Alameda Climate Action and Resiliency Plan (CARP)

April 2025

Climate Action and Resilience Plan Update Acknowledgements

City Council

Mayor Marilyn Ezzy Ashcraft

Vice Mayor Michele Pryor

Councilmember Greg Boller

Councilmember Tony Daysog

Councilmember Tracy Jensen

Staff Lead

Danielle Mieler, Sustainability and Resilience Manager

Green Team

Planning, Building and Transportation
Lisa Foster, Transportation Planning Manager
Stephen Buckley, Planning Services Manager
Gail Payne, Project Manager
Eric Shimp, Supervising Building Inspector
Public Works
Brendin Christolear, Supervising Civil Engineer
Liz Acord, Public Works Coordinator
Marc Green, Zero Waste Specialist
Ricardo De La Torre, Parking Project Manager
Mike Billington, Facilities Manager
Base Reuse and Economic Development
Eric Fontstein, Development Manager
Annie Cox, Management Analyst
Alameda Recreation and Parks Department (ARPD)
Matt Nowlen, Park Manager
Alameda Municipal Power (AMP)
Heather Heinbaugh, Utility Program Manager
Edbert Nguyen, Utility Program Manager
City Manager's Office
Sarah Henry, Communications & Legislative Affairs Officer
Housing Authority of the City of Alameda
Tony Weng
Climate Action for a Sustainable Alameda (CASA)
Ruth Abbe
Debi Ryan

Consultant Team

Raimi + Associates
Pathways Environmental Institute
Fehr & Peers
Cascadia Consulting

Contents

List of Tables

List of Figures

List of Acronyms

AMP	Alameda Municipal Power
BART	Bay Area Rapid Transit
BCDC	Bay Conservation and Development Commission
CARP	Climate Action and Resiliency Plan
CASA	Community Action for a Sustainable Alameda
EV	Electric vehicle
FEMA	Federal Emergency Management Agency
GHG	Greenhouse gas
LHMP	Local Hazard Mitigation Plan
$MTCO_2e$	Metric tons of carbon dioxide equivalent
OAAC	Oakland Alameda Adaptation Committee
TDM	Transportation Demand Management
TMA	Transportation Management Agency
VMT	Vehicle miles traveled

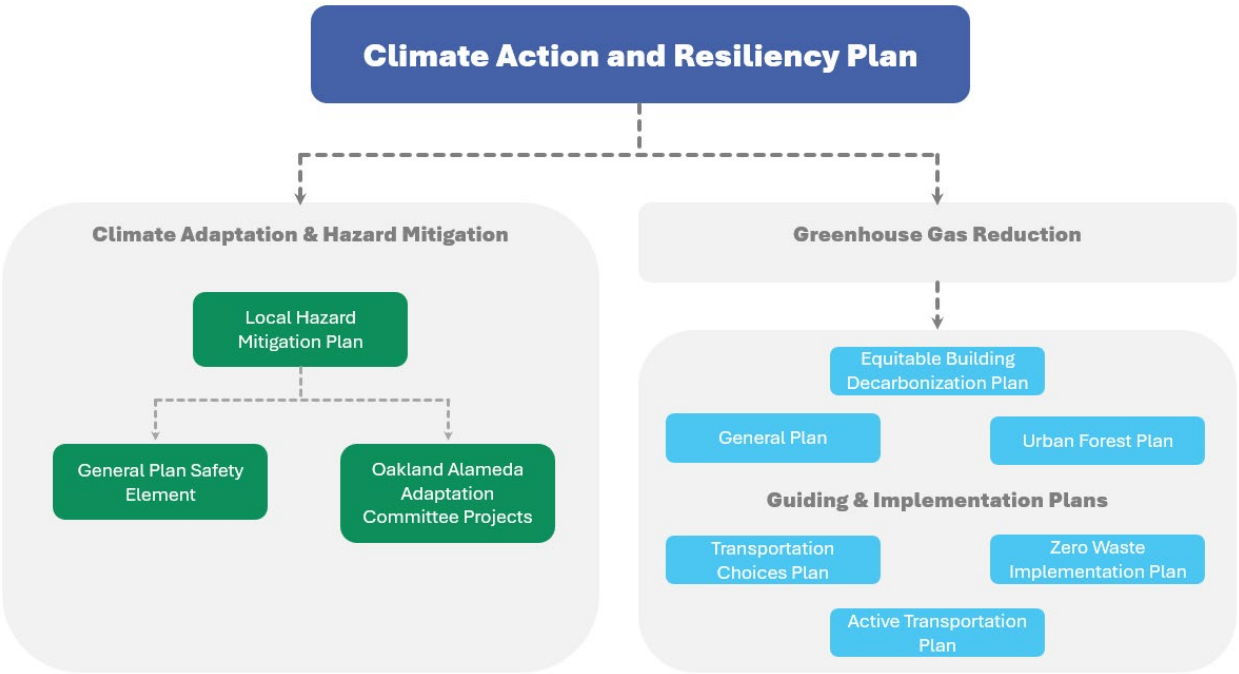
Background

Every day, human behavior accelerates climate change by releasing harmful greenhouse gas (GHG) emissions that warm the Earth's atmosphere and cause severe impacts. Rising sea and groundwater levels, unhealthy air quality from wildfires, more intense rainstorms, warmer weather, and longer droughts are just some of the impacts Alameda is experiencing—and will continue to experience—if Alameda and the world doesn't act now to mitigate emissions that contribute to climate change. Alameda City Council's March 2019 declaration of a climate emergency is a call to action for the City and community to restore a safe climate. As a result, Alameda took bold action and adopted its Climate Action and Resiliency Plan (CARP) in 2019.

Alameda's CARP has undergone a mid-cycle update to wholistically evaluate and celebrate the city and community's successes and identify barriers to meeting the CARP's goals. This mid-cycle update report incorporates recent and ongoing local initiatives and plans by the City of Alameda and regional agencies, as well as new State laws and initiatives, into the CARP. The updated vision, goals, strategies, greenhouse gas (GHG) emissions inventory, and action plans are meant to help Alameda maintain focus and stay on track to meet its ambitious climate goals.

The CARP covers both climate adaptation and hazard mitigation and greenhouse gas reduction. It acts as an umbrella for several other plans and ongoing initiatives within the city. For adaptation and mitigation, it nests over the City's Local Hazard Mitigation Plan (which is called the Adaptation and Hazard Mitigation Plan), the General Plan Safety Element, and a series of climate adaptation implementation programs nested within the Oakland Alameda Adaptation Committee (OAAC). On the greenhouse gas reduction side, the CARP reflects numerous sector-specific guiding and implementation plans, including the Equitable Building Decarbonization Plan, Urban Forest Plan, Zero Waste Implementation Plan, Transportation Choices Plan, and Active Transportation Plan (Figure 1).

Figure 1: Plan Relationships



How to use this document

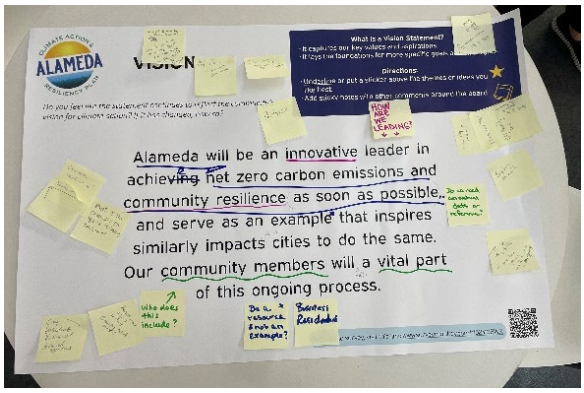
The mid-cycle CARP evaluation process was undertaken to assess the efficacy of the CARP and ensure that it still reflects the community's vision for climate action in Alameda. The update process has:

- Revised CARP vision and goals to better capture community values,
- Measured the impact of the implementation of CARP on GHG emissions by conducting the 2022 GHG inventory (Appendix 2),
- Identified gaps and opportunities in CARP GHG mitigation measures as part of the creation of GHG Action Plans,
- Aligned the resilience component of the CARP with the Local Hazard Mitigation Plan (LHMP) update cycle by using the CARP measures to inform the LHMP,
- Updated the list of Strategies for Location-Based Priority Flooding.

This document supersedes the 2019 CARP and outlines the updated CARP vision and goals, the updated GHG mitigation measures (both new and continuing from the original CARP) which are reorganized into GHG action plans, and the updated hazard mitigation and the CARP resilience measures, which are now housed in the LHMP. The City is planning to undertake a comprehensive CARP update in 2030 which will update the technical analysis and consider CARP implementation progress toward goals, changes in State climate planning legislation, and technological advancements.

Community Engagement

Throughout the CARP update process, the team used a variety of engagement methods to connect with community members of different backgrounds and ages. The team conducted engagement activities that included public workshops, pop-up events, stakeholder meetings, a community survey, and City staff advisory committee meetings. These activities were designed to gather feedback on both the GHG reduction and climate adaptation and hazard mitigation portions of the CARP. Some CARP outreach activities asked for voluntary demographic information from attendees to anonymously track who was engaging in the CARP development process and promote equity.



Community feedback on the CARP vision

Green Team

To support the CARP update, an interdepartmental advisory committee made up of City staff from various departments, including Public Works, Planning, Building & Transportation, City Manager's Office, Recreation and Parks Department (ARPD), Base Reuse and Economic Development (BRED), Alameda Municipal Power (AMP), and Alameda Housing Authority (AHA), met with the team to discuss and provide feedback on the updated portions of the plan. The community organization Community Action for a Sustainable Alameda (CASA) was also a member of the Green Team to advise on community outreach. The Green Team met a total of six times during the update process.

Stakeholder meetings and interviews

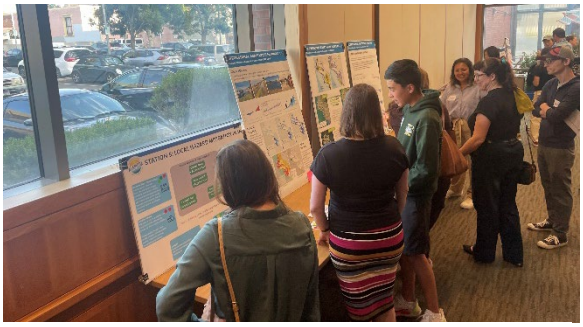
The team met with key City departments and conducted two rounds of stakeholder meetings with civic and community organizations, the Chamber of Commerce and business groups, housing organizations, and youth climate and sustainability leaders to inform the CARP update, including the vision and goals and GHG mitigation strategies. Specific community groups included 100K Trees for Humanity, Alameda Food Bank, REAP, West End Arts District, Bay Area MakerFarm, Bike Walk Alameda, a member of the PTA, and YouthPower, Amplify, and Encinal Environmental Cooperative.

CARP meeting hosted by the Chamber of Commerce, August 2024

Community workshops and pop-ups

The CARP team hosted two community workshops throughout the CARP Update process. The first interactive workshop was held during the update process to receive community input on vision and goals development, GHG mitigation strategy development, and to share updated climate hazard information related to the LHMP update. The second workshop was held virtually to present the Draft CARP Update and solicit feedback from the community. Pop-up events were also held at popular locations and events in Alameda, such as the Spring Shindig, Bike Fest, Rhythmix Rising Seas Premiere and BANDALOOP Dances for Sea and Low Sky event, to raise more awareness about the plan update and to hear from the community.

In addition to CARP specific workshops, OAAC conducted six workshops related to adaptation, sea level rise, groundwater, and flooding hazards.



CARP community workshop, June 2024

City Council

The City Council held a work session in October 2024 to provide input on the CARP update, including the draft vision, goals and strategies, and key priority implementation plans.

Online survey and outreach

An online community survey was developed to support the CARP update and to understand the community's climate challenges, awareness of climate change, and the strengths, weaknesses, and challenges of the city in addressing climate change.

The City's monthly Sustainability Newsletter provided updates on the CARP update and noticed the project's community events to approximately 1,400 Alameda residents.

Incorporation of Public Comment into the Final Draft

The Final Draft CARP Update incorporated public comments received on the Public Draft CARP Update. The Public Draft was available for review from mid December 2024 through January 2025 utilizing an online public comment form. The Public Draft received nearly 80 comments. The main takeaways from the public comment process are summarized below:

- Many comments were supportive of the CARP and shared additional existing/ongoing efforts in Alameda and by the community that could be highlighted.
- A few comments refuted the need for the city to take climate action.
- The community expressed concern about sea level rise and supported strategies to increase community resilience.
- Some community members expressed concern about the difficulty of reducing VMT and transitioning to walking and biking modes of travel.
- Community members appreciated the consideration of equity in the CARP and expressed a desire to see it included in the implementation of CARP strategies.
- General clarification and proofreading comments.
- No comments resulted in major policy changes related to the CARP goals or strategies.

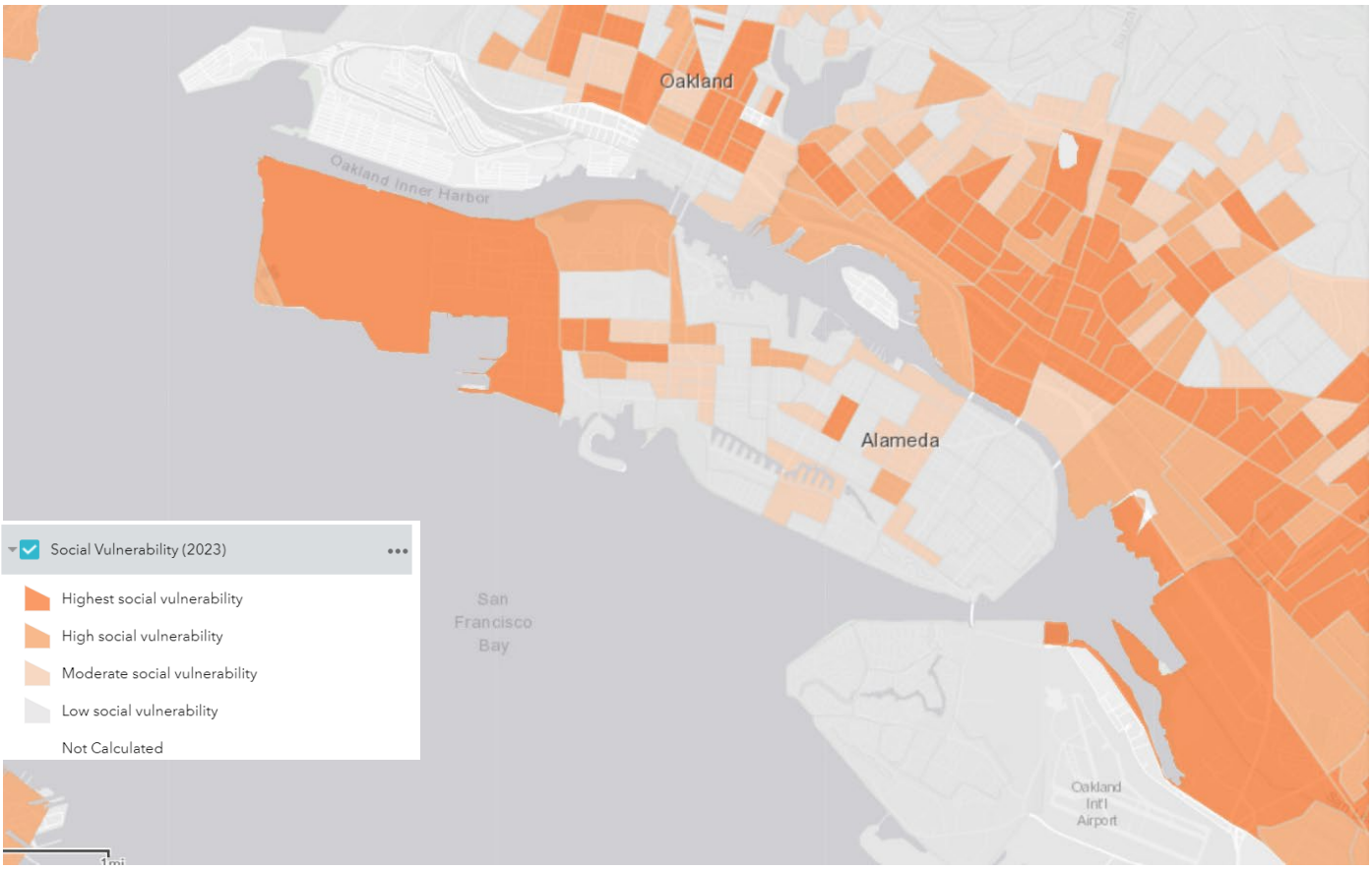
Social Vulnerability

The impacts of climate change will be unevenly distributed across Alameda and the region. Lower-income residents, seniors, renters, and other priority populations will bear much of the burden of climate change, with many of those groups having the fewest resources to adapt to changing conditions. Social Vulnerability to climate change can be defined as the susceptibility of a given population to harm from exposure to a hazard, directly affecting its ability to prepare for, respond to, and recover.[1]

The City utilizes the Bay Conservation and Development Commission's (BCDC) Community Vulnerability Assessment to understand the level of social vulnerability to climate hazards across Alameda. Certain socioeconomic characteristics may reduce the ability to prepare for, respond to, or recover from a hazard event. Figure 2 presents the areas of social vulnerability in Alameda.

[1] Cooley, Heather, Eli Moore, Matthew Heberger, and Lucy Allen. (2012). *Social Vulnerability to Climate Change in California*. Pacific Institute. https://pacinst.org/wp-content/uploads/2014/04/social-vulnerability-climate-change-ca.pdf. Accessed on 2/11/2025.

Figure 2: Social Vulnerability to Climate Hazards Across Alameda



Source: BCDC 2023.

Mapping vulnerability is helpful to ensure that the CARP and LHMP are equitably implemented across the city, focusing resources where they are needed most. There are a variety of ways the City can work to support the equitable implementation of CARP programs, including procedural, distributional, and structural equity.

- **Procedural equity**: Transparent, fair, and inclusive process; ensure all are treated openly and fairly; and increase civic engagement opportunities. For example, the City can focus future outreach and engagement efforts for priority populations most sensitive to the impacts of climate change and collect voluntary demographic data to track engagement efforts.
- **Distributional equity**: Fairly distribute resources, benefits, and burdens; and prioritize resources for communities that experience greatest inequities and unmet needs. The City can focus program implementation in neighborhoods with the highest social vulnerability and need.
- **Structural equity**: Make a commitment to compensate for past harms and prevent future unintended consequences; and address underlying structural and institutional systems that are the root causes of social and racial inequities. The City can support transformational initiatives, linking climate program implementation with job training, local hire, and other economic development objectives.

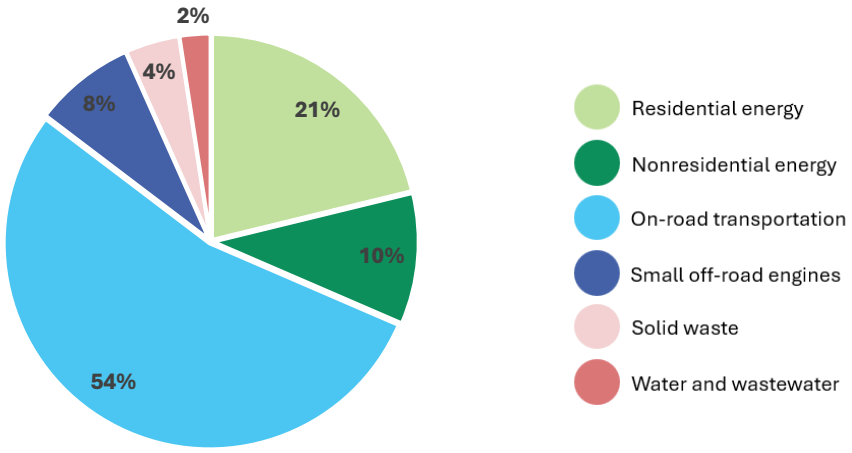
2022 Greenhouse Gas (GHG) Emissions Inventory

The 2019 CARP includes a greenhouse gas emissions inventory to assess and understand the impact of existing CARP strategies. A new GHG emissions inventory was developed for 2022, the most recent year for which complete data was available.

The 2022 greenhouse gas emissions inventory provides an overview of Alameda's current emissions and helps guide future greenhouse gas reduction and carbon sequestration policy. It captures the primary sources of emissions that can be reduced through local and regional government actions. This includes energy use in homes, businesses, vehicles, off-road equipment (such as lawn and garden, recreational, construction, and industrial equipment); emissions from treating and delivering water, and emissions from materials that are thrown away. Municipal emissions were not inventoried separately but are included in the community inventory. Additionally, the 2022 inventory does not include consumption-based emissions that largely result from individual choices about the consumption of goods and services; however, a separate estimate from the UC Berkeley Cool Climate Network is discussed to provide information about the scale of consumptive emissions, which can be found in Appendix 2.

The total 2022 communitywide GHG emissions are estimated to be 267,894 $MTCO_2e$, a 35% and 29% decrease from the 2015 and 2005 inventories, respectively. Of the five sectors, on-road transportation (vehicles) accounted for the largest sector of GHG emissions with estimated emissions of 145,995 $MTCO_2e$, or 54% of total emissions (Figure 3). The second largest sector was building energy use with estimated emissions of 85,390 $MTCO_2e$, or 31% of total emissions all of which are due to natural gas use. The remaining 14% of emissions are made up of solid waste, off-road transportation (equipment engines), and water and wastewater.

Figure 3: Proportion of 2022 Annual Community GHG Emissions by Sector



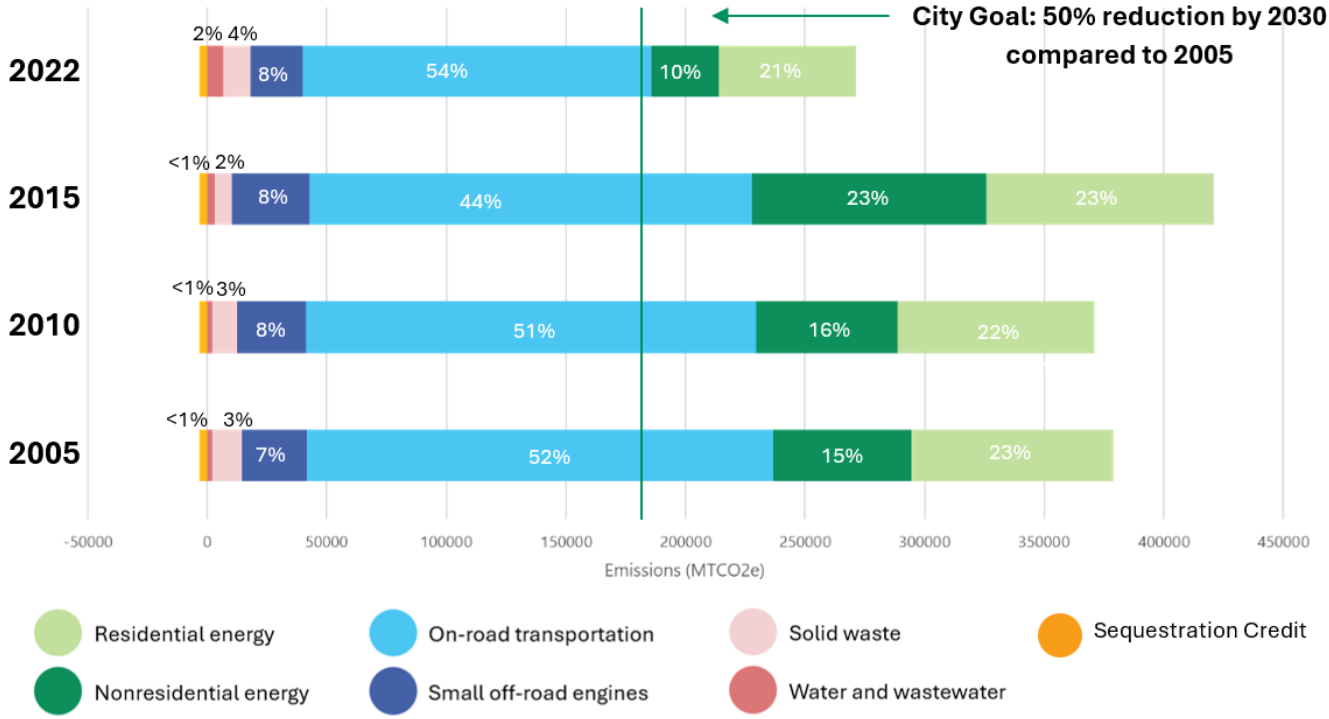
Greenhouse Gas Emissions Over Time

Between 2005 and 2022, Alameda's total emissions decreased by approximately 29% despite population and service population growth.[2] Alameda is over halfway to achieving its goal of reducing emissions by 50% by 2030. This reduction has mainly been driven by Alameda Municipal Power's (AMP) shift to providing 100% clean energy in 2020 and lower

[2] Service population can be defined as the combined total population and number of jobs in the city.

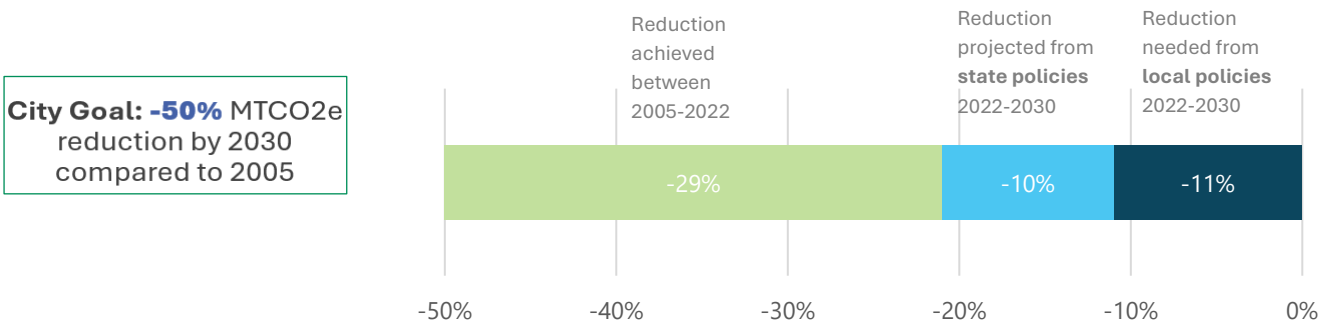
transportation emissions (by about 25%) due to cleaner vehicles, reduced vehicle miles traveled (VMT), and more efficient off-road equipment. Natural gas emissions also decreased by about 6% due to reduced residential natural gas usage. Figure 4 shows how Alameda's emissions have changed over time from 2005-2022.

Figure 4: Emissions Comparison 2005-2022



Emissions are expected to continue to decrease because of State policies, but not enough to meet CARP targets without also implementing additional local measures. Projected emissions, adjusted for State policy, are estimated to decrease an additional 10% from 2022 to 2030. To meet CARP targets, an additional 11% emissions reduction needs to be achieved by local policies. See Figure 5 for a breakdown of Alameda's progress toward GHG reduction goals.

Figure 5: City of Alameda Progress Toward GHG Reduction Goal ($MTCO_2e$)



CARP Accomplishments

CARP implementation is reducing communitywide emissions. Below is a list of some of the most impactful CARP accomplishments since 2020. More information on progress can be found in the City's CARP annual reports.

1. Clean Energy from AMP (2020)

On January 1, 2020, AMP began providing 100% clean energy to all customers. In 2023, 64% of AMP's power mix comes from eligible renewable resources, including: geothermal, biomass (landfill gas), small hydroelectric, and wind. An additional 36% of the power mix comes from large hydroelectric projects in California. *(2019 CARP measures E1-E3)*

2. City Implementation Leadership and Team (2021)

The City convened an interdepartmental Green Team, comprised of leaders from City Manager's Office, Public Works, Parks and Recreation Department, Planning, Building & Transportation Department, Base Reuse and Economic Development, Alameda Housing Authority, and Alameda Municipal Power to oversee implementation of the CARP and ensure that key milestones are being met. The City hired a Sustainability and Resilience Manager to implement CARP recommendations, dedicated a half time position to manage sea level rise adaptation projects, and hired a CivicSpark fellow to provide additional staff capacity to the Sustainability and Resilience Program. *(2019 CARP Responsibilities, Structure, and Staffing)*

3. De-Pave Park Ecological Park (2021)

City Council approved the De-Pave Park Vision Plan in 2021, and the City was awarded an $800,000 planning grant from the San Francisco Bay Restoration Authority Measure AA grant to create a Master Plan. De-Pave Park is a 21-acre planned ecological park in which all existing concrete (from the former Naval Base airfield/runway system) will be removed to create tidal wetlands and wildlife habitat. The City is currently seeking funding for construction. *(2019 CARP measures I1, I4, I6)*

4. Oakland Alameda Adaptation Committee (OAAC) (2021)

OAAC is a coalition of shoreline communities and stakeholders working to accelerate sea level rise adaptation, protect and restore water quality, habitat and recreation, and promote community resilience. OAAC has secured $4.14 million in funds to lead three sea level rise adaptation projects: Sub-Regional Adaptation Plan, Oakland-Alameda Estuary Adaptation Project, and Bay Farm Island Adaptation Project. *(2019 CARP measures C3, S1)*

5. Active Transportation Plan (2022)
City Council adopted the Active Transportation Plan, delineating pedestrian improvements, a low-stress bicycle network, project prioritization, and the future of Slow Streets. The City has completed 13.1 miles of bikeways as of 2024 towards CARP's goal of 16.54 miles by 2030. *(2019 CARP measures T2)*

6. Senate Bill 1383 Implementation (2022)
Secured a grant for $115,019 to help the City comply with SB 1383 and increase compost application in the city and began implementation of SB 1383, the state's Short-Lived Climate Pollutant Reduction Law, to reduce methane emissions from landfills and to increase the recovery of edible food. Additionally, the City entered into agreements with StopWaste and the Alameda County Department of Environmental Health to help educate, implement, and enforce SB 1383. *(ZWIP)*

7. Community Resilience (2022)
City Council adopted a FEMA approved Climate Adaptation and Hazard Mitigation Plan (LHMP) and amended the General Plan Safety Element to align with the plan. *(2019 CARP measures B3, B12, I6, L1, L2, S1, S2)*

8. Electric Vehicle Adoption (2024)
Alameda has 164 public EV chargers and almost 9% of all vehicles registered in Alameda are electric, plugin hybrid, or fuel cell in 2024, up from 4% in 2017. AMP issued 952 EV charger and 194 used EV rebates between 2019 and 2024. *(2019 CARP measures T6-T9)*

9. Existing Building Decarbonization (2024)
Staff developed an Equitable Building Decarbonization Plan with community input that lays out the process for transitioning natural gas use in existing buildings to clean, energy efficient all-electric buildings in accordance with the City's climate and equity goals**.** AMP issued rebates for 110 heat pump water heaters, 389 electric dryers, 87 heat pump space heaters, and 59 electric panel upgrades between 2019 and 2024. *(2019 CARP measures E1-E3)*

10. Mode shift to non-single occupancy vehicles (2024)
Alamedans have reduced VMT by 6% by increasingly using public transportation and walking and biking. Although ridership has not rebounded fully to pre-pandemic levels, AC Transit bus ridership has increased, as has ferry and BART ridership. *(2019 CARP measures T1, T4)*

11. Alameda Youth Climate Ambassadors (2024)
Staff launched the Alameda Youth Climate Ambassadors program with clubs at Alameda middle and high schools. Meetings occur every two months during the school year to help student climate clubs learn how to get involved in City climate action work, activate the broader student community, and facilitate the exchanging of ideas and sharing of resources across student climate clubs in Alameda.

Revised CARP Vision and Goals

Alameda recognizes the need for immediate and fair action to respond effectively to the climate emergency. The following revised vision and goals reflect the feedback heard from City departments, stakeholder meetings, a community survey, and a community workshop held on June 25, 2024 on the 2019 CARP vision and goals. The vision captures key values and aspirations and lays the foundation for goals, strategies, and actions. Goals are broad, aspirational statements of what we want to achieve. Targets are specific objectives or results toward which efforts are directed.

Vision

Alameda aims to be carbon neutral and to build community resilience in ways that enhance our quality of life and reduce environmental burden on vulnerable communities. The whole community is a vital part of this effort.

Goals

Goal 1: Carbon Neutral. Alameda will fairly reduce emissions from transportation, buildings, solid waste, and water in line with local and State targets.

Goal 2: Community Resilience. Alameda will safeguard the community, especially vulnerable communities, from the impacts of climate change and natural hazards.

Goal 3: Community Education and Activation. The Alameda community will be inspired to participate in climate action and resilience efforts. Alameda will cultivate climate leadership, innovation, and community building among all residents, businesses, community organizations, and service providers.

Goal 4: City Leadership. The City of Alameda will lead by example by aligning resources and working collaboratively to implement CARP.

Our Targets

Alameda set targets in line with the State and scientific community to:

- Reduce emissions 50% below 2005 levels by 2030
- Become carbon neutral by 2045

Key Terms

Carbon neutral: Carbon neutral, or achieving zero net emissions, means having a balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks.

Community resilience: Resilience is the ability of a community to prepare for disruptions, to adapt to changing conditions, withstand and rapidly recover from shocks and stresses, and to adapt to future change.

Socially vulnerable communities: Vulnerable communities are those that have both social vulnerability (i.e. renter, children, disabled, single parent households, lack transportation, people of color, low level of education, very low income), and exposure to environmental burdens and climate impacts.

Revised GHG Reduction Strategies

Table 1 lists the updated strategies, key implementation actions, and associated estimated 2030 annual emissions reductions from the 2019 CARP. A crosswalk of changes between the 2019 CARP and this update can be found in Appendix 1. Table 1 also lists existing and new performance targets and metrics associated with each strategy. Targets represent the levels of progress the City hopes to achieve and the metrics are the indicator/data used to measure progress towards the target. It includes new relevant targets/metrics, targets/metrics from the 2019 CARP, ZWIP, ATP, and annual reporting.

Table 1: Updated CARP Strategies

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*
City Leadership	**CL-1: City Leadership.** Ensure all employees have the resources and knowledge to support climate goals. Monitor and report on CARP implementation progress to be transparent with the public, measure impact, align with funding opportunities and other city planning efforts, and reevaluate as needed.	• Continue interdepartmental Green Team meetings • Education and training for City staff • Annual reporting and data collection • Regularly update GHG inventory • Continue to attract and support green and blue tech businesses to locate in Alameda	• Reduce GHG emissions 50% below 2005 levels by 2030 and net zero emissions by 2045 (2024 CARP)	• Total communitywide and municipal GHG emissions (City)	Not quantified
City Leadership	**CL-2: Clean Energy Purchase and Generation**. Electricity consumed by all residential and commercial users in Alameda is from 100% clean energy sources by 2020 (existing commitment).	• AMP to continue to purchase 100% clean electricity • AMP to continue to maintain affordable electric rates • Encourage local solar generation	• Electricity consumed from 100% clean energy sources	• % clean energy purchase (AMP) • Rooftop solar installations – # of installations; annual and cumulative kilowatts (AMP)	134,189

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*
City Leadership	**CL-3: City Facilities and Operations.** Implement policies and programs to reduce emissions associated with City facilities and operations.	• Continue to prioritize the purchase of zero emission fleet vehicles • Minimize and eliminate where possible natural gas infrastructure for new and renovated City buildings • Evaluate existing municipal buildings and take actions to switch to climate-friendly refrigerants, reduce water consumption, and electrify new and existing facilities • Conduct regular City employee commute surveys and explore City employee commute programs • Modify City procurement standards to reduce waste	• 208 light duty, non-police patrol, and police patrol vehicles are EV by 2030 (2019 CARP) • Audit of priority buildings and facilities by 2035.	• # and % of EV fleet vehicles (City) • City employee mode share to work (City)	Not quantified
Community Activation and Education	**CAE-1: Community Activation and Education.** Educate the community about anticipated near and long-term climate impacts, community vulnerabilities, opportunities for adaptation, and opportunities for GHG mitigation with the intent to activate residents, businesses, and community partners.	• Partner with community and faith-based organizations and engage youth to raise community awareness and inspire climate action • Encourage behavior change around purchasing to reduce waste	• No target	• # of public workshops, events, and presentations by sustainability staff • # of email bulletins sent and average open rate • Unique page views on sustainability and resilience webpages	Not quantified
Transportation	**T-1: Land Use and Transportation Coordination**. Support development that minimizes the need for single occupancy vehicles and facilitates the use of transit and active transportation.	• Implement General Plan Land Use, Housing, and Mobility Elements • Update zoning codes to reflect General Plan	• Reduce VMT per capita 25% below 2019 levels by 2030, and 30% below 2019 levels by 2045 (CA Scoping Plan 2022)	• VMT (Google Env. Insights Explorer)	Not quantified

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*

Transportation	**T-2: Active Transportation**. Provide safe, comfortable, and accessible ways for people of all ages and all abilities to get around Alameda by walking, biking, or other active modes.	• Implement Active Transportation Plan, Vision Zero Action Plan, and General Plan Mobility Element
		• Continue to support Safe Routes to School program and implement infrastructure improvements
			• Construct 16.54 miles of bikeways from 2019 to 2030
			• 2030 (3-year average) trips to work mode split
			  ○ Walking = 4%
			  ○ Bicycling = 3.6% (2022 ATP)
				• Miles of bikeways constructed (ATP) (City)
				• Percent of bicycling and walking trips to work, and percent of drive alone trips to work (US Census ACS, City)
				• Bicycling and walking count trends on key streets (County, City)
					1,741

Transportation	**T-3: Motor Vehicle Trip Reduction**. Reduce single occupancy vehicle (SOV) travel and shift trips to walking, biking, scootering and transit by informing and encouraging travelers to maximize the efficiency of our transportation systems leading to improved mobility, reduced congestion, and lower vehicle emissions.	• Regularly evaluate the TDM ordinance and Alameda TMA operations to ensure VMT reduction. • Regularly coordinate with the Alameda TMA to facilitate smooth pass-through of TDM fees. • Create packages of TDM resources and educational materials for building owners / managers and employers	• 25% of Alamedans primarily telecommute	• Alameda TMA trips taken via supplied transit passes (Alameda TMA) • Percent of workers who primarily work from home (US Census ACS Table S0 801) • Mode share for all trips (Google Env. Insights Explorer)	17,307
Transportation	**T-4: Parking and Curb Management**. Proactively manage public parking to lower VMT and greenhouse gas emissions. Regularly update vehicular, bike, EV, carshare, and other parking standards in the Zoning Code to lower VMT and greenhouse gas emissions.	• Continue to implement parking management program, General Plan, Transportation Choices Plan, Alameda Municipal Code, Alameda Point Transportation Management Plan and Ferry Terminal Parking Pricing Strategy • Increase the City's capacity to effectively manage and enforce parking demand	• 85% parking occupancy (Parking Management Program / General Plan)	• Percent parking occupancy (City parking occupancy counts)	Quantified as part of TDM

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*
Transportation	**T-5: Public Transit Service.** Support and advocate for regional transit agency improvements that make transit more accessible, affordable, and timely. Improve transit stops on City public right-of-way.	• Implement Transportation Choices Plan • Support Link21 • Continue the free bus pass program for seniors and people with disabilities • Continue the Estuary Water Shuttle	• No target	• Public transportation ridership on routes serving Alameda (WETA, AC Transit, City, Water Shuttle) • Boardings using City of Alameda's Free Bus Pass Program for older adults and people with disabilities	Quantified as part of TDM
Transportation	**T-6: Vehicle Electrification.** Increase the adoption of zero-emission vehicles and electric micromobility options and increase the availability of EV charging stations citywide.	• Continue public awareness efforts and provide educational resources to encourage EV ownership • Publicize financial incentives and rebates programs • Expand publicly available EV charging infrastructure in public parking lots and public right of way • Explore supporting residential curbside charging • Continually update parking standards in the Building/Zoning Code • Update Alameda Municipal Code to allow enforcement of EV parking zones • Support WETA Electrification Plan	• 7,378 new ZEVs in use such that 12% of all vehicles in Alameda are ZEVs by 2030 (2019 CARP) • 260 public EV chargers by 2030 (2019 CARP)	• ZEV ownership (California Energy Commission) • Public EV chargers (U.S. DOE) • Residential EV charger rebates and permits issued (AMP and City) • Used EV and E-bike rebates issued (AMP)	20,484

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*
Buildings and Energy	**BE-1: Existing Building Decarbonization.** Improve the performance of and decarbonize existing residential, commercial, and municipal buildings and facilities throughout the city aligning with the Equitable Decarbonization Plan and regional air quality and water conservation standards.	• Implement the Existing Building Decarbonization Plan • Connect residents, businesses, architects, and contractors to building energy and water conservation resources and incentives provided by AMP, BayREN, EBMUD and others • Continue to streamline and discount permit fees for electrification permits • Adopt policies and building code amendments that require higher energy performance in existing buildings and prepare for future State electrification regulations • Identify additional funding to support building decarbonization programs • Educate businesses and contractors about low-GWP refrigerant alternatives	• Natural gas use is reduced by 12% by 2030 (2019 CARP) • 382 new electric heat pump water heaters by 2030 (2019 CARP) • 3,819 new electric dryers by 2030 (2019 CARP) • Reduce average indoor water use from 50 to 42 gallons per person per day by 2030 (EBMUD)	• Natural gas consumption by customer type (PG&E) • Electrification rebates and permits issued for heat pump water heaters, panel upgrades, and heat pump HVAC systems (AMP and City) • Home heating fuel (ACS Table B25040) • Average indoor water use per person per day (EBMUD)	8,283
Buildings and Energy	**BE-2: New Construction Decarbonization.** Adopt Energy Policy & Conservation Act (EPCA)-friendly reach codes that decarbonize residential and nonresidential new construction and encourage the use of recycled and low embodied carbon materials, renewable energy, efficient design, and align with the Equitable Building Decarbonization Plan.	• Connect residents, businesses, architects, and contractors to building energy resources and incentives provided by AMP, BayREN, and others • Adopt policies that require higher energy performance for new construction that meet federal standards • Develop a new development checklist that includes all sustainability-related building requirements	• 2,727 new all electric housing units by 2030 (2019 CARP)	• # of new all-electric housing units	1,893

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*
Waste	**W-1: Solid Waste Diversion**. Divert recyclables and organics from landfills in accordance with State targets and reduce greenhouse gas emissions related to landfilled waste through the implementation of the Zero Waste Implementation Plan.	• Adopt and implement the Zero Waste Implementation Plan	• 89% diversion rate (ZWIP) • 1.2 pounds of waste per day, per person	• Waste per person per day (ACI) • Disposed and diverted waste (ACI)	3,416
Waste	**W-2: Goods and Services.** Encourage behavior change around purchasing to reduce waste through education, highlighting local businesses and products, partnerships, and/or lobbying with other local agencies.	• Work with community-based organizations to encourage behavior change around the disposability of goods • Encourage a local sharing and repair economy • Measure consumption-based emissions • Partner with community organizations to support fixit clinics • Implement a tool lending library	• No target	• Consumptive based emissions (UC Berkeley Cool California)	Not quantified
Urban Greening	**UG-1: Urban Forestry.** Implement the Urban Forest Plan to increase tree canopy coverage by growing and maintaining the urban forest across all neighborhoods, particularly in socially vulnerable communities.	• Adopt and implement the Urban Forest Plan	• 3,500 new trees by 2030 (2019 CARP)	• Net trees planted, including new trees planted and trees removed (City) • Canopy coverage (U.S. Forest Service)	646

CARP Focus Area	Strategy	Key Actions (2025 – 2030)	Targets	Metrics and Data Source	2030 Annual Emissions Reductions (MTCO2e)*
Urban Greening	**UG-2: Open Space and Greenbelts.** Expand and manage open space, greenbelts and natural stormwater treatments such as bioretention basins or rain gardens to increase carbon sequestration, habitat connectivity, public access to nature, and flood and heat island reductions.	• Implement SB 1383 requirements to procure locally produced compost • Apply compost on Alameda's parks and open spaces • Continue partnerships to provide a free community compost hub and educate residents about producing and using compost • Support development of urban greening projects in schoolyards, community centers, and neighborhoods • Implement the Green Infrastructure Plan • Align Alameda public lands management with climate resilience goals as outlined in the LHMP and OAAC projects	• 9,383 cubic yards (6,471 tons) of recycled compost procured annually (SB 1383)	• Cubic yards of compost applied in public spaces (City) • Acres that have received green infrastructure treatment	5,560

GHG Reduction Action Plans for CARP Strategies

The following section details action plans for each greenhouse gas reduction strategy listed in Table 1. All strategies include a short description, a summary of key plans and programs to implement the strategy, and a summary table that describes responsible departments, GHG reduction potential, co-benefits, and equity and environmental justice considerations. The list of actions in the implementation plans are items that the City will initiate by 2030. These actions will be prioritized based on the availability of funding. *Additionally, each action plan identifies future implementation actions (beyond 2030) to consider if funding and staff resources become available*.

Action plans for each strategy, however, vary in their level of detail. Some include several proposed actions for the City to take in partnership with CASA and other organizations (e.g., City Leadership, Vehicle Electrification, Existing Building Decarbonization, and Goods and Services), while some rely on existing plans for their implementation (e.g., Land Use and Transportation Coordination, Active Transportation and Complete Streets, and Urban Forestry).

City Leadership

The ability to meet Alameda's greenhouse gas mitigation goal and adapt to the effects of climate change will be demonstrated by City leadership efforts to achieve high-performing buildings and facilities, sustainable transportation, and more. The City will continually assess department resources and staffing, organizational structure, and communications to manage facilities and assets to achieve carbon neutrality.

The City will implement a series of actions that will both reduce carbon emissions from municipal operations and enhance resiliency. These actions include energy and water efficiency upgrades for City facilities, parks, and landscapes, sustainable new construction, the electrification of existing buildings and fleet vehicles, and supporting electric vehicle adoption through charger installations. These actions will also create community benefits by enabling the continuity of operations during emergencies and leading by example.

This will require the City to commit consistent, sustainable funding for staff resources, training, and reporting and monitoring, among other things.

CL-1: City Leadership

Description

The CARP is an ambitious plan that requires a high-level of interdepartmental coordination, communication, and decision making. The City Leadership strategy aims to establish an initial framework to implement the CARP actions, recognizing the framework must be flexible to adapt over the next decade and beyond. Departments will continue to participate in the Green Team to support the implementation of CARP strategies and actions assigned to their department, educate their co-workers about GHG reduction strategies in the workplace, and coordinate annual reporting with the Sustainability and Resilience Manager.

Additionally, the City's employees are a valuable resource in making the City's practices more climate ready. When employees understand the many ways in which the City can advance readiness, they can consider how their work fits into the bigger picture. Employees who understand the urgency of climate change and the severity of the inequities of climate impacts will be motivated to develop and implement sustainable solutions in both their professional and personal lives. Climate should be part of everyone's job and be woven into the City's staff culture. Employee training and continuing education will help to ensure that all employees implement the City's municipal and workplace sustainability policies.

To achieve the CARP's GHG reduction targets, it is crucial for the City to keep track of implementation progress with clear metrics on progress and trends. Expanding existing emissions monitoring and data collection procedures can contribute to the Green Team's overall CARP monitoring. Results will then be analyzed internally to ensure progress is being made, or to course correct if certain sectors or measures are not progressing as expected. The results will continue to be shared with the public in an annual report and new online tracking dashboard.

CL-1 Summary Table

Strategy Type	Greenhouse Gas Reduction and Climate Resiliency
Responsible City Departments	• Primary: Sustainability • Secondary: All

GHG Reduction Potential	**Supporting** Not quantified. Although not quantitatively evaluated, supporting measures may achieve emissions reductions, produce co-benefits, and/or enhance the ability of quantified measures to reach expected reductions. This strategy strengthens the implementation of other strategies in the CARP.	
Co-Benefits	• Supports co-benefits from other strategies	
Equity and Environmental Justice Considerations	Tracking and monitoring measure implementation can ensure that the benefits and costs associated with climate actions are equitably distributed in the community.	
Performance Targets and Metrics	Target • Reduce emissions 50% below 2005 levels by 2030 and net zero emissions by 2045 (2024 CARP)	Metric • Total municipal and communitywide GHG emissions (City)
Funding Resources	• Climate Corp • CivicSpark	

Key Implementation Actions

Actions	Funding Available	Lead
Staffing and Training		
Green Team. Continue interdepartmental Green Team meetings to collect data, lead educational activities, coordinate updated annual work plans, participate in established City Leadership activities, and incentivize actions consistent with the CARP vision. This is an ongoing action.	Fully funded	Sustainability; All
Education and training program for City staff. Develop and implement an ongoing education program for new and continuing employees about the City's GHG reduction and climate adaptation programs and explicitly integrate climate-positive action into the City's mission. Create and distribute educational materials to staff related to climate change initiatives. Staff may develop materials on: • CARP vision, goals, targets, strategies, and action plans; • Departmental data collection procedures; • Climate change and equity; and/or • Other topics and sector-specific initiatives as defined by the Green Team and recommended by CASA.	Partially funded	Sustainability; Human Resources
Data Collection, Monitoring, and Reporting		
Annual reporting. Continue annual CARP reporting in conjunction with the General Plan, Housing Element, and transportation plans. Develop standard operating procedures to coordinate annual data collection, processing, and responsibilities with the Green Team and departments.	Fully funded	Sustainability; Planning, Building & Transportation

Actions	Funding Available	Lead
Community emissions inventory. Regularly update the communitywide emissions inventory every 2-3 years in conjunction with annual reports.	Not funded	Sustainability
Municipal emissions inventory. Utilize the Local Government Operations Protocol to develop a greenhouse gas inventory for municipal operations.	Not funded	Sustainability; Green Team
Economic Development		
Green and blue tech businesses. Continue to attract and support green and blue tech businesses to locate and thrive in Alameda.	Partially funded	BRED

Future Actions for Consideration

Future actions for consideration if funding and staff resources become available.

- **Consumption-based emissions inventory**. Inventory consumption-based emissions specifically for Alameda residents.
- **Internal progress tracking.** Develop an internal protocol and site on the City intranet to track progress on all community and municipal mitigation, adaptation, equity, and engagement activities and actions. The site may be administered by the Sustainability and Resilience Manager and incorporate the data from the City's annual reporting. This data will be used to continue publishing community-facing annual progress reports.

CL-2: Clean Energy Purchase and Generation

Description

In 2020, Alameda Municipal Power (AMP) began providing 100% clean energy to all customers decades ahead of California's goal of 100% clean power by 2045. About 64% of AMP's power comes from renewable sources, such as geothermal, biomass (or landfill gas collection), small hydroelectric, and wind projects. An additional 36% of Alameda's power comes from large hydroelectric projects in California.

AMP will continue this existing commitment to purchase electricity from renewable and clean energy sources and provide 100% clean energy to residents and businesses, ensuring adequate sources to meet growing electricity demand due to increased electrification. Clean energy generation can be enhanced with community and rooftop solar projects. Coupled with battery storage, local energy generation can help Alameda become more climate resilient and reduce reliance on the electric grid during an energy emergency.

CL-2 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: AMP
GHG Reduction Potential	**High** Up to 134,189 $MTCO_2e$ annual emissions (2019 CARP) Achieved existing commitment: 100% reduction in emissions from electricity use.

Co-benefits	• Improved air quality • Reduced resource use, cost savings	
Equity and Environmental Justice Considerations	Renewable and clean grid energy is one of the easiest ways for renters and low-income residents to be a part of the transition to clean energy. Participation does not require any new equipment or retrofits. Likewise, low-income customers can be enrolled in the California Alternate Rates for Energy (CARE) program and receive a 30-35% discount on their electric bill and a 20% discount on their natural gas bill through the FERA program.	
Performance Targets and Metrics	Target • Electricity consumed from 100% clean energy sources (2019 CARP)	Metrics • % clean energy purchase (AMP) • Rooftop solar installations – # of installations; annual and cumulative kilowatts (AMP)
Funding	• CPUC Self-Generation Incentive Program (SGIP) • California iBank Infrastructure State Revolving Fund (ISRF) Program • California Energy Commission Energy Conservation Assistance Act (ECAA) loans • Federal investment tax credit (ITC) or production tax credit (PTC) • US DOE Grid Innovation Program	

Key Implementation Actions

Actions	Funding Available	Lead
AMP to continue to provide 100% clean electricity. Continue to provide customers with 100% clean electricity, while increasing the proportion of renewables in their portfolio.	Funded	AMP
Affordable energy. Continue to explore and implement ways to make clean electricity more affordable to disadvantaged communities in Alameda through special tariffs, etc.	Funded	AMP
Encourage local solar generation. Conduct a community-wide renewable energy generation analysis to identify locations in the city where distributed energy resources (DERs) can be installed. Encourage DER and battery installation by promoting regional incentive programs.	Partially funded	AMP; Sustainability

CL-3: City Facilities and Operations

Description

The City of Alameda will demonstrate leadership through efforts to achieve high-performing buildings and facilities, sustainable transportation, and more. The City will implement a series of actions that will both reduce carbon emissions from municipal operations and enhance resiliency. These actions include energy and water efficiency upgrades for City facilities, parks, managed landscapes, sustainable new construction, the electrification of existing buildings and fleet vehicles, supporting electric vehicle adoption through charger installations, and the installation of resilience measures including solar plus storage projects. These actions will not only reduce emissions but create community benefits by ensuring the continuity of operations through emergencies and leading by example.

CL-3 Summary Table

Strategy Type	Greenhouse Gas Reduction	
Responsible City Departments	• Primary: Public Works • Secondary: ARPD	
GHG Reduction Potential	**High (relative to municipal emissions)**	
Co-benefits	• Improved air quality • Reduced resource use, cost savings • Community resilience	
Equity and Environmental Justice Considerations	Improving the operations of facilities means they can better serve all Alamedans. Though there are upfront costs to make upgrades, they can save money in the long-term that can be reinvested back into the community.	
Performance Targets and Metrics	Target • 208 light duty, non-police patrol, and police patrol vehicles are EV by 2030 (2019 CARP) • 50% of vehicle purchases are zero-emissions beginning in 2024 and 100% of vehicle purchases are zero-emissions by 2027, excluding emergency response vehicles (California Advanced Clean Fleets Regulation) • Assessment of buildings and facilities by 2035	Metrics • # and % of EV fleet vehicles (City) • City employees mode share to work (City)
Funding	• BayREN • PG&E SGIP • PG&E On-bill financing • CEC Energy Conservation Assistance Act • FEMA	

Key Implementation Actions

Actions	Funding Available	Lead
Facilities Decarbonization		
Municipal building upgrades. Continue to prioritize the replacement of existing gas appliances with zero emission alternatives in City buildings when feasible.	Not funded	Public Works

Actions	Funding Available	Lead
Municipal building decarbonization roadmap. Prepare a municipal building and facility efficiency and electrification roadmap to prioritize buildings to minimize and eliminate, where possible, natural gas infrastructure, improve energy efficiency and resilient energy for new and renovated City buildings.	Not funded	Public Works
Municipal building audits. Conduct energy and water audits of high priority municipal buildings to identify and prioritize facility upgrades (e.g., decarbonization, resilient energy, and energy and water efficiency) opportunities in existing facilities and incorporate them into the Capital Improvement Program (CIP) by 2035.	Not funded	Sustainability; Public Works
New backup power systems at City facilities. Explore opportunities for new backup power systems at City facilities to be powered using carbon-free energy sources such as lithium-ion batteries or solar where feasible. Explore utilizing EV fleet bidirectional charging for back-up power where feasible.	Not funded	Public Works
Low-Global Warming Potential (GWP) refrigerants. • Enhance maintenance to reduce leakage of refrigerants in City facilities. • Transition away from high-GWP refrigerants in City facilities when purchasing products containing refrigerants. • Advocate for stricter state and federal standards to reduce refrigerant emissions.	Not funded	Sustainability; Public Works
Reduce water use at City facilities and parks. Retrofit plumbing fixtures to be low water use; install low-water use irrigation and plantings where appropriate; identify opportunities to install rainwater capture systems (i.e., rain barrels, cisterns, etc.), and utilize EBMUD's recycled water for landscape irrigation, when available.	Not funded	Public Works
Fleet Electrification		
ZEV Municipal Fleet. Continue to prioritize the purchase of ZEV City fleet vehicles in line with California's Advanced Clean Fleets Regulation.	Not funded	Public Works
Transportation Demand Management		
Establish City employee commute program. Conduct regular employee commute surveys and establish a data monitoring system that tracks reductions in employee single occupancy trips. Conduct focus groups with employees about their commutes and how to reduce single occupancy trips. Develop employee commute programs to reduce single occupancy commute trips, such as: • Implementing a transit pass reimbursement program for City employees. • Reducing or eliminating free employee parking at City facilities or establishing a parking cash-out program.	Not funded	Sustainability; Planning, Building & Transportation; Human Resources

Actions	Funding Available	Lead
• Implementing a carpool incentive and carpool group matching program. • Improving and/or expanding biking and walking infrastructure at City facilities such as secure bike racks, bike lockers, bike repair stands, E-bike hubs, and showers. • Prioritizing transit for work-related travel. • Creating an E-bike share program for City employees or incentivizing employee use of electric micromobility. • Partnering with local bike shops to create an employee bike voucher or reimbursement program.		

Community Activation and Education

Community education and awareness are crucial for promoting and inspiring climate action. Providing education helps people understand and address the impacts of the climate crisis, thereby empowering them with the knowledge, skills, values, and attitudes needed to act as agents of change. Resident and business owner input from a variety of geographic and socioeconomic identities allows policies and programs to be tailored to meet the needs of each type of community member.

CAE-1: Community Activation and Education

Description

The City will continue to collaborate with CASA, the Alameda Chamber of Commerce, and other partners to provide education around critical issues to allow the community to develop a better understanding of the benefits of certain greenhouse gas mitigation and resilience actions, increasing their likelihood of participating. Similarly, education around how to participate is equally valuable to empower community members to take action and change behaviors.

Likewise, a public engagement and education campaign can enhance procedural equity by ensuring all community members, particularly socially vulnerable populations, have access to information about climate change hazards and the programs available to them. Providing a mix of in-person, online, and meeting people where they are engagement opportunities can help to ensure equitable participation and access to information.

CAE-1 Summary Table

Strategy Type	Greenhouse Gas Reduction and Climate Resiliency
Responsible City Departments	• Primary: Sustainability • Secondary: AMP
GHG Reduction Potential	**Supporting** Not quantified. Although not quantitatively evaluated, supporting measures may achieve emissions reductions, produce co-benefits, and/or enhance the ability of quantified measures to reach expected reductions. This strategy strengthens the implementation of other strategies in the CARP.

Co-Benefits	• Supports co-benefits from other strategies • Improves equity outcomes	
Equity and Environmental Justice Considerations	Engagement materials, outreach, and activities regarding the implementation of these strategies should be accessible to the diverse communities of the city. Actions such as ensuring the deliverables are translated into Spanish and other prominent languages spoken in Alameda would ensure equitable engagement practices are part of the CARP. Partnering with organizations in Alameda that already have established relationships with socially vulnerable communities is key to effective implementation.	
Performance Targets and Metrics	Target • No targets established	Metrics • # of public workshops, events, and presentations by sustainability staff • # of email bulletins sent and average open rate • Unique page views on sustainability and resilience webpages
Funding	• Sustainable California Libraries Grant: https://www.library.ca.gov/grants/sustainability/	

Key Implementation Actions

Actions	Funding Available	Lead
Climate awareness and action program. Continue to collaborate with CASA, the Alameda Chamber of Commerce, AMP, and other community partners to implement a robust, ongoing climate awareness and action program, focused on reducing emissions, including consumption-based emissions, by residents, businesses, and contractors through educational events, media outreach, and other creative approaches. Program components include: • Highlighting a sustainable local business in every City newsletter and other communications including social media. • Providing information about sustainable local businesses and other consumption-related topics at relevant City counters and offices, such as the Permit Center and Mastick Senior Center. • Creating a module on the City's website that highlights resources (i.e., local "buy nothing" groups, thrift stores, donation centers, etc.) and local businesses to help Alameda residents reuse.	Partially funded	Sustainability; PIO
Youth engagement and partnership. Continue partnership with student clubs and organizations to empower students to be leaders in reducing greenhouse gas emissions, lowering energy consumption, and utilizing active transportation in their community through in-class education, guest presentations, internships, and other programs.	Partially funded	Sustainability

Actions	Funding Available	Lead
Socially vulnerable community partnerships. Continue to establish relationships and build partnerships with CBOs, faith-based organizations, and trusted partners within socially vulnerable communities. Develop a mini-training on the CARP and resources available to residents and businesses.	Partially funded	Sustainability

Future Actions for Consideration

Future actions for consideration if funding and staff resources become available.

- **Green job partnerships**. Develop partnerships with local trade associations, vocational programs, and community colleges to support workforce development in green jobs, such as for installers and building owners/operators to discuss the benefits and technical requirements of electrification.

Transportation

Land use and transportation coordination is a fundamental part of Alameda's plan to reach carbon neutrality. Transportation-related emissions are the largest contributor to community-wide emissions, accounting for 54% of total emissions. Land use and neighborhood design impacts where people travel, how far people go, and by what vehicle mode they make their trips. Compact, mixed-use neighborhoods encourage non-auto travel to meet daily needs.

Reducing transportation emissions to achieve the City's target will require investments in active transportation infrastructure, public transit coordination, transportation demand, and parking management programs that reduce single-occupancy vehicle travel, and investment in electric vehicle infrastructure. It also means prioritizing people, cyclists, micromobility, and transit modes over cars, guaranteeing these modes are safe, more convenient, and less costly to use, and creating a healthier and cleaner future.

T-1: Land Use and Transportation Coordination

Description

Alameda will manage land use change to support greenhouse gas reduction targets by focusing development in location-efficient places and creating complete neighborhoods and transit-oriented communities. Complete, mixed-use neighborhoods will allow residents to access most of their everyday needs within a short walk, bike, or transit trip. The City will manage a transportation system that improves mobility for everyone and reduces the amount of driving by using roadway and parking pricing, combined with financial incentives and regulations, to help activate and manage demand for safe, attractive, multimodal infrastructure.

T-1 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Planning, Building & Transportation
GHG Reduction Potential	**Moderate** Up to 30% reduction in transportation-related emissions for the community [3] Not quantified in 2019 CARP
Co-Benefits	• Reduces criteria pollutants and toxic emissions • Reduces traffic congestion and travel times
Equity and Environmental Justice Considerations	Socially vulnerable communities face higher burdens from environmental pollution, traffic collisions, and longer commutes. This strategy aims to coordinate land use and transportation decision-making to ensure a healthier and cleaner future. New development in existing socially vulnerable communities may increase displacement pressure.

[3] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Performance Targets and Metrics	Target • Reduce VMT per capita 25% below 2019 levels by 2030, and 30% below 2019 levels by 2045 (CA Scoping Plan 2022)	Metrics • VMT (Google Env. Insights Explorer)
Funding	• General Fund • Development Impact Fees	

Key Implementation Actions

Actions	Funding Available	Lead
Land use and transportation coordination. Support development that minimizes the need for single occupancy vehicles and facilitates the use of transit and active transportation.	Partially funded	Planning, Building, & Transportation
Existing plan implementation. These plans implement CARP's approach for land use and transportation coordination: • General Plan Land Use, Housing, and Mobility Elements • Zoning Code updates • TOD Zoning	Partially funded	Planning, Building, & Transportation

T-2: Active Transportation

Description

Foundational to meeting the City's GHG reduction targets and generating co-benefits is to redesign the City's streets around people rather than vehicles. Travel demand and parking management programs to shift travel mode from single-occupancy vehicle trips will be accompanied by improvements to the active transportation system, which creates a safe, integrated, and seamless network that encourages people of all ages and abilities to conveniently travel throughout the city.

T-2 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Planning, Building & Transportation; Public Works
GHG Reduction Potential	**Low** Up to 1,741 $MTCO_2e$ annual emissions (2019 CARP) Up to 1% reduction in transportation-related emissions for the community [4]

[4] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Co-Benefits	• Reduces criteria pollutants and toxic emissions • Reduces traffic congestion and travel times • Improves the health of Alameda residents • Increases redundancy and resilience of transportation system	
Equity and Environmental Justice Considerations	Complete streets improve health by making places where it is safe and comfortable to be healthy and active. Historically, socially vulnerable communities face higher burdens from traffic collisions with streets having a concentration of higher vehicle speeds. With an expanded and more reliable, accessible, and cost-effective transportation system, residents will decrease their percentage of trips made by a vehicle and increase their percentage of trips made by active transportation and public transportation. This decrease in vehicle miles traveled will reduce localized air pollution and improve health and quality of life for communities along high-volume roadways.	

Performance Targets and Metrics	Targets:
	• Construct 16.54 miles of bikeways from 2019 to 2030
	• 2030 (3-year average) trips to work mode split
	  ○ Walking = 4%
	  ○ Bicycling = 3.6% (2022 ATP)
		Metrics
		• Miles of bikeways constructed (ATP) (City)
		• Percent of bicycling and walking trips to work, and percent of drive alone trips to work (US Census ACS, City)
		• Bicycling and walking count trends on key streets (County, City)

Funding	• Development Impact Fees • Parking fee revenue fund • California State Parks Recreational Trails Program (RTP): https://www.parks.ca.gov/?page_id=24324 • Clean Mobility Options Pilot Program: https://cleanmobilityoptions.org/ • Transportation Development Act Article 3 (TDA 3): https://mtc.ca.gov/funding/regional-funding/tda-sta/bicycle-pedestrian-funds-tda-3	

Key Implementation Actions

Actions	Funding Available	Lead
Active transportation. Provide safe, comfortable, and accessible ways for people of all ages and all abilities to get around Alameda by walking, biking, or other active modes.	Partially funded	Public Works; Planning, Building & Transportation
Existing plan implementation. These plans implement CARP's approach to active transportation: • General Plan Mobility Element • Active Transportation Plan • Vision Zero Action Plan • Safe Routes to School • Education and events	Partially funded	Public Works; Planning, Building & Transportation
Safe Routes to School. Continue to support Safe Routes to School program and implement infrastructure improvements.	Partially funded	Public Works; Planning, Building & Transportation

T-3: Transportation Demand Management

Description

Transportation demand management (TDM) seeks to reduce single-occupancy vehicle (SOV) travel and shift trips to walking, biking, scootering, and transit. TDM is the use of strategies to inform and encourage travelers to maximize the efficiency of our transportation systems, leading to improved mobility, reduced congestion, and lower vehicle emissions. A key element of a comprehensive trip-reduction strategy for the CARP will be managing the parking supply (see T-4 for strategies to manage demand for existing parking supply). Strategies like TDM fees to fund transportation choices, parking maximums, unbundling, and shared parking reduce parking demand, minimize vehicle trips, optimize the use of the parking supply, and support walkable neighborhoods. Robust TDM programs represent some of the most important opportunities to reduce transportation-related emissions in Alameda.

T-3 Summary Table

Strategy Type	Greenhouse Gas Reduction	
Responsible City Departments	• Primary: Planning, Building & Transportation • Secondary: Base Reuse & Economic Development • Key Partner: Alameda Transportation Management Agency (TMA)	
GHG Reduction Potential	**Low to Moderate** Up to 17,307 MTCO2e annual emissions (2019 CARP) Up to 4% reduction in transportation-related emissions for the community [5]	
Co-benefits	• Reduces criteria pollutants and toxic emissions • Reduces traffic congestion and travel times • Improves the safety and health of Alameda residents • Facilitates economic development	
Equity and Environmental Justice Considerations	TDM programs help improve transportation alternatives to the car, more accurately reflect the cost of travel, reduce emissions, and may provide direct benefits such as financial savings and more affordable transportation options. Other equity considerations may include the accessibility of transit or active transportation in socially vulnerable communities and exploring a transportation benefits program for Alameda's low-income residents. Likewise, commercial tenants and market rate housing at Alameda Point and the Northern Waterfront could cover the cost of transit passes for affordable housing residents in those areas.	
Performance Targets and Metrics	Targets • 25% of Alamedans primarily telecommute	Metrics • Alameda TMA trips taken via supplied transit passes (Alameda TMA) • Percent of workers who primarily work from home (US Census ACS Table S0 801) • Mode share for all trips (Google Env. Insights Explorer)

[5] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Funding	• TDM Fees for new development • TDM Fees from Alameda Point tenants • TDM penalties • General Fund • Development impact fee • VMT impact fee

Key Implementation Actions

Actions	Funding Available	Lead
Evaluation of TDM ordinance. Regularly evaluate the existing TDM ordinance and Alameda TMA operations to ensure development projects achieve the required VMT reduction. Consider defining monitoring, reporting, and oversight requirements.	Partially funded	Planning, Transportation, Building
TMA Support and Coordination. Regularly coordinate with the Alameda TMA to facilitate smooth pass-through of TDM fees and financial projections and support Alameda TMA's budgeting and service planning efforts.	Partially funded	Base Reuse and Economic Development
TDM resources and materials. With Alameda TMA, create packages of TDM resources and educational materials for building owners / managers and employers that can be downloaded from the City or Alameda TMA website.	Partially funded	Alameda TMA

Future Actions for Consideration

Future actions for consideration if funding and staff resources become available.

- **Expand TDM program to existing businesses**. Partner with the Alameda Chamber of Commerce, CASA, and other organizations to identify funding mechanisms for adding voluntary TDM program for existing businesses.
- **TDM and parking management for schools.** Partner with the schools to voluntarily implement TDM plans and parking management strategies

T-4: Parking and Curb Management

Description

Proactive parking and curb management in the public right-of-way reduces automobile congestion by reducing double-parking and circling for parking. Parking pricing can also influence traveler mode choice such that people who are able may choose more sustainable modes like carpool, bus, or active transportation. Strategies include paid parking, demand-responsive parking pricing, and time limits, as well as color curb zones to facilitate loading, quick pick-ups, and disability access.

T-4 Summary Table

Strategy Type	Greenhouse Gas Reduction

Responsible City Departments	• Primary: Public Works • Secondary: Planning, Building & Transportation	
GHG Reduction Potential	**Low** Up to 30% reduction in transportation-related emissions for a plan. [6] Quantified as part of T1-T5 (2019 CARP)	
Co-benefits	• Reduces criteria pollutants and toxic emissions • Reduces traffic congestion and travel times • Improves traffic safety for people in commercial areas	
Equity and Environmental Justice Considerations	Parking and curb management programs help improve access to transportation alternatives to the car, more accurately reflect the cost of travel, reduce emissions, and may provide direct benefits such as more affordable transportation options through revenue generation and the prioritization of space for non-single-occupancy vehicles.	
Performance Targets and Metrics	Target • 85% parking occupancy (Parking Management Program / General Plan)	Metrics • Percent parking occupancy (City parking occupancy counts)
Funding	• General Fund • Parking Fund	

Key Implementation Actions

Actions	Funding Available	Lead
Implementation of existing plans and initiatives. These plans and initiatives implement CARP's approach to parking and curb management: • parking management program, including demand-based parking pricing and curb management strategies • General Plan • Transportation Choices Plan • Alameda Municipal Code • Alameda Point Transportation Management Plan • Ferry Terminal Parking Pricing Strategy	Partially funded	Planning, Building & Transportation
Manage and enforce parking regulations. Increase the City's capacity to effectively manage and enforce parking controls, including implementing demand-responsive parking pricing in commercial areas and collecting parking occupancy data where demand-responsive parking pricing is implemented.	Partially funded	Public Works

[6] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

T-5: Public Transit Service

Description

Robust regional and local transit service is critical to serving the needs of workers, residents, and visitors in Alameda. The city is served by the AC Transit, BART (via Fruitvale and Lake Meritt Stations in Oakland), and WETA.

To reduce the number of overall vehicle trips, investment in transit and shuttle service will be coordinated with complete street design improvements and amenity improvements at transit centers. Priority for transit on key streets, and strategies for coordination between transit agencies and other travel modes will improve connectivity and access for passengers using transit services.

T-5 Summary Table

Strategy Type	Greenhouse Gas Reduction	
Responsible City Departments	• Primary: Planning, Building & Transportation	
GHG Reduction Potential	**Low to Moderate** Up to 15% reduction in transportation-related emissions for a plan. [7] Quantified as part of TDM (2019 CARP)	
Co-benefits	• Reduces criteria pollutants and toxic emissions • Reduces traffic congestion and travel times • Improves the health of Alameda residents • Increases redundancy and resilience of transportation system	
Equity and Environmental Justice Considerations	Transit offers safe, affordable, timely, and convenient access to places and provides an essential service for lower-income people with limited mobility options. The prioritization of auto travel has created disparities in transit and car travel, safety considerations, and infrastructure that is inaccessible to people with disabilities. Further equity considerations may include the number of jobs held by low-income individuals and the need to access their destination in a timely manner which may include locations outside Alameda. Low-wage earners, such as restaurant employees, frequently need timely access to transportation on a different schedule than 9-5 commuters.	
Performance Targets and Metrics	Target • No targets established	Metrics • Public transportation ridership on routes serving Alameda (WETA, AC Transit, City, Water Shuttle) • Boardings using City of Alameda's Free Bus Pass Program for older adults and people with disabilities

[7] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Funding	• Sustainable Transportation Planning Grant: https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/regional-and-community-planning/sustainable-transportation-planning-grants

Key Implementation Actions

Actions	Funding Available	Lead
Public transit service. Support and advocate for regional transit agency improvements that make transit more accessible, affordable, and timely. Improve transit stops on City public right-of-way**.**	Partially funded	Planning, Building & Transportation
Bus pass program. Continue the free bus pass program for seniors and people with disabilities.	Funded	Alameda TMA
Existing plan implementation. These plans implement CARP's approach for public transit service and infrastructure: • Transportation Choices Plan • Support Link21 • Estuary Water Shuttle • Support WETA Electrification Plan	Partially funded	Planning, Building & Transportation

T-6: Vehicle Electrification

Description

State policy requires all light-duty vehicles sold in California to be zero emission vehicles (ZEV) starting in 2035 and in 2045 for mid and heavy-duty vehicles. Alameda will invest in expanding the network of charging infrastructure to promote the transition to zero-emission vehicles, incentivize ZEV purchases, and continue transitioning the City's fleet to zero-emission vehicles. Additionally, the City will support the adoption of scooters, e-bikes, neighborhood electric vehicles (i.e. e-golf carts), and similar electric micromobility.

T-6 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: AMP; Public Works • Secondary: Planning, Building & Transportation; Sustainability
GHG Reduction Potential	**High** Up to 20,484 $MTCO_2e$ annual emissions (2019 CARP) Up to ~100% reduction in on-road transportation-related emissions for the community when combined with 100% renewable energy from AMP. [8]

[8] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Co-benefits	• Reduces criteria pollutants and toxic emissions • Improves the health of Alameda residents	
Equity and Environmental Justice Considerations	Low-income and socially vulnerable communities face higher burdens from the transportation system, including environmental pollution, due partly to their adjacency to highways and high-volume roadways. Cleaner vehicles produce fewer emissions and help reduce the pollution burden. Equity considerations associated with vehicle electrification should also include charging "deserts", accessibility for those with disabilities, costs associated with installing charging infrastructure, and potential electric panel replacement costs. The implementation actions within this measure, such as identifying gaps in the EV charging infrastructure, address this equity consideration.	
Performance Targets and Metrics	Targets • 7,378 new ZEVs by 2030 such that 12% of all vehicles are ZEVs (390 new EVs per year) (2019 CARP) • 260 public EV chargers by 2030 (2019 CARP)	Metrics • ZEV Ownership (California Energy Commission) • Public EV Chargers (U.S. DOE) • Residential EV charger rebates and permits issued (AMP and City) • Used EV and E-bike rebates issued (AMP)
Funding	• Charging and Fueling Infrastructure Discretionary Grant (CFI) • NEVI • CALeVIP 2.0 • AMP • 25D Tax Credit • 30C Tax Credit • Low Carbon Fuel Standard Credits (LCFS)	

Key Implementation Actions

Actions	Funding Available	Lead
Community Engagement and Activation		
Public awareness and education. Continue public awareness campaigns in partnership with community-based organizations, including messaging tailored to specific communities, with the goal of educating residents and property owners about existing incentives/rebates and the health, economic, and environmental benefits of electric vehicles.	Partially funded	Sustainability
Rebates and incentives. Publicize existing financial incentives and rebate programs for electric micromobility for residents and businesses; and explore expanding future offerings to include neighborhood EVs.	Partially funded	Sustainability; AMP

Actions	Funding Available	Lead
Residential Neighborhoods		
EV charging development standards. During each building code update cycle, review and update EV charging requirements for new development and major renovations.	Partially funded	Planning, Building & Transportation
Expand publicly available ZEV charging infrastructure. Implement public ZEV charging infrastructure in the public right-of-way in the city's multi-family residential neighborhoods and in public parking lots with a focus on increasing access for renters and socially vulnerable communities.	Partially funded	Public Works; AMP
Residential curbside charging. Develop a strategy and policy guidance to increase access to home charging for residents without dedicated off-street parking by allowing private charging cords in the public right-of-way in residential areas when certain conditions are met.	Not funded	Public Works
Commercial		
Fuel station ZEV charging. Evaluate policy options for requiring new and major renovations of fuel stations to install ZEV charging infrastructure.	Not funded	Planning, Building & Transportation
Small Offroad Engines. Support the transition to zero emissions small off-road engines such as portable generators, lawn and garden equipment, and other outdoor power equipment in alignment with California Air Resources Board (CARB) regulations.	Partially funded	Public Works, ARPD

Future Actions for Consideration

Future actions for consideration if funding and staff resources become available.

- **Transfer ordinance.** Evaluate a property transfer, point-of-sale, or similar ordinance that could trigger an assessment of the building's electrical capacity for the installation of EV chargers.
- **Zero emissions delivery zone pilot.** Pilot a zero-emission delivery zone that encourages the deployment of types of light-duty ZEVs, such as electric cargo bikes and light electric trucks, curbside priority, and supportive charging infrastructure.
- **Food and service delivery pilot.** Facilitate a pilot program for the use of ZEVs and electric micromobility for delivery and meal delivery services.
- **ZEV charging for medium and heavy-duty vehicles.** Collaborate with businesses that own or are serviced by medium and heavy-duty vehicles to develop a strategy to phase in charging infrastructure.

Building Energy

Most building-related emissions are attributable to the existing building stock operations, which are much less efficient than new construction due to being built when building energy standards were less stringent or nonexistent. The three ways to reduce building-related emissions are energy efficiency, sustainable construction practices, and electrification. Decarbonizing existing building operations through electrification is critical to meeting emissions reduction goals. There are many challenges associated with improving the performance of existing buildings including costs, rental/ownership status and split incentives, and technological constraints.

BE-1: Existing Building Decarbonization

Description

Most building-related emissions are attributable to the existing building stock, which is generally less efficient than new construction due to being constructed to meet less stringent energy efficiency standards. Additionally, most existing buildings utilize natural gas for space and water heating, which generates more emissions than all-electric construction. Electrifying existing building operations, coupled with energy efficiency, is critical to meeting emissions reduction goals. Residential and nonresidential natural gas use accounts for 31% of Alameda's greenhouse gas emissions for space heating, water heating, clothes drying, and cooking.

Furthermore, Alameda is aligning with shifts in regional policy that are accelerating existing building decarbonization. The Bay Area Air Quality Management District (BAAQMD) updated Rules 9.4 and 9.6 to require the installation of zero-NOx space and water heating equipment beginning in 2027. [9] Similarly, California Air Resource Board (CARB) is developing statewide Zero Emission Space and Water Heater Standards. [10]

Alameda will continue its commitment to equitable decarbonization by:

- Building upon regional air quality standard implementation and building decarbonization efforts to improve the performance of, and decarbonize, existing residential and commercial buildings;
- Supporting the expansion of existing programs that upgrade properties to address energy efficiency, building maintenance, and health and safety concerns; and
- Prioritizing resources for socially vulnerable communities.

BE-1 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Planning, Building & Transportation; Sustainability • Secondary: Alameda Municipal Power
GHG Reduction Potential	**Medium – High** Up to 8,283 $MTCO_2e$ annual emissions (2019 CARP)

[9] More information and the specific rules can be found on BAAQMD's Rules 9-4 and 9-6 Building Appliances website: https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances.

[10] More information about CARB's rulemaking process can be found here: https://ww2.arb.ca.gov/our-work/programs/zero-emission-space-and-water-heater-standards.

	Up to ~100% reduction of GHG emissions for new electric appliances and boilers when combined with 100% renewable energy from AMP. [11]	
Co-benefits	• Improving indoor air quality • Improving safety • Reducing combustion by-products (such as nitrogen oxides NOx) that contribute to poor air quality • Reduced resource use, cost savings	
Equity and Environmental Justice Considerations	Many low-income residents cannot afford the additional costs of electrifying heating/cooling systems, water heaters, and appliances for cooking and drying. This measure aims to expand programs, like direct install programs, grant funding, rebates, incentives, and financing so the cost to make the energy transition is not passed on to lower-income residents, particularly if targeted within low-income and socially vulnerable communities. This is an important measure to reduce the funding gap for the decarbonization of existing buildings.	
Performance Targets and Metrics	Targets • Natural gas use is reduced by 12% by 2030 (2019 CARP) • 382 new electric heat pump water heaters by 2030 (2019 CARP) • 3,819 new electric dryers by 2030 (2019 CARP) • Reduce average indoor water use from 50 to 42 gallons per person per day by 2030 (EBMUD)	Metrics • Natural gas consumption by customer type (PG&E) • Electrification rebates and permits issued for heat pump water heaters, panel upgrades, and heat pump HVAC systems (AMP and City) • Home heating fuel (ACS Table B25040) • Average indoor water use per person per day (EBMUD)
Funding	• CEC Building Initiative for Low-Emissions Development (BUILD) • CEC Equitable Building Decarbonization Program • CEC Decarbonizing Heating, Ventilation, and Air Conditioning Systems in Large Buildings • CEC's Low-Income Home Energy Assistance Program (LIHEAP) and the Low-Income Weatherization Program • AMP and BayREN Home+ Rebates	

[11] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Key Implementation Actions

Actions	Funding Available	Lead
Existing plan implementation. Implement the Equitable Existing Buildings Decarbonization Plan	Partially funded	AMP; Sustainability
Community Education and Activation		
Community education and resources. Provide education materials, training, demonstrations, and educational events to educate residents and businesses about current incentive programs, benefits of electrification, and the process of transitioning to zero emission equipment and appliances.	Partially funded	AMP; Sustainability
Trade education. Support and educate local contractors about decarbonization options and work with local retailers (i.e. hardware stores, appliance stores, etc.) to publicize rebate and incentive programs.	Not funded	AMP; Sustainability
Water conservation practices. Partner with EBMUD to implement and evolve public education campaigns that highlight water conservation practices and promote and provide demonstrations of graywater and rainwater harvesting.	Not funded	Public Works; Sustainability
Rebates and Incentives		
Promote rebate and incentive programs. Partner with AMP, BayREN, and EBMUD to promote and implement customer programs for residential and commercial buildings**.** • Collaborate with AMP on electrification programs and energy efficiency education. • Work with BayREN on energy efficiency programs. • Educate residents and businesses about other local, state and federal rebates and incentives.	Partially funded	AMP; Sustainability; CASA
Permit streamlining. Continue to streamline and discount permit fees for electrification and water conservation related permits.	Partially funded	Planning, Building & Transportation
Existing Residential and Commercial Decarbonization		
Adopt policies to encourage electrification. Adopt policies and building code amendments that achieve higher energy performance in existing buildings and prepare for future regional and state regulations. • Explore policy options such as evaluations or upgrades to zero emission appliances at time of equipment replacement, time of property transfer, and/or time of permit. • Consider building energy benchmarking programs that require building owners to track and report energy usage and work towards improving their energy efficiency.	Fully funded	Planning, Building & Transportation; AMP

Actions	Funding Available	Lead
• Employ best practices for renter protections, so that energy retrofits are not used as a tool to displace, relocate, or harass tenants.		
Establish tracking mechanisms for electrification projects. Develop a process to track natural gas and electric appliance/system installations through building permits, rebates, local/regional sales, or other methods.	Partially funded	Planning, Building & Transportation; Sustainability
Support renters and low-income residents transition to zero emission buildings. • Partner with Alameda Housing Authority to identify funds to decarbonize their building portfolio. • Include energy efficiency and electrification upgrades as part of the City's Housing Rehabilitation Program. • Develop other pilot programs to support low-income residents and tenants to transition buildings appliances and equipment to zero emission. • Continue to explore and implement opportunities to provide support to Alameda's underserved communities to maintain energy affordability and access to electrification and energy efficiency upgrades.	Not funded	AMP; Sustainability; Housing and Human Services; Alameda Housing Authority
Refrigerants		
Refrigerant education. Publish guidelines for refrigerant management best practices in new and existing equipment to enhance compliance with state regulations banning hydrofluorocarbons (HFCs) from large new refrigeration installations starting in 2022 and requiring even lower emissions refrigerant alternatives by 2025.	Not funded	Sustainability; Base Reuse and Economic Development

Future Actions for Consideration

Future actions for consideration if funding and staff resources become available.

- **Refrigerant reporting requirements.** Support compliance with CARB regulations by establishing local reporting requirements to track local refrigerant usage and identify leaks.
- **Refrigerant audits.** Establish a technical assistance program to provide free audits, maintenance, and equipment replacement to food retail establishments and restaurants.

BE-2: New Construction Decarbonization

Description

New construction is governed by the California Building Standards Code and the California Green Building Standards Code (Title 24 Parts 6 and 11) or CALGreen, which include requirements for sustainable construction practices and energy performance in the following categories:

- Planning and design
- Energy efficiency
- Water efficiency and conservation
- Material conservation and resource efficiency
- Environmental quality

The California Building Standards Code is updated every three years to reflect industry best practices and increase the sustainability of new construction. Although Alameda already adopted an all-electric reach code for new construction, the City rescinded the code as a result of the "Berkeley Ruling" which nullified the all-electric reach code and directed staff to reevaluate Energy Policy and Conservation Act of 1975 (EPCA)-friendly policy options. [12]

BE-2 Summary Table

Strategy Type	Greenhouse Gas Reduction	
Responsible City Departments	• Primary: Planning, Building & Transportation • Secondary: Sustainability	
GHG Reduction Potential	**Low to Moderate** Up to 1,893 $MTCO_2e$ annual emissions (2019 CARP) Only new buildings would be subject to the reach code. The GHG reduction potential is low compared to other strategies (for instance, those that apply to existing buildings) because the number of new buildings is small in comparison, however on an individual building basis, the GHG reduction potential is significant over the lifespan of the building. Up to 100% reduction from baseline natural gas use for new construction. [13]	
Co-benefits	• Improving indoor air quality • Reducing combustion by-products such as nitrogen oxides NOx that contribute to poor outside air quality. • Reduced resource use, cost savings	
Equity and Environmental Justice Considerations	The extent of benefits accruing to low-income and socially vulnerable communities depends on the geographic distribution and type of new residential and commercial construction in the city, e.g., where new construction occurs. For new residential construction of below-market rate units, significant benefits would flow to low-income residents.	
Performance Targets and Metrics	Target • 2,727 all electric housing units (2019 CARP)	Metric • # of new all electric housing units (City)

[12] The Berkeley Ruling refers to the Ninth Circuit decision in California Restaurant Association v. City of Berkeley which holds that Berkeley's gas ban violates the U.S. Energy Policy & Conservation Act.
[13] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Funding	• CEC California Electric Homes Program (Building Initiative for Low-Emissions Development Program Phase 2 by Assembly Bill 137)

Key Implementation Actions

Actions	Funding Available	Lead
Community Education and Activation		
Community Resources. Partner with CASA to connect residents, businesses, architects, and contractors to building electrification resources and incentives provided by AMP, BayREN, and others through the city website, the planning counter, and outreach events.	Partially funded	Sustainability; AMP; CASA
New Construction Residential and Commercial		
Adopt policies to encourage electrification. Adopt policies and building code amendments that can be adopted as part of the 2025 and 2028 California Building Standards Code update that achieve higher energy performance in new buildings and prepare for future regional and state regulations, such as establishing energy performance standards, flexpath reach code options, or indoor air quality standards that are Energy Policy & Conservation Act friendly. The reach code may include ADUs, remodels, and tenant improvements of a certain size or dollar amount in addition to new construction.	Partially funded	Sustainability; Planning, Building & Transportation
Development checklist. Create a new development checklist to be required as part of the discretionary project review that includes all sustainability-related building requirements, in addition to the Green Infrastructure/stormwater treatment and design checklists	Not funded	Planning, Building & Transportation
Water conservation and efficiency. Adopt the CALGreen Tier 1 or 2 water efficiency and conservation requirements for new construction, additions, alterations, and remodels as part of the 2025 or 2028 California Building Standards Code update. Consider additional incentives or exceptions for affordable housing development.	Not funded	Sustainability; Planning, Building & Transportation

Future Actions for Consideration

Future actions for consideration if funding and staff resources become available.

- **Recycled materials.** Explore incentives and requirements for using a minimum amount of reused and salvaged local building materials in remodels and new construction.
- **Low-embodied carbon materials**. Determine which building materials have low-embodied carbon alternatives and are appropriate for the expected types of development projects in the city. Explore incentives using existing green building rating systems, including LEED and Living Building Challenge Red List as a resource.

Waste

Alameda residents and businesses consume many goods and services that originate inside and outside the City of Alameda, including food, clothing, vehicles, furniture, pharmaceuticals, cosmetics, packaging, electronics, entertainment, software, hardware, transportation services, building materials, tools, and short-lived and single-use plastic and paper commodities by the ton – many of which are difficult to recycle and/or compost. The extraction, processing, transport, distribution, sales, marketing, and disposal of these products represent the city's largest source of consumption-based greenhouse gas emissions. The more goods people in Alameda buy, the greater their relative emissions (i.e., the emissions resulting from their manufacture, transport, use, and disposal), and the greater the adverse effects of those expenditures.

Waste strategies and the City's Zero Waste Implementation Plan (ZWIP) aim to reduce overall resource demand, shift demand to lower-resource alternatives, and lower the material inputs for resources consumed. This plan couples traditional municipal roles, like solid waste diversion, with emerging roles, like facilitating a sharing economy.

W-1: Solid Waste Diversion

Description

Through Senate Bill (SB) 1383, State policy requires jurisdictions to divert 75% of organic materials from landfills by 2025 and increase the amount of edible food that can be donated to food recovery organizations. Diverting organic material, including food waste, is a crucial step to meeting long-term goals. Alameda will divert recyclables and organics from landfills in accordance with State targets and reduce greenhouse gas emissions related to landfilled waste through the implementation of the Zero Waste Implementation Plan.

W-1 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Public Works • Secondary: Sustainability
GHG Reduction Potential	**Moderate** Up to 3,416 MTCO2e annual emissions (2019 CARP)
Co-benefits	• Improves air quality • Reduces short-lived climate pollutants • Food justice
Equity and Environmental Justice Considerations	Food recovery programs that connect generators of edible food with organizations that supply food to those who are food insecure, can help address the food insecurity of Alameda residents, particularly for low-income households and socially vulnerable communities. Technical assistance can be prioritized for small businesses and low-income housing with the city to reduce the burden of implementation costs. Requirements could be phased in to allow businesses with fewer resources more time to achieve compliance.

Performance Targets and Metrics	Targets • 89% diversion rate (ZWIP) • 1.2 pounds of waste per day, per person	Metrics • Waste per person per day (ACI) • Disposed and diverted waste (ACI)
Funding	• CalRecycle SB 1383 Local Assistance Grant Program • CalRecycle Greenhouse Gas Reduction Loan Program • Franchise Fees	

Key Implementation Actions

Actions	Funding Available	Lead
Adopt and implement the Zero Waste Implementation Plan. Adopt and implement the Zero Waste Implementation Plan.	Partially funded	Public Works
Implementation of existing plans and ordinances. These plans implement CARP's approach for solid waste diversion, including: • Disposable Food Service Ware Reduction Law • Mandatory Recycling and Organics Collection Ordinance • Franchise Agreement with ACI	Partially funded	Public Works

W-2: Goods and Services

Description

All the goods and services that are brought into and used within Alameda have embedded emissions. They are made up of the emissions that were generated to source, produce, and transport those goods and services into the city. Their eventual disposal adds to the emissions generated from solid waste within the city. Because there is no global, national, or even local system to track consumption emissions, it can be difficult for consumers to make informed choices about the emissions embedded in the products they buy.

This strategy aims to encourage behavior change around purchasing and waste through education, highlighting local businesses and products, and partnerships and/or lobbying with other local agencies. There are many organizations operating in Alameda that work to foster a sharing and reuse economy within the community. For example, the Bay Area MakerFarm regularly hosts repair clinics and houses a compost hub, while Alameda Backyard Growers supports urban farming as well as promotes food resilience within the community through a food recovery program. Implementing the circular economy reduces the need to purchase new items and reduces the amount of trash that ends up producing methane in the landfill.

W-2 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Sustainability; Public Works • Secondary: Planning, Building & Transportation; Parks and Recreation

GHG Reduction Potential	**Low to Moderate** Not quantified. Although not quantitatively evaluated in the CARP, supporting measures may achieve emissions reductions, produce co-benefits, and/or enhance the ability of quantified measures to reach expected reductions.	
Co-benefits	• Resilience • Improved air quality and public health	
Equity and Environmental Justice Considerations	Messaging about consumption emissions tends to focus on consuming less, but many households struggle to meet their basic needs due to income or other reasons. Therefore, it is necessary to encourage community members to aim for a level of consumption that is socially just and environmentally safe. Cultivating a sharing economy among community members can foster a spirit of helping and supporting others. Though the intent is that residents of all income levels participate, this approach can benefit low-income households who cannot always afford to buy new items	
Performance Targets and Metrics	Target • No targets established	Metrics • Consumptive based emissions (UC Berkeley Cool California)
Funding	• Philanthropy • CalRecycle Grants	

Key Implementation Actions

Actions	Funding Available	Lead
Behavioral Change and Awareness		
Behavioral change and disposability of goods. Implement measures to cultivate behavior change around the disposability of goods. Such as: • Modify City procurement rules to more heavily weight proposals that include returnable/reusable packaging instead of plastic in competitive processes. Notify all current suppliers of the preference for returnable/reusable packaging instead of plastic. • Conduct a study of repair/reuse/share businesses in Alameda. Identify and implement strategies to support business retention and growth, with a focus on BIPOC-owned businesses. • Support neighborhood projects and programs that reduce the production and consumption of goods, including little libraries, repair clinics, and yard sales/exchanges. • Raise awareness for and support implementation of the California Responsible Textile Recovery Act (AB 707).	Not funded	Sustainability; Public Works
Studying and Measuring		
Measuring consumption emissions. Conduct community surveys needed to estimate consumption emissions.	Not funded	Sustainability

Study the most impactful goods and services. Conduct a study to understand the most impactful goods and services to reduce greenhouse gas emissions and publish it publicly. The study shall include an analysis of the local waste stream, an exploration of how to track and reduce microplastics, and an analysis of the services used most by residents (childcare, landscaping, mail, etc.).	Not funded	Sustainability; Public Works
Advocacy and Partnerships		
Greenhouse gas labeling and disclosure advocacy. Advocate for more robust extended produce responsibility policies and GHG content labeling statewide.	Partially funded	Sustainability
Local sharing economy. Partner with other agencies and local organizations to build participation in the local sharing economy, repairing, and secondhand goods. Promote resources on the City's social media platforms and website. This includes: • Partner with the Alameda Free Library to expand their existing lending library offerings (seeds, Pathway to Learning Kits, etc.) and publicize the library's services on City social media platforms and website. • Establish a tool lending library. • Promote and expand neighborhood hubs where tools and other larger items can be shared and/or exchanged. Explore options to deliver items that are too large to pick up. • Partner with an organization to host recurring Repair Fairs and workshops for the community to encourage reuse as a low-emission alternative to purchasing new goods. • Identify and support programs that train people to fix items.	Not funded	Sustainability; Parks and Recreation

Urban Greening

Alameda's natural and managed lands sequester carbon in the soil and plants, which absorb carbon dioxide in the atmosphere and store it as organic carbon through photosynthesis. [14] Climate change impacts such as extreme heat, drought, and wildfires degrade the health of those natural systems, which unfortunately impact landscapes' ability to sequester carbon. Healthy landscapes are also important to protect biodiversity and ecological connection, improve water quality, and improve public health by improving access to quality green space.

To meet the City's greenhouse gas reduction targets, the City will manage its parks and other open spaces in ways that support healthy soils and foster plants that can thrive in Alameda as the climate changes. This will ensure that Alameda's landscapes continue to reduce rather than emit GHGs.

UG-1: Urban Forestry

Description

Carbon sequestration is the long-term removal of carbon dioxide from the atmosphere into the earth's natural systems including trees, grasses, soils, and riparian areas, thereby slowing the accumulation of GHGs in the atmosphere. Carbon sequestration through the enhancement of natural systems provides many quality-of-life and resiliency co-benefits in addition to emissions reductions. For example, expanding the urban forest can help mitigate the urban heat island effect, improve air quality, provide traffic calming, and reduce energy use. Alameda will implement its Urban Forest Plan to increase tree canopy coverage by growing and maintaining the urban forest across all neighborhoods, particularly in socially vulnerable communities.

UG-1 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Public Works; Recreation and Parks • Secondary: Sustainability
GHG Reduction Potential	**Low** Sequesters up to 646 $MTCO_2e$ annually (2019 CARP) 0.0354 $MTCO_2e$ per tree per year (target of 3,500 new trees by 2030)
Co-benefits	• Mitigate urban heat island effects • Improve air quality and public health • Stormwater management and biodiversity
Equity and Environmental Justice Considerations	Historic patterns of development have created an inequitable distribution of tree canopy within the city. Increasing tree canopy in socially vulnerable communities creates benefits such as cooling, air quality improvements, and increased public safety. Together these factors also support active transportation by making it more comfortable to walk, wait for the bus, and bike to a destination. This especially helps households without

[14] CA Natural Resources Agency. 2022. Natural and Working Lands Climate Smart Strategy. Retrieved from: https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Expanding-Nature-Based-Solutions/CNRA-Report-2022---Final_Accessible.pdf.

	vehicles, youth, and older adults who can be more severely impacted by heat while traveling.	
Performance Targets and Metrics	Target • 3,500 new trees by 2030 (2019 CARP)	Metrics • Canopy coverage (City) • Net trees planted, including new trees planted and trees removed (City)
Funding	• ReLeaf • CalFire Urban and Community Forestry Grant Program • CNRA Environmental Enhancement and Mitigation Program • Bank of America Community Resilience Grant • CA Transportation Commission ATP (must demonstrate that greening benefits active transportation)	

Key Implementation Actions

Actions	Funding Available	Lead
Adopt and Implement the Urban Forest Plan. Adopt and implement the Urban Forest Plan.	Partially funded	Public Works

UG-2: Park and Open Space Management

Description

Several forms of carbon sequestration can be applied to open spaces, including planting trees, applying compost, reusing tree biomass as mulch, and restoring and protecting natural riparian areas and shorelines. The city will incorporate ecological principles and practices that enrich soils and increase carbon storage, while also increasing biodiversity, improving watersheds, and enhancing ecosystem services while aligning with the city's resilience goals. Alameda will manage open space, green space, riparian areas, and shoreline in a way that increases carbon sequestration, habitat connectivity, public access to nature, and resiliency benefits.

UG-2 Summary Table

Strategy Type	Greenhouse Gas Reduction
Responsible City Departments	• Primary: Public Works; Recreation and Parks • Secondary: Sustainability
GHG Reduction Potential	**Moderate** Sequesters up to 447 $MTCO_2e$ annually (Urban Forest Plan) There can be a variable reduction in emissions. [15]

[15] 2021. California Air Pollution Control Officers Association. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Retrieved from: https://www.caleemod.com/documents/handbook/full_handbook.pdf.

Co-benefits	• Resilience • Improved air quality and public health • Increased biodiversity	
Equity and Environmental Justice Considerations	Residents in socially vulnerable communities tend to have less access to quality open space. Studies have found a link between lack of access to open space in minority and low-income communities and increased rates of negative health outcomes (chronic disease, respiratory illness, lower life expectancy). [16] Protecting, expanding, and improving the quality of open space can provide increased opportunities for outdoor exercise, socializing, and other healthy activities. Greenspace can also create a cooling effect, which can make temperatures more comfortable in socially vulnerable communities where high amounts of impervious surfaces and lower tree canopy coverage are more common. Limiting the use of pesticides can also help reduce the exposure of gardeners, landscapers, and their families to dangerous pollutants and chemicals. [17]	
Performance Targets and Metrics	• Targets9,383 cubic yards (6471 tons) of recycled compost procured annually (SB 1383)	Metrics • Cubic yards of compost applied in public spaces (City) • Acres that have received green infrastructure treatment

Funding	• CA Wildlife Conservation Board grants
	  ○ Riparian Habitat Conservation Program
	  ○ Habitat Enhancement and Restoration
	  ○ Climate Adaptation and Resiliency
	• CNRA Environmental Enhancement and Mitigation Program
	• CA DWR Urban Stream Restoration Grants
	• CA Transportation Commission ATP (must demonstrate that greening benefits active transportation)	

Key Implementation Actions

Actions	Funding Available	Lead
Local and regional sequestration projects. Develop a policy that prioritizes local and regional carbon sequestration partnerships and projects.	Not funded	Public Works; Sustainability
Comply with SB 1383 Compost Requirements. Implement SB 1383 requirements to procure locally produced compost.	Partially funded	Public Works

[16] Yañezm E., Aboelata, M, & Bains, J. (2020). Park Equity, Life Expectancy, and Power Building Research Synopsis. Prevention Institute. https://preventioninstitute.org/sites/default/files/uploads/PI_Park_Equity_Research-Summary_092420_FINAL%20%281%29.pdf.
[17] The City has adopted an integrated pest management policy, which can be found here: https://www.alamedaca.gov/files/assets/public/v/1/publicworks/city-of-alameda-integrated-pest-management-policy.pdf.

Local composting. Continue partnerships to provide a community compost hub for residents to procure free locally produced compost. Provide public workshops and information on making and using compost.	Funded	Public Works
Compost application. Continue to apply compost on Alameda parks and open spaces and the former Doolittle landfill.	Funded	Public Works; ARPD
Open space management framework. Align Alameda public lands management with climate resilience goals as outlined in the LHMP and OAAC projects.	Not funded	Public Works; Sustainability
Urban greening projects. Support the development of urban greening projects in schoolyards, community centers, and neighborhoods utilizing California-friendly landscaping plants and methods and reducing non-functional turf.	Not funded	Sustainability
Green infrastructure. Implement the Green Infrastructure Plan.	Partially funded	Public Works

Local Hazard Mitigation Plan Summary

The CARP nests over the City's Local Hazard Mitigation Plan (LHMP), which is called the Adaptation and Hazard Mitigation Plan, the General Plan Safety Element, and a series of climate adaptation implementation programs nested within the Oakland Alameda Adaptation Committee (OAAC). This update process is structured to align those documents. The Resilience component of the CARP is now housed in the LHMP (Appendix 3).

Table 2 provides a summary of the updated climate hazards facing Alameda.

Table 2: Summary of Climate Hazard Analysis

Hazard	Likelihood	Consequence	Hazards of Concern
Earthquakes	Likely	Catastrophic	Hazards of Greatest Concern
Flooding	Likely	Moderate to Catastrophic	
Sea level rise	Likely	Catastrophic	
Coastal erosion	Likely	Moderate	Hazards of Concern
Groundwater rise	Likely	Moderate	
Tsunamis	Possible	Moderate to Catastrophic	
Heat	Likely	Moderate	
Drought	Likely	Moderate	
Wildfire-related hazards (smoky air, PSPS)	Likely	Moderate	
Dam breach inundation	Unlikely	Moderate	

Table 3 provides a summary of the updated adaptation and hazard mitigation strategies included in the LHMP.

Table 3: Updated Climate Adaptation and Hazard Mitigation Strategies

Strategy	Hazard(s) Addressed	Lead Department	Related Policy/ Plan
Buildings			
B1. Water Efficiency and Conservation. Minimize water use in existing and new construction and landscaped areas to make Alameda more resilient to drought and generate less wastewater.	Drought	Planning, Building & Transportation Public Works Recreation and Parks	General Plan Policy CC-16
B2. Rising Groundwater. Prepare for the impacts of rising groundwater levels on private and public property.	Groundwater	Planning, Building & Transportation Public Works	General Plan Policy CC-23, HS-35

Strategy	Hazard(s) Addressed	Lead Department	Related Policy/ Plan
B3. Seismic Retrofit for Private Buildings. Require owners of vulnerable structures, to the extent feasible, to retrofit existing structures to withstand earthquake ground shaking, and require retrofitting when such structures are substantially rehabilitated or remodeled	Earthquake Ground Shaking Earthquake Liquefaction	Planning, Building & Transportation	General Plan Policy HS-13, Municipal Code Section 13-80.1 to 13-80.16 and 13-70.1 to 13-70.6
B4. Flood Insurance. Continue the City's participation in the National Flood Insurance Program and the Community Rating System as a Class 8 community. Maintain Alameda's Community Rating to reduce flood insurance costs.	Flooding Sea Level Rise	Public Works	General Plan Policy HS-14, Municipal Code Section XX - Floodplain Management
B5. Design for Flooding. Implement programs and amend regulations to require and incentivize flood-proofing retrofits to existing buildings in flood-prone areas and require all new development to raise finished floor elevations and design for sea level and associated groundwater rise based on the most current regional projections.	Flooding Sea Level Rise Groundwater	Planning, Building & Transportation	General Plan Policies HS-19, HS-22, LU-30, CC-20, CARP
B6. Building Codes. Maintain up to date building codes and adopt new codes as needed to improve building safety and reoccupancy in an earthquake, fire, flood or other disaster.	Earthquake Caused Fires Earthquake Ground Shaking Flooding	Planning, Building & Transportation	General Plan Policy HS-10, HS-29
B7. Fire Prevention in Existing Properties. Encourage existing properties to minimize the risks of fire and include adequate provisions for emergency access and appropriate firefighting equipment.	Earthquake Caused Fires	Fire	General Plan Policy HS-29
B8. Cool/Green Buildings. Incentivize and consider requiring the installation of cool roofs, green roofs, and/or other energy-efficient cool building methods to mitigate heat impacts and reduce runoff.	Heat	Planning, Building & Transportation	General Plan Policy CC-34
B9. Sea Level Rise Protection. Reduce the potential for property damage and loss, and loss of natural habitat resulting from sea level rise.	Flooding Sea Level Rise	Planning, Building & Transportation Public Works	General Plan Policy CC-19
Infrastructure			
I1. Critical Public Assets. Ensure resilience and long-term functionality of critical public assets threatened by earthquakes, sea level rise or rising groundwater.	Earthquake Ground Shaking Liquefaction Flooding Sea Level Rise	Public Works AMP	General Plan Policy CC-22 and HS-12

Strategy	Hazard(s) Addressed	Lead Department	Related Policy/ Plan
I2. Stormwater Detention. Design street rights-of-way, parks, other public spaces, street trees and landscaping to be resilient to temporary flooding and to serve as temporary water detention sites where feasible.	Flooding Sea Level Rise	Public Works	General Plan Policy CC-24, HS-19, HS-22
I3. Urban Forest. Maintain and expand the number of trees in Alameda on public and private property to improve public health, reduce pollution, and reduce heat island effects.	Heat	Public Works Recreation and Parks	General Plan Policy CC-26, CARP
I4. Lagoons. Continue to preserve and maintain the lagoons as natural habitat as well as an integral component of the City's green infrastructure network and flood control system.	Flooding	Public Works	General Plan Policy CC-32
I5. On-Island Generation. Support development of on-island solar power generation and wind power.	Earthquake Ground Shaking Wind/Storms	AMP	General Plan Policy CC-4, CC-14
I6. Public Infrastructure Priorities. Identify public transportation, streets, electric facilities, stormwater and wastewater facilities, open space, shoreline assets, and other public assets vulnerable to sea level and groundwater rise and flooding hazards and prioritize projects for adaptation funding, including strategies for Location-Based Priority Flooding (Tables 5-1 to 5-15).	Earthquake Ground Shaking Flooding Liquefaction Sea Level Rise	Planning, Building & Transportation Public Works	General Plan Policy HS-17, CARP
I7. Green Infrastructure. Implement the 2019 City of Alameda Green Infrastructure Plan to increase and incorporate areas for green infrastructure in Alameda to help infiltrate stormwater and reduce street flooding. Green infrastructure can be implemented and designed in pre-existing infrastructure plans or new development plans.	Flooding Sea Level Rise	Public Works Planning, Building & Transportation	General Plan Policy HS-23, CARP
I8. Underground Utilities. Continue to replace overhead electrical power lines with underground lines and require new development to underground power lines to improve the safety and reliability of the power grid and minimize disruption by fire or other natural disasters.	Earthquake Caused Fires	AMP	General Plan Policy HS-30, Underground Utility District Policy

Strategy	Hazard(s) Addressed	Lead Department	Related Policy/ Plan
I9. Lifeline Standard Estuary Crossing. Work with Caltrans, Alameda County, and other regional agencies to retrofit and improve at least one estuary crossing to meet a lifeline standard to ensure access to the larger region for emergency access, equipment supplies, and disaster response and recovery shortly after a major seismic event.	Earthquake Ground Shaking Liquefaction	Public Works	General Plan Policy HS-11
I10. Emergency Firefighting Water Supply. Create an emergency water supply system to ensure sufficient firefighting capabilities after an earthquake or large emergency.	Earthquake Caused Fires	Fire	
Land Use			
L1. Land Development. Require that new development include onsite stormwater detention, reduce the potential for property damage, and loss of natural habitat, which results from groundwater and sea level rise.	Sea Level Rise	Planning, Building & Transportation	General Plan Policy HS-35, CC-20
Emergency Response			
E1. Heat and Wildfire Smoke Emergencies. Create a network of clean air and cooling emergency shelters throughout Alameda.	Heat Wildfire Smoke	Library Public Works Recreation and Parks	General Plan Policy CC-25, CARP, Emergency Operations Plan
E2. Emergency Preparedness. Maintain emergency management and disaster preparedness as a top City priority.	All Hazards	Fire	General Plan Policy HS-1
E3. Tsunami Preparedness. Prepare Alameda for tsunamis and prepare for a timely evacuation with a focus of access and functional needs populations.	Tsunamis	Fire Planning, Building & Transportation	General Plan Policy HS-20
E4. Emergency Coordination. Coordinate local emergency preparedness efforts with local, state and federal partners in preparation for natural and man-made disasters and ensure that the City's disaster response communication technologies are compatible with other agency communication technologies.	All Hazards	Fire	General Plan Policy HS-3
E5. Wildfire Smoke. Prepare for future wildfire smoke events.	Wildfire Smoke	Fire	General Plan Policy HS-61

Strategy	Hazard(s) Addressed	Lead Department	Related Policy/ Plan
E6. Emergency Response and Disaster Preparedness. Preserve access for emergency response vehicles to people and property and for evacuation.	Earthquake Ground Shaking Liquefaction Tsunamis	Planning, Building & Transportation Public Works	General Plan Policy ME-9
Communication, Community, and Coordination			
C1. Public Communication. Maintain and promote community programs to train volunteers, support vulnerable community members like seniors and individuals with disabilities, coordinate with food banks and other local aid organizations, and assist police, fire, and civil defense personnel during and after a major earthquake, fire, or flood.	All Hazards	City Manager's Office Fire Police	General Plan Policy HS-4, Emergency Operations Plan
C2. Air Quality Alerts. Continue to partner with BAAQMD to enhance awareness of air quality index alerts and related outreach and education to protect the health of residents.	Wildfire Smoke	Fire	General Plan Policy HS-65
C3. Regional Partnerships. Actively participate in regional discussions on groundwater and sea level rise mitigation, infrastructure improvements, and adaptation strategies.	Drought Sea Level Rise	City Manager's Office Planning, Building & Transportation Public Works	General Plan Policy HS-16
C4. Collaboration. Work collaboratively with other jurisdictions and agencies to reduce fire hazards in Alameda, such as post-earthquake fire hazards, with an emphasis on mutual aid agreements.	Earthquake Caused Fires	Fire	General Plan Policy HS-27
C5. Neighborhood Resilience Coordination. Consider piloting building electrification, water conservation and other climate initiatives at a block or neighborhood level to more cost effectively transition to climate friendly energy, water, and resource use.	All Hazards	City Manager's Office	General Plan Policy CC-15
C6. Social Vulnerability. Prioritize the needs of frontline communities when prioritizing public investments and improvements to address climate change.	All Hazards	All Departments	General Plan Policy CC-2
Studies and Plans			

Strategy	Hazard(s) Addressed	Lead Department	Related Policy/ Plan
S1. Long-Term Adaptation Plan. Develop a long-term adaptation plan that includes additional vulnerability studies as needed, economic analysis, groundwater rise studies and other data collection as needed to identify the range of shoreline protection, groundwater management and adaptation strategies over time from short- to long-term as well as land use, building and infrastructure design standards needed to help Alameda adapt to rising sea and groundwater levels.	Sea Level Rise	City Manager's Office Community and Economic Development Planning, Building & Transportation Public Works	General Plan Policy CC-21, CARP
S2. Rising Groundwater. Prepare for the impacts of rising groundwater levels on private and public property.	Groundwater Sea Level Rise	City Manager's Office Planning, Building & Transportation Public Works	General Plan Policy CC-23, HS-24, Groundwater Study
S3. Flood Hazard Maps. Prioritize the review and publishing for public discussion the latest and most up to date flood hazard and sea level rise forecasts from all trusted sources.	Flooding	Planning, Building & Transportation	General Plan Policy HS-15

Figure 6 summarizes the specific strategies for location-based priority flooding that are detailed in Tables 5-1 through 5-16 in the LHMP.

Figure 6: Strategies for Location-based Flooding (LHMP Tables 5-1 to 5-16)

What Comes Next

CARP Implementation and Tracking

The City will continue to implement the CARP based on the reworked frameworks provided as the GHG Action Plans and new LHMP. The City has committed to continue tracking the progress and efficacy of the CARP by conducting GHG inventories every 2-3 years, next in 2026.

Along with the 2024 Annual Report that highlights CARP implementation progress and successes, and the 2025 CARP priority workplan, the City will develop an online dashboard to track CARP implementation and communicate progress to the community and other stakeholders.

2030 and Beyond

Beginning in 2030, the CARP and LHMP revision cycles will be aligned. Both documents will be updated in concert and combined into one document. The combined document will update the climate action and resilience components to reflect changes in local conditions, progress made by the community toward climate goals, new State and Federal legislation, and advancements in related technologies.

Appendix 1: 2019 CARP Update Crosswalk

This table highlights the alignment between the CARP Update strategies and key actions and the original 2019 CARP.

CARP Focus Area	Strategy	Key Actions	2019 CARP Strategy Alignment
City Leadership	**CL-1: City Leadership**. Ensure all employees have the resources and knowledge to support climate goals. Monitor and report on CARP implementation progress to be transparent with the public, measure impact, align with funding opportunities and other city planning efforts, and reevaluate as needed.	• Continue interdepartmental Green Team meetings • Education and training for city staff • Annual reporting and data collection • Regularly update GHG inventory • Continue to attract and support green and blue tech businesses to locate in Alameda	• None
City Leadership	**CL-2: Clean Energy Purchase and Generation.** Electricity consumed by all residential and commercial users in Alameda is from 100% clean energy sources by 2020 (existing commitment).	• AMP to continue to purchase 100% clean electricity • AMP to continue to maintain affordable electric rates • Encourage local solar generation	• Existing commitment: AMP to provide electricity to all customers in Alameda from 100% clean energy sources by 2020. • E5. promote distributed generation (rooftop solar)* (complete)
City Leadership	**CL-3: City Facilities and Operations.** Implement policies and programs to reduce emissions associated with City facilities and operations.	• Continue to prioritize the purchase of zero emission fleet vehicles • Minimize and eliminate where possible natural gas infrastructure for new and renovated City buildings • Evaluate existing municipal buildings and take actions to switch to climate-friendly refrigerants, reduce water consumption, and electrify new and existing facilities • Conduct regular City employee commute surveys and explore city employee commute programs • Modify city procurement standards to reduce waste	• None
Community Activation and Education	**CAE-1: Community Activation and Education.** Educate the community about anticipated near- and long-term climate impacts, community vulnerabilities, opportunities for adaptation, and opportunities for GHG mitigation with the intent to	• Partner with community- and faith-based organizations and engage youth to raise community awareness and inspire climate action • Encourage behavior change around purchasing to reduce waste	• None

CARP Focus Area	Strategy	Key Actions	2019 CARP Strategy Alignment
	activate residents, businesses, and community partners.		
Transportation	**T-1: Land Use and Transportation Coordination.** Support development that minimizes the need for single occupancy vehicles and facilitates the use of transit and active transportation.	• Implement General Plan Land Use, Housing, and Mobility Elements • Update zoning codes to reflect General Plan	• None
Transportation	**T-2: Active Transportation.** Provide safe, comfortable, and accessible ways for people of all ages and all abilities to get around Alameda by walking, biking, or other active modes.	• Implement Active Transportation Plan, Vision Zero Action Plan, and General Plan Mobility Element • Continue to support Safe Routes to Schools program and implement infrastructure improvements	• Existing commitment Implement the TCP • T2. Build additional bike lanes • T3. Traffic signal synchronization (complete/removed)
Transportation	**T-3: Motor Vehicle Trip Reduction.** Reduce single occupancy vehicle (SOV) travel and shift trips to walking, biking, scootering and transit by informing and encouraging travelers to maximize the efficiency of our transportation systems leading to improved mobility, reduced congestion, and lower vehicle emissions.	• Regularly evaluate the TDM ordinance and Alameda TMA operations to ensure VMT reduction. • Regularly coordinate with the Alameda TMA to facilitate smooth pass-through of TDM fees. • Create packages of TDM resources and educational materials for building owners / managers and employers	• Existing commitment to implement the TCP • T1. Reduce commute VMT • T4. Expand EasyPass program
Transportation	**T-4: Parking and Curb Management.** Proactively manage public parking to lower VMT and greenhouse gas emissions. Regularly update vehicular, bike, EV, carshare, and other parking standards in the Zoning Code to lower VMT and greenhouse gas emissions.	• Continue to implement parking management program, General Plan, Transportation Choices Plan, Alameda Municipal Code, Alameda Point Transportation Management Plan and Ferry Terminal Parking Pricing Strategy. • Increase the City's capacity to effectively manage and enforce parking demand.	• Existing commitment to Implement the TCP
Transportation	**T-5: Public Transit Service.** Support and advocate for regional transit agency improvements that make transit more accessible, affordable, and timely. Improve transit stops on City public right-of-way.	• Implement Transportation Choices Plan • Support Link21 • Continue the free bus pass program for seniors and people with disabilities • Continue the Estuary Water Shuttle	• Existing commitment to Implement the TCP

CARP Focus Area	Strategy	Key Actions	2019 CARP Strategy Alignment
Transportation	**T-6: Vehicle Electrification.** Increase the adoption of zero-emission vehicles and electric micromobility options and increase the availability of EV charging stations citywide.	• Continue public awareness efforts and provide educational resources to encourage EV ownership • Publicize financial incentives and rebates programs • Expand publicly available EV charging infrastructure in public parking lots and public right of way • Explore supporting residential curbside charging • Continually update parking standards in the Building/Zoning Code • Update City Charter to allow enforcement of EV parking zones • Support WETA Electrification Plan	• Existing commitment to implement the TCP • T6. Increase availability of EV charging stations citywide • T7. Promote purchase of LEVs and ZEVs • T8. Continue programs to encourage new EV purchases. • T9. Continue to encourage businesses to install EV charging stations. • T10. Electrify City's fleet
Buildings and Energy	**BE-1: Existing Building Decarbonization.** Improve the performance of and decarbonize existing residential, commercial, and municipal buildings and facilities throughout the city to align with the Equitable Decarbonization Plan and regional air quality and water conservation standards.	• Implement the Existing Building Decarbonization Plan. • Connect residents, businesses, architects, and contractors to building, energy, and water conservation resources and incentives provided by AMP, BayREN, EBMUD and others. • Continue to streamline and discount permit fees for electrification permits. • Adopt policies and building code amendments that require higher energy performance in existing buildings and prepare for future State electrification regulations. • Identify additional funding to support building decarbonization programs. • Educate businesses and contractors about low-GWP refrigerant alternatives.	• E1. "Fuel switch" in existing buildings. • E3. Programs to encourage fuel switching in certain appliances. • E6. Draft zoning code amendment to facilitate reduction in energy use (complete/removed)
Buildings and Energy	**BE-2: New Construction Decarbonization.** Adopt Energy Policy & Conservation Act (EPCA)-friendly reach codes that decarbonize residential and nonresidential new construction and encourage the use of recycled and low embodied carbon materials, renewable energy,	• Connect residents, businesses, architects, and contractors to building energy resources and incentives provided by AMP, BayREN, and others. • Adopt policies that require higher energy performance for new construction that meet federal standards.	• E2. Electrification of new residential construction • E4. Green roof installations on new developments at Alameda Point

CARP Focus Area	Strategy	Key Actions	2019 CARP Strategy Alignment
	efficient design, and align with the Equitable Building Decarbonization Plan.	• Develop a new development checklist that includes all sustainability-related building requirements.	
Waste	**W-1: Solid Waste Diversion.** Divert recyclables and organics from landfills in accordance with State targets and reduce greenhouse gas emissions related to landfilled waste through the implementation of the Zero Waste Implementation Plan.	• Adopt and implement the 2024 Zero Waste Implementation Plan	• Existing commitment to implement the ZWIP Update
Waste	**W-2: Goods and Services.** Encourage behavior change around purchasing to reduce waste through education, highlighting local businesses and products, and partnerships and/or lobbying with other local agencies.	• Work with community-based organizations to encourage behavior change around the disposability of goods • Encourage a local sharing and repair economy • Measure consumption-based emissions • Partner with community organizations to support fixit clinics • Implement a tool lending library	• None
Urban Greening	**UG-1: Urban Forestry.** Implement the Urban Forest Plan to increase tree canopy coverage by growing and maintaining the urban forest across all neighborhoods, particularly in socially vulnerable communities.	• Adopt and implement the Urban Forest Plan	• Existing commitment Plant 3,500 new trees. • S2. Further develop urban forest.
Urban Greening	**UG-2: Open Space and Greenbelts.** Expand and manage open space, greenbelts and natural stormwater treatments such as bioretention basins or rain gardens to increase carbon sequestration, habitat connectivity, public access to nature, and flood and heat island reductions.	• Implement SB 1383 requirements to procure locally produced compost • Apply compost on Alameda's parks and open spaces • Continue partnerships to provide a free community compost hub and educate residents about producing and using compost • Support development of urban greening projects in schoolyards, community centers, and neighborhoods • Implement the Green Infrastructure Plan • Align Alameda public lands management with climate resilience goals as outlined in the LHMP and OAAC projects	• S1. Apply compost to Alameda parks and open spaces.

Appendix 2: 2022 Alameda GHG Inventory

Alameda CARP 2022 Greenhouse Gas Emissions Inventory

Introduction

This greenhouse gas (GHG) emissions inventory provides an overview of Alameda's current emissions and helps guide future greenhouse gas reduction and carbon sequestration policy. It includes emissions by sector (building energy use, on-road and off-road transportation, solid waste, and water and wastewater) that were emitted communitywide in 2022. Municipal emissions were not inventoried separately but are included in the community inventory. Additionally, the inventory does not include consumption-based emissions.

This report presents a summary of Alameda's 2005-2015 GHG emissions and details the 2022 data year community GHG inventory completed in 2024. It also provides an updated GHG emissions forecast for 2025-2045.

Key Findings

- **2022 GHG emissions decreased 29% compared to baseline year 2005 despite population and job increases.** Total emissions in 2022 are estimated to be 267,894 metric tons of carbon dioxide equivalent ($MTCO_2e$), a 29% decrease as compared to 2005 emissions of 375,590 $MTCO_2e$. 2022 per capita emissions are estimated to be 3.5 $MTCO_2e$ and 2.4 $MTCO_2e$ per service population. [18]
- **Energy emissions decreased 40% compared to baseline year 2005.** Total residential energy emissions decreased 32% and total nonresidential emissions decreased 52% as compared to 2005. Moreover, electricity emissions decreased 100% as a result of Alameda Municipal Power (AMP) providing 100% carbon-free electricity starting in 2020.
- **Transportation emissions decreased 25% compared to baseline year 2005.** The main drivers of transportation emissions reductions are cleaner vehicles, e.g., more hybrid and electric vehicles (EVs) on the road, more efficient off-road equipment, and a 6% reduction in vehicle miles travelled (VMT).
- **Although emissions have declined, the proportion of emissions by sector has remained fairly constant.** In 2022, transportation related emissions were the largest sector, accounting for 62%, followed by building energy use (natural gas) accounting for 31%, while solid waste and water accounted for 4% and 2% respectively.
- **Emissions will continue to decrease as a result of State policies, but not enough to meet CARP targets without local measures**. Projected emissions, adjusted for State policy, are estimated to decrease an additional 10% from 2022 to 2030. To meet CARP targets, an additional 11% emissions reduction is needed from local policies.
- **Consumption-based emissions totaled approximately 1.1 million $MTCO_2e$ in 2015**. This estimate is about 267% higher than the traditional activity-based emissions approach for Alameda in the same year. The difference is largely due to the inclusion of activities within *and* outside city limits, including air travel, imported foods and goods, services, and construction. [19]

[18] Service population is defined as the population and number of jobs within the city.
[19] Consumption-based emissions estimates for the City of Alameda derived from UC Berkeley Cool Climate Network (2015). Accessed from: https://coolclimate.berkeley.edu/inventory.

Protocol and Emissions Sources

The inventory was developed based on the International Council for Local Environmental Initiative (ICLEI) U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) principles, [20] in addition to the 2022 Climate Change Scoping Plan released by the California Air Resources Board (CARB). [21] A minimum set of five "Basic Emissions Generating Activities," also known as sectors, should be included in the GHG emissions inventory, which includes: community electricity use, use of fuel in residential and commercial stationary combustion equipment, generation of solid waste by the community, on-road passenger and freight motor vehicle travel, and the use of energy in potable water and wastewater treatment and distribution. The City of Alameda also started tracking carbon sequestration in 2015 from the City's existing tree canopy which is also included in this inventory.

Table 1: GHG Emissions Sources and Scopes

Sector in 2022 GHG Inventory	GHG Emissions Source	Emissions Scope
Energy	Natural Gas (buildings and other facilities)	Scope 1
	Electricity (buildings and other facilities, vehicles, and water delivery/treatment	Scopes 1 and 2
Transportation	All trips	Scopes 1, 2, and 3
Solid Waste	Community waste generation and direct landfill emissions	Scopes 1 and 3
Water and Wastewater	Water use	Scope 3
	Water treatment	Scope 3
Sequestration	Forest land and trees	N/A

Greenhouse Gas Emissions Reduction Target

In 2008, Alameda City Council adopted a resolution to set a citywide greenhouse gas reduction goal of 25% below 2005 baseline levels by 2020. This goal was in line with California's Assembly Bill (AB) 32 goal, a statewide target to reduce emissions to 1990 levels by 2020. AB 32 was replaced by California Senate Bill (SB) 32's goal for reducing emissions by 40% below 1990 levels by 2030. Alameda's 2019 Climate Action and Resiliency Plan (CARP) set a new goal of reducing emissions by 50% below 2005 levels by 2030 and becoming carbon neutral as soon as possible. This is in line with the State's goal of achieving carbon neutrality by 2045.

[20] ICLEI. (2014). Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Accessed from: https://ghgprotocol.org/ghg-protocol-cities.

[21] CARB. (2022) 2022 Scoping Plan for Achieving Carbon Neutrality. Accessed from: https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

2005 – 2015 Communitywide Emissions Summary

The communitywide GHG emissions inventory for Alameda captures the primary sources of emissions that can be reduced through local and regional government actions. This includes energy use in homes, businesses, vehicles, off-road equipment; emissions from treating and delivering water and emissions from materials that are thrown away. The activity data is collected from service providers, local utilities, and regional and state agencies. Alameda uses the inventory to better understand emissions sources and trends and track progress towards meeting the CARP's targets. The 2005 emissions inventory is the baseline year from which subsequent inventories track progress.

Baseline 2005 Community Inventory

The City of Alameda's total 2005 GHG emissions are reinventoried to be375,590 $MTCO_2e$. [22] The inventory included building energy use (residential and commercial electricity and natural gas), transportation (on-road and off-road [23]), solid waste, and water. It also included a sequestration credit of 11,213 $MTCO_2e$. Based on new data, the sequestration credit for inventory years 2005-2022 has been revised to 3,270 $MTCO_2e$ resulting in a new 2005 baseline total of 375,590 $MTCO_2e$. Of the six sectors, on-road transportation accounted for the largest amount of GHG emissions with an estimated emissions of 195,201 $MTCO_2e$, or 52% of total emissions. The second largest was residential energy with estimated emissions of 84,325 $MTCO_2e$, or 22% of total emissions. The remaining 26% of emissions were made up by commercial energy use, solid waste, off-road transportation, and water and wastewater.

2010 and 2005 inventoried the same sectors. Total emissions and the breakdown by sector for inventory years 2005-2015 are summarized in table 2.

Table 2: Total Annual Community GHG Emissions (2005-2015)

Sector	2005 Total ($MTCO_2e$)	2005 Percent of Total	2010 Total ($MTCO_2e$)	2010 Percent of Total	2015 Total ($MTCO_2e$)	2015 Percent of Total
Residential Energy	84,325	22%	82,700	22%	95,446	23%
Nonresidential Energy	57,747	15%	58,993	16%	97,995	23%
On-road Transportation	195,201	52%	188,122	51%	185,202	44%
Off-road Transportation	26,981	7%	28,962	8%	32,418	8%
Solid Waste	12,426	3%	10,367	3%	6,951	2%
Water/Wastewater	2,180	0.6%	2,156	0.6%	3,207	0.8%

[22] 2005-2015 GHG inventories provided by the City of Alameda as part of the 2015 Community-Wide Greenhouse Gas Inventory and Projection to 2020 Goal prepared by Sustainable Analysis, LLC. in 2018.
[23] The off-road transportation sector includes lawn and garden, recreational, construction, and industrial equipment.

Sequestration	(3,270)	-	(3,270)	-	(3,270)	-
Total	**375,590**		**368,030**		**417,949**	

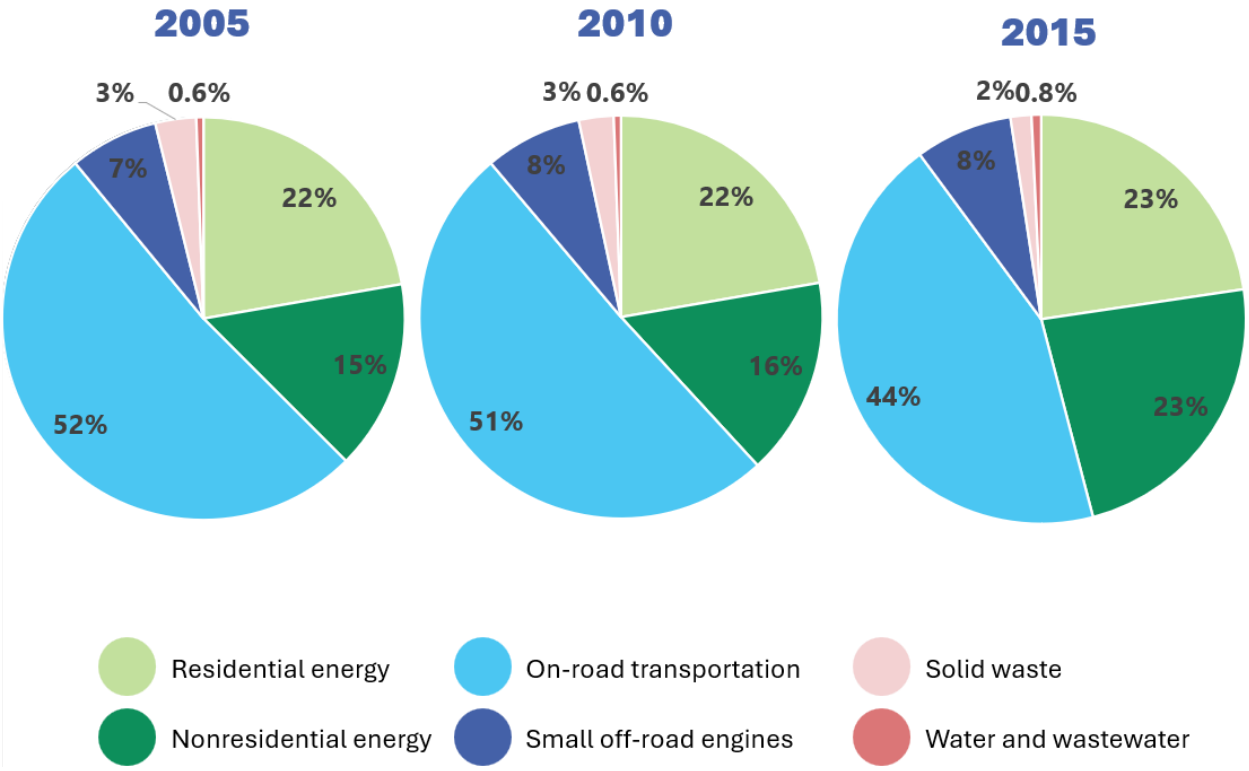
Emissions Trends 2005 to 2015

Between 2005 to 2015, Alameda's emissions increased by 42,359 $MTCO_2e$, about 10%. The service population, which is the sum of population and jobs in the city, grew from 91,153 in 2005 to 112,835 in 2015. With this, the emissions per service population remained the same: 4.0 $MTCO_2e$ to 4.0 $MTCO_2e$.

Emissions growth from 2005-2015 was largely due to increases in building energy use and off-road transportation. Emissions reductions were largely in the solid waste and water and wastewater sectors.

These changes are reflected in Figures 1, which shows the proportion of emissions by sector for the city's previous inventories. Between 2005 and 2015, the proportion of the community-wide emissions for non-residential energy grew from 15% to 23% while the proportion of emissions from on-road transportation declined from 52% to 44%.

Figure 1: Proportion of Annual Community GHG Emissions by Sector 2005-2015



2022 Communitywide Emissions Inventory Summary

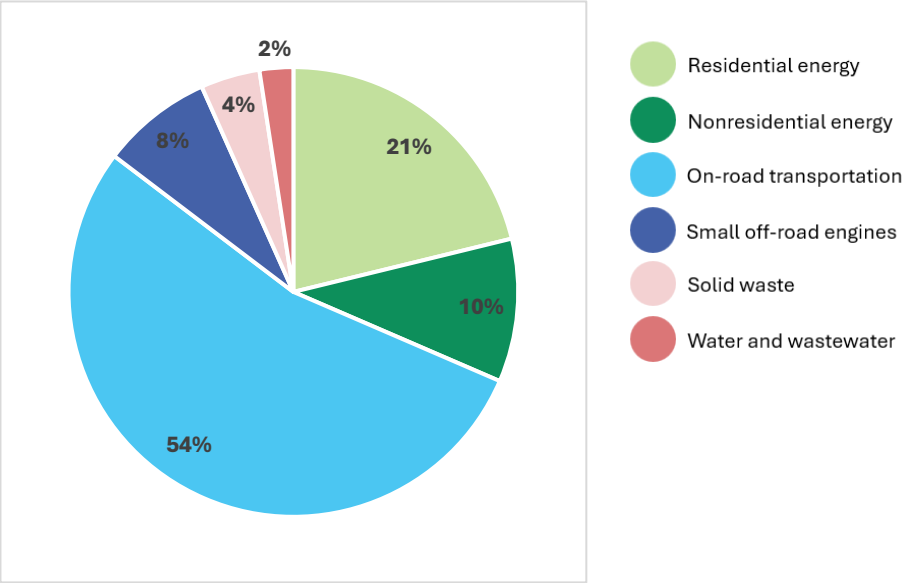
The total 2022 GHG emissions are estimated to be 267,559 $MTCO_2e$, a 35% and 27% decrease from the 2015 and 2005 inventories as shown in Table 2. Of the five sectors, on-road transportation accounted for the largest amount of GHG emissions with estimated emissions of 145,995 $MTCO_2e$, or 56% of total emissions. The second largest sector was building energy use with estimated emissions of 85,398 $MTCO_2e$, or 33% of total emissions. The remaining 11% of emissions are made up by solid waste, off-road transportation, and water and wastewater (see Figure 2). A summary of emissions and associated activity data is presented in Table 3.

Table 3: Total Annual Community GHG Emissions (2022)

Sector	Subsector	Units	Activity Data	Emissions ($MTCO_2e$)
Building Energy	Residential Electricity	kWh	133,444,603	0
	Residential Natural Gas	Therms	10,825,631	57,453
	Nonresidential Electricity	kWh	200,602,388	0
	Nonresidential Natural Gas	Therms	5,264,025	27,937
Transportation	On-road Transportation	VMT	350,826,308	145,995
	Off-road Transportation	Gallons	2,565,539	21,653
Solid Waste	Landfilled Waste	Tons	25,900	8,191
	Doolittle Landfill	-	-	3,360
Water/Wastewater	Water Use	Million Gallons	26,937	4,256
	Wastewater	Million Gallons	24,243	2,319
Sequestration [24]	Sequestration	-		(3,270)
			Total	**267,894**

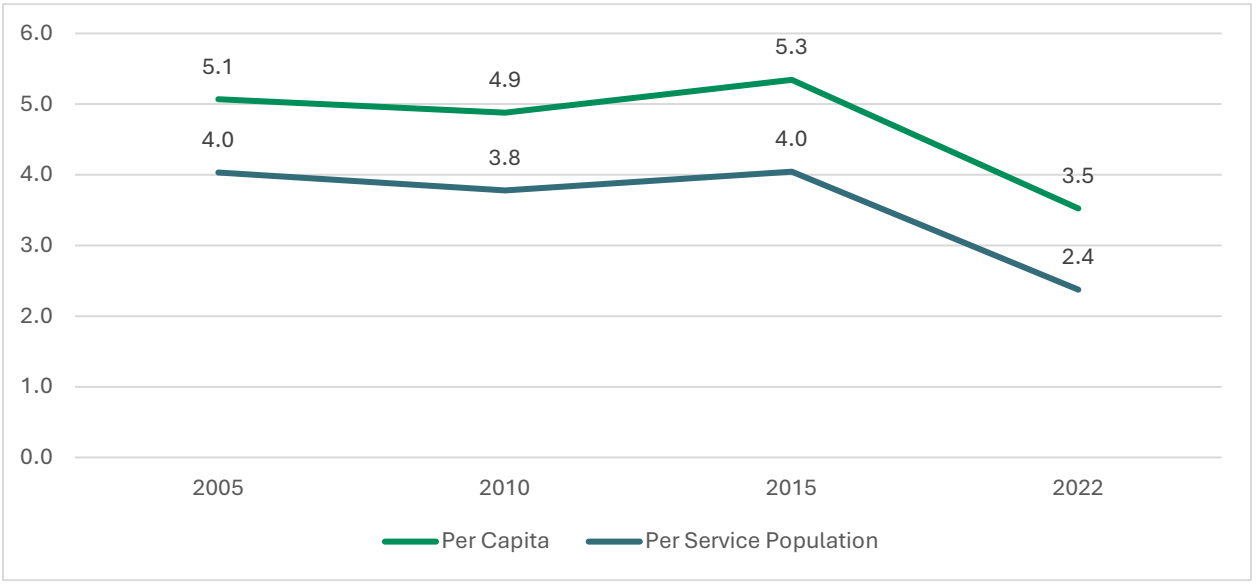
[24] The sequestration credit value includes carbon sequestered by the City's tree canopy. The 2005-2015 number is from a previous City of Alameda Tree Canopy Assessment, which could not be located. The 2022 inventory estimates a more current and accurate value for tree canopy carbon sequestration provided by the City's consultant, Dudek which utilized the US Forest Service iTree canopy tool. Available here: https://www.itreetools.org/.

Figure 2: Proportion of 2022 Annual Community GHG Emissions by Sector



Between 2005 to 2022, the population grew by 5% and the city's service population grew by 24%. Despite the city's growth, total emissions declined as did per capita and service population emissions from 5.1 $MTCO_2e$ to 3.5 $MTCO_2e$ and 4.0 $MTCO_2e$ to 2.4 $MTCO_2e$ respectively (see Figure 3).

Figure 3: Per Capita and Per Service Population Emissions (2005-2022)



2022 Communitywide Emissions Inventory Detail

Data Sources

Table 4 lists the data sources used to calculate Alameda's 2022 GHG emissions.

Table 4: 2022 Communitywide Emissions Inventory Data Sources by Sector

Sector	Subsector	Data Source
Residential Energy	Electricity	Alameda Municipal Power
	Natural Gas	PG&E
Nonresidential Energy	Electricity	Alameda Municipal Power
	Natural Gas	PG&E
Transportation	On-Road	Google Insight Explorer CARB EMFAC 2021
	Off-Road	CARB OFFROAD2021
Solid Waste	Landfilled Waste	City of Alameda CalRecycle
	Doolittle Landfill	US EPA LandGem Model
Water and Wastewater	Water use	East Bay Municipal Utility District
	Wastewater	East Bay Municipal Utility District
Sequestration	Trees	City of Alameda, Dudek iTree analysis (2024)

Energy

This section presents the GHG emissions for the energy sector, specifically emissions generated from residential and nonresidential energy use that occurred within City limits. This section provides electricity and natural gas activity data and emission estimates in both residential and nonresidential buildings for 2022 and compares it to the estimates for the years 2005, 2010, and 2015.

Building energy emissions decreased by 40% as compared to 2005. Total residential energy emissions decreased 32% and total nonresidential emissions decreased 52% as compared to 2005. Moreover, electricity emissions decreased 100% as a result of AMP providing 100% carbon-free electricity starting in 2020.

Alameda's electricity is provided by Alameda Municipal Power (AMP), a municipally operated utility. In 2020, AMP began providing 100% clean energy to customers, which contributed to a significant reduction in emissions from building electricity use from 2015 to 2022.

To calculate GHG emissions, an emissions factor is applied to the activity data. Electricity suppliers provided carbon dioxide (CO_2) emissions factors. The electricity generation process also releases small amounts of methane (CH_4) and nitrous oxide (N_2O). Their emissions factors are provided by the EPA's Emissions & Generation Resource Integrated Database (eGRID) and Comprehensive Air Quality Model CAMX. CO_2 is the most referenced GHG; however, numerous gases have greenhouse characteristics. CH_4 and N_2O are commonly accounted for in GHG inventories. These gases have

a greater global warming potential than CO_2; CH_4 traps approximately 28 times as much heat as CO_2 over a 100-year period and N_2O traps approximately 265 times as much heat. To account for these differences, a factor is applied to the gasses emissions to calculate a CO_2 equivalence (CO_2e). The emissions factors differ by electricity provider due to their energy portfolio.

When electricity is transported through transmission wires over long distances some of the energy is lost as heat, resulting in transmission losses. Additional energy is lost when electricity is delivered to lower voltage wires for distribution to end users, resulting in distribution losses. The Community Protocols recommend reporting transmission and distribution (T&D) losses, as this emission source can be reduced through increased distributed energy generation (i.e. solar photovoltaic) by reducing the need for electricity that is transported over long distances.

Since AMP provides 100% clean electricity, emissions associated with T&D losses are zero for the 2022 GHG inventory.

Table 5: Total Annual Community Electricity Usage and GHG Emissions

	2005		2010		2015		2022 [25]	
Subsector	**Usage (kWh)**	**Emissions ($MTCO_2e$)**	**Usage (kWh)**	**Emissions ($MTCO_2e$)**	**Usage (kWh)**	**Emissions ($MTCO_2e$)**	**Usage (kWh)**	**Emissions ($MTCO_2e$)**
Residential	137,906,700	19,580	141,336,935	16,146	125,431,220	42,599	133,444,603	0
Nonresidential	223,590,100	31,771	239,017,888	27,500	216,771,565	73,987	200,602,388	0
Total	**361,496,800**	**51,351**	**380,354,823**	**43,646**	**342,202,785**	**116,586**	**334,046,991**	**0**

Table 6: Electricity Emissions Factors

	2005	2010	2015	2022 [26]
Subsector	**Emissions Factor ($MTCO_2e$/kWh)**	**Emissions Factor ($MTCO_2e$/kWh)**	**Emissions Factor ($MTCO_2e$/kWh)**	**Emissions Factor ($MTCO_2e$/kWh)**
Residential	No Data	No Data	0.000325	0
Nonresidential	No Data	No Data	0.000325	0

[25] Activity data for electricity provided by AMP via data request.
[26] Emissions factor for electricity provided by AMP via data request.

Natural gas is supplied to Alameda by Pacific Gas and Electric Company (PG&E). Table 7 provides the natural gas activity data in therms and the emissions estimates for 2022. The nonresidential subsector includes natural gas uses from government, commercial, and industrial accounts. As with electricity, GHG emissions are estimated from activity data by applying an emission factor. However, unlike electricity, the carbon intensity of the combustion of natural gas does not vary annually and it does not vary between residential and nonresidential. These estimates are using the most current emissions coefficient for natural gas from the US EPA.

Table 7: Total Annual Community Natural Gas Usage and GHG Emissions

	2005		2010		2015		2022 [27]	
Subsector	**Usage (Therm)**	**Emissions ($MTCO_2e$)**	**Usage (Therm)**	**Emissions ($MTCO_2e$)**	**Usage (Therm)**	**Emissions ($MTCO_2e$)**	**Usage (Therm)**	**Emissions ($MTCO_2e$)**
Residential	12,180,175	64,745	12,520,503	66,554	9,957,908	52,847	10,825,631	57,453
Nonresidential	4,886,714	25,976	5,924,692	31,493	4,523,840	24,008	5,264,025	27,937
Total	**17,066,889**	**90,721**	**18,445,195**	**98,047**	**14,481,748**	**76,855**	**16,089,656**	**85,390**

Table 8: Natural Gas Emissions Factors

	2005	2010	2015	2022 [28]
Subsector	**Emissions Factor ($MTCO_2e/kWh$)**	**Emissions Factor ($MTCO_2e/kWh$)**	**Emissions Factor ($MTCO_2e/kWh$)**	**Emissions Factor ($MTCO_2e/kWh$)**
Residential	No Data	No Data	0.005307085	0.005307085
Nonresidential	No Data	No Data	0.005307085	0.005307085

[27] Activity data for natural gas provided by PG&E via data request.
[28] Emissions factor for natural gas from US EPA. Available from: https://www.epa.gov/climateleadership/ghg-emission-factors-hub.

Transportation

This section presents the GHG emissions for the transportation sector, specifically emissions generated from on-road and off-road transportation activity. This section provides activity data and emission estimates for 2022 and compares it to the estimates for the years 2005-2015.

Transportation emissions decreased by 25% as compared to 2005. Between 2005 and 2022, VMT has fluctuated but decreased by 6% overall, and its associated GHG emissions decreased by 25%. Emissions decreasing faster than VMT can be due to State and Federal regulations improving fuel efficiency standards and low carbon fuel standards. Emissions have also decreased due to an increasingly efficient overall fleet of vehicles within the city (including an increased uptake of electric, hybrid, and high efficiency vehicles).

The on-road transportation subsector looks at all on-road trips (taken by cars, trucks, buses, etc.) using the origin-destination method or induced activity method as defined by the Community Protocol. [29] This method quantifies the transportation emissions induced by the city, including trips that begin, end, or are fully contained within the city (usually excluding pass-through trips). As such, this inventory accounts for 100% of trips that occur within city boundaries and 50% of both trips that originate or terminate within the city's boundary.

Emissions are calculated by determining the VMT of in-boundary and transboundary trips and then applying an emissions factor for fuel to those trips. 2022 VMT estimates for the City of Alameda were modeled using Google Insight Explorer while emissions factors are determined using CARB's 2021 EMFAC model. EMFAC represents the state's current understanding of motor vehicle travel activities and associated emission levels from on-road vehicles including cars, trucks, and buses in California.

Table 9: Total Annual Community GHG Emissions from On-Road Transportation

	2005		2010		2015		2022	
	Total VMT	Emissions ($MTCO_2e$)	Total VMT	Emissions ($MTCO_2e$)	Total VMT	Emissions ($MTCO_2e$)	Total VMT	Emissions ($MTCO_2e$)
Transportation	373,588,845	195,201	355,048,342	188,122	358,437,257	166,455	350,826,308	145,995

[29] Induced activity method as defined in the ICLEI Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Available from https://ghgprotocol.org/sites/default/files/ghgp/standards/GHGP_GPC_0.pdf.

Table 10: On-Road Transportation Emissions Factors

2005	2010	2015	2022
Emissions Factor ($MTCO_2e/VMT$)	Emissions Factor ($MTCO_2e/VMT$)	Emissions Factor ($MTCO_2e/VMT$)	Emissions Factor ($MTCO_2e/VMT$)
0.0005169	0.0005046	0.0004644	0.0004161

Note: Emissions factors for 2005, 2010, and 2015 presented in this table may differ from the original inventory as the result of using the most recent CARB EMFAC model from 2021, updated from 2014.

The off-road transportation GHG emissions come from mobile sources including construction, lawn and garden, recreational, and industrial equipment use within Alameda. Off-road transportation emissions data was gathered from CARB's 2021 OFFROAD model. [30] This model applies an emissions factor for equipment within Alameda County to the amount and types of fuel used. The off-road activity data and emissions are apportioned to the City of Alameda by population.

The emissions factor used for the 2022 inventory is 0.00844 $MTCO_2e$/gallon of fuel. Between 2005 and 2022, emissions for off-road transportation fluctuated and decreased overall by 19%. This change is likely due to more efficient off-road equipment and varied levels of development within the City. Furthermore, the State is focusing on reducing off-road emissions and pollution by requiring that all small off-road engines (SORE) sold within California be zero emission starting January 1, 2024. [31]

Table 11: Total Annual GHG Emissions from Off-Road Transportation

2005		2010		2015		2022 [32]	
Gallons	Emissions ($MTCO_2e$)	Gallons	Emissions ($MTCO_2e$)	Gallons	Emissions ($MTCO_2e$)	Gallons	Emissions ($MTCO_2e$)
No Data	26,981	No Data	28,962	3,563,098	32,418	2,565,539	21,653

Solid Waste

Solid waste emissions include emissions associated with the decomposition of waste in landfills and compost facilities and the off-gassing of the closed Doolittle Landfill. Doolittle solid waste landfill began operation in 1953 and was closed

[30] CARB. (2021). OFFROAD Model. Available from: https://arb.ca.gov/emfac/offroad/emissions-inventory/bb97cd7046d459dd9e4fdc4b5f5bf14ac3512c00.
[31] More information about SORE regulations can be found here: https://ww2.arb.ca.gov/our-work/programs/small-off-road-engines-sore.
[32] Activity data and emissions derived from CARB OFFROAD2021 model, apportioned for the City of Alameda from County data by population.

in 1985. The landfill is currently being monitored by the City while decomposition occurs beneath the landfill cap. As shown in Table 12, the total solid waste emissions of the city increased between 2015 and 2022 by 66%, largely due to increases in municipal solid waste generation, which reflects overall growth in the city.

The data presented in this sector came from the City of Alameda (refuse tonnage) and the US EPA LandGem Model to quantify emissions from Doolittle Landfill. [33] Solid waste emissions are mostly methane (CH_4) from the decomposition of the materials in the landfill. Emissions are estimated from activity data (tons of waste sent to landfill) by applying an emissions factor, which is different for municipal solid waste and the closed landfill because their composition varies. The waste composition comes from the CalRecycle 2015 Waste Characterization Study and the emissions factors are from the WARM model.

The recommended GHG emissions calculation methodologies are Community Protocol Methods SW.4, SW.5, and SW.7 for emissions associated with methane emissions from waste sent to landfills, landfilling process emissions and waste sent to combustion facilities, respectively. The landfill gas (LFG) capture rate of a destination landfill contributes significantly to the methane emissions generated by waste disposal. While many of the destination landfills report having LFG capture, the availability of accurate data representing current LFG capture rates is limited; therefore, the Community Protocol recommended default LFG capture rate of 75% was used for emission calculations.

Table 12: Total Annual Community GHG Emissions from Solid Waste

	2005		2010		2015		2022 [34]	
	Tons	Emissions ($MTCO_2e$)	Tons	Emissions ($MTCO_2e$)	Tons	Emissions ($MTCO_2e$)	Tons	Emissions ($MTCO_2e$)
Municipal Solid Waste	49,962	5,049	37,310	4,621	27,175	2,477	25,900	8,191
Doolittle Landfill	-	7,377	-	5,745	-	4,474	-	3,360
Total	**49,962**	**12,426**	**37,310**	**10,367**	**27,175**	**6,951**	**25,900**	**11,551**

Table 13: Solid Waste Emissions Factor

	2005	2010	2015	2022 [35]
	Emissions Factor ($MTCO_2e$/Ton)	Emissions Factor ($MTCO_2e$/Ton)	Emissions Factor ($MTCO_2e$/Ton)	Emissions Factor ($MTCO_2e$/Ton)
Municipal Solid Waste	No Data	No Data	No Data	0.3163

[33] More information about the US EPA LadnGem Model can be found at: https://www.epa.gov/land-research/landfill-gas-emissions-model-landgem.
[34] Municipal solid waste tonnage provided by the City of Alameda and Doolittle emissions estimated using the US EPA LandGem Model.
[35] 2022 solid waste emission factor is presented as the average based on city's waste composition and is for solid waste sent to landfill.

Water Use and Wastewater

GHG emissions in this sector come from the energy used to collect, convey, treat, and deliver water to users, and the additional energy used to collect, treat, and dispose of wastewater. The City of Alameda is supplied municipal water by the East Bay Municipal Utility District (EBMUD), which also collects and treats the city's wastewater. Water related emissions have increased since 2005 likely because of the city's continued growth and due to the use of updated methodology that more accurately captures emissions from water consumption and wastewater treatment for 2022. Inventory years 2005-2015 were not updated using the same methodology due to a lack of data.

For water consumption, GHG emissions are calculated by determining the energy intensity of water supplied and applying the appropriate GHG emission factors for electricity to the energy used in each aspect of the water supply cycle. Energy intensity (kWh/AF) was determined using CAPCOA Table W-1.1 for the San Francisco Bay hydrologic region. [36] EBMUD water is distributed and treated within PG&E territory so the 2022 PG&E emissions factor for electricity was used. [37]

For wastewater, GHG emissions for process and fugitive emissions are calculated using Community Protocols Methods WW.1.(alt) WW.2.(alt), WW.8.(alt), and WW.12.(alt); with the primary data input being population served. Community Protocol Method WW.15 will be used to determine the amount of energy used for wastewater conveyance and treatment, using the energy intensity factor from CAPCOA Table W-1.1 for the San Francisco Bay hydrologic region and the 2022 PG&E emissions factor for electricity.

Rather than calculating emissions for Alameda, previous inventories (2005-2015) reported only wastewater emissions as a proportion of EBMUD's total wastewater emissions inventory by population, which likely underestimated water related emissions. [38] The 2022 inventory was not able to recalculate previous year emissions due to a lack of available data.

Table 14: Total Annual Community GHG Emissions from Water and Wastewater

	2005		2010		2015		2022	
	Gallons	Emissions ($MTCO_2e$)	Gallons	Emissions ($MTCO_2e$)	Gallons	Emissions ($MTCO_2e$)	Gallons	Emissions ($MTCO_2e$)
Water	No Data		No Data		No Data		26,937	4,256
Wastewater Treatment	No Data		No Data		No Data		24,243	2,319
Total		**2,180**		**2,156**		**3,207**		**6,575**

[36] California Air Pollution Officers Association (CAPCOA). (2021). Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. Available from: http://www.aqmd.gov/docs/default-source/ceqa/handbook/capcoa-quantifying-greenhouse-gas-mitigation-measures.pdf.

[37] Table E-4.3 from CAPCOA. Available from: http://www.aqmd.gov/docs/default-source/ceqa/handbook/capcoa-quantifying-greenhouse-gas-mitigation-measures.pdf.

[38] 2005-2015 GHG inventories provided by the City of Alameda as part of the 2015 Community-Wide Greenhouse Gas Inventory and Projection to 2020 Goal prepared by Sustainable Analysis, LLC. in 2018.

Table 15: Water and Wastewater Emissions Factor

		2005	2010	2015	2022 [39]
Sector	**Subsector**	**Emissions Factor ($MTCO_2e$/Gallon)**	**Emissions Factor ($MTCO_2e$/Gallon)**	**Emissions Factor ($MTCO_2e$/Gallon)**	**Emissions Factor ($MTCO_2e$/Gallon)**
Water	Water use	No Data	No Data	No Data	0.16
Wastewater	Wastewater Process and Fugitive	No Data	No Data	No Data	0.05473
	Wastewater Collection and Treatment	No Data	No Data	No Data	0.04092

[39] 2022 water and wastewater emission factors are presented as the average from multiple Community Protocol equations.

Future Forecasts

Forecasts of the communitywide emissions were developed using demographic and socio-economic forecasts to understand how emissions would change over time. This includes two forecasts:

- A "**Business as Usual**" (BAU) GHG emissions forecast considers how Alameda's emissions would change over time if no action were taken to reduce emissions by the State or at the local level; if conditions were held constant from 2022.
- An "**Adjusted Business as Usual**" (ABAU) forecast shows how Alameda's emissions are anticipated to change accounting for the impacts of adopted State and Federal policies but without local action.

Both forecasts use a consistent set of demographic and economic projections derived from the Association of Bay Area Governments (ABAG) and the City's General Plan 2040 VMT projections. These projections assume that population, housing, employment, and transportation activity will continue to grow through 2040. Demographic and VMT projections have been extrapolated to 2045 to align with the State's GHG reduction targets. Table 16 shows the assumed demographic changes.

Table 16: Alameda Demographic Projections (2005-2045) [40]

	2005	2010	2015	2020	2022	2025	2030	2035	2040	2045
Population	72,512	73,812	76,733	76,961	76,039	82,648	88,336	94,023	99,710	104,260
Jobs	18,641	21,477	24,655	32,121	36,798	35,375	38,630	41,884	45,138	47,741
Housing Units	30,265	30,713	32,042	31,329	30,553	33,828	36,327	38,732	41,324	43,323
Service population	**91,153**	**95,289**	**101,388**	**109,082**	**112,837**	**118,024**	**126,965**	**135,907**	**144,848**	**152,001**

[40] Sources: U.S. Census American Community Survey, ABAG, Alameda General Plan 2040, Alameda 2015 Greenhouse Gas Emissions Inventory.

Business as Usual GHG Forecast

BAU forecast emissions are expected to increase from 267,894 $MTCO_2e$ in 2022 to 327,727 $MTCO_2e$ in 2045, an approximate 22% increase. Table 17 shows the forecasted BAU emission levels for each sector in future years.

Table 17: Forecasted Business as Usual Total Annual Community GHG Emissions 2025-2045 (in $MTCO_2e$)

Sector	Subsector	2025	2030	2035	2040	2045
Building Energy	Residential electricity	-	-	-	-	-
	Residential natural gas	62,446	66,743	71,040	75,338	78,775
	Nonresidential electricity	-	-	-	-	-
	Nonresidential natural gas	26,856	29,327	31,798	34,268	36,245
Transportation	On-Road Transportation	148,122	151,719	155,404	159,178	163,044
	Off-Road	22,648	24,364	26,080	27,796	29,168
Solid Waste	Solid Waste	8,567	9,217	9,866	10,515	11,034
	Doolittle	2,892	2,253	1,754	1,366	1,064
Water/Wastewater	Water Use	4,452	4,789	5,126	5,463	5,733
	Wastewater Treatment	2,365	2,444	2,522	2,601	2,663
	Total	**278,349**	**290,856**	**303,590**	**316,525**	**327,727**

Adjusted Business as Usual GHG Forecast

The Adjusted Business as Usual (ABAU) forecast shows how Alameda's emissions are anticipated to change accounting for impacts of adopted State policies if no action is taken at the local level. There are four major policies that the State has adopted to reduce GHG emissions at the local level:

1. **Transportation**: Major regulations incorporated into the CARB's 2021 transportation modeling used for forecast development include the Advanced Clean Truck Rule, SAFE Vehicle Rules and Actions, and Innovative Clean Transit Rule. [41]
2. **Title 24**: The California Code of Regulations Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings is updated triennially to allow consideration and possible incorporation of new energy-efficient technologies and methods. The AB 32 Scoping Plan calls for the continuation of ongoing triennial updates to Title 24 that will yield regular increases in the mandatory energy and water savings for new construction.
    a. Calculations include: adjusted residential and nonresidential electricity activity data to reflect additional electricity demand due to all-electric building code beginning in 2030 and efficiency assumptions. [42]
3. **Renewable Portfolio Standard (SB 100)**: AMP already provides 100% carbon-free energy, so electricity is assumed to be carbon free from 2020 onward.
4. **SB 1383 Regulations:** This law requires organic waste disposal to be reduced by 50% by 2020 and 75% by 2025 in California. To achieve these targets, starting in 2022 jurisdictions must provide organic waste collection services to all residents and businesses and recycle the materials.

Under the ABAU forecast, emissions are expected to decrease from 267,894 $MTCO_2e$ in 2022 to 242,746 $MTCO_2e$ in 2030, an approximate 10% decrease. Table 18 shows the forecasted ABAU emissions for each sector in future years, while Figure 4 shows the City's actual and projected progress toward GHG reduction goals comparing the forecasted ABAU and reductions expected from CARP implementation.

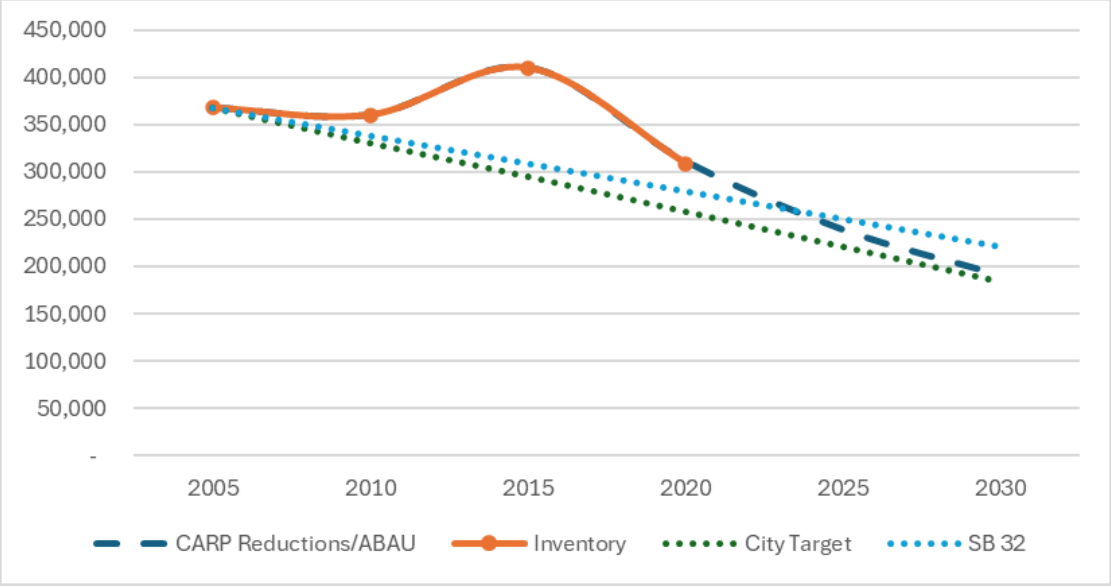
[41] California Air Resources Board. (2021). EMFAC2021 Volume III Technical Document Version 1.0.1. Accessed from: https://ww2.arb.ca.gov/sites/default/files/2021-08/emfac2021_technical_documentation_april2021.pdf.

[42] California Energy Commission. (2021). California Building Decarbonization Assessment. Accessed from: https://www.energy.ca.gov/publications/2021/california-building-decarbonization-assessment (average of moderate electrification scenario grid impacts p.62).

Table 18: Forecasted Adjusted Businesses as Usual Total Annual Community GHG Emissions in 2025-2045 (in $MTCO_2e$)

Sector	Subsector	2025	2030	2035	2040	2045
Building Energy	Residential electricity	-	-	-	-	-
	Residential natural gas	57,802	62,747	62,747	62,747	62,747
	Nonresidential electricity	-	-	-	-	-
	Nonresidential natural gas	26,856	29,327	29,327	29,327	29,327
Transportation	On-Road Transportation	118,551	108,837	102,506	99,444	98,961
	Off-Road	21,954	23,133	24,602	26,279	27,752
Solid Waste	Solid Waste	8,567	9,217	9,866	10,515	11,034
	Doolittle	2,892	2,253	1,754	1,366	1,064
Water/Wastewater	Water Use	4,452	4,789	5,126	5,463	-
	Wastewater Treatment	2,365	2,444	2,522	2,601	1,327
	Total	**243,439**	**242,746**	**238,450**	**237,743**	**232,212**

Figure 4: City of Alameda Progress Toward GHG Reduction Goals ($MTCO_2e$)



Appendix 3: 2025 Local Hazard Mitigation Plan

The 2025 Local Hazard Mitigation Plan is available here:

www.alamedaca.gov/HazardMitigationPlan