Bay Area Regional Climate Action Planning Initiative

Priority Climate Action Plan for the Northern and Central Bay Area Metropolitan Region

Bay Area Air Quality Management District
March 1, 2024

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

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The Air District thanks the following individuals for their contribution to this plan, as well as the more than 90 participants who attended Working Sessions held between October – December 2023.

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The Air District acknowledges and assumes complete responsibility for the content of the Priority Climate Action Plan as outlined in this report, submitted in fulfillment of the USEPA grant requirements.

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Definitions and Acronyms

Acronym or Abbreviation	Definition
ABAG	Association of Bay Area Governments
AWG	Advisory Work Group
BAAQMD	Bay Area Air Quality Management District
BayREN	Bay Area Regional Energy Network
BARC	Bay Area Regional Collaborative
BARCAP	Bay Area Regional Climate Action Plan initiative
CBO	community-based organization
CCAP	Comprehensive Climate Action Plan
CCA	Community Choice Aggregator
CH_4	methane
CO_2	carbon dioxide
GHG	greenhouse gas
GWP	global warming potential
LIDACs	Low income, disadvantaged communities
MSA	Metropolitan Statistical Area
MTC	Metropolitan Transportation Commission
N_2O	nitrous oxide
NOx	nitrogen oxides
PCAP	Priority Climate Action Plan
SF_6	sulfur hexafluoride
USEPA	United States Environmental Protection Agency
VMT	vehicle miles traveled

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Executive Summary

The Bay Area Air Quality Management District (Air District) has partnered with local governments (cities and counties) and regional agencies across the San Francisco Bay Area region[1] (Bay Area region) to produce this Priority Climate Action Plan (PCAP) for the San Francisco-Oakland-Berkeley Metropolitan Statistical Area (MSA). Throughout development of the PCAP, the Air District conducted extensive coordination and outreach with other government agencies and engaged a range of stakeholders across the Bay Area region.

The Air District established an Advisory Work Group (AWG) in April 2023 to support this effort by engaging them in discussions and decision-making on key aspects of the PCAP, including coordination and engagement with other agencies, organizations, and low income, disadvantaged communities (LIDACs), measure selection, and development of deliverables, as well as provision of information and data and advising on technical analyses. The AWG is composed of representatives from:

- Bay Area regional agencies (Air District, Association of Bay Area Governments (ABAG) through its program Bay Area Regional Energy Network (BayREN), Bay Area Regional Collaborative (BARC), and MTC),
- the cities named in the MSA (City of Berkeley, City of Oakland, and City and County of San Francisco) and
- the counties comprising the MSA (Alameda County, Contra Costa County, Marin County, Napa County, San Mateo County, and the portions of Solano County and Sonoma County that are within the Air District's jurisdiction).[2]

OUTREACH AND ENGAGEMENT

Nearly all cities and counties in the Bay Area region have adopted local climate action plans. At the state level, the State of California has adopted aggressive greenhouse gas (GHG) reduction targets and adopted a statewide 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) that includes a statewide strategy to achieve those targets. The PCAP development process included a review of climate action plans and reflects the priorities and targets in the State Scoping Plan.

The Air District conducted extensive outreach to local governments in the Bay Area region to understand their priorities and implementation-ready projects for the PCAP, to request the results of recent community engagement efforts, and to further develop the PCAP measures during a series of Working Sessions. In total, over 50 cities, towns, and counties participated in at least one outreach effort.

The very short timeline for completing the PCAP did not lend itself to the type of in-depth community partnering and engagement that has become best practice in the Bay Area. To accommodate the aggressive timeline, the Air District reviewed results of recently conducted community engagement activities and created a synthesis document of the identified community needs and priorities. The Air District established a Roundtable of external advisors from regional and local community-serving organizations to review, discuss, add to, and overall improve the synthesis. The Roundtable members

[1] Includes Alameda County, Contra Costa County, Marin County, Napa County, City and County of San Francisco, and San Mateo County, and the southern portions of Sonoma County and Solano County that are included in the Bay Area Air Quality Management District's jurisdiction, reflected in this map.

[2] The federally-designated San Francisco-Oakland-Berkeley MSA includes Alameda County, Contra Costa County, Marin County, City and County of San Francisco, and San Mateo County. The Air District received approval from the USEPA to expand the PCAP to cover the entire Air District's jurisdiction, including Napa County and portions of Solano County and Sonoma County with the exception of Santa Clara County which is included in a separate MSA for the CPRG effort.

contributed their in-depth understanding of Bay Area LIDACS, which are referred to in this document as frontline communities – communities that bear the brunt of the impacts from fossil fuel dependence and are often the first to experience climate impacts – and their insights into community needs and expertise in the topic areas to evaluate and contribute to the draft synthesis.

The Air District convened a public workshop to provide information about the PCAP effort and provide input on draft measure concepts. In order to address potential barriers to participation throughout the engagement process, the Air District offered stipends to community-based organizations (CBOs), convened meetings virtually, and created a website for the project where participants and the public could access meeting materials and project updates.

GHG INVENTORY

The Air District has prepared a GHG emissions inventory for the Bay Area region for the base year 2022. The inventory comprises emissions of climate pollutants from major and minor sources, including those of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), and many high-global warming potential (high-GWP) gases that are substitutes of ozone-depleting substances. The GHG emissions inventory is split across six major sectors – Transportation, Commercial & Residential, Electricity Generation, Industrial, Waste Management, and Agriculture. The total GHG emissions for the Bay Area region for year 2022 are ~60 million metric tons of CO_2-equivalent. The Transportation and Commercial & Residential sectors combined account for half of the regional GHG emissions.

The two priority sectors included in the PCAP are passenger vehicles and residential buildings. Together, emissions from these sectors make up more than 25% of the Bay Area region's GHG emissions. They are the top two sectors most commonly identified by local government staff as highest priority and are top priorities for mitigation in the 70+ local climate action plans that have been adopted by Bay Area jurisdictions. They have similarly been identified as community priorities across the region and in the State of California's Scoping Plan. According to the Scoping Plan, "by prioritizing climate action in transportation electrification, VMT reduction and building decarbonization, local governments will be addressing the largest sources of emissions under their authority and meaningfully tackling climate change, as well as aligning with State climate goals and protecting public health and welfare."[3]

PRIORITY GHG REDUCTION MEASURES

The PCAP includes two priority measures – one from each identified priority sector:

- Safe, Accessible, Clean, and Equitable Multi-modal Transportation
- Holistic Building Decarbonization for Clean, Healthy, and Secure Housing

The over-arching goal of the transportation measure is to reduce GHG and other polluting emissions from personal vehicle travel while increasing transportation choices in frontline communities. This priority measure will reduce single occupancy vehicle miles traveled (VMT) by creating or building out mobility hubs to make it easier for trips to be made by transit, biking, walking, scooter, wheelchair or other mobility devices, including e-micro-mobility, and encourage electric vehicle (EV) charging and EV carshare at or near the hubs. Implementation will focus on creating or expanding mobility hubs in frontline communities and incorporating policies that produce, preserve, and protect affordable housing and stabilize businesses to prevent displacement.

[3] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality; Appendix D Local Actions

The goal of the building decarbonization measure is to speed the transition away from residential natural gas use to healthy and low-emission housing. This measure will accelerate electrification and energy efficiency retrofits in existing homes, prioritizing homes located in frontline communities, to achieve an equitable transition to clean, healthy, and secure housing. The measure will include incentives and direct installations, workforce development and contractor support, housing security and policy support, and a Community Work Group to ensure community members' needs are prioritized.

LOW INCOME / DISADVANTAGED COMMUNITIES (FRONTLINE COMMUNITIES)

Frontline communities in the Bay Area region bear the brunt of the impacts from fossil fuel dependence and are often the first to experience climate impacts. The priority measures are designed to provide significant benefits and minimize harm to frontline communities. For the PCAP, the Air District used the USEPA's IRA Disadvantaged Communities map (which combines Climate & Economic Justice Screening Tool (CEJST), EJ Screen, and any geographic area within tribal lands), as well as the Air District's identified AB 617 communities and the Metropolitan Transportation Commission's (MTC's) Equity Priority Communities to identify frontline communities. The Air District developed an online map to visually depict these layers across the Bay Area region.[4]

The Air District followed a multi-pronged engagement approach to ensure that PCAP development was shaped and informed by the priorities of frontline communities in the Bay Area region. In implementing the engagement plan, the Air District first learned from recently completed engagement efforts. Then the Air District conducted targeted engagement of regional community-serving organizations and CBOs through a Roundtable of community-serving organizations, partner-led meetings, and a series of Working Sessions. The PCAP includes a discussion of the potential benefits and disbenefits that may accrue to frontline communities from implementation of the two priority measures.

NEXT STEPS

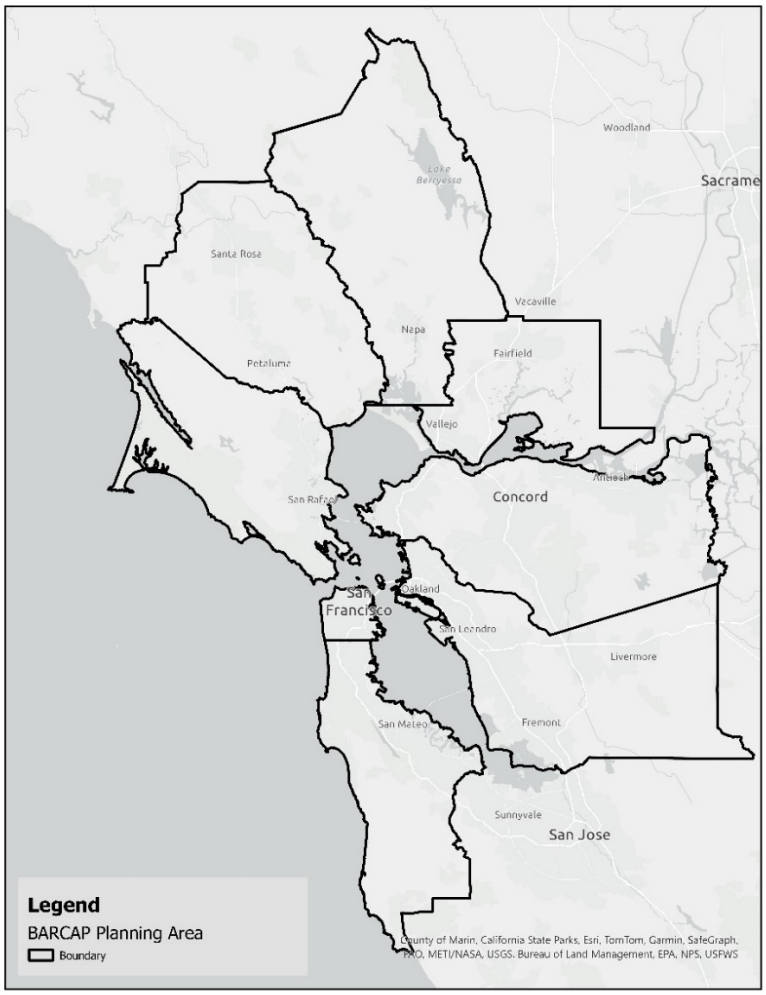
This PCAP is the first deliverable under the USEPA CPRG planning grant awarded to the Air District. The next deliverable due to USEPA in 2025 is a regional comprehensive climate action plan (CCAP) to reduce GHG emissions across all sectors of the economy. In late spring 2024, the Air District will begin engagement for the CCAP, building upon the foundation of the PCAP through meaningful community engagement. Work with technical and facilitation consultants is already underway in preparation for the CCAP.

[4] For the purpose of the PCAP, frontline communities are defined using: 1) USEPA IRA Disadvantaged Communities, 2) AB 617 communities, and 3) MTC Equity Priority Communities, and visualized together in this map.

1. Introduction

The Bay Area Air Quality Management District (Air District) has partnered with local governments and regional agencies across the San Francisco Bay Area region[5] (Bay Area region) to produce this Priority Climate Action Plan (PCAP) for the San Francisco-Oakland-Berkeley Metropolitan Statistical Area (MSA). The PCAP builds upon the region's climate leadership and rich foundation of existing climate-related plans, programs, projects, and policies to identify and support core policies, practices, and technologies in the transportation and building sectors that will help accelerate the Bay Area's transition to a more equitable and zero-carbon future. Implementation of the PCAP will reduce emissions of greenhouse gases (GHGs), criteria air pollutants, and hazardous air pollutants; create high-quality jobs; spur economic growth; and enhance the quality of life for Bay Area residents, particularly those in frontline communities.

Figure 1.1: Map of the Bay Area Region



[5] Includes Alameda County, Contra Costa County, Marin County, Napa County, City and County of San Francisco, and San Mateo County, and the southern portions of Sonoma County and Solano County that are included in the Bay Area Air Quality Management District's jurisdiction, reflected in this map.

THE CLIMATE POLLUTION REDUCTION GRANT (CPRG) PROGRAM AND THE BAY AREA REGIONAL CLIMATE ACTION PLANNING (BARCAP) INITIATIVE

In July 2023, the Air District received funding from the U.S. Environmental Protection Agency's (USEPA) Climate Pollution Reduction Grant (CPRG) Program to develop regional climate action plans. The CPRG Program provides funding to states, local governments, tribes, and territories to develop and implement ambitious plans for reducing GHG emissions and other harmful air pollutants.[6] The first plan is this Priority Climate Action Plan (PCAP), which includes two near-term, high-priority, implementation-ready measures to reduce GHG emissions from residential buildings and passenger vehicles, which together make up one-quarter of the Bay Area region's GHG emissions. Once the PCAP is submitted to USEPA, eligible applicants[7] can apply for funding to implement the measures in the plan. The second plan is the Comprehensive Climate Action Plan (CCAP) covering all sectors, which will be submitted to USEPA by September 2025.

The CPRG planning grant enabled the Air District to launch the Bay Area's first region-wide climate action planning effort, the Bay Area Regional Climate Planning (BARCAP) initiative, with the PCAP and the CCAP at its core. This regional approach to climate planning will identify areas where regional collaboration and action can accelerate our ability to meet our ambitious climate goals. This effort provides an opportunity to harmonize the many strong yet disparate climate planning efforts in the region together with state and regional climate goals into a regional climate planning effort that reflects common top priorities. The BARCAP approach elevates and centers the priorities of frontline communities in the planning process and builds on the extensive work that cities and counties in the region have been doing for years.

THE REGIONAL CONTEXT

The Bay Area has a strong tradition of climate leadership. Nearly all cities and counties in the Bay Area are engaged in some form of climate action planning, with local climate action plans adopted by over 70 cities and counties and numerous policies and programs to reduce GHG emissions adopted and implemented by all 100+ jurisdictions in the region. The Air District's 2017 regional Clean Air Plan[8] focuses on reducing regional GHG emissions, primarily through regional agency-led initiatives. The Metropolitan Transportation Commission's (MTC) Plan Bay Area 2050[9] aims to reduce GHG emissions through transportation and land use strategies. Additionally, the State of California's 2022 Scoping Plan lays out a strategy for making the State carbon neutral by 2045. According to the Scoping Plan, "by prioritizing climate action in transportation electrification, VMT reduction and building decarbonization, local governments will be addressing the largest sources of emissions under their authority and meaningfully tackling climate change, as well as aligning with State climate goals and protecting public health and welfare." These state, regional, and local efforts have all incorporated robust engagement

[6] https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants

[7] Eligible applicants are limited to lead organizations for CPRG planning grants; other municipal agencies (including local air pollution control agencies), departments, or other municipal government offices; and councils of government, metropolitan planning commissions, or other regional organizations comprised of multiple municipalities located within the geographic area covered by the PCAP.

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

[9] https://www.planbayarea.org/

with community and environmental justice community organizations, reflecting the state and region's strong commitment to equity in climate planning.

The centering of equity in climate planning is motivated by a widely held understanding among elected officials, the business community, and the public at large that climate change is already having and will increasingly have serious impacts on the Bay Area's economy, environment, and public health. Communities of color and low-income communities often experience the first and worst impacts of climate change. Increasing average temperatures, fluctuations in precipitation, decreasing snowpack, rising sea levels, and increased incidence and severity of wildfires are just some of the impacts the Bay Area is experiencing from climate change. In addition, fossil fuel combustion to power the region's cars, buildings, and economy contributes to unhealthy levels of air pollution (in addition to GHG emissions) with communities of color and low-income communities disproportionately impacted. A transition to a clean energy economy – one that does not rely on fossil fuels – can provide significant health benefits and create new high-quality[10] jobs to advance a more equitable future for residents of the Bay Area region.

The Bay Area is also one of the most diverse regions in the nation. Fifty-nine percent of residents are people of color,[11] including many different racial and ethnic groups. The region is home to speakers of more than 160 languages, nearly half (43%) of which speak a language other than English at home.[12] The geographic area covered by the PCAP includes a population of approximately 5.5 million and 81 cities that range from very small and rural, to the large and cosmopolitan city of San Francisco. Specifically, the PCAP covers Alameda County, Contra Costa County, Marin County, Napa County, City and County of San Francisco, and San Mateo County, and the portions of Solano County and Sonoma County in the Air District's jurisdiction.[13]

OVERVIEW OF DEVELOPMENT OF THE PCAP

The Air District has striven to make the development of the PCAP and the BARCAP overall an inclusive regional planning process focused on reducing GHG emissions and elevating the priorities of frontline communities.

The Air District established an Advisory Work Group (AWG) in April 2023 composed of representatives from:

- Bay Area regional agencies (Air District, Association of Bay Area Governments (ABAG) through its program Bay Area Regional Energy Network (BayREN), Bay Area Regional Collaborative (BARC), and MTC)
- the cities named in the MSA (City of Berkeley, City of Oakland, and City and County of San Francisco)
- the counties comprising the MSA (Alameda County, Contra Costa County, Marin County, Napa

[10] The USEPA uses the term 'High-quality' for the CPRG effort. Workforce development efforts in the Bay Area region and California use the term 'high-road'. Both terms refer to jobs that pay a sustaining wage with adequate benefits and provide training and upward mobility, among other factors.

[11] "An Equity Profile of the Nine-County San Francisco Bay Area Region," Policy Link and USC Program for Environmental & Regional Equity, page 16. Note that this data includes Santa Clara County, which is not included in the San Francisco – Oakland – Berkeley MSA.

[12] BAAQMD Plan for Language Services to Limited English Proficient Populations, September 2023

[13] While Santa Clara County is often considered as being a part of the San Francisco Bay Area, for the purposes of the PCAP, Santa Clara County has been excluded, as the USEPA has designated it a part of the San Jose-Sunnyvale-Santa Clara MSA.

County, San Mateo County, and the portions of Solano County and Sonoma County that are within the Air District's jurisdiction)[14]

The Air District and the AWG met regularly to discuss coordination and engagement with other agencies, organizations, and frontline communities; make decisions on key aspects of the project such as measures selection and development; and provide input on technical analyses. ABAG is a sub-awardee, partnering with the Air District on key program elements, including measure development and local government and stakeholder outreach and engagement.

The Air District sought input from local governments beginning in April 2023 through surveys, individual and group meetings, and a series of four Working Sessions with stakeholders to design the PCAP measures in October-December 2023. In total, over 50 cities, towns, and counties participated in at least one PCAP-related outreach event. In addition, the Air District engaged in targeted outreach and engagement with community choice aggregators (CCAs)[15] and the local investor-owned utility, PG&E, through individual meetings and their inclusion in the Working Sessions.

The Air District designed and facilitated, with the support of ABAG/BayREN, a series of measure design Working Sessions, which brought together more than 90 stakeholders across the four sessions, representing local government and regional agencies, community-based organizations (CBOs), community-serving organizations, equity organizations, transportation agencies, CCAs and a utility, subject matter expert organizations for transportation and building decarbonization, and multiple representatives from organized labor and workforce training, non-profit housing, non-profit retrofit organizations, bike, environment and other stakeholder organizations. The sessions produced a set of design principles to guide measure development and two detailed measure descriptions. They also initiated discussions on potential implementation funding proposal ideas and partners.

In November 2023, the Air District held a public workshop to receive feedback on the draft measure concepts.[16] Feedback from the public workshop was added to the Working Session discussions that contributed to the PCAP measures.

The very short timeline for completing the PCAP did not lend itself to the type of in-depth community partnering and engagement that has become best practice in the Bay Area. Therefore, the Air District relied on recently completed engagement efforts and established avenues for engaging frontline communities. The Air District reviewed results of recently conducted (within the past 3 years) community engagement activities provided by local governments and regional agencies. A Roundtable of regional community-serving organizations with deep familiarity with Bay Area frontline communities worked with the Air District to finalize a synthesis of these community engagement efforts. Roundtable members included Emerald Cities Collaborative, Greenlining Institute, PODER, and Transform. They also

[14] The federally-designated San Francisco-Oakland-Berkeley MSA includes Alameda County, Contra Costa County, Marin County, City and County of San Francisco, and San Mateo County. The Air District received approval from the USEPA to expand the PCAP to cover the entire Air District's jurisdiction, including Napa County and portions of Solano County and Sonoma County with the exception of Santa Clara County which is included in a separate MSA for the CPRG effort.

[15] Community Choice Aggregation programs allow local governments to procure power on behalf of their residents, businesses, and municipal accounts from an alternative supplier while still receiving transmission and distribution service from their existing utility provider. In the BARCAP geography, there are five community choice aggregators: Ava Community Energy, Clean Power SF, MCE Clean Energy, Peninsula Clean Energy, and Sonoma Clean Power.

[16] A recording of the public workshop, along with PPT slides, can be found here: https://www.baaqmd.gov/plans-and-climate/climate-protection/bay-area-regional-climate-action-planning-initiative

participated in the four Working Sessions mentioned above. Air District staff presented on the BARCAP at two CCA-led meetings of CBOs and community partners and held a pre-meeting with other CBOs prior to their participation in the Working Sessions.

More information on frontline community engagement can be found in *Section 4: Frontline Communities Benefits Analysis*. *Section 6: Coordination and Outreach* provides more detail on the AWG and the engagement of other key stakeholders.

OVERVIEW OF THE PCAP

This document includes the following required and optional components of the PCAP, with additional detail available in the appendices:

- Description of the regional GHG inventory
- Priority GHG Reduction Measures
- Identification of frontline communities, how they were engaged and how they may benefit from implementation of the Priority GHG Reduction Measures
- Workforce planning analysis
- Summary of outreach and interagency and intergovernmental coordination efforts
- Next steps

2. Greenhouse Gas (GHG) Inventory

This section describes the regional GHG emissions inventory, which is a foundational piece of the PCAP that quantifies major and minor sources of GHG emissions in the Bay Area region.

SCOPE

The Air District has developed a GHG emissions inventory for the PCAP (with a base year of 2022[17]). The inventory accounts for GHG emissions at the county level for the eight Bay Area counties[18] included in this planning effort (excluding those portions of Sonoma County and Solano County that fall outside the Air District's jurisdiction) across six major sectors – Commercial and Residential, Transportation, Industrial, Electricity Generation (direct emissions only), Waste Management, and Agriculture. These sectors are defined and discussed in more detail in *Appendix A* of this report.

For all sources, carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are quantified, and emissions of several fluorine-bearing species representing hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3) are also included, wherever applicable. GHG emissions are reported in terms of CO_2-equivalents (CO_2e) and are developed using 100-year time-horizon global warming potentials (GWP) relative to CO_2 from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), which includes climate feedbacks.[19]

DATA REVIEW

The GHG emissions inventory is subject to an extensive data review and quality control process that is described in the Quality Assurance Project Plan[20] for the PCAP. Details of the GHG inventory quality assurance process are provided in *Appendix A* and are based on the Quality Assurance Project Plan.

INVENTORY METHODOLOGY

The Air District applied a 'production-based' approach to develop the GHG emissions inventory, which focuses on estimating emissions from sources that produce direct emissions in the region, as compared to attributing emissions to consumers (and end-users) of goods and services (consumption-based approach).

The Air District inventory method involves a combination of:

- a bottom-up approach where emissions are derived by combining activity data and/or throughputs with GHG emissions factors and local/regional controls
- a top-down approach where emissions are derived by scaling down from an existing (e.g., national and/or state) emissions inventory using a proxy (such as population, vehicle miles traveled, etc.)
- emissions verified and approved through the Air District's permitting program

[17] This choice of base year reflects the best available data, for a vast majority of the source categories, including up-to-date (current) activity data, throughputs, emissions factors, impact of implemented controls, or actual reported and approved emissions (not a projection), or access to up-to-date national and statewide emissions inventories.

[18] The Air District's complete GHG inventory includes nine counties, but the GHG inventory for the PCAP excludes Santa Clara County to align with the geographic scope of this PCAP.

[19] Table 8.7, Page 714, IPCC Fifth Assessment Report, https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

[20] Quality Assurance Project Plan for The Bay Area Climate Action Planning Initiative, Grant No..: 98T73201; *submitted on*: 12-27-2023; *approved on*: 01-04-2024; available on request.

More details on inventory accounting methods can be found in *Appendix A*.

GHG EMISSIONS

The annual GHG emissions for the Bay Area region for the year 2022 total 59.9 million metric tons of CO_2-equivalent ($MMTCO_2e$), as shown in *Figure 2.1* (subsector detail in *Table 1* and *Figure 1* in *Appendix A*). For context, this total represents about 16% of California's statewide GHG emissions for year 2021.[21] Transportation (35%) is the largest contributing sector to the annual total GHG emissions, followed by Industrial (33%) emissions. Other high contribution sectors include Commercial and Residential (15%) and Electricity Generation (12%).

The relative share of GHG emissions in the Commercial and Residential sector (primarily, combustion emissions from space- and water-heating activities, and use of refrigerants in buildings[22]) are consistent with those in the national inventory.[23] GHG emissions in the Electricity Generation sector (attributed at the point of generation rather than point of use) in the Bay Area region constitute a lower relative share as compared to the national GHG inventory, indicating a relatively less-carbon intensive energy generation profile.

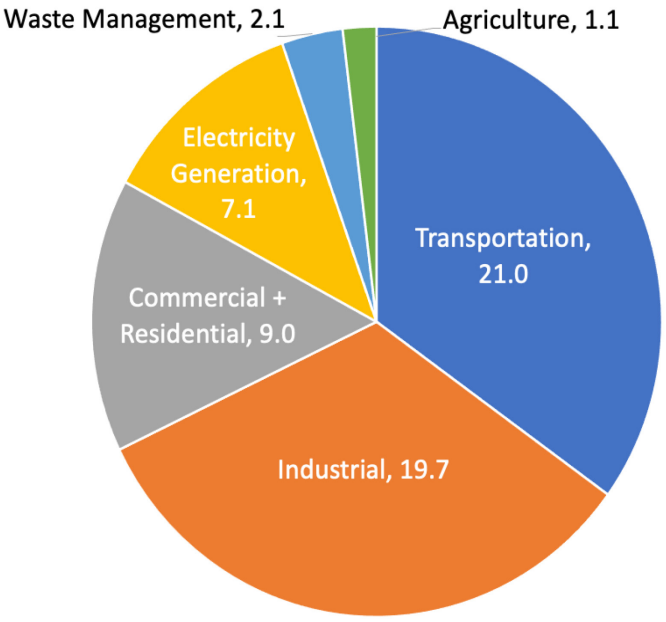


Figure 2.1. 2022 greenhouse gas inventory for the Bay Area region by sector. Total of 59.9 $MMTCO_2e$.

The regional distribution is different from the national inventory where the share of CH_4 and N_2O emissions, mostly from waste management, animal agriculture, and petrochemical production systems, is much larger (~18%). High-GWP gases like HFCs and PFCs comprise a significant proportion of emissions in the Commercial and Residential sector (~25%). The distribution of the different climate pollutants by sector in the Bay Area region is shown in *Figure 2.2* and *Table 2.1*.

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[21] California 2000-2021 GHG Inventory (2023 Edition), https://ww2.arb.ca.gov/ghg-inventory-data

[22] Electricity consumed in the Commercial and Residential sector is reported in the Electricity Generation sector.

[23] Inventory of U.S. Greenhouse Gas Emissions and Sinks, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

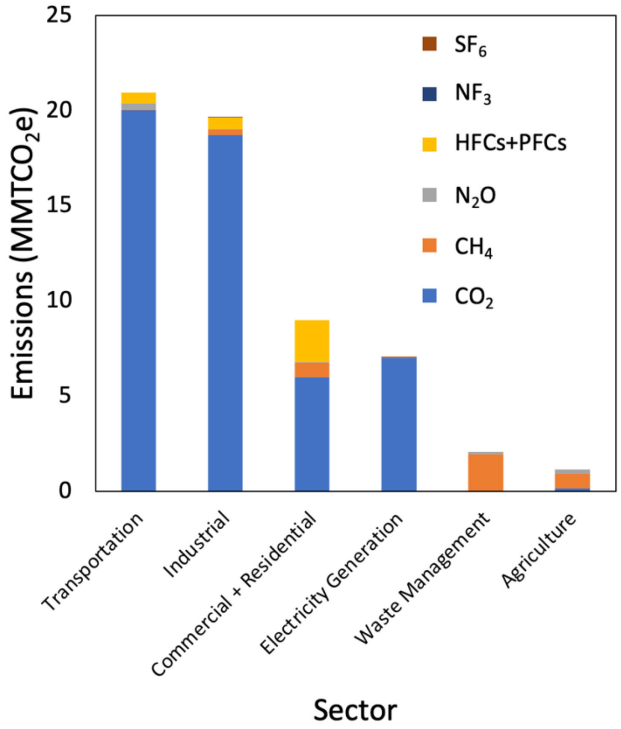

Figure 2.2. 2022 greenhouse gas inventory for the Bay Area region by sector and climate pollutant. Total of 59.9 $MMTCO_2e$.

Table 2.1. Distribution of GHG emissions across the six major source sectors by major climate pollutant type for the Bay Area region.

Sector/Gas	Bay Area Region Emissions ($MMTCO_2e$)		Sector/Gas	Bay Area Region Emissions ($MMTCO_2e$)
Commercial + Residential			**Transportation**	
CO_2	5.98		CO_2	20.02
CH_4	0.77		CH_4	0.04
N_2O	0.02		N_2O	0.32
HFC+PFC	2.21		HFC+PFC	0.58
Total	**8.98**		**Total**	**20.95**
Electricity Generation			**Waste Management**	
CO_2	7.02		CO_2	0.002
CH_4	0.01		CH_4	1.92
N_2O	0.005		N_2O	0.15
SF_6	0.03		HCFC	0.00001
Total	**7.06**		**Total**	**2.07**
Industrial			**Agriculture**	
CO_2	18.72		CO_2	0.16
CH_4	0.30		CH_4	0.74
N_2O	0.04		N_2O	0.24

SF_6	0.03		**Total**	**1.14**
NF_3	0.004			
HFC+PFC	0.58			
Total	**19.67**			
Grand Total	**59.88**			

Figure 2.3 shows the distribution of emissions by county across the Bay Area region. Contra Costa County stands out as the county having the most GHG emissions (~45%) in the Bay Area region. This, in large part, is because four of the five refineries (Industrial sector) and five of the six power plants (Electricity Generation sector) in the Bay Area region are in this county. The fifth refinery is in Solano County, which otherwise has relatively low GHG emissions, as its population is low and only the southern part of the county is in the Bay Area region. In the other six counties, the Transportation and Commercial and Residential sectors account for the majority of GHG emissions. A detailed breakdown is provided in *Table 2* in *Appendix A*, showing emissions by county and sector.

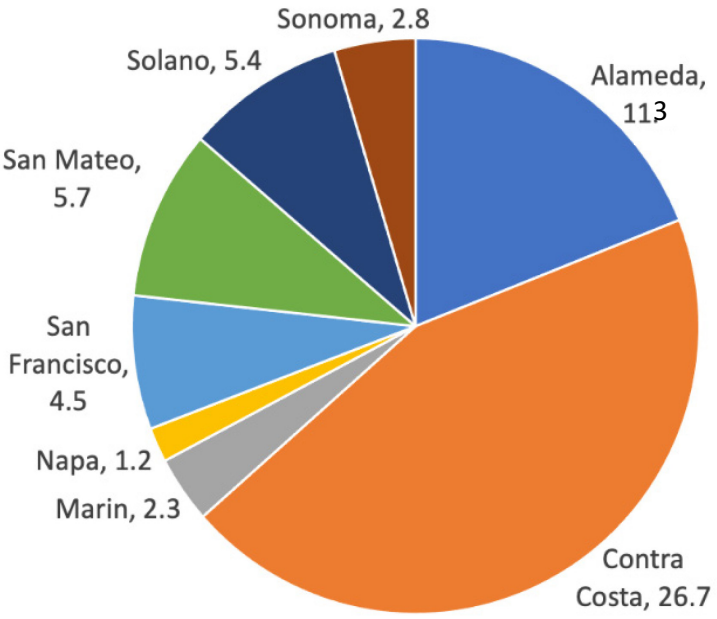

Figure 2.3. 2022 greenhouse gas inventory for the Bay Area region by county. Total of 59.9 MMTCO$_2$e.

DATA RESOURCES

National, state, and local datasets for activity and/or throughputs, emission factors, and emissions have been utilized to develop the Air District's GHG emissions inventory for the Bay Area region. The list below reflects a subset of the most frequently used and referenced datasets contributing to the development of the Bay Area region's GHG emissions inventory. Some of the more prominent data sources deployed in the development of this inventory include:

- Facility-specific GHG data published by the USEPA in the Facility Level Information on Greenhouse Gases tool (FLIGHT)[24]
- Data reported to the USEPA's Greenhouse Gas Reporting Program[25]
- California Air Resources Board's 2000-2021 Greenhouse Gas Inventory (2023 Edition)[21]
- United States Census and American Community Survey downscaled data for Bay Area[26]

[24] https://ghgdata.epa.gov/ghgp/main.do

[25] https://www.epa.gov/ghgreporting/data-sets

[26] https://www.census.gov/quickfacts/fact/table/CA/HSG010222

- Federal Aviation Administration (FAA) emissions modeling through the Aviation Environmental Design Tool (AEDT)[27]
- Natural-gas and electricity generation and use data obtained from the California Energy Commission[28]
- Natural-gas and electricity generation and use data obtained from the Energy Information Administration (EIA)[29]
- California Air Resources Board's statewide mobile source emissions inventory generated using the USEPA-approved EMFAC (EMission FACtor) model[30]
- County crop reports[31]
- Air District facility-scale permit-to-operate throughput and activity data (mostly confidential) that has been previously reviewed for quality assurance and published as a part of prior greenhouse gas inventories
- Air District facility-scale emissions data that have been self-reported by facilities

[27] https://aedt.faa.gov/

[28] https://www.energy.ca.gov/data-reports/energy-almanac

[29] https://www.eia.gov/state/print.php?sid=CA

[30] https://ww2.arb.ca.gov/our-work/programs/msei/on-road-emfac

[31] https://www.cdfa.ca.gov/exec/county/CountyCropReports.html

3. Priority GHG Reduction Measures

This section describes the measures that have been identified as 'priority measures' for the PCAP and for the purposes of pursuing funding through CPRG implementation grants. It is not an exhaustive list of the region's priorities. Instead, the selected priority measures included in this PCAP meet the following criteria:

- The measure is implementation-ready and can be completed in the near-term (by end of the five-year performance period for the CPRG implementation grants when all funds must be expended)
- The measure results in significant GHG reductions and significant benefits to frontline communities, with a process for being informed by communities
- The measure is regional in nature and necessitates the participation of multiple jurisdictions
- The measure is replicable and innovative and addresses funding gaps
- The measure advances the guiding values, or design principles, in *Table 3.1* which were developed by the Air District, AWG, Roundtable, and Working Session participants

Table 3.1. PCAP measure development design principles.

PCAP Measure Development Design Principles	
Climate equity: Provide direct, meaningful, desired, and assured benefits to frontline communities, with a particular focus on Black, Indigenous, and People of Color (BIPOC) communities.	**Health & safety**: Improves living conditions (indoor and outdoor air quality, traffic safety, and pedestrian safety), especially in frontline communities.
Cooperative: Build upon and integrate existing efforts to expand impact, rather than introduce duplication.	**Housing and community stability**: Supports people, especially renters and low-income homeowners, be housed and remain in their homes by increasing healthy, resilient housing with affordable electricity and accessible transportation options.
Coordinated: Build cooperation and peer working relationships among local government and community-based organizations that builds community capacity and empowers community leadership within and across counties.	**Jobs**: Creates lasting, high-quality, family-sustaining high-road jobs and other pathways to economic sovereignty in frontline communities.
Funding: Increases access to critical financing and funding mechanisms for frontline communities and other key stakeholders.	**Resilience**: Builds resilience, especially for frontline communities, through changing climate conditions in the near and long term.
Genuine affordability and access: Increases access to housing and transportation, especially for frontline communities.	**Strategic**: Uses one-time funding transformatively, considering both short- and long-term impact.

The two priority sectors included in the PCAP are passenger vehicles and residential buildings. Together, emissions from these sectors make up more than 25% of the Bay Area region's GHG emissions. They are the top two sectors most commonly identified by local government staff as highest priority when

surveyed early in the BARCAP process. AWG members echoed this prioritization. They are also identified in the State Scoping Plan as the highest priority areas for action by local governments.[32] Passenger vehicles and residential buildings are also reflected as major local GHG emission sources and top priorities for mitigation in the 70+ local climate action plans that have been adopted by Bay Area jurisdictions. The Air District's review of recently conducted community engagement by local governments and regional agencies found similar community priorities across the region, including active transportation, public transit systems, e-micro-mobility, and clean, healthy, affordable, and secure housing. In the Bay Area region, Roundtable members and other community-serving organizations have worked extensively with communities to understand their priorities for these two sectors and how to best advance climate equity in implementation.

BAY AREA REGION'S PRIORITY CLIMATE ACTION PLAN GREENHOUSE GAS REDUCTION MEASURE: SAFE, ACCESSIBLE, CLEAN, AND EQUITABLE MULTI-MODAL TRANSPORTATION

The Bay Area is a leader in transportation planning that is integrated, favors transit and active modes of transportation, and considers environmental and equity impacts. The Bay Area is unique in that it has a visionary long-range integrated transportation, housing, economic, and environmental plan – Plan Bay Area 2050[33] (PBA 2050), developed by MTC. PBA 2050 aims to have nearly half of all Bay Area residents (70% for low-income households) living within one half-mile of frequent transit by 2050, in order to make the region more affordable, connected, diverse, healthy, and vibrant, with a focus on equity outcomes. Implementation of PBA 2050's strategies, especially those that focus on active and shared travel modes, combined with PBA 2050's transit-supportive land use pattern, are forecasted to significantly decrease GHG emissions, meeting the state-mandated 19% reduction in per capita GHG emissions from transportation below 2005 levels by 2035 for the region. The PCAP measure described below is designed to implement key elements of PBA 2050, particularly in frontline communities, and help achieve this GHG emission reduction target.

BACKGROUND

Transportation is the largest contributor to GHG emissions in the Bay Area region, accounting for 35% of regional GHG emissions. Passenger cars and light-duty trucks make up more than half of those emissions. With many of the area's highways cutting through frontline communities, this vehicle travel also contributes to the health burden of these communities through the increases in air pollution that result from tailpipe exhaust and brake and tire wear. Although private vehicle trips have rebounded since COVID-19, as demonstrated by toll crossing numbers for the Bay Bridge, transit ridership across the Bay Area is still greatly suppressed, with Bay Area Rapid Transit (BART) only at approximately 37% of the average monthly ridership of the year before the pandemic.[34] This new reality for transit agencies across the Bay Area is one that creates significant funding challenges as they work to attract new and previous riders to their services.[35]

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[32] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality; Appendix D Local Actions

[33] https://www.planbayarea.org/plan-bay-area-2050

[34] BART ridership information accessed on 9/11/23 at https://mtc.ca.gov/tools-resources/data-tools/monthly-transportation-statistics

[35] In April 2020, MTC established the Blue Ribbon Transit Recovery Task Force to help transit agencies rebound from suppressed ridership in the wake of the COVID-19 pandemic.

The Bay Area's transit system is comprised of 27 different transit agencies operating with a transit fleet that includes bus, rail, and ferry service. The complexity of this network leads to challenges that include lack of accessibility due to poor first-mile, last-mile connections;[36] increased costs due to uncoordinated fare structures; and increased time for trips due to uncoordinated service schedules. These challenges are often felt more acutely by residents of frontline communities that have historically faced under-investment due to racism, socioeconomic status, and lack of access to decision makers. Additionally, residents in these communities are typically more reliant on public transportation to complete trips to work, obtain goods and services, and get to other places they need to go. This measure is aimed at reducing these challenges by co-locating a variety of transportation options in mobility hubs that will offer a safe, comfortable, convenient, and accessible space to seamlessly transfer between different travel modes and ultimately shift trips made in single occupancy vehicles to transit and active modes of transportation, reducing vehicle miles traveled (VMT) and GHGs.

Priority for Local Governments in the Region

Regional and local governments and agencies across the Bay Area region identified reducing VMT through transportation mode shift as a priority for the PCAP. Their commitment to addressing vehicle emissions through mode shift is demonstrated through their adopted active transportation[37] plans, climate action plans, and policymaking. They also raised this priority during engagement efforts led by the Air District and partners to inform PCAP development from April 2023 to October 2023.

Engagement conducted by MTC to inform an update of PBA 2050 identified active transportation and mobility improvements as a priority for communities throughout the Bay Area region as well. Engagement with the public, and specifically from frontline communities, identified priorities for transit, changes in travel behavior, and active transportation improvements.[38] For active transportation, there was a call to encourage and provide alternative mobility options, to increase safe bike and pedestrian infrastructure, and to prioritize that infrastructure over vehicles, making communities more accessible via active modes of transportation.

Through its Community-Based Transportation Planning (CBTP) Program, MTC and county transportation agencies work with communities that have been historically underserved by or excluded from the transportation process to identify mobility challenges and prioritize solutions. Nearly half of the CBTP-related recommendations focused on active transportation improvements, and more than one-third of the recommendations were related to transit.[39]

Frontline communities have shared with local governments similar transportation-related priorities for improved active transportation infrastructure and public transit systems, along with safety and

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[36] First-mile, last-mile connections describe the distance to get from your home to the transit stop and from the transit stop to your final destination (work, goods and services, etc.).

[37] Active transportation refers human-powered mobility, including biking and walking.

[38] https://mtc.ca.gov/sites/default/files/meetings/attachments/5833/8aiii_PBA50_Attachment_B_Draft_Blueprint_Round_1_Engagement.pdf

[39] https://mtc.ca.gov/sites/default/files/documents/2022-05/CBTP_Program_Evaluation_April_2022.pdf. The most common recommendations included new bike facilities, roadway intersection and sidewalk improvements, complete streets improvements, and shared mobility (e.g., bike or scooter share). The two most common transit recommendations focused on improving traveler information and improvements to stations.

affordability concerns, and interest in e-micro-mobility, [40] [41] which echo much of the feedback MTC received.

Priority Reflected in Regional Planning

This priority measure creates mobility hubs – places in a community that bring together different types of low-emission, safe, and accessible transportation options. By locating new or expanded mobility hubs in the frontline communities within MTC's priority development areas (areas within existing communities identified and approved by local cities or counties for future growth), the measure supports two high-impact PBA 2050 strategies (Strategies H3 and EC4),[42] bringing more transportation options to areas that have been identified for increased densities of residential and commercial growth. Increasing connectivity to transit and improving access to active transportation will allow more trips to be completed without the use of personal vehicles and will help the region reach its ambitious targets for VMT reduction and reducing GHG emissions.

Plan Bay Area 2050 includes strategies that support active transportation. PBA 2050 strategy T8 calls for building a Complete Streets network that promotes walking, biking, and other micro-mobility options through sidewalk improvements, car-free slow streets, and 10,000 miles of bike lanes or multi-use paths. Strategy T9 advances the regional Vision Zero policy through improved street design and reduced vehicle speeds. Both strategies complement and enhance mobility hubs implementation.

Existing Efforts

Throughout the Bay Area region, a variety of programs focus on shifting single occupancy vehicle trips to transit and active modes of transportation and reducing emissions from alternative modes. They include projects such as incentives for e-bikes, electric vehicle (EV) charging infrastructure, bike/car share, and other clean, shared, zero-emission transportation projects. The main program this measure builds upon is MTC's Regional Mobility Hubs Program,[43] which coordinates, funds, and provides technical assistance for the development of mobility hubs. Mobility hubs serve as community anchors that enable travelers of all backgrounds and abilities to access multiple travel options – including shared scooters, bicycles, cars, and transit – as well as supportive amenities in a cohesive space, oriented to the traveler. MTC has funded twelve mobility hub projects to date throughout the Bay Area since the launch of the program in 2021,[44] and developed a Mobility Hubs Implementation Playbook[45] to provide technical assistance to public agencies and community organizations interested in providing safe and accessible alternatives to single-occupancy vehicle trips.

In addition to the Regional Mobility Hubs Program, MTC has developed a variety of plans and policies that support the implementation and success of mobility hubs. These include:

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[40] E-micro mobility (Electric micro mobility) includes any small, low-speed, electric-powered transportation device, including electric-assist bicycles (e-bikes), electric scooters (e-scooters), and other small, lightweight, wheeled electric-powered conveyances.

[41] These priorities come from an analysis of outputs from recently conducted (within the past 3 years) community engagement activities provided by local governments.

[42] Strategy H3: Allow a greater mix of housing densities and types in growth geographies; Strategy EC4: Allow greater commercial densities in growth geographies.

[43] https://mtc.ca.gov/planning/transportation/mobility-hubs

[44] 2021 Pilot Awards approval: https://mtc.legistar.com/LegislationDetail.aspx?ID=5126761&GUID=89D47ED1-F31B-4A79-960D-B655A382FD7E&Options=&Search=; 2023 Grant Awards Approval: https://mtc.legistar.com/LegislationDetail.aspx?ID=6249612&GUID=94FDC2D8-7411-408C-A00B-85E06140E7FB

[45] MTC's Mobility Hubs Implementation Playbook is a comprehensive technical assistance guide with implementation strategies, tactical approaches, and management techniques.

- MTC's Regional Active Transportation Plan,[46] which guides MTC's policy and investment framework to implement the PBA 2050 active transportation strategies
- The Regional Active Transportation Network,[47] which focuses the Bay Area's efforts in providing active transportation connections in areas with the highest potential for shifting vehicle trips to biking and walking, where there is the greatest need for affordable transportation options, and where active trips can connect people with transit for longer distance travel
- MTC's Transit Oriented Communities (TOC) Policy,[48] which was developed to enable people to access and use transit more often for more types of trips by centering housing, jobs, services, and shopping around public transit

Additionally, there are a multitude of plans and pilot projects from counties and cities throughout the Bay Area region (community-based transportation plans, climate action plans, active transportation plans, general plans, etc.), that include key active transportation improvements needed to help shift trips away from single occupancy vehicle travel. These plans help to identify and prioritize active transportation improvements around planned mobility hubs and can inform measure implementation.

These efforts include:

- Active transportation plans, bicycle plans, pedestrian plans, and/or safe streets plans for all counties and most cities in the Bay Area region, with others under development
- Community-based transportation plans for more than 30 low-income communities across the Bay Area region that have been developed through a collaborative process with transportation agencies, residents, and community organizations, with funding from MTC. The plans include locally identified transportation needs and solutions to address them[49]
- The City of Oakland's Basic Mobility Pilot Project, which provides prepaid debit cards and transit passes to income-qualifying residents for transit, shared mobility, and other mobility-related services[50]
- TransForm and MTC's EV Carsharing and Mobility Hubs in Affordable Housing Pilot, which brings EV car sharing, EV charging infrastructure, and other travel options to affordable housing communities in the region[51]

Although the Bay Area is ahead of many other regions in California and across the country, more accelerated action is needed to reduce VMT and meet state and regional goals. This includes funding mode shift-supporting plans, policies, and infrastructure that will be required to meet the region's goal

[46] https://mtc.ca.gov/funding/investment-strategies-commitments/climate-protection/regional-active-transportation-plan

[47] The Regional Active Transportation Network (https://www.arcgis.com/home/item.html?id=43e128434c07450b8b8f6d6dc5791a51) supports Plan Bay Area goals by focusing the region's efforts on providing high comfort active transportation connections in areas with the highest potential for shifting auto trips to bicycling and walking trips, where there is the greatest need for affordable transportation options and where active trips connect people with transit.

[48] https://mtc.ca.gov/sites/default/files/documents/2022-10/MTC_Resolution_4530.pdf

[49] https://mtc.ca.gov/planning/transportation/access-equity-mobility/community-based-transportation-plans-cbtps

[50] https://www.oaklandca.gov/topics/universal-basic-mobility

[51] https://www.transformca.org/mobility-hubs-affordable-housing-pilot#:~:text=With%20funding%20from%20the%20California,%2C%20Richmond%2C%20and%20San%20Jose

of reducing per capita VMT to 19% below 2005 levels by 2035 and the state's goal of reducing per capita VMT to 25% below 2019 levels by 2030 and 30% below 2019 levels by 2045.[52]

Key Barriers and Gaps

A variety of barriers can prevent Bay Area residents from using transit and active transportation, and importantly, from switching personal auto travel to transit or active modes of transportation. These barriers are often felt more acutely by residents of frontline communities, as these areas often have historically faced under-investment due to racism or socioeconomic conditions and are typically more reliant on public transportation to complete trips to work, obtain goods and services, and get to other places they need to go. Barriers include:

- Transportation costs
- Inadequate or unsafe first-mile, last-mile connections to transit
- Issues connecting between different transit agency networks
- Increased time for transit trips due to uncoordinated transit schedules
- Lack of tree cover and vegetation for biking and pedestrian facilities, contributing to uncomfortable conditions due to extreme urban heat and potential flooding during heavy rains

PRIORITY GHG REDUCTION MEASURE: SAFE, ACCESSIBLE, CLEAN, AND EQUITABLE MULTI-MODAL TRANSPORTATION

The over-arching goal of this measure is to reduce GHG and other polluting emissions from personal vehicle travel while increasing transportation choices in frontline communities. This priority measure will reduce single occupancy VMT by creating or building out mobility hubs to make it easier for trips to be made by transit, biking, walking, scooter, wheelchair, or other mobility devices, including e-micro-mobility. Implementation will focus on creating or expanding mobility hubs in frontline communities and incorporating policies that produce, preserve, and protect affordable housing and stabilize businesses to prevent displacement, similar to the goals outlined in MTC's TOC Policy.[53]

Mobility hubs should include a variety of components to meet the needs of the community (determined through engagement with CBOs and participatory community processes), with the intent that the hub will serve as a community anchor that enables residents to access multiple transportation options and supportive amenities. While the optimal configuration of the mobility hub depends on the surrounding land use and community input, project components should include:

- First-mile, last-mile connectivity improvements, such as:
    - Bicycle and pedestrian facility improvements, incorporating complete streets and vision zero[54] in design
    - Micro-mobility, bikeshare/e-bikeshare
    - EV Carshare/EV Charging (on-site and in adjacent ½ mile area)
    - Urban greening along pedestrian, bicycle, and transit infrastructure
- Multi-modal connectivity improvements, such as:
    - Solar charging for e-bikes, e-scooters, and EVs
    - Bike racks/lockers (with proper sizing for e-bikes and e-cargo bikes)
    - Micro-transit service
    - Transit priority infrastructure improving on-time performance and bus transit access

[52] California Air Resources Board's 2022 Scoping Plan (https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf)

[53] https://mtc.ca.gov/planning/land-use/transit-oriented-communities-toc-policy

[54] "Vision Zero" is a nationwide movement to reduce traffic injuries to zero.

    - Improved transit waiting area infrastructure (e.g., bus shelters, lighting, etc.)
    - Improved signage, wayfinding, and real-time information for transit departure
    - Transit fare coordination
    - Transit schedule coordination
- Community amenities and services (e.g., common carrier package pickup lockers, retail kiosks, community centers, medical services, street furniture)
- E-bike incentives
- Discounted fare programs and discounted bike share passes for low-income and underserved populations
- Safety improvements
- Outreach and education to the community, with a special focus on youth, engaging CBOs to encourage the shift to active and low-carbon or zero-carbon mobility options

GHG REDUCTIONS

Table 3.2. GHG emissions reductions from implementation of the Mobility Hubs measure.

2025-2030 GHG reductions (cumulative)	2025-2050 GHG reductions (cumulative)
~172,000 MT CO_2e	~471,000 MT CO_2e

More detailed information is included in *Appendix C*, including the GHG emissions quantification methodology, GHG reductions by measure component, quantification methodology inputs, and more.

KEY IMPLEMENTING AGENCIES

Implementation of this measure involves a diverse collaboration of agencies across the region:

- Regional agencies to lead overall program management
- Regional and County Transit Agencies to coordinate stakeholders and projects within their jurisdictions and to implement project components on their properties
- Cities and counties to implement project components on their properties and right-of-ways
- Community choice aggregators and utilities to administer rebates and incentives
- Research institutions to partner on research efforts

Other organizations, including CBOs, may play key roles as well.

IMPLEMENTATION SCHEDULE AND MILESTONES

- 2024 – Program established and sites selected for mobility hubs
- 2024-2025 – Engagement with the community and CBOs to determine mobility needs
- 2025-2026 – Develop final construction plans and/or programs and obtain needed permits
- 2026-2027 – Begin implementation of non-construction-related components of mobility hubs (such as e-bike incentives or reduced fare programs)
- 2026-2030 – Phased construction of upgrades to mobility hubs
- 2027-2028 – Education and marketing to promote use of mobility hubs

AUTHORITY TO IMPLEMENT

Implementation of this measure involves voluntary actions. No additional authority must be acquired by implementing partners to implement the measure. Below is a list of key existing authorities related to the upgrades to properties and right-of-ways and administration of rebates and incentives, as well as anti-displacement policies.

- Transit Agencies have the authority to make upgrades to their properties.
- Cities and counties have the authority to make upgrades to properties and right-of-ways and implement anti-displacement policies.[55]
- Regional agencies, community choice aggregators, and utilities have authority to administer rebates and incentives.

GEOGRAPHIC SCOPE

The geographic scope of this measure covers frontline communities in Alameda County, Contra Costa County, Marin County, Napa County, City and County of San Francisco, San Mateo County, and the portions of Sonoma County and Solano County that are in the Bay Area air basin.

METRICS FOR TRACKING PROGRESS

Because projects will be located in or adjacent to frontline communities, the metrics below will focus on frontline communities. The following metrics will be used to track progress:[56]

- GHG emission reductions
- VMT reductions
- Change in transit ridership
- Change in bike/pedestrian activity
- Number of mobility hubs created and amount of each project component included (e.g., miles of bike lanes created, number of carshare vehicles and miles, number of e-bike incentives, etc.)

INTERSECTION WITH AVAILABLE FUNDING

This priority measure complements and potentially expands upon existing programs. The Air District has explored federal and non-federal funding sources to determine whether these sources could fund implementation of the measure and whether such funding is sufficient to fully implement the measure.

Potential Cost to Implement the Measure

MTC's 2023 Regional Mobility Hub Program solicitation[57] is used as a basis to estimate the potential cost of implementing the measure. Although the solicitation has a maximum award of $3 million per mobility hub, MTC received feedback from applicants and previous awardees that mobility hubs actually cost between $5 million and $10 million to fully implement, so an estimated cost of $7.5 million per hub is used. Assuming that 25 of the approximately 115 potential mobility hub sites in frontline communities and transit-oriented community designations could be upgraded within the 5-year implementation period, the total cost would be approximately $188 million.

E-bike incentives and discount fare programs are not included in MTC's program and represent an additional cost. Assuming that incentives are provided for 2,500 e-bikes through the measure and those incentives provide $1,000 toward an e-bike,[58] the total additional cost would be $2.5 million. Discounted

[55] Improvements to neighborhoods, such as investments to public infrastructure like the ones in this measure, can increase home values, which can in turn lead to displacement of long-time residents.

[56] The Air District will report on measure progress in its 2027 Status Report to USEPA.

[57] The solicitation includes some of the first-mile, last-mile improvements (limited to bike and ped facility improvements within ¼ mile of the hub), multi-modal connectivity improvements, and community amenities and services listed in Section 3 above.

[58] Based on Peninsula Clean Energy's E-Bikes For Everyone Program incentive amount (https://www.peninsulacleanenergy.com/ebikes/)

fare programs will result in additional costs but those costs are dependent on the scale of the fare program developed and are not calculated for this funding analysis.

Potential Funding Sources

Many of the federal programs identified below are general and/or competitive funding sources that fund a wide variety of projects, without earmarked dollars for specific activities that comprise the priority measure. As a result, this funding is much less certain than CPRG funding and, notably, funding cycles for these programs have closed.

Table 3.3. Federal, state, and regional grant programs to leverage for the Mobility Hubs measure.

Grant Program	Federal, State, or Regional	Total
Neighborhood Access and Equity Grant Program [59]	Federal – Inflation Reduction Act (IRA)	$3.2 billion (nationally competitive)
National Electric Vehicle Infrastructure Formula Program[60]	Federal – Bipartisan Infrastructure Law (BIL)	$384 million statewide (Competitive statewide solicitation from CEC and Caltrans)
Carbon Reduction Program[61]	Federal – BIL	$10 million for Bay Area plus $38.5 million to be spent anywhere in the state *($110 million statewide, assume Bay Area region accounts for 16% of statewide population)* Note: MTC received funding through this program and uses it for their 2023 Mobility Hub Program. For their 2023 solicitation (a 4-year grant cycle) they have used a $33million allocation.
California Active Transportation Program[62]	State	$850 million in proposed 2024-2025 budget (competitive statewide)
Charge! Program[63] - grant from Charging and Fueling Infrastructure Discretionary Grant Program[64]	Regional (BIL)	$15 million (competitive Bay Area Region)

The California Active Transportation Program (ATP) provides funding to increase the proportion of trips accomplished by walking and biking, increasing the safety and mobility of non-motorized users, advancing efforts of regional agencies to achieve GHG reduction goals, enhancing public health, and providing a broad spectrum of projects to benefit many types of users including disadvantaged communities. Although this funding would not apply to all the components of this PCAP measure, it

[59] https://www.transportation.gov/grants/rcnprogram/about-neighborhood-access-and-equity-grant-program
[60] https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nevi_formula_program.cfm
[61] https://www.fhwa.dot.gov/bipartisan-infrastructure-law/crp_fact_sheet.cfm
[62] https://catc.ca.gov/programs/active-transportation-program
[63] https://www.baaqmd.gov/news-and-events/page-resources/2024-news/011124-dot-grant
[64] https://www.transportation.gov/rural/grant-toolkit/charging-and-fueling-infrastructure-grant-program

could be leveraged to fund the active transportation component of it. The next cycle of ATP funding is currently under development and final funding amounts are yet to be set. However, the State of California is facing a $38-$68 billion shortfall for 2024-2025 and the Governor has proposed a $2.9 billion reduction in funding for climate programs, including a $200 million reduction to the ATP. These shortfalls highlight the need for more federal funding for these types of projects.

BAY AREA REGION'S PRIORITY CLIMATE ACTION PLAN GREENHOUSE GAS REDUCTION MEASURE: HOLISTIC BUILDING DECARBONIZATION FOR CLEAN, HEALTHY, AND SECURE HOUSING

The Bay Area is uniquely positioned to demonstrate an equitable and accelerated transition to zero-emission homes through building decarbonization,[65] given its distinctive constellation of programs and first-of-its kind building appliance regulation. This priority measure accelerates electrification and energy efficiency retrofits in existing homes, prioritizing frontline communities, through an integrated approach that maximizes co-benefits, applies economies of scale and strategic targeting, sends important market signals, and helps build the workforce necessary for a full and just transition. This measure will provide a replicable model for moving beyond status quo of current retrofit efforts that have tended to be siloed and have achieved only incremental residential building decarbonization to date – to a comprehensive, strategic, multi-faceted pathway for achieving widespread home decarbonization that significantly reduces GHG emissions from residential buildings and benefits frontline communities.

BACKGROUND

Major GHG Emissions Source

Residential and commercial buildings in the Bay Area are a significant source of regional GHG emissions, surpassed only by transportation and industrial sources. Burning gaseous fossil fuels for energy in homes creates almost half of those building-related regional GHG emissions. Due to state and local policies and actions, the electricity grid in California – and particularly the Bay Area – is much cleaner than in most of the rest of the country.[66] As a result, there is a GHG reduction premium when switching from gas to electricity in the Bay Area that does not occur in many other locations. Residential building decarbonization can also decrease exposure to health-damaging air pollutants such as nitrogen oxides (NOx) and particulate matter that are by-products of fossil fuel combustion.[67]

Priority for Local Governments in the Region

Local governments across the Bay Area region identified equitable residential building decarbonization as a priority for the PCAP. Their commitment to decarbonizing homes is demonstrated in their adopted

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[65] Building decarbonization refers to a broad group of strategies to reduce GHG emissions from residential and commercial buildings. Energy efficiency and building electrification (or replacing fossil fuel-dependent appliances and equipment with electric ones) are two critical components. Throughout this document, residential building decarbonization will refer primarily to these two strategies. Other strategies for building decarbonization may include: the use of zero-carbon electricity, energy storage, demand flexibility, and the use of very low- or no-GWP refrigerants and refrigerant emission leak reduction. (https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-f-building-decarbonization.pdf)

[66] California's Renewables Portfolio Standard (updated by SB 100) targets 60 percent of retail electricity sales in 2030 and 100 percent by 2045. In the Bay Area, Pacific Gas and Electric Company (PG&E) and seven community choice aggregators (CCAs) have already exceeded these targets. According to its 2022 Climate Strategy Report, "PG&E delivers some of the nation's cleanest electricity to customers, with 93% from greenhouse gas-free resources in 2021. The associated emissions rate is nearly 90% cleaner than the latest national average among energy providers." The CCAs aim to deliver cleaner electricity than PG&E's benchmark.

[67] https://coeh.ph.ucla.edu/2020/04/29/study-gas-powered-appliances-may-be-hazardous-for-your-health/#:~:text=The%20UCLA%20Fielding%20School%20of,that%20exceeded%20both%20state%20and

climate action plans and policymaking. They also expressed it as a top focus for the PCAP in response to various engagement efforts conducted by the Air District and partners to inform PCAP development from April 2023 to October 2023 (e.g., surveys, interviews, meetings, etc.), with a particular emphasis on existing low-income homes. Frontline communities have shared with local governments that their key priorities related to home decarbonization include housing security and affordability (including tenant protections), health and safety upgrades, and reduced energy costs (or at the very least no increased costs) and reliability.[68] Communities of color and low-income communities regularly experience poor housing quality and disproportionate exposure to environmental hazards as the result of racist and discriminatory policies and practices.[69]

Local governments throughout the Bay Area have been leading the nation on building decarbonization, with their early actions, such as those focused on new construction, influencing similar efforts across California and the country. For the past several years, Bay Area policy and program activities have turned to focus on the challenge of decarbonizing the existing building stock.

Rich Constellation of Existing Efforts

Local government policies are just part of a broader constellation of programs by community choice aggregators, the local investor-owned utility PG&E, ABAG/BayREN and other regional agencies, local governments, and non-profits in the Bay Area region dedicated to incentivizing and subsidizing residential electrification and energy efficiency retrofits in a way that benefits all residents.

The Bay Area is also home to many innovative pilots focused on identifying the most effective and equitable solutions to advance residential decarbonization.

- **Home Electrification Equity Project (HEEP)*:*** Four cities in the Bay Area region are partnering with Habitat for Humanity East Bay/Silicon Valley, with funding from Google.org and ICLEI, to develop a data-driven approach to serve low-income homeowners by incorporating electrification into traditional "health and safety" home upgrade programs. Other partners include California State University East Bay, Rebuilding Together, and GRID Alternatives.[70]
- **Bay Area Healthy Homes Initiative (BAHHI):** The Air District leads this program that seeks to improve health outcomes and climate resilience for Contra Costa and Alameda County asthma patients and residents living in the areas most impacted by traffic-related air pollution. The program brings asthma services and home retrofits to address health triggers, electrify appliances and improve energy efficiency, and keep outdoor pollution out of the home through a unique partnership with Contra Costa Health Services, Alameda County's Asthma Start, ABAG/BayREN, StopWaste, and local energy non-profit Association for Energy Affordability.[71]
- **Just Transition Residential Electrification Pilot:** The City of Berkeley is working with the non-profit Rebuilding Together East Bay North to advance high-road, family-sustaining workforce opportunities through aggregated residential building electrification retrofits in existing affordable housing and/or low-to-moderate income households.
- **Neighborhood-scale electrification analyses and pilots:** The CCA Ava Community Energy and Gridworks analyzed eleven neighborhoods to assess the benefits and costs along with the

[68] These priorities come from an analysis of outputs from recently conducted (within the past 3 years) community engagement activities provided by local governments.

[69] https://www.nrdc.org/sites/default/files/2023-12/housing-justice-health-equity-building-decarbonization-ib.pdf; https://policycommons.net/artifacts/2683765/income-qualified-program-innovations-to-reduce-deferral-rates/3706414/

[70] https://icleiusa.org/wp-content/uploads/2022/11/ICLEI-USA-Action-Fund-Recipient_Home-Electrification-Equity-Project.pdf

[71] https://www.baaqmd.gov/community-health/bay-area-healthy-homes-initiative

practical feasibility and requirements of neighborhood-scale electrification, which involves targeted electrification and decommissioning of gas infrastructure in a specific neighborhood.[72] The City of Albany recently received funding through the US Department of Energy's Energy Efficiency and Conservation Block Grant program to pilot community engagement approaches for neighborhood-scale electrification. UC Berkeley's EcoBlock research project focuses on designing and implementing cost-effective retrofits at the block scale for full decarbonization and independence from the utility grid, including an effort in Oakland.[73]

While a good start, these efforts must be accelerated for existing homes to meet local climate goals (e.g., carbon neutrality, all-electric buildings combined with capped and/or decommissioned natural gas lines[74]) and support the state's goals for achieving carbon neutrality by 2045, reaching 3 million and 7 million all-electric and electric-ready homes (new and existing) statewide by 2030 and 2035, respectively, and installing 6 million heat pumps in homes statewide by 2030. In the Bay Area, the current number of homes relying on natural gas ranges from 20-88 percent depending on the county.[75]

First-in-the-Nation Regulatory Approach

The Bay Area is uniquely positioned to set a precedent for the rest of the nation in the building appliances space with the regulation adopted by the Air District to reduce health-damaging emissions of NOx from these appliances. The rule will prohibit the sale and installation of NOx-emitting appliances for indoor space and water heating in the Bay Area, focusing on replacement upon burnout using a phased approach that begins in 2027. A recent analysis by the Air District found that NOx and particulate matter emissions from home and water heating disproportionately impact communities of color.[76] Implementation of the rule is estimated to avoid up to $890 million per year in health impacts by reducing exposure to NOx and particulate matter.[77] While the purpose of the rule is to reduce NOx emissions, it will also likely deliver important GHG emission reduction co-benefits, as currently the only compliant technologies are electric appliances.[78] As a first-of-its-kind regulation, its success will determine the direction of subsequent regulatory efforts across California and the nation. A critical component to success is ensuring that important market players – such as technology developers, manufacturers and distributors, installers, contractors, and builders – are ready to support and comply with the regulation. Another is addressing concerns related to a potential inequitable burden of the rule on frontline communities. This regulatory approach could serve as a model for the rest of the nation,

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[72] Benefit-Cost Analysis of Targeted Electrification and Gas Decommissioning in California (ethree.com)

[73] https://ecoblock.berkeley.edu/about/

[74] This requirement focuses on all-electric buildings (or all-electric conversions) and the capping and/or decommissioning of all fuel gas plumbing lines by a certain date, which can be called "end of flow." For example, the City of Half Moon Bay adopted an end of flow ordinance in March 2022 focused on end of flow by 2045.

[75] This information is based on a national dataset, NREL's ResStock.

[76] Appendix E: Assessing Ambient Air Quality and Health Impacts from Natural Gas Building Appliances in the Bay Area (https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-6-nitrogen-oxides-emissions-from-natural-gasfired-water-heaters/2021-amendment/documents/20221220_sr_appe_rg09040906-pdf.pdf?rev=f05e1e6f12874600a0382b178b04ab0d), Appendix F: Exposure and Equity Assessment of Natural Gas Appliances in the San Francisco Bay Area (https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-6-nitrogen-oxides-emissions-from-natural-gasfired-water-heaters/2021-amendment/documents/20221220_sr_appf_rg09040906-pdf.pdf?rev=c7a8dc1225b243298e7bd9395a292844)

[77] Infographics – Proposed Amendments to Rules 9-4 and 9-6 (https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20200313_infographics_rules0904and0906-pdf.pdf?rev=1dc3359b09e4476087ddea65a5fa1cd0)

[78] The regulation itself is technology neutral, and natural gas-fired zero-NOx appliances may or may not be developed (https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances#:~:text=2%2F6%2F2023-,Description%3A,fired%20water%20heaters%20and%20boilers).

once successfully implemented. When combined with the state of California's aggressive building decarbonization goals, policies, and regulatory direction, it is already sending strong market signals to appliance manufacturers, building developers, contractors, and building- and homeowners.

Key Barriers and Gaps

The aforementioned efforts across the Bay Area region have illuminated key barriers and gaps to rapid and equitable home decarbonization. This PCAP measure addresses several near-term critical barriers and gaps to create a more holistic approach for residential buildings that can be replicated elsewhere. This includes addressing:

- Possible cost barriers, such as incremental up-front costs of electric appliances as well as potential related infrastructure costs (e.g., panel upgrades, etc.)
- Significant levels of deferred maintenance and health and safety concerns that often hinder or significantly delay energy efficiency and electrification retrofits, especially in low-income housing[79]
- Inadequate number of trained and/or certified contractors, including from frontline communities
- Dynamics in the rental housing market that may deter participation in retrofit programs, including split incentives, fear of displacement (on the part of tenants), and fear of code enforcement for past violations and risk of additional costs to address newly discovered remediation needs (on the part of building owners)
- Lack of up-to-date data on costs and limited appliance model availability for specific use-cases (e.g., small space constraints)

PRIORITY GHG REDUCTION MEASURE: HOLISTIC BUILDING DECARBONIZATION FOR CLEAN, HEALTHY, AND SECURE HOUSING

The over-arching goal of this measure is to speed the transition away from residential natural gas use to healthy and zero-emission housing. This measure will accelerate electrification and energy efficiency retrofits in existing homes, prioritizing homes located in frontline communities, to achieve an equitable transition to clean, healthy, and secure housing.[80]

A program or programs to implement this measure should include:

Retrofits through Incentives and Direct Installations

- Retrofit homes to use electricity instead of natural gas, with a focus on exploring how to aggregate residential projects for economies of scale and strategic targeting (e.g.,

[79] Health and safety issues (such as mold, moisture, asbestos, etc.), structural issues, code violations, or other major issues may lead to homes being deferred from low-income energy upgrade services (like the federal Weatherization Assistance Program (WAP) and utility energy incentives programs) until issues are addressed (or remediated), especially if the total remediation cost exceeds the amount allocated for remediation in the program budget. In addition, most large decarbonization projects require permits and inspections for code compliance. For more information, see: https://policycommons.net/artifacts/2683765/income-qualified-program-innovations-to-reduce-deferral-rates/3706414/, https://buildingdecarb.org/wp-content/uploads/home_decarbonization_8.14.23.pdf, BEI-Berkeley_Residential+Funding+Gap+Analysis_Feb+2023.pdf (squarespace.com)

[80] This measure first and foremost seeks to benefit and serve frontline communities. Recent efforts focused on retrofitting low-income households who had high exposure to air pollution met unexpected hurdles which necessitated flexibility in approach to meet the goals of the effort. This language reflects the need to preserve flexibility while focusing on these communities for implementation of the measure.

neighborhoods with similar small multifamily buildings, in locations that PG&E has identified as most ready for neighborhood-scale electrification)[81]

- Build upon and augment programs that upgrade residential properties to address deferred maintenance and health and safety concerns (such as lead, asbestos, mold, etc.) to increase the amount of updated housing units in frontline communities ready for decarbonization; this issue is a critical concern raised by frontline communities that diminishes living conditions and one that must be corrected before energy efficiency and electrification retrofits can proceed[82]
- Implement efficiency measures for building envelopes and heating distribution systems, along with demand response, load shifting, and resident education measures (such as smart thermostats and enrolling households in load flex programs) to help save money on bills, reduce the size and cost of the retrofits, and lay the groundwork for future virtual power plants[83]
- Stack (or layer) new rebates, incentives, and financing for electrification, health and safety, and energy efficiency retrofits with existing federal, state, and local rebates, incentives, and financing in a user-friendly way to make retrofits affordable for low-income families, affordable housing owners, and non-profit housing developers who acquire and retrofit older housing
- Incorporate EV charging-readiness and measures to increase energy resilience, such as distributed solar and storage, where strategic and feasible
- Provide incentives to reclaim and recycle refrigerants from heat pump water and space heaters and other appliances using refrigerants at end of life to prevent emissions of these high global-warming-potential gases

Community Work Group

- Establish a group that includes CBOs, community members, and other partners to advise on and participate in implementation so that frontline community members' needs are prioritized

Workforce Development and Contractor Support

- Partner with and augment local workforce training programs for electricians, plumbers, and other decarbonization-related roles, particularly those that target workers from frontline communities, formerly incarcerated people, and people with other barriers to employment
- Seek to develop and implement regionally consistent workforce standards for retrofit projects to increase the number of family-sustaining/high-quality jobs
- Provide streamlined contractor support (e.g., increase awareness of and access to incentives, improve communication tools with customers)

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[81] Aggregating projects has the potential to reduce per-unit cost through price negotiations with installers and suppliers. It might also help lower barriers to future neighborhood-scale electrification along a common section of a natural gas line.

[82] See footnote 79. Given limited budgets for health and safety remediation in many programs, other funding is often leveraged to close the funding gap to complete the necessary upgrades. For more information, see https://www.mwalliance.org/sites/default/files/meea-research/deferrals_aceee_paper.pdf

[83] A virtual power plant (VPP) is made of hundreds to thousands of households and businesses that together have the potential to support the electric grid, through their thermostats, batteries, appliances (heat pumps, HVAC equipment, other appliances), EVs and chargers, and solar arrays. When these small-scale energy-resources are aggregated and coordinated with grid operators, they support grid reliability (and provide compensation for this service to households and businesses). VPPs can also lessen the need (and associated costs) for new energy resources and infrastructure. Source: https://rmi.org/clean-energy-101-virtual-power-plants/.

Housing Security and Policy Support

- Identify and implement housing security and anti-displacement best practices for retrofits and health and safety upgrades, with policy support from regional agencies, and best practices to engage and encourage rental property owners' participation in retrofits
- Provide policy support to local governments and CBOs to address implementation barriers as they emerge

GHG REDUCTIONS

Table 3.4. GHG emissions reductions and retrofits from implementation of the Residential Building Decarbonization measure.

2025-2030 GHG reductions (cumulative)	2025-2030 installations (cumulative)	2025-2050 GHG reductions (cumulative)	2025-2050 installations (cumulative)
~363,000 MT CO_{2e}	~269,000[84]	~7,267,000 MT CO_{2e}	~1,475,000

More detailed information is included in *Appendix C*, including the GHG emissions quantification methodology, GHG reductions by type of installation and year, cumulative installation numbers by installation type, and more.

KEY IMPLEMENTING AGENCIES

Implementation of this measure involves a diverse network of agencies across the region:

- Regional agencies, such as ABAG/BayREN along with eight counties, to lead on coordination, alignment, and overall program management, and the Air District to focus on policy development
- Local governments to assist with recruiting homeowners and property owners, convening multi-partner collaborations, and implementing best practices related to housing security
- Community Based Organizations to assist with engagement and outreach as well as implementation of energy efficiency and electrification upgrades
- CCAs, utilities, and ABAG/BayREN to administer rebates and incentives
- Research institutions and CBOs to partner on research efforts

Several other non-agency organizations may play key roles as well, including non-profit organizations that conduct retrofits, workforce development organizations, and non-profit housing developers.

IMPLEMENTATION SCHEDULE AND MILESTONES

Table 3.5. Implementation schedule and milestones for the Residential Building Decarbonization measure.

Year	Implementation Activity or Targeted Milestone
2024	• Determine program design and how best to leverage existing efforts for retrofits • Launch Community Work Group • Identify workforce training partners

[84] Roughly 54,000 are weatherization and deep envelope measures and 71,000 are efficiency measures like thermostats and lighting. Other types of installations include: a heat pump water heater, air-source heat pump, electric oven or induction stovetop, electric dryer. This number does not equate to total homes retrofit, as some homes may have multiple installations.

	• Begin to engage contractors to understand support needs • Research on rental property owner engagement • Identify best practices for renter protection • Identify and prioritize topics for policy development and adoption
2025	• Launch full program or beta offering for retrofits through incentives and direct installations while continuing research • Develop tool or approach for streamlined contractor support • Begin pilot project to implement landlord engagement research findings • Work with 4-6 cities and retrofit programs to begin implementing renter protection best practices related to residential building decarbonization
2030	• At least 10-20 cities implement renter protection policies related to residential building decarbonization • More than 250,000 installations between 2025-2030 related to residential building electrification and energy efficiency[85]

Achievement of these milestones is contingent upon sufficient funding to implement the measure.

AUTHORITY TO IMPLEMENT

Implementation of this measure involves voluntary actions. No additional authority must be acquired by implementing partners to implement the measure. Below is a list of key existing authorities related to the administration of rebates, incentives, and financing, as well as renter protections.

- ABAG/BayREN has the authority to administer rebates and incentives[86]
- Cities and counties have the authority to implement renter protections in their respective jurisdictions under California law
- CCAs and utilities have the authority to administer rebates and incentives

GEOGRAPHIC SCOPE

The geographic scope of this measure includes Alameda County, Contra Costa County, Marin County, Napa County, City and County of San Francisco, San Mateo County, and the portions of Sonoma County and Solano County that are in the Bay Area air basin, with a priority on frontline communities in those counties.

[85] This number does not equate to total homes retrofit, as some homes may have multiple installations including a heat pump water heater, air-source heat pump, electric oven or induction stovetop, electric dryer, efficiency measures (thermostats and lighting), and weatherization and deep envelope measures.

[86] ABAG is the administrator of BayREN, which is a Regional Energy Network (REN) that was authorized by California Public Utilities Commission D. 12-11-015. CPUC D. 12-11-015 authorized BayREN as a pilot to begin independently administering programs funded through ratepayers without oversight by an Investor-Owned Utility, such as PG&E, for the program year 2013-2014. Subsequent decisions continued to authorize BayREN to administer energy programs, and CPUC D.23-06-55 formalized the RENs as established program administrators, rather than pilots.

METRICS FOR TRACKING PROGRESS

The following metrics will be used to track progress.[87] They may be reassessed periodically with implementation partners based on data availability:

- Reductions in GHG emissions and NOx and $PM_{2.5}$ emissions from retrofits
    - In frontline communities, and in overall region
- Energy costs in low-income households overall and in frontline communities
- Number of retrofits by type (e.g., full electrification, partial, health & safety, energy efficiency)
    - In frontline communities, and in overall region
- Dollars spent on incentives and direct installs
    - In frontline communities, and in overall region
    - Average cost per install by equipment type
- Number of contractors trained to conduct retrofits
    - From frontline communities and areas with high unemployment, and in overall region[88]

INTERSECTION WITH FUNDING

This priority measure complements and potentially expands upon existing programs. The Air District has explored federal and non-federal funding sources to determine whether these sources could fund implementation of the measure and whether such funding is sufficient to fully implement the measure.

Potential Cost to Implement the Measure

The cost estimate for implementing the measure relies on cost per install and program administration data provided by ABAG/BayREN, Bay Area CCAs, and TECH Clean CA[89] when possible, with national average cost per install data filling in data gaps. It does not include the cost to address deferred maintenance or health and safety upgrades. Between 2025-2030, it will cost an estimated $1.4 billion, representing the cost of the appliance or equipment plus the construction or installation costs and enabling upgrades minus two federal incentives and one state incentive.[90] Estimated programmatic costs for 2025-2030 would be $147 million total, which includes program administration, marketing associated with a retrofit program, and the value of regional incentives administered by a regional agency.[91] Notably, this estimate represents the full cost of a retrofit (rather than the incremental cost with replacement upon burnout). The Air District's zero NOx-emitting appliance regulations focus on replacement upon burnout. For more detailed information, see *Appendix C*.

[87] The Air District will report on measure progress in its 2027 Status Report to USEPA.

[88] To the extent feasible, implementing agencies will assess whether these trained contractors are serving frontline communities.

[89] "Installation Costs for Zero-NOx Space and Water Heating Appliances" (forthcoming). Prepared by Rincon Consultants, Inc. for the Air District

[90] The following incentives have been included in the cost estimate: federal incentives (Home Electrification and Appliance Rebates (HEEHRA) and Home Efficiency Rebates (HOMES) Program) and one state incentive (Golden State Rebates). For more information on these incentives, see Appendix C.

[91] Regional incentives may reduce overall customer cost, and increase the program cost for the regional agencies and community choice aggregators (CCAs) who administer them.

Potential Funding Sources

There are several additional federal, state, and regional programs that can be leveraged to help fund this measure.[92] Together they do not fully cover the cost of implementation between 2025-2030.

Table 3.6. Additional federal, state, and regional grant programs to leverage for the Residential Building Decarbonization measure.

Grant Program	Federal, State, or Regional	Total
LIHEAP[93]	Federal – Bipartisan Infrastructure Law	$36 million for FY23-24 *($226 million statewide, assume Bay Area region accounts for 16% of statewide households)*
California Energy Commission's Equitable Building Decarbonization Program[94]	State	$147 million over 4 years from start of program *($639 million statewide, 23% allotted for Northern California (NorCal), assume all NorCal funding goes to Bay Area as a conservative estimate)*
TECH Clean CA - Residential Market Rate HPWH[95]	State	$5 million until expended *($32.7 million statewide, assume Bay Area region accounts for 16% of statewide households)*
TECH Clean CA - Residential Equity HPWH[96]	State	$6 million until expended *($37.9 million statewide, assume Bay Area region accounts for 16% of statewide households)*
TECH Clean CA – Single Family Residential Heat Pump HVAC[97]	State	$2 million until expended *($11.2 million statewide, assume Bay Area region accounts for 15% of statewide single-family households)*
ABAG/BayREN Home+[98]	Regional	$5 million per year
ABAG/BayREN BAMBE[99]	Regional	$5 million per year

[92] Estimates of available funding for California through the federal Weatherization Assistance Program were not readily available online. In addition, CCAs in the region provide local incentives that are not reflected in the table.

[93] https://www.padilla.senate.gov/newsroom/press-releases/padilla-announces-over-226-million-for-california-to-help-households-save-on-home-energy-costs/#:~:text=Senator%20Padilla%20has%20consistently%20advocated,families%20afford%20their%20energy%20bills

[94] https://www.energy.ca.gov/programs-and-topics/programs/equitable-building-decarbonization-program

[95] https://techcleanca.com/

[96] https://techcleanca.com/

[97] https://techcleanca.com/

[98] https://www.bayren.org/how-get-started/single-family-homeowners

[99] https://www.bayren.org/bambe-eligibility

4. Frontline Communities (Low-Income Disadvantaged Communities) Benefits Analysis

Frontline communities in the Bay Area region bear the brunt of the impacts from fossil fuel dependence and are often the first to experience climate impacts. The transition to a zero emissions future must not further harm these communities – and these communities must benefit from the transition through improved quality of life and increased access to opportunity. The priority measures are therefore designed to provide significant benefits and minimize harm to frontline communities, when implemented.

This section identifies each frontline community within the Bay Area region, and describes the Air District and partner's meaningfully engagement of frontline communities during PCAP development, the anticipated benefits or disbenefits of implementation of the measures on these communities, and how the Air District and partners will continue to engage with frontline communities into the future.

IDENTIFICATION OF FRONTLINE COMMUNITIES

The Air District identified frontline communities for the PCAP using several datasets:[100]

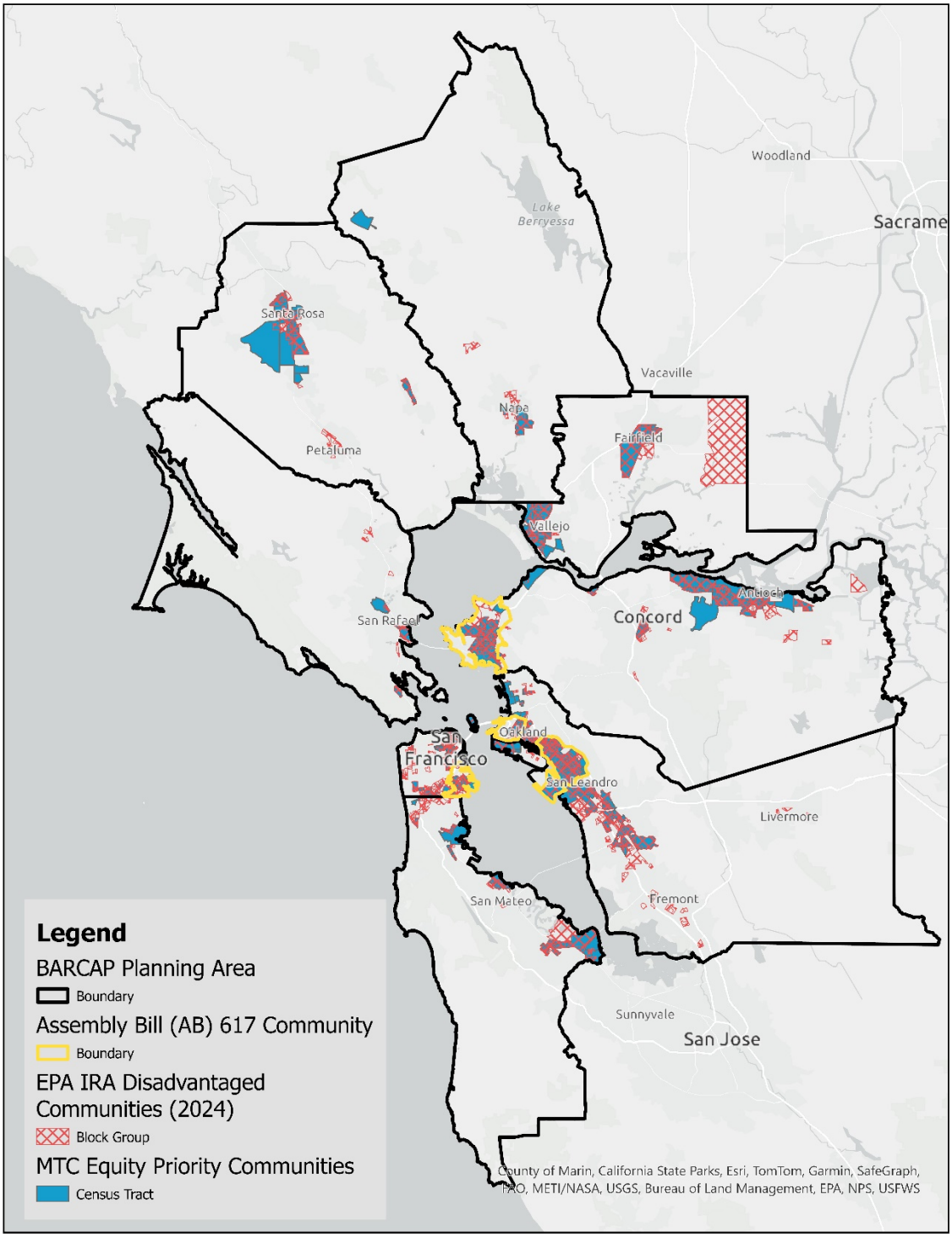
- ***EPA's IRA Disadvantaged Communities***,[101] which include census tracts identified by the federal government's Climate & Economic Justice Screening Tool (CEJST),[102] census block groups at or above the 90th percentile for any EJScreen Supplemental Indices compared to the nation or state, and any geographic area within tribal lands
- ***AB 617 communities***,[103] which are communities spanning multiple census tracts identified by the California Air Resources Board and the Air District as the communities most overburdened by air pollution in the Bay Area
- ***MTC's Equity Priority Communities***,[104] which are census tracts identified by MTC using a combination of factors, such as households with low incomes and people of color, that define these areas as having a significant concentration of underserved populations

These three tools cover many of the frontline communities in the region. The Air District recognizes that USEPA will only consider census tracts and block groups identified using CEJST and EJ Screen as LIDACs in the evaluation of community benefits for the CPRG Implementation Funding Grant applications. However, for the BARCAP planning effort, the Air District and the AWG felt it was important to consider a broader definition to inform measure development, and to ensure the implementation applications benefit locally and regionally identified frontline communities beyond those defined by the USEPA.

The Air District developed an online map to visually depict these layers across the Bay Area region.

[100] These datasets are compliant with federal non-discrimination statutes.
[101] https://ejscreen.epa.gov/mapper/
[102] https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5
[103] https://www.baaqmd.gov/community-health/community-health-protection-program
[104] https://mtc.ca.gov/planning/transportation/access-equity-mobility/equity-priority-communities

Figure 4.1. Map of Frontline Communities in the Bay Area Region



Appendix F includes a list of census tracts and block groups that are considered frontline communities for this planning effort. The priority measures cover and aim to provide benefit to these census tracts and block groups.

CLIMATE RISKS TO FRONTLINE COMMUNITIES

In addition to disproportionate exposure to air pollution and other environmental hazards, frontline communities face exposure to several climate-related hazards. The region faces moderate to very high climate risks of inland flooding due to high-precipitation events (and associated landslides), coastal flooding from sea level rise, extreme heat and heat waves, wildfire, and drought.[105] Nearly every community and system is impacted. Much of the region's transportation infrastructure is located along the San Francisco Bay where flooding is a major risk. Increased air pollution from extreme heat and wildfires threatens public health. Urban heat islands and a lack of air conditioning in much of the region exacerbate these conditions, especially for low-income communities.[106] Due to limited affordable housing in the core of the region, many households are moving further south, north, and inland, where building energy demand is often higher.

Frontline communities often experience these climate impacts first – and worst – and have fewer resources to withstand and recover from them due to decades of disinvestment and discriminatory policies.[107] [108] [109] For example, they are more likely to work and live in locations affected by extreme heat and face exposure to industrial pollutants when rising sea levels impact water tables at contaminated sites.[110] Exposure to climate hazards in frontline communities can result in property damage or loss causing displacement, increased financial precarity, exacerbated physical and mental health conditions, and lost labor hours, among other negative effects. These impacts can be lessened through economic development and increased financial resources, improved public health, and strengthened social structures to support the most vulnerable frontline communities in the region.[111] The PCAP measures seek to strengthen these communities' resilience to climate impacts in several crucial ways.

ENGAGEMENT OF FRONTLINE COMMUNITIES

The Air District followed a multi-pronged engagement approach to ensure that PCAP development was shaped and informed by the priorities of frontline communities in the Bay Area region. In implementing the engagement plan, the Air District first learned from recently completed engagement efforts. Then the Air District conducted targeted engagement of regional community-serving organizations and CBOs through a Roundtable of community-serving organizations, partner-led meetings, and a series of Working Sessions.

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[105] BARCMapping_v1_20231018_72dpi.pdf (ca.gov); San Francisco Bay Area Region Report (ca.gov)

[106] San Francisco Bay Area Region Report (ca.gov)

[107] https://greenlining.org/work/climate-equity/climate-resilience-and-mitigation/

[108] Socioeconomic characteristics that can be used to identify increased vulnerability to hazards include: income (very low income), vehicle access (without a vehicle), people with disability, age (under 5yo and older adults), race and ethnicity (communities of color, limited English proficiency), housing security (renters, severely housing cost burdened), as well as single parent households, people without a high school degree, those who are not US citizens, pre-existing health status, and a lack of access to information and services. (Adapting to Rising Tides Bay Area: Regional Vulnerable Communities Section and Communities and Housing « Adapting to Rising Tides)

[109] Several tools have been developed to highlight the resulting differential vulnerabilities of these communities, which are highly variable across the Bay Area region depending on location. These tools include the San Francisco Bay Conservation and Development Commission's Community Vulnerability Index, the National Risk Index (FEMA) and a Vulnerable Communities Platform currently under development by the Governor's Office of Planning and Research in collaboration with the Asian Pacific Environmental Network, the Greenlining Institute, and other organizations.

[110] BARCMapping_v1_20231018_72dpi.pdf (ca.gov)

[111] https://greenlining.org/work/climate-equity/climate-resilience-and-mitigation/

PRIORITIES FROM COMMUNITY ENGAGEMENT SYNTHESIS

When engaging communities in the Bay Area region, the Air District follows a meaningful and thoughtful process,[112] which is best practice in the Bay Area. The expedited PCAP timeline did not provide sufficient time for new community-informed and community-driven engagement necessary to ensure equitable outcomes. Many local governments and regional agencies have conducted robust and meaningful engagement to inform development of their climate actions plans, transportation plan, and related efforts. Rather than launch a brand-new engagement effort, the Air District opted to leverage these recent community engagement efforts.[113] The Air District synthesized the results of recently conducted, meaningful community engagement activities as described in documents provided by local governments in the Bay Area region, with a particular focus on results received from cities with frontline communities, and county and regional agency efforts focused on these communities. The synthesis culminated in a summary of findings about community priorities and concerns of the Bay Area region's frontline communities overall and with respect to the two identified sectors for the PCAP: residential building electrification and transportation mode shift. The process benefited from focused community engagement that had already been conducted related to these topic areas. A Roundtable of regional community-serving organizations added to the synthesis based on their knowledge and expertise from working with communities regionally in these two sectors. Needs and priorities of frontline communities identified through this process were critical to the development of the PCAP measures. More information on this process is available in *Appendix B*.

ROUNDTABLE

The Air District established a Roundtable of external advisors from regional and local community-serving organizations in the Bay Area region to review, discuss, add to, and overall improve the synthesis of community engagement efforts. The synthesis, compiled by Air District staff, was derived from documents generated through local government community planning processes. The Roundtable members contributed their insights into community needs and expertise in the topic areas to evaluate and contribute to the draft synthesis. They bring an in-depth understanding of Bay Area frontline communities and possess significant expertise in climate equity issues, particularly related to the two PCAP measure areas of residential building decarbonization and transportation mode shift. The members of the Roundtable are:

- Aminah Luqman, Oakland Program Manager, Capacity Building, The Greenlining Institute
- Antonio Diaz, Coordinating Director, PODER
- Megan Leary, Community Engagement and Policy Manager, Emerald Cities Bay Area Collaborative San Francisco Bay Area
- Zack Deutsch-Gross, Policy Director, TransForm

[112] The Air District is known for its decades-long relationship and partnership with the environmental justice organization West Oakland EIP. Through the experience gained from that partnership, the Air District knows well the importance of honoring environmental justice principle number 7 (www.ejnet.org/ej/principles.pdf) while working with the community. That principle demands that the community participates fully and as equal partners at every level of decision-making when working on a project or plan. That principle is followed currently as we develop the AB 617 emission reduction plans with the Bayview Hunters Point SF and East Oakland communities.

[113] This approach intended to obtain a preliminary understanding of what the Bay Area region's frontline communities have already voiced about their priorities and concerns, both generally and in response to climate action measures. This approach not only saved time, but it also protected the many crucial relationships between local governments and regional agencies and frontline communities in the region from harmful impacts of a rushed and potentially ill-informed new engagement process, preventing meeting fatigue and frustration stemming from frequent repetition of the same questions. It allows for strategically building upon thoughtful community-driven engagement in the region while allowing room for deeper public engagement for the CCAP.

A professional facilitator was contracted to help the Air District coordinate and to facilitate meetings with the Roundtable. The Roundtable met all together twice in October 2023 and a third time in individual meetings (due to scheduