

Alameda: The City of Alameda adopted an Equitable Building Decarbonization Plan in January 2023. The plan presents a phased approach to shifting existing buildings from gas to all-electric in alignment with the City's climate, equity, and housing efforts.[22]

Berkeley: The City of Berkeley adopted an Existing Building Electrification Strategy in November 2021. This plan lays out research and recommendations to transition gas appliances in existing buildings to all-electric alternatives to benefit all residents, especially members of historically marginalized communities.[23]

Half Moon Bay: In February 2022, the City of Half Moon Bay adopted an ordinance requiring all gas lines to be capped or decommissioned in existing buildings by 2045.[24]

Piedmont: In October 2021, the Piedmont City Council adopted a Reach Code Ordinance that requires electrical panel replacement to include sufficient capacity to allow for the transition to all-electric appliances.[25]

San Jose: The City of San Jose launched the Electrify San Jose: Framework for Existing Building Electrification in May 2022. The plan includes strategies to encourage and expand awareness of and access to existing incentive programs for homes and businesses to become all-electric.[26]

San Mateo: In November 2022, the City of San Mateo adopted a Reach Code Ordinance that includes a variety of requirements related to increased electric panel capacity to prepare for future electrification, the installation of electric-readiness outlets in kitchen and laundry renovations, the installation of heat pump air conditioning and water heaters, and the prohibition of new gas infrastructure for outdoor equipment.[27]

[22] www.alamedaca.gov/files/assets/public/city-manager/documents/building-electrification/building-decarb-plan_jan-2023_final.pdf
[23] www.berkeleyca.gov/your-government/our-work/adopted-plans/berkeley-existing-buildings-electrification-strategy
[24] www.half-moon-bay.ca.us/761/Building-Electrification
[25] www.piedmont.ca.gov/services___departments/planning___building/about_building_/reach_code_information
[26] www.sanjoseca.gov/home/showpublisheddocument/90625/638017000335100000
[27] www.cityofsanmateo.org/3363/Reach-Codes

Santa Monica: The City of Santa Monica released a high-level Existing Building Electrification Roadmap in February 2023. The plan includes a building stock inventory, an analysis of the associated costs, and it outlines policy options to convert existing buildings to all-electric with a focus on equity.[28]

3.4 Contra Costa County Programs and Plans

The actions taken by the County to reduce GHG emissions started in 2005 with the Contra Costa County Climate Protection Report, which presented the County's first GHG emissions inventory. In 2015, the County adopted its first CAP, laying the groundwork for future and ongoing efforts to reduce GHG emissions in the unincorporated County. The County's current CAAP includes additional strategies to retrofit existing buildings and facilities to reduce energy use for conversion to low-carbon or carbon-neutral fuels. Below are County specific policies, programs, and plans that support this effort.

Building Ordinance Reach Codes: In January 2022, the County BOS approved an All-Electric Buildings Ordinance (Ordinance No. 2022-02), also known as a reach code, because it requires more stringent standards than that of the state, requiring all new construction of residential, office, retail, and hotels to be all-electric. On February 27, 2024, the County BOS suspended its the All-Electric Buildings Ordinance because of a decision on January 2, 2024, by the U.S. Court of Appeals 9th Circuit that invalidated the City of Berkeley ordinance that prohibited gas infrastructure in new buildings. The court held that the federal Energy Policy and Conservation Act ("EPCA"), a federal statute that regulates the energy efficiency of several consumer products including water heaters, furnaces, stoves, and heating, ventilation, and air conditioning (HVAC) systems, precludes cities and counties from adopting ordinances that prohibit the installation of gas plumbing in buildings.[29] To ensure the County could meet its CAAP goals, on October 1, 2024, the County BOS adopted Ordinance 2024-17 which amends the County's energy code to require higher energy efficiency for new residential and commercial construction.

Contra Costa County Asthma Initiative (2019 – 2023): The Asthma Initiative was developed through a technical assistance grant provided by Green and Health Homes Initiative (GHHI), in coordination with Contra Costa Health Services (CCHS), the County Weatherization Program, The Association for Energy Affordability (AEA), BayREN, and MCE (the County's community choice energy provider) to develop a business plan to implement a comprehensive home-based asthma program. After

[28] www.santamonica.gov/press/2023/02/27/city-of-santa-monica-releases-existing-building-electrification-roadmap
[29] https://www.contracosta.ca.gov/8536/All--Electric-Buildings

completion of the business plan in late 2019, CCHS was awarded grant funding from the Sierra Health Foundation (on behalf of the State's Health Division) and BAAD to implement and administer the Contra Costa Asthma Initiative. Program services include an assessment of the home to identify the primary asthma triggers and establish a remediation scope, including asthma trigger remediation, and energy efficiency and weatherization services to lower utility bill costs and improve comfort in the home. Program grant funding for this project ended in 2023, however the County is exploring how to implement a similar program on a long-term basis through the County's Health Plan or other funding sources.[30]

Contra Costa County Weatherization Program: The County weatherization program is a federal and state funded program designed to assist low and/or fixed income homeowners and renters in making their homes more energy efficient. The program provides a home evaluation and overview of potential energy efficiency measures needed as well as gas appliance testing at no cost to determine whether the test appliances are operating properly and safely. Core energy efficiency measures offered by the program include building envelope improvements and monitoring equipment such as programmable thermostats and carbon monoxide detectors. Gas appliances in the home that fail inspection are either repaired or replaced, potentially with an electric replacement.[31]

PeakFLEX Demand Response Program: In 2022, the Board approved participation in MCE's PeakFLEX Demand Response program for County facilities. The program incentivizes building-level electric load shifting and shedding during critical times of peak energy demand in California. The County successfully implemented a Demand Response strategy the Summer of 2022, when the California Independent System Operation called 9 consecutive "Flex Alert" days. By participating in the program, the County reduced electric usage across 20 office facilities by adjusting each building's operating hours, which in turn provided critical relief to California's burdened electric grid. The County received a program incentive of $15,000 on top of an estimated $3,000 utility bill cost reduction. The County will continue to participate in the program and increase the number of Demand Response tactics employed.

Strategic Energy Management Program: In 2022, the BOS approved participation in MCE's Strategic Energy Management program. The program incentivizes any measured or modeled energy savings resulting from County actions taken to reduce energy use in County buildings. The County Public Works Department is working with program implementers and County consultants, to draft a comprehensive Strategic Energy Management (SEM) program to govern, manage, report, and

[30] www.greenandhealthyhomes.org/publication/contra-costa-asthma-initiative/
[31] www.contracosta.ca.gov/4336/Weatherization

evaluate energy use from County operations. County SEM program strategies will reflect all Board-approved energy-related plans and initiatives through proactive management and continuous improvement.

Strategic Energy Management Plan: In January 2025, the BOS adopted the 2025-2035 Strategic Energy Management Plan for the County. This plan serves to direct and organize the County's energy investments to be aligned with the newly adopted Envision 2040 General Plan, CAAP, and other County plans, track performance related to energy investment at County facilities and promote stakeholder engagement both internally and externally.

Local Energy Efficiency Pilot/Rebate or Grant Programs: The County routinely obtains outside funding from other agencies or grants to implement various small scale energy efficiency programs throughout the County. Below is a list of the current programs being offered/administered by the County:

- Pinole Energy Enhancement Rebate Program
- Bay Point / Pittsburg Energy Enhancement Pilot Program

4.0 Building Inventory Analysis

A comprehensive building inventory analysis is needed to enable the County to identify the specific building types that are less complex and costly to transition to all-electric and better understand the barriers to a cost-effective transition for all-electric buildings in the County.

The initial building inventory analysis conducted in this report focuses on residential buildings, which comprise a majority of building use types in unincorporated Contra Costa County. The analysis includes the number of residential structures, residential building vintages, and building square footage of these buildings. Maps were also created to highlight the existing makeup of home building types in the County's most impacted communities, referred to by the State as "disadvantaged communities" (DACs), as defined by Senate Bill (SB) 535. The specific impacted community maps can be found in Appendix A. Below is a summary analysis of the existing residential building landscape in unincorporated County.

For unincorporated Contra Costa County, there are approximately 51,715 residential structures, with over 90 percent identified as single-family homes. The remaining residences, which include smaller multifamily housing like duplexes, triplexes, and quadplexes alongside the typical 5+ unit multi-family buildings, account for less than 10

percent of the remaining housing stock. A detailed summary of this is provided in Table 4-1 below.

Table 4-1 Residential Building Types

Building Typologies	Total Buildings	Percentage of Buildings
Single-family Homes	47,970	93%
Small Multi-family (Duplex, Triplex, and Quadplex)	916	2%
5+ Multi-family, up to 3 floors	2,829	5%
Total Residential	51,715	100%

Figures 4-1, 4-2, and 4-3 below divide the age of homes built in unincorporated Contra Costa County into the following four categories: (1) pre-1978, (2) 1978-1991, (3) 1992-2010, and (4) 2011-present. These building age ranges were selected because they are often used in evaluating cost-effectiveness for existing energy efficiency programs operating throughout the State.

Figure 4-1

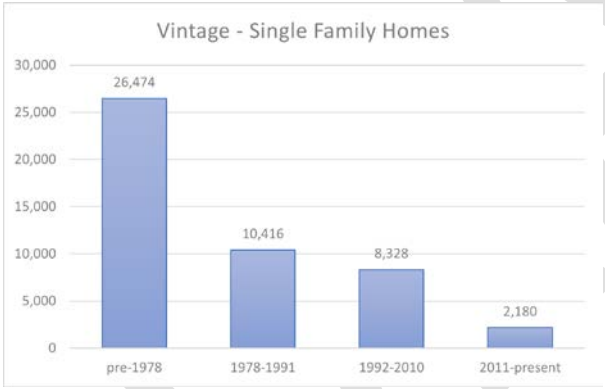


Figure 4-2

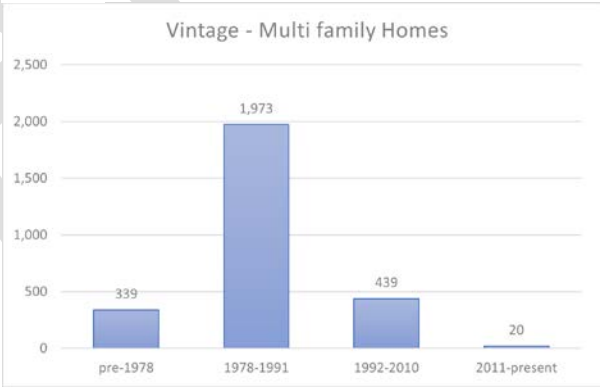
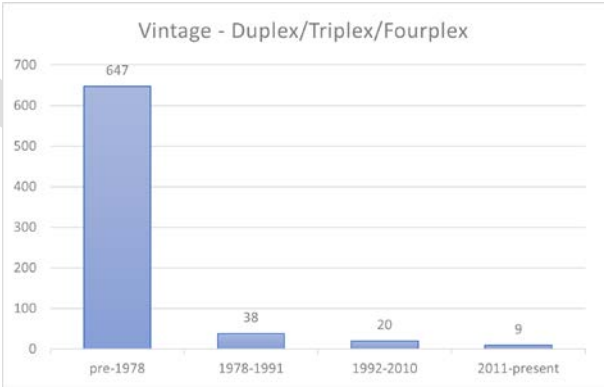


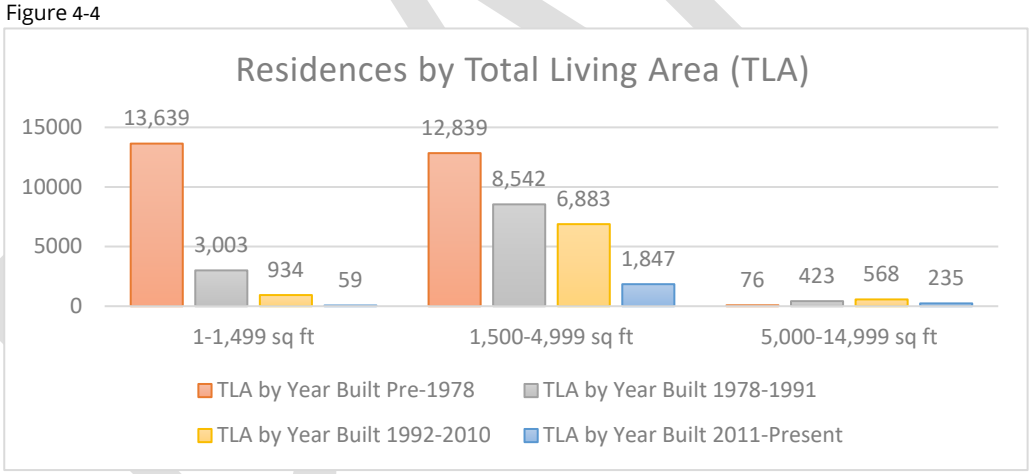
Figure 4-3



The year homes were built varies depending on housing type. For single-family homes, 56 percent were constructed prior to 1978, 22 percent between 1978-1991, 18 percent between 1992-2010, and only 5 percent in 2011 or later. Like single-family homes, the majority of duplexes, triplex, and quadplexes in the unincorporated County were constructed before 1978, accounting for 91 percent of all structures in this housing category. Of the multi-family housing in the unincorporated County, only 12 percent was built before 1978, with most of the multifamily housing, 71 percent, being built between 1978-1991. Multi-family homes built between 1992-2010 account for roughly 6 percent and homes built after 2010 account for less than 1 percent.

Another criterion used in this preliminary building inventory is the home's square footage, or total living area (TLA). Figure 4-4 below shows the breakdown of single-family homes by the TLA as well as when the homes were built and how many were constructed. For homes that were built prior to 1978, 52 percent are 1,500 sq ft or less and 48 percent are between 1,500 sq ft and 4,999 sq ft. Homes built post-1978 generally fall in the 1,500 – 4,999 sq ft category with homes of this size built between 1978-1991 at 71 percent, homes built between 1992-2010 representing 82 percent, and homes built after 2011 representing 86 percent.

Figure 4-4



The year, size, and type of homes built are all important factors in determining an approach to what types of homes should be targeted first for conversion to all-electric. These factors help with understanding what the building requirements are based on the age of the home, the expected electrical panel size and needs for upgrading if the home were to be made all-electric, as well as other barriers for certain building ages that may make it difficult for specific home configurations to make an all-electric transition. Additional analysis is needed to determine what building configurations are best suited for a cost-effective all-electric retrofit. A more detailed building inventory will also need to be

conducted for other building types (i.e., commercial, and industrial buildings). This is especially important for specific impacted communities, such as North Richmond, Bay Point, Pacheco, Rodeo, and Vine Hill.

5.0 Cost Analysis

A key component in determining the feasibility of transitioning existing buildings to all-electric is cost. There are various factors that impact cost, such as the cost of the new equipment, operational costs, and other unique factors.

Since the mid-1900s, domestic appliances have been commonplace in homes. These appliances include water heaters, gas furnaces, clothes washers, clothes dryers, and cooking stoves. Historically, both gas and electricity have been used as a fuel source for home appliances with some appliances, such as a gas furnace, requiring both to operate. However, in recent years, as climate change awareness has increased and energy efficiency and cost savings have become more important to residents, more options for all-electric appliances have become available. To adequately prepare for this transition, an in-depth cost analysis specific to the County's geographic region is needed. This will work to inform the County on what resources may be needed or could be provided to better support a cost-effective all-electric transition that retrofits existing buildings and facilities to reduce energy use for conversion to low-carbon or carbon-neutral fuels. Specific information is needed on the cost differences between new gas and new electric appliances, the motivation of homeowners to stay with gas appliances or embrace all-electric appliances, and how incentive programs impact the cost of this transition.

Capital cost and operating costs of appliances also impact the overall cost of transitioning existing buildings to all-electric. Operating costs are influenced by utility rates, the efficiency of the appliance(s), heating and cooling loads, and resident behavior. Conducting a comparative analysis on the utility rates for gas versus electricity (including time-of-use rate programs) and the efficiency of the appliances would allow a better understanding of the benefits of all-electric buildings. Insufficient building insulation and inefficient appliances can also make it more costly to operate due to the space not retaining the desired temperature as well as resulting in more frequent heating and cooling appliance use.

Capital cost considerations that are specific to transitioning a building to be all-electric are the home's wiring configuration, the capacity of the electrical panel and the addition of solar panels and battery storage. Though not all homes will require an upgraded electrical panel and wiring, most will likely need to be replaced because most single-family homes in the unincorporated areas of the County were constructed prior to 1978, when the building

code was first adopted. The cost of needing a panel upgrade is expected to be a substantial barrier for transitioning buildings to be all-electric. Solar panels and battery storage present a different challenge because these additions are not required for a home to transition to all-electric. However, when paired with all-electric appliances, solar panels and battery storage result in higher energy cost savings. Like electrical panel and wiring upgrades, there are few incentives for solar and most of the available incentives are financing programs, which are less accessible to residents of impacted communities.

To better understand how all these variables impact the cost of transitioning a home to be all-electric, a comprehensive study will need to be conducted. A cost study will also be needed for other types of buildings, such as commercial and industrial.

6.0 Funding and Financing Opportunities

Funding and financing opportunities will need to be leveraged to assist property owners with the cost of upgrading gas equipment to all-electric equipment. Understanding what funding opportunities are available to property owners, the incomes to which they are applicable, and the type of buildings that qualify are important considerations to determine where gaps in resources exist and where additional funding or resources need to be prioritized.

Below is an overview of the current rebate opportunities, tax credits, and financing mechanisms available for property owners located in unincorporated Contra Costa County that support or assist with converting buildings to be all-electric. Using these existing resources will be very important to determine where resources should be prioritized to meet the County's all-electric building(s) goals. The County may also determine if it wishes to develop its own financing program to assist its residents.

6.1 Rebate Opportunities

There are numerous rebate programs available that will reduce the cost of transitioning existing buildings to all-electric. These programs come from both the State and regional level and apply to a variety of appliance upgrades and energy efficient retrofits. This section includes an overview of the programs that are currently available.

Bay Area Regional Energy Network (BayREN)

BayREN is a network of local governments consisting of the nine Bay Area counties that work in collaboration to promote energy and water efficiency with the goal of reducing

greenhouse gas emissions. BayREN is funded by utility ratepayer funds through the CPUC and led by the Association of Bay Area Governments (ABAG).

BayREN's programs[32] provide the Bay Area with rebates, funding, technical assistance, education and more. BayREN manages 10 programs spanning four sectors: residential, cross-cutting, commercial and public sector.

TECH

The TECH Clean California[33] initiative works to accelerate the adoption of clean space and water heating technology across California homes in order to help California meet its goal of being carbon-neutral by 2045. TECH operates statewide and offers incentives for Heat Pump heating, ventilation, and air conditioning (HVAC) systems and can be layered with other incentive programs such as BayREN.

Self-Generation Incentive Program (SGIP)

The SGIP program[34] provides incentives for customer-side battery storage installation serving residential, small businesses, non-profit organizations, government agencies and educational institutions. The program is regulated by the CPUC and administered by the investor-owned utilities (IOUs) in California as well as the Center for Sustainable Energy (CSE), a non-profit organization. Since its creation in 2001, the program has evolved to include provisions that target low-income customers and disadvantaged communities as well as communities with an elevated risk of PSPS events due to wildfires. In April 2022, the program was expanded further to include incentives for heat pump water heater (HPWH) installations with half of the $40 million allocated to be reserved for low-income utility customers.[35]

MCE

MCE became California's first community choice aggregator (CCA) in 2010, procuring and providing electricity produced by renewable sources for the County of Marin and its jurisdictions. Since then, MCE has expanded to Napa County, parts of Sonoma County, and most of Contra Costa County, including 14 of the County's 19 jurisdictions as well as the unincorporated County[36]. In total, MCE provides service to over 540,000 customers with Contra Costa County accounting for the largest portion. In addition to serving as a clean energy provider, MCE offers a suite of customer programs to incentivize local

[32] www.bayren.org/how-we-work/our-programs
[33] www.techcleanca.com/
[34] www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/self-generation-incentive-program
[35] www.selfgenca.com/
[36] The City of Hercules has been approved for membership in MCE. The enrollment of Hercules is expected to occur in spring 2025, after completion of regulatory approvals by the California Public Utilities Commission.

renewable energy development, grow the energy economy, and support energy equity across its communities. The incentives offered through MCE include energy efficiency and electrification retrofits for residential and commercial properties, electric vehicles and charging, as well as workforce development programs. Below is a list of the current programs offered by MCE

Residential Programs

Home Energy Savings Program[37]: Free home energy assessment by a trained energy advisor for low-income households. The advisor recommends energy efficiency upgrades including attic insulation, duct sealing, pipe installation, and smart thermostats.

Multifamily Energy Savings Program[38]**:** Free comprehensive assessment and consultation for multifamily properties that have 5 or more units and offer affordable housing and/or is a deed-restricted property.[39] The assessment will identify opportunities for energy efficiency and electrification including HVAC, heat pumps, insulation, and window replacement.

Emergency Water Heater Incentive[40]*: Provides contractors with $1,500 to help cover the cost of installing and maintaining a temporary loaner water heater as part of the customer's permanent HPWH installation.*

Commercial and Industrial

Commercial Energy Efficiency Program[41]: Businesses that take service from MCE can receive free energy assessments and project specifications, rebates for a range of energy efficiency upgrades, start-to-finish project management and technical assistance, post-project quality assurance and financing assistance.

Strategic Energy Management (SEM) [42]*:* Provides businesses, municipalities, and multifamily properties (5 units or more) that are located within the MCE service area with an Energy Coach who will conduct a walk-through and assessment to learn current energy usage and help the customer reduce energy use through insights gained from custom-built energy models. The program goals are to help clients save from 3-15

[37] www.mcecleanenergy.org/home-savings/
[38] www.mcecleanenergy.org/multifamily-savings/
[39] Deed Restricted Property: A written agreement that accompanies the home's deed restricting the use or activities that may take place on the property. Oftentimes these restrictions are used to safeguard affordable housing by limiting any future sales of the home to income-eligible borrowers.
[40] www.mcecleanenergy.org/heat-pump-water-heater-incentive/
[41] www.mcecleanenergy.org/business-savings/
[42] www.mcecleanenergy.org/energy-management/

percent on energy use, provide incentives of $0.03/kWh and $0.25/therm saved, and provide additional incentives for achieving program milestones.

FLEXmarket[43]*:* Pays aggregators for the actual grid value of energy savings achieved and commercial and residential projects. Aggregators can receive a 20 percent upfront cash payment of the forecasted value on energy efficiency projects to limit risk and preserve cashflow. This program does not provide direct incentives for all-electric appliances.

Electric Vehicle and Charging

MCE EV Rebate Program[44]*:* Offers a $3,500 instant rebate for new and leased EVs and $2,000 for pre-owned EVs. In addition, this program will provide application support for additional rebates through the Clean Vehicle Rebate Project (CVRP) offered through the state. This program is limited to applicants that are enrolled in an existing low-income assistance program (see MCE website for list of programs) or for applicants that meet the income requirements established by MCE.

MCE EV Charging and Multifamily Properties[45]*:* Provides incentives for multifamily property owners for EV charger installation. This program also provides education materials and technical assistance and can be stacked with rebates from other programs.

MCE Sync[46]*:* An EV smart charging app that helps users automate EV charging to use the least expensive and cleanest energy available. In addition to EV charging automation and scheduling, this program provides up to $10 cash back per month for charging during "low-carbon events".

Workforce

Workforce Opportunities for Contractors and Pathways for Job Seekers[47]*:* MCE provides free electrification workshops and partners with local workforce development programs to match pre-qualified job seekers with contractors that work on electrification projects and need staff. Job seekers are provided free, comprehensive job training as well as paid, on-the-job experience with a vetted contractor. This allows job seekers to gain green job experience at no cost so that they have an edge on future employment opportunities.

[43] www.mcecleanenergy.org/flexmarket/
[44] www.mcecleanenergy.org/ev-rebate/
[45] www.mcecleanenergy.org/ev-charging/
[46] www.mcecleanenergy.org/mce-sync/
[47] www.mcecleanenergy.org/contractors/#gwp

Green Workforce Pathways (GWP) Program[48]: This program connects job seekers with career opportunities in the electrification industry. MCE works with local organizations to help develop training programs, offer specialized energy efficiency courses, and provide career readiness materials.

Pacific Gas and Electric (PG&E)

PG&E is the investor-owned utility that provides gas and electricity to the San Francisco Bay Area as well as a large portion of northern and central California.

Energy Savings Assistance (ESA) Program[49]*:* Free energy efficiency upgrades and appliance replacement for low-income homeowners and renters living in a home that is at least 5 years old.

Generator and Battery Rebate Program[50]*:* In response to the increasing frequency of PSPS events, PG&E has started offering a $300 rebate for the purchase of a qualifying product (battery or generator) to prepare for power outages.

Portable Battery Program[51]*:* In response to the increasing frequency of PSPS events, PG&E provides backup batteries for customers who rely on medical devices.

California Golden State Rebate Program[52]*:* The ratepayer-funded California Golden State Rebate program is authorized by the CPUC and supported by the major IOUs in California, including PG&E. The program offers rebates (via coupons) for HPWH and room air conditioner installations.

[48] https://mcecleanenergy.org/building-the-workforce-for-our-clean-energy-future/
[49] www.pge.com/en/save-energy-and-money/energy-saving-programs.html
[50] www.pge.com/en/outages-and-safety/outage-preparedness-and-support/general-outage-resources/generator-and-battery-rebate-program.html
[51] www.pge.com/en/account/billing-and-assistance/financial-assistance/portable-battery-program.html
[52] www.goldenstaterebates.clearesult.com/

6.2 Inflation Reduction Act Rebates and Tax Credits[53]

The United States Government passed the Inflation Reduction Act in 2022 to curb inflation and as one of the strategies, the legislation promotes clean energy through rebates for energy efficiency retrofits as well as solar and EV charger installation. The following tax credits can be utilized by both single-family homeowners and multi-family property owners.

Measure	Rebate	Tax Credit
HP HVAC	up to $8,000	30% of cost up to $2,000
HPWH	up to $1,750	30% of cost up to $2,000
HP Clothes Dryer	up to $840	N/A
Electric Stove	up to $840	N/A
Building Weatherization	up to $1,600	30% of cost up to $1,200
Electrical Panel Upgrade	up to $4,000	30% of cost up to $600
Electrical Wiring	up to $2,500	N/A
Home Energy Audit	N/A	30% of cost up to $150
Battery Storage (2022-2023)	N/A	30% of total cost
Solar Energy Systems (2022-2023)	N/A	30% of total cost

6.3 Financing Options

For many property owners, particularly those located in Impacted Communities, it will be a substantial financial burden to make any energy efficiency or all-electric building retrofits. A transition to all-electric in all existing buildings will need to leverage existing financing options as well as come up with other, more creative financing options. Beyond the traditional lending options (i.e., home equity loan or personal loan), below are other financing options available for property owners and businesses to transition their gas appliances to all-electric.

[53] www.rewiringamerica.org/app/ira-calculator

Tariff On-Bill Financing (TOBF)[54]: TOBF, or Inclusive financing, allows utilities to finance clean energy upgrades for low- and middle-income households without dealing with credit or income level issues. TOBF is similar to traditional on-bill financing except it does not require the loan recipient to be approved by the utility or a third-party financier for the loan. This enables utilities to provide capital for electrification upgrades and then recoup their cost through a tariff added to the customer's utility bill. The tariff charge is tied to the service address as well as the upgrade made.

On-Bill Financing (Traditional)[55]: On-bill financing of retrofits enables non-residential customers to obtain loans from their utility provider to fund the upfront costs of electrification and weatherization projects. The customer pays the loan back using cost savings that result from the project. Once the loan is repaid, subsequent savings go directly to the customer. PG&E offers on-bill financing with loans ranging between $5,000 and $4,000,000 through its interest free loan program. PG&E also offers loans smaller than $5,000 through the GoGreen Business Financing Program.[56]

GoGreen Home Energy Financing (GoGreen Home)[57]: The GoGreen Home program, formerly known as the Residential Energy Efficiency Loan (REEL) program, is a statewide loan program that provides incentives for homeowners to make home energy efficiency improvements by offering a credit enhancement to mitigate the risk of default. These credit enhancements essentially improve the credit risk of a borrower which in turn improves the terms for repaying the debt. This allows participating lenders to offer lower rates, higher loan amounts, longer payback periods, and a broader base of borrowers. The program is available to single-family homes, condos, townhomes, manufactured homes and duplexes, triplexes, and fourplexes. In early 2022, the Go Green Home program partnered with the TECH initiative to expand the equipment and associated costs that are eligible for credit enhancements through GoGreen Homes based on fuel source. This partnership results in a streamlined pathway to home electrification for California residents.

GoGreen Multifamily Energy Financing (GoGreen Multifamily)[58]: The GoGreen Multifamily program provides financing options to eligible multifamily property owners for energy efficiency upgrades. Financing types include leasing, equipment financing agreements, and energy service agreements for existing properties. Eligibility is contingent on the property having five or more units with at least 50 percent of the units categorized as income restricted, the property must have a minimum of five years

[54] www.aceee.org/toolkit/2017/02/bill-energy-efficiency
[55] www.pge.com/pge_global/common/pdfs/save-energy-money/financing/energy-efficiency-financing/handbook_obf.pdf
[56] www.gogreenfinancing.com/smallbusiness
[57] www.gogreenfinancing.com/residential
[58] www.gogreenfinancing.com/multifamily

remaining on the affordability covenant when qualified, and the property must receive a gas or electricity bill from PG&E, or another participating utility.

Property Assessed Clean Energy (PACE)[59]: PACE programs are financing mechanisms designed for residential and commercial properties to fund energy efficiency, electrification, and renewable energy improvements. This includes, but is not limited to, replacement and/or installation of HVAC system, solar panels, EV charging, battery storage, as well as projects that improve seismic and wildfire resiliency. PACE is unique from other financing mechanisms in that a PACE loan is tied to the property rather than the individual. This means that when a home is purchased with an active PACE loan tied to it, the new property owner is responsible for the loan payments. Contra Costa County has approved four PACE financing providers to work with property owners in unincorporated areas of the County.

Refundable Transfer Tax: A refundable transfer tax for converting to all-electric is a financing mechanism that levies a refundable tax on the sale of a home for which the home buyer can then be reimbursed upon the completion of a partial or full transition to all-electric. Should the buyer decide not to make any upgrades that bring it closer to or fully transition the home to all-electric, the home buyer will forfeit the tax refund.

Restructuring Permit Fees: The County collects permit fees for new construction, additions, alterations, remodels, for any conversion or replacement of an electrical or gas system, and more. An option would be to reduce the permit fees associated with retrofits that improve energy efficiency and/or result in the replacement of a gas appliance with an electric equivalent.

6.4 Existing Funding Models to Explore

Richmond Community Foundation (RCF) Model[60]: In partnership with the City of Richmond, the Richmond Community Foundation has developed a solution for addressing blighted properties and barriers to home ownership through social impact bonds from private capital to fund the rehabilitation of abandoned properties. These properties are then advertised and sold to first time home buyers. Though this model doesn't directly address all-electric building retrofits, it does provide a potential framework for other jurisdictions to adopt and modify so that the homes that are rehabilitated are outfitted to be all-electric. Identifying the potential impact of a program of this nature will require an analysis to determine the frequency of property types this program reaches in unincorporated Contra Costa County. This includes

[59] www.energy.gov/scep/slsc/property-assessed-clean-energy-programs
[60] www.rcfconnects.org/community-initiatives/restoring-neighborhoods/richmond-housing-renovation-program/

properties that are abandoned or extremely dilapidated, properties that have unaddressed code violations or significant tax delinquencies, and properties that have defaulted on the mortgage. Exploring the feasibility of implementing this financing model or others that are similar will be important in supporting the County's all-electric building(s) goals.

7.0 Centering Equity

Impacted communities exist throughout the County, however, the majority of the impacted communities are concentrated along the Northern Waterfront and in East and West County. In many cases, these communities consist of minority groups that have been historically marginalized including Black, Latino/a/x, Asian, and Indigenous and Communities of Color (BIPOC). Additionally, and oftentimes concurrently, the residents living in these communities have limited income, live with a disability, are non-English speaking, elderly, or part of the LGBTQ community.

The effort needed to make our existing buildings be all-electric in unincorporated Contra Costa County we will need to consider equity in the process. Transitioning buildings to all-electric in these communities presents an invaluable opportunity to improve on the inequities around housing that persist in the County today. To address equity in this roadmap we we will use the Greenlining Institute's definition of equity, which states that equity is "increasing access to power, redistributing and providing additional resources, and eliminating barriers to opportunitity, in order to empower low-income communities of color to thrive and reach full potential". This means that those living in impacted communities should have an equal opportunity to experience the benefits of transitioning to all-electric such as health, comfort, improved resilience, and economic benefits.

Communities in the County have varying needs and backgrounds and it will be important to develop strategies and policies that are targeted for these varying needs. Exploring policies that prevent resident displacement, particularly when home improvments are made. This approach will consider the concept of Targeted Universalism in the strategy and policy planning around this transition. Targeted Universalism, as outlined in the Haas Institute *Primer on Targeted Universalism*[61], seeks to establish a general policy goal while also identifying strategies to specifically address impacted communities. This serves to ensure that both impacted communities and the greater population stand to benefit from the established policy.

[61] www.belonging.berkeley.edu/targeted-universalism

The Greenlining Institute's Equitable Building Electrification Framework[62] outlined below, serves as a framework to be used to engage the community on the County's all-electric buildings approach. The Greenlining framework consists of five steps that are outlined to serve as a guide for jurisdictions, such as the County, to ensure that community engagement is equitable and supports the overall goal.

The Greenlining Framework

1. **Step 1: Assess the Communities' Needs.**
   This should include understanding the barriers preventing community members from transitioning their homes to all-electric as well as the residents' knowledge around building electrification.

2. **Step 2: Establish Community-Led Decision-Making.**
   Input and engagement from the community serves to strengthen the overall program design quality by ensuring local buy-in and investment, and deliver tangible local benefits rooted in the lived experiences of everyday people. Partner with community-based organizations to develop a decision-making process that ensures that decisions are based on community needs and priorities.

3. **Step 3: Develop Metrics and a Plan for Tracking.**
   Metrics should include both clean energy benefits like greenhouse gas reductions and community benefits such as local hires and residents' ability to pay their energy bills without sacrificing other essential expenses.

4. **Step 4: Ensure Funding and Program Leveraging.**
   Current low-income energy programs often fail to deliver maximum benefits to all qualifying households due to short and unpredictable funding cycles, poor program design that inadequately reaches qualifying customers, or lack of coordination and integration with complementary programs.

5. **Step 5: Improve Outcomes.**
   Using the tracking and metrics plan described above, ensure that there is a continuous feedback loop to improve current and future programs' reach and impact in Environmental and Social Justice Communities. Consider adjustments to ensure the program reaches the people it seeks to reach and delivers the intended benefits.

[62] www.greenlining.org/publications/equitable-building-electrification-a-framework-for-powering-resilient-communities/

7.1 Community Engagement Approach

Using the Greenlining Framework as a guide, the County should develop a strategy for working with communities that build trust with all stakeholders who may be involved in an all-electric transition. Community engagement efforts should be transparent and place emphasis on co-creation throughout the process.

Preparing for Community Engagement

Understanding Community Level Data: Prior to working with the community, staff will need to develop an understanding of the composition and geographic distribution of all communities. This will include data on socio-economic demographics as well as burdens faced by communities such as air quality, climate resilience, and energy costs.

Determine Key Issues: Through activities such as literature review and policy analysis, a building inventory assessment, meeting with technical experts and community members, and consultation of the specific community profiles developed in the County's Envision 2040 General Plan, the County can build its understanding of the most pressing issues communities face as they work to make the existing building stock all-electric.

Establish Relationships with Community-Based Organizations (CBOs): The role of CBOs in engaging the community cannot be understated. CBOs will provide an invaluable perspective about the communities with which they work. CBOs can help convey the financial and economic needs, the social and human assets, and the values of the community, providing an understanding of the power dynamics within the community.

Consider Establishing a Steering Committee: A steering committee composed of members who understand the function and capabilities of the community engagement process can help ensure the process continuously leads to positive outcomes.

Work With Community Stakeholders Prior to Engagement Process: It is important that the all-electric building strategy is developed in collaboration with the community in order to address strategy development. This requires working with stakeholders to establish a mutual understanding and metrics for assessing goals and potential strategies and establishing recommendations. Community engagement should prioritize working with community leaders to define as many relevant community partners and stakeholders as possible to ensure that all community groups, especially impacted groups, have a voice in planning the strategy.

Proposed Community Engagement Process

Engage the Community through CBOs**:** The initial stages of community engagement will focus on educating the public on the County plans around all-electric buildings for existing buildings. This would include an overview of the benefits of having buildings be all-electric. CBOs would serve as a bridge between local government and community groups and members who are best positioned to provide input, feedback, or assist with the initial outreach efforts in coordination with the County. CBOs can set up meetings with community leaders and other groups, especially those representing impacted communities, to build trust. Because the County will be requesting feedback from community members, providing compensation for their time through use of stipends is critical to the success of the effort. County staff should work to identify funding mechanisms to cover this cost, either through grant or County funding.

These meetings can also serve as a place for feedback on the County's goal to reduce greenhouse gas emissions from existing buildings as well as provide direction on how to reach the broader community at-large. County staff should also explore partnerships with all other County departments in developing the outreach strategy, such as the Office of Racial Equity and Social Justice, the County Health Department, the Employment and Human Services Department and Department of Conservation and Development.

As the CBOs work with the County on initial outreach to communities, the County will connect with other stakeholders. These should include, and are not limited to, unions such as the Electrical Workers Union (IBEW Local 302) and the Plumbers and Steamfitters Union (Local 159), environmental organizations like 350 Contra Costa, the East Contra Costa Community Alliance and Rising Sun, community colleges, faith organizations, and other similar groups.

Acknowledge and Understand Community Feedback: As communities become informed about the benefits of all-electric buildings and trust is established between the communities and the County, feedback would be gathered from the community on the opinions and concerns related to this transition. In addition to receiving community feedback, the County will look to explore other options for this type of transition, including the exploration of alternative pathways for making buildings all-electric.

To help bolster widespread community comprehension and increase community participation, the County will look at ways to host educational workshops and use focus groups to help inform communities on electrification technology, available incentives, and the health and safety benefits of having buildings be all-electric.

County and Community Co-Create Draft Strategy: A co-created draft strategy should be developed for strategically engaging with specific community groups on the barriers

and other considerations that need to be contemplated in working to transition buildings in their community to be all-electric.

7.2 Workforce Development

Transitioning our buildings to be all-electric in the County is an opportunity to increase the number of high-quality jobs that pay a living wage. Making buildings all-electric will require one or more specialized tasks such as building weatherization, replacement of appliances, electrical panel and wiring upgrades, energy efficiency upgrades, or battery backup and solar photovoltaic (PV) power. This transition can lead to the creation of more high-quality job opportunities which will in turn necessitate a trained workforce. It will also require a focus on maintaining the existing contractor pool by continuing to provide resources and training through programs like BayREN.

To address the eventual need for more trained contractors, coordination will be needed with the Workforce Development Board of Contra Costa County (WDBCCC) and the Contra Costa County Department of Conservation and Development's Economic Development team on outreach to local trade schools, leveraging existing relationships with community colleges that provide information on pathways to becoming trained to work on transitioning buildings to be all-electric. Coordinating this effort should also be integrated into the Economic Development team's work around the County's Just Transition to an economy that is less reliant on fossil fuels.

8.0 Facilitating an Equitable Transition

Moving to all-electric buildings includes a number of issues that must be resolved if the transition is going to be equitable for all County residents. Those issues are described below.

Electrical Panel Capacity and Wiring: Electrical panel capacity can be a significant barrier to cost-effective all-electric buildings. Existing residences in unincorporated areas vary widely by vintage and oftentimes lack sufficient capacity to accommodate newer all-electric appliances. Homes of average size built in the 1980s are typically equipped with 200-amp service, the minimum service level currently required for new home construction. Whereas homes built prior to the 1980s may be outfitted with any number of panel sizes, such as 100-amp or 60-amp service, depending on the year the home was built or if the home has had any significant upgrades. As shown in this report, the housing stock in the unincorporated county, which consists of 93 percent single-family homes and consists

primarily of homes that were built prior to 1978. This indicates that over half of the existing single-family homes could require panel upgrades.

Wiring is also a factor that presents a challenge for transitioning buildings to be all-electric. When designing electrical systems for homes, 240-V outlets are often only located where they'll be needed; historically limited to clothes dryers and in some cases for electric stoves. This has resulted in the majority of homes being insufficiently equipped to successfully transition homes to be all-electric. For this transition, many homes will need to have rewiring work completed to accommodate the newer appliances that require 240-V outlets. This will increase the cost burden. As the County explores pathways for a cost-effective all-electric building(s) transition, high priority must be given to mitigate the challenges around electrical panel and wiring upgrades.

The cost of an electric panel upgrade and associated rewiring may be the most significant barrier to making homes all-electric in the County. Determining how best to upgrade an electric panel that minimizes the impact on the overall electric grid capacity needs to be considered in evaluating the best approach to transitioning buildings to be all-electric.

On-site Solar Photovoltaic (PV) and Battery Storage: Barriers for installing solar PV and battery storage impact low income and impacted communities more than the broader community. The largest barrier is cost, as solar PV requires high upfront cost if paying out of pocket or a relatively high credit score to access financing options. Furthermore, there is a lack of incentives available for low-income and impacted communities for on-site solar PV and battery storage. Another common barrier is that low-income and impacted communities often face issues around site suitability, which also impacts cost. Roofs oftentimes require repair or replacement before solar PV can be installed and the electrical wiring and panel of a home may need to be upgraded, as described above. In the case of renter-occupied properties, renters lack the decision-making authority to initiate investments in solar PV and battery storage.

To overcome these barriers the County will need to explore creative solutions. One approach and promising example of a creative solution is the EnergyScore risk indicator [63] developed by Stanford University, the Massachusetts Institute of Technology (MIT), and a community solar company, Solstice, designed to provide an alternative metric to predict a customer's future payment behavior more accurately than the FICO credit score, which is the current standard. Rather than focusing on a customer's overall credit history, EnergyScore utilizes the customer's utility bill payment history to gauge future payment history, thereby ensuring that potential customers with lower FICO scores are not automatically disqualified from financing. In addition to removing the barriers to those without exemplary credit scores, this model also could enable utility companies to

[63] www.globalenergyinstitute.org/international-energy-security-risk-index

consolidate the utility bill with community solar repayment so that the customer would only receive one bill and would be less likely to default on the financing payments for solar PV.

Another option is facilitating community-scale solar projects with battery storage, rather than projects on individual rooftops. Community solar projects are defined by the U.S. Department of Energy as:

> ...any solar project or purchasing program, within a geographic area, in which the benefits flow to multiple customers such as individuals, businesses, nonprofits, and other groups. In most cases, customers benefit from energy generated by solar panels at an off-site array.
>
> Community solar customers typically subscribe to—or in some cases own—a portion of the energy generated by a solar array and receive an electric bill credit for electricity generated by their share of the community solar system. Community solar can be a great option for people who are unable to install solar panels on their roofs because they are renters, can't afford solar, or because their roofs or electrical systems aren't suited to solar. [64]

Community solar projects, paired with battery storage for backup, may be a more efficient and cost-effective option for providing solar energy in unincorporated areas of the County.

Displacement and Tenant/Landlord Constraints: As the County creates a strategy to transition existing buildings to all-electric, it is important to ensure that retrofits don't displace renters or homeowners. Any strategy or policy addressing all-electric conversion of existing buildings should develop strategies to support housing preservation and tenant protections. Property owners of single family and multifamily buildings encounter numerous obstacles when transitioning buildings to be all-electric. These obstacles are highlighted in the American Council for an Energy-Efficient Economy's (ACEEE), Energy Equity for Renters Toolkit[65], and include,

- Lack of awareness or knowledge
- Lack of resources
- Deferred Maintenance
- Split Incentives

Addressing these barriers is paramount in the overall effort to transition our existing building stock to all-electric. Staff should explore strategies for addressing the

[64] https://www.energy.gov/eere/solar/community-solar-basics
[65] www.aceee.org/toolkit/2022/11/energy-equity-renters-toolkit

tenant/landlord dilemma that are being deployed in other jurisdictions to determine their feasibility as a strategy in Contra Costa County.

Ensuring Energy Reliability: With the increase of electric appliances in homes and businesses, it is anticipated that communities in Contra Costa County will become more dependent on the electrical grid. The California electrical grid, operated by the California Independent System Operator (CALISO), delivers over 239 million megawatt hours (MWh) per year to approximately 30 million consumers.[66] The grid operates under a delicate balance. Because electricity is difficult to store, the grid must maintain a balance that ensures that electricity consumption matches electricity production as closely as possible. Increasing the number of all-electric homes will strain the grid while utility companies and energy providers work to build capacity. For this reason, communities throughout the County and beyond will need to take steps to make homes more energy efficient to help to reduce power disruptions.

As Contra Costa County pushes forward to transition its existing building stock to all-electric to meet its CAAP target goal of carbon neutrality by 2045, the County must take actions to better insulate itself from the potential of an unreliable grid. These actions will need to focus on multiple areas including minimizing demand on the grid from our building stock to the greatest extent feasible, enhancing the energy resilience of the building stock, developing policies and programs that support grid stability and increase renewable generation, as well as partnering with regulatory agencies, utility companies, and other government agencies at the local, regional, and state level.

Minimizing demand on the grid from our building stock is necessary for maintaining grid stability and energy reliability to residents in the County. As more buildings transition to all-electric, energy efficiency, building envelope improvements, and load management will become increasingly important strategies. Homes transitioning to all-electric should be outfitted with high-efficiency appliances and building envelope improvements such as wall and attic insulation, multi-pane windows, and air sealing to minimize energy loss. Residents will also need to shift energy use habits to avoid drawing from the electrical grid during peak demand periods which generally run from 4:00 p.m. to 9:00 p.m. and shift the use of operating high energy use appliances such as clothes dryers and electric vehicle charging during off-peak times.

Local utility companies and others play an important role in shifting consumer behavior by offering demand response programs like the Power Saver Rewards Program offered by PG&E, which provides consumers with credit to their bills for minimizing energy

[66] www.caiso.com/Documents/CaliforniaISO-GeneralCompanyBrochure.pdf

consumption during peak demand periods or the SmartAC device that remotely shifts air conditioning use to off-peak times to reduce strain on the grid.[67]

Building resilience through distributed energy resources (DER) is another strategy for maintaining overall grid stability and improving energy reliability for residents. DER consists of small, modular, energy generation and storage technologies that provide electric capacity such as solar panels, battery storage, and electric vehicles.[68] Installing solar panels on homes reduces the demand on the grid during peak times and when paired with battery storage provides the added benefit of allowing homes to maintain power, even during power loss events due to extreme heat or weather. DER can also help to build out the infrastructure for Virtual Power Plants (VPP) which consists of a collection of small-scale energy resources that, when aggregated together and coordinated with grid operations, can provide added grid reliability.[69]

Developing programs to support energy efficiency and DER will be necessary to realize the full benefit of these strategies. Contra Costa County offers several programs that help support grid reliability and energy resilience. The State funded weatherization program offers free energy efficiency improvements to low-income renters and property owners. The County also partners with BayREN to promote energy efficiency through rebates and no-cost technical assistance for single-family and multifamily properties. MCE, the County's community choice energy provider, offers similar incentive programs for properties in its service area which includes much of Contra Costa County along with parts of Marin, Napa, and Solano Counties. These programs will help residents in the County to improve efficiency in their homes, however, this alone will not ensure grid reliability as the building stock increasingly becomes more electric. The state will need to continue to support local governments by establishing policies and programs that promote continued energy efficiency and DER retrofits in our building stock. In 2022, California established the Community Energy Resilience Investment (CERI) program to fund projects that bolster grid reliability. One of the CERI program goals will be to reduce the frequency and duration of power outages as well as strengthen communities' ability to function during these outages.[70] The program is currently being developed by the CEC and anticipates releasing its first Grant Funding Opportunity (GFO) in early 2024.

As Contra Costa County and other jurisdictions across the State continue to promote transitioning to all-electric in their communities, ensuring that the grid has the capacity to handle the added demand is paramount. At the local level, this will require local

[67] www.pge.com/en_US/residential/save-energy-money/savings-solutions-and-rebates/demand-response/demand-response.page
[68] www.nrel.gov/docs/fy02osti/31570.pdf
[69] www.rmi.org/clean-energy-101-virtual-power-plants/
[70] www.energy.ca.gov/programs-and-topics/programs/community-energy-resilience-investment-ceri-program

governments to develop and implement policies and programs that further support energy efficiency and DER upgrades in our communities. However, ensuring a reliable grid goes beyond local governments. The state must act as a leader in this effort by continuing to establish higher emission reduction targets while also developing policies and programs that help to mitigate the challenges involved, notably maintaining grid reliability.

9.0 Policy Options and Other Strategies

There are many local policies and approaches that other jurisdictions have implemented to make or encourage buildings to transition to all-electric. Most policy actions taken include the adoption of a local ordinance to establish mandates for all-electric retrofits based on a specific action being taken by a property owner. This includes:

- Time of Major Renovation – Requires homeowners to replace gas appliances with the electric equivalent when performing major home renovations.
- Time of Burnout – Requires homeowners to replace end-of-life gas appliances with the electric equivalent.
- Point of Sale – Requires home sellers and/or buyers to retrofit the home to be all-electric at the time of sale.

Ordinances with these types of actions have been implemented in other jurisdictions within the San Francisco Bay Area. The most widely utilized policy adopted is an ordinance that requires gas appliances/equipment to be replaced with all-electric equipment at the time of major renovation, which has been successfully adopted in numerous counties and cities in the region. This includes the City and County of San Francisco, the County of Marin, the City of Alameda, and the City of Palo Alto.

While these policy actions have been successful with other jurisdictions, it is not recommended that they are considered due to a decision from the U.S. Court of Appeals 9th Circuit in January 2024, that precludes cities and counties from adopting ordinances that prohibit the installation of gas plumbing in buildings. Some jurisdictions have responded with implementing more stringent energy efficient building code requirements instead of mandating that gas appliances be replaced with all-electric appliances. However, similar to what the County has done, this approach is more widely used only for new construction projects.

Neighborhood-wide gas infrastructure decommissioning is a strategy being looked at by local governments with their local utility. The process involves identifying sections of the gas distribution system that are more cost-effective to remove from use. These buildings would be converted to all-electric. The primary advantage of this approach is that it is the

most efficient method for transitioning homes to all-electric and in certain circumstances can be very cost-effective for the utility to implement. Rather than continuing to maintain the gas pipeline system, the utility can instead invest those funds in other ways to make the grid more reliable.

Coordination with the County's local utility, PG&E, and CCA, MCE, will be necessary to leverage all available resources to develop an approach within the County to implement neighborhood-wide gas infrastructure decommissioning. Incentivizing Incremental improvements to reduce reliance on gas, such as changing out specific appliances when they wear out, is also likely to be a more realistic option for removing gas infrastructure from existing buildings. Additional research and coordination will be needed to determine the best feasible approaches for the County.

10.0 Next Steps

Transitioning the existing building stock to be all-electric is a complex issue. Most of the approaches used only address a portion of the issue. To meet our CAAP goals, the County will need to implement additional initiatives that both align and compliment state and regional efforts. To help support this work, below are recommended actions for staff to either explore or implement to support the use of low-carbon or carbon-free appliances for existing buildings.

10.1 Action Items and Recommendations

Regional and State Collaboration

- Work with the County's Legislation Committee and Board of Supervisors to develop a policy framework to more routinely engage with State regulatory agencies, such as the CEC, CPUC, and CARB, to provide input on activities and actions that help support all-electric building initiatives, or other low-carbon or carbon-free appliances for existing buildings.

- Work with energy providers, such as PG&E, MCE, or other regulatory agencies, such as the CEC and CPUC, to obtain information on the gas infrastructure throughout the County to determine cost-effective opportunities where gas infrastructure could be decommissioned. Analyze which community areas may have the best opportunity for cost-effective gas infrastructure decommissioning and explore a

County-wide strategy for decommissioning gas infrastructure in certain parts of the County, if feasible.

- Continue to track opportunities that assist property owners and renters in paying for retrofits associated with transitioning buildings to all-electric. These opportunities could include incentive programs that offer rebates or no-cost retrofits as well as financing options that are accessible to those of all income levels. In addition, County staff should track statewide and regional plans that address building decarbonization so that future planning efforts are aligned with these plans.

Additional Analysis

- Expand on the preliminary building inventory. This should include a more comprehensive inventory that accurately reflects the distribution of homes by type and vintage so that these can be mapped on a more specific community scale. County staff should also work to gain a better understanding of the appliances that currently exist in homes by analyzing the permits issued for appliance replacement. For appliances that do not require a permit for replacement, such as stoves or washers and dryers, staff should seek other ways to identify whether these are gas fueled in homes or have already been swapped for the all-electric equivalent. These actions will help enable County staff to better prioritize and more accurately target specific areas based on home configuration and financial need. Explore the feasibility of this work being completed in-house or determine if a consultant is needed to assist with this work.

- Expand on the preliminary cost analysis. This roadmap presents a high-level overview of the costs associated with transitioning existing buildings to all-electric. Further research is needed on the direct and indirect costs for this all-electric transition which includes an analysis and cost breakdown of the various options for each appliance type and the operational costs around operating all-electric appliances. From this analysis, County staff could provide a policy or County specific program for consideration to encourage more buildings to operate solely using electricity.

Outreach and Engagement

- Develop a thoughtful community outreach and engagement strategy that centers equity in the process. Outreach and engagement should educate residents about the benefits of all-electric buildings. Leverage regional programs like BayREN for outreach and education, as appropriate. The preliminary work done in this roadmap should serve as a framework for engaging with impacted communities throughout the County.

- Work with the County's Economic Development team on outreach to local trade schools, leveraging existing relationships with community colleges that provides information on pathways to becoming trained to work on transitioning buildings to be all-electric.

Other Actions

- Further explore the policy options outlined in this document to support making buildings become all-electric. This should include, time of sale, time of replacement due to burnout OR due to renovation, building performance standards, and neighborhood-wide gas pruning (gas decommissioning).

- To support the transition of making buildings become all-electric, work to develop a strategy to address the tenant/landlord rental property constraints that commonly prevent property owners from making building improvements.

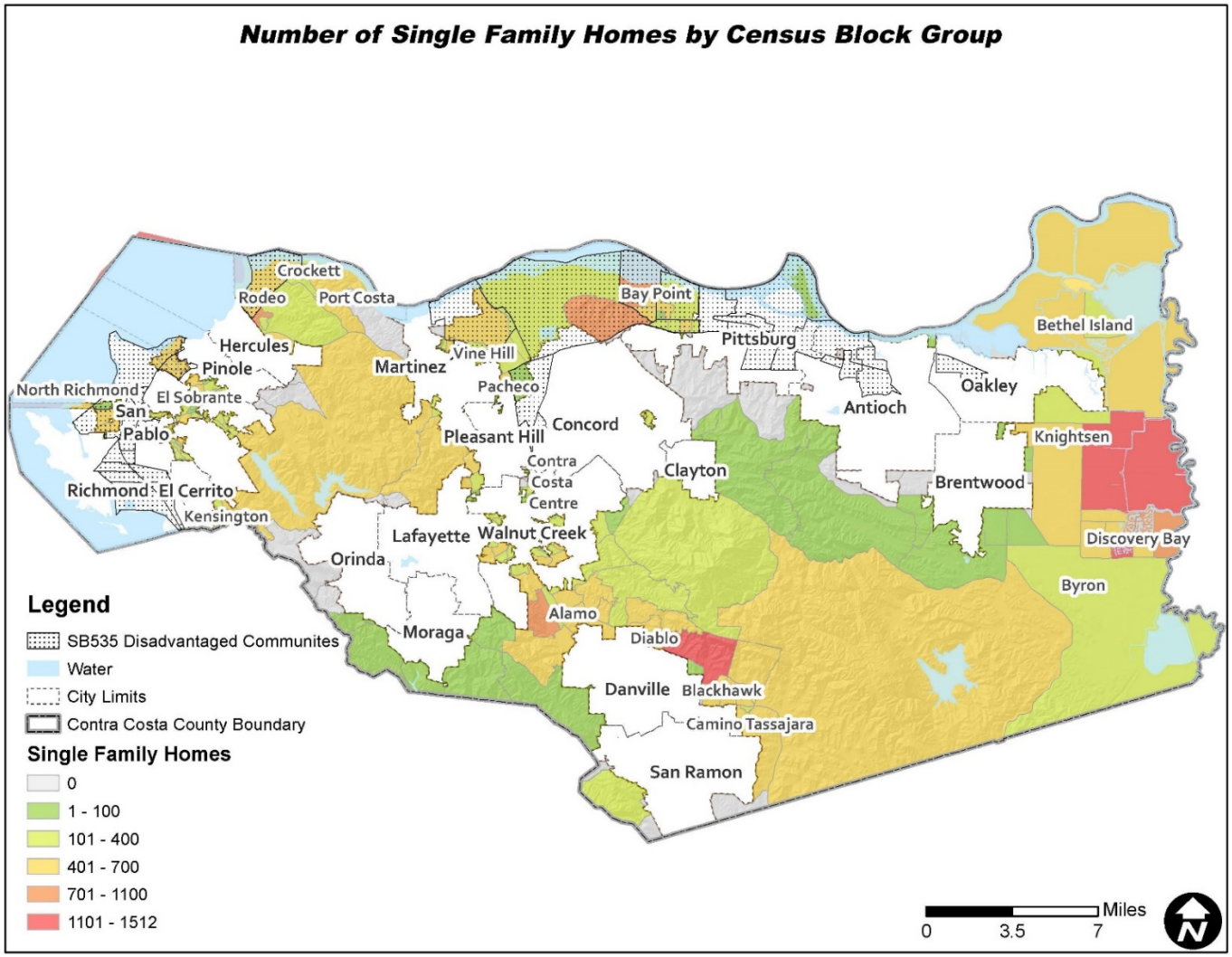
- Seek solutions that make installing solar panels and battery storage accessible to all homeowners and property owners to improve the overall resiliency of households in unincorporated County, including community solar with battery storage. Work with the County's Legislation Committee and Board of Supervisors to advocate through the CPUC for additional funding support to utility companies and collaborate with PG&E to facilitate more timely and efficient solar panel upgrades and backup battery installations.

- Allow staff to seek and obtain funding that supports the implementation of this roadmap.

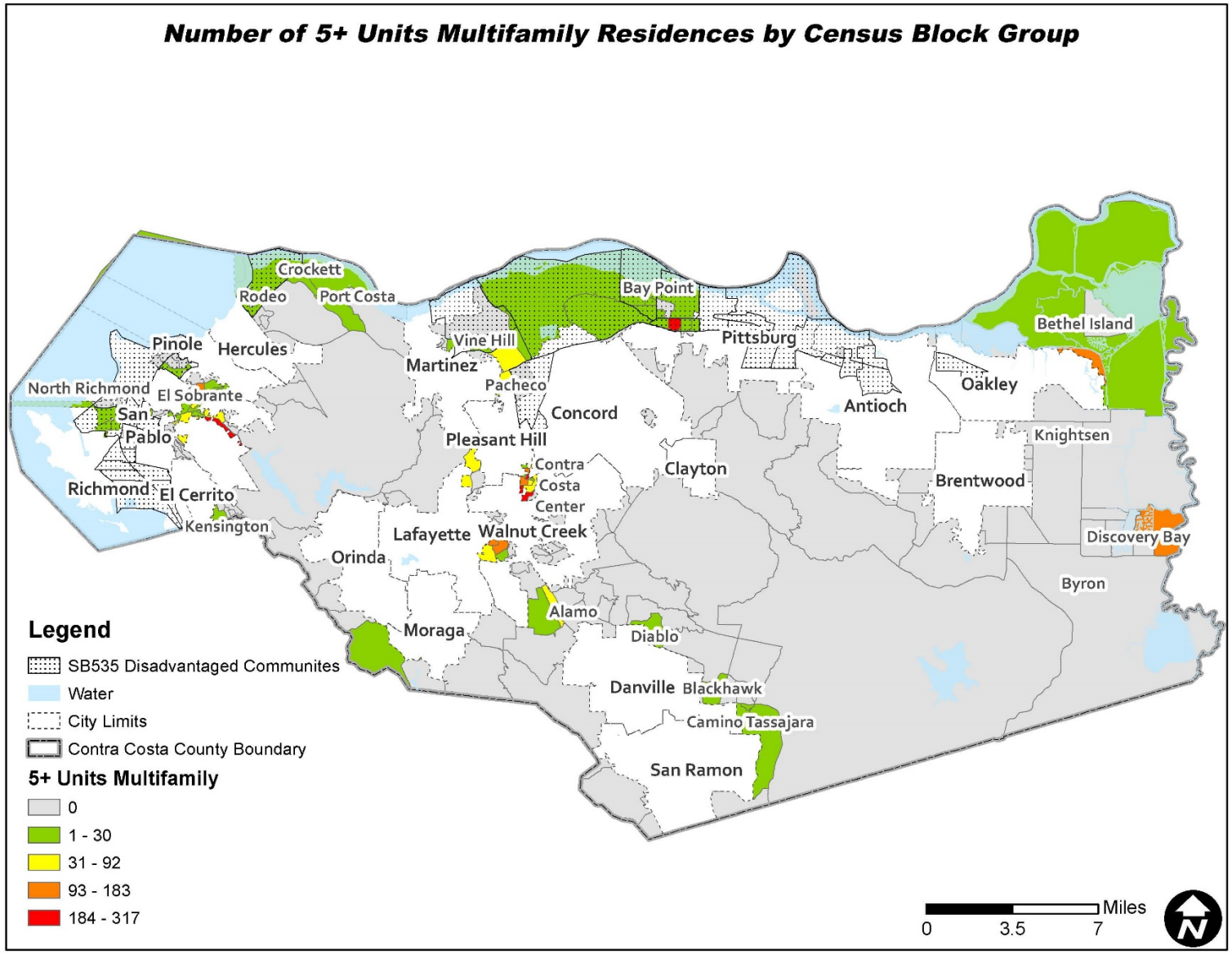
- Identify opportunities for pilot projects that will test the variety of strategies for converting existing homes and other buildings to be all-electric.

APPENDIX A: Unincorporated Contra Costa County Housing Stock Maps

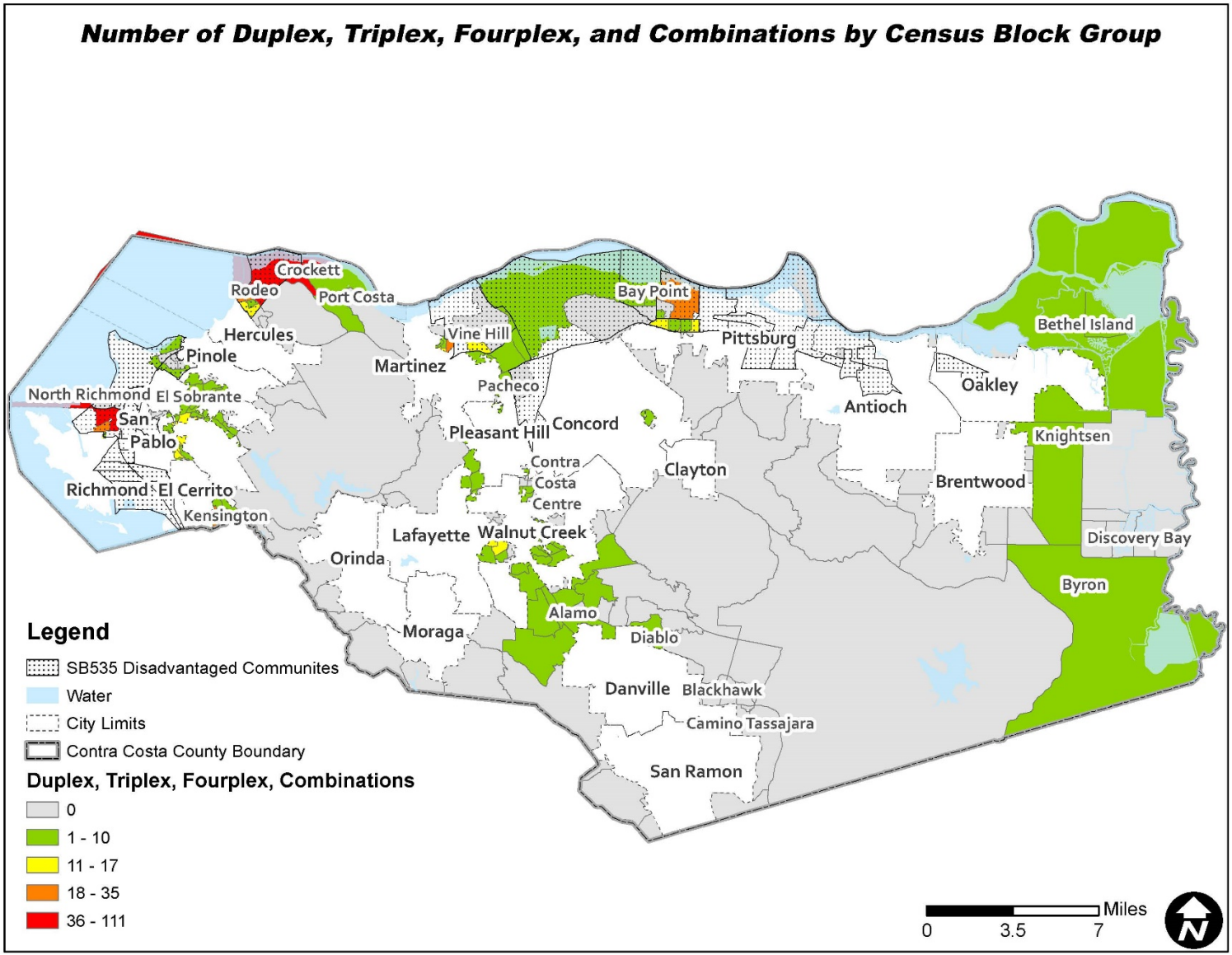
Single-family Residential



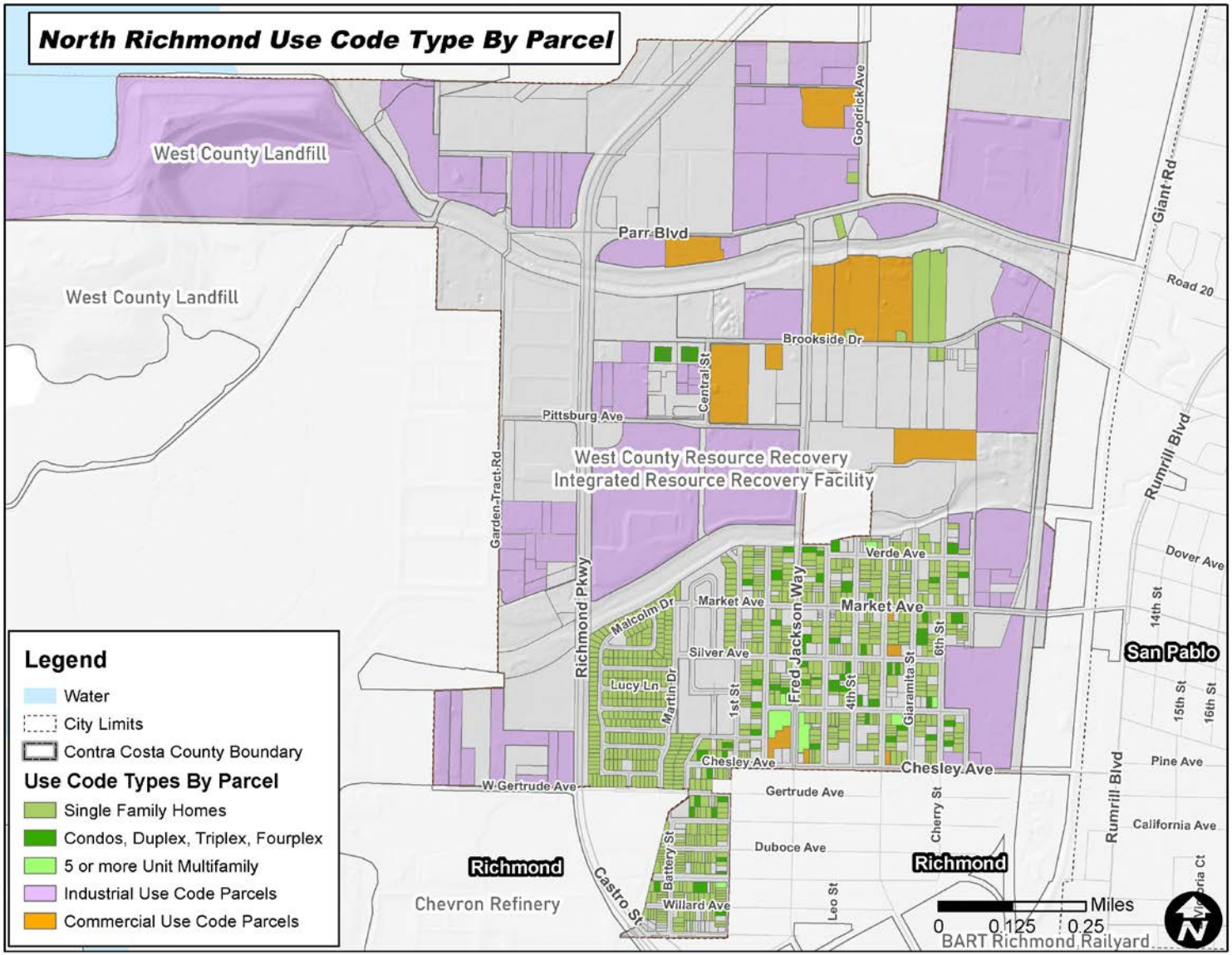
Multifamily Residential



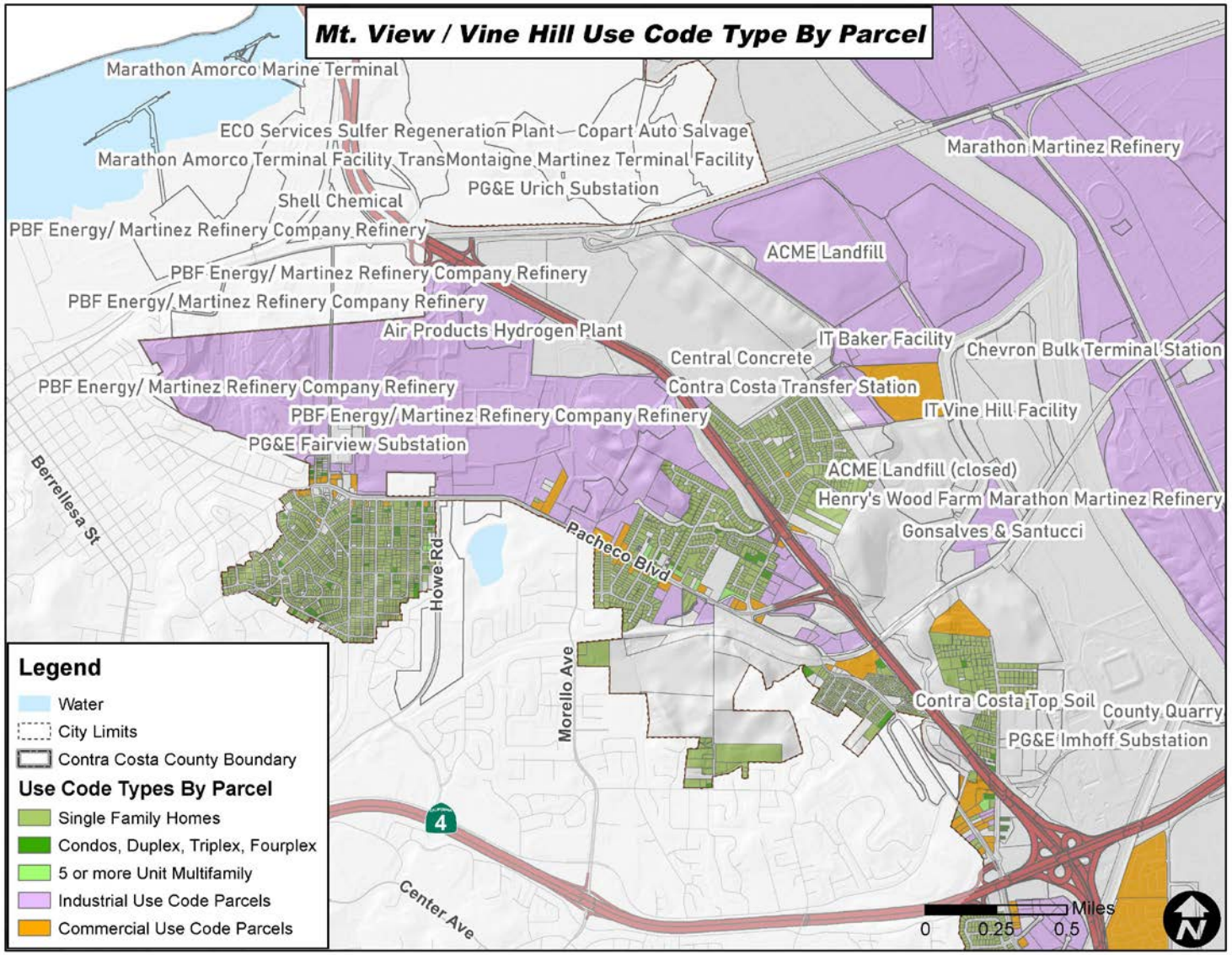
Duplex, Triplex, Fourplex, and Combination Residential



North Richmond, CA - Residential Zoning



Vine Hill, CA - Residential Zoning



Bay Point, CA - Residential Zoning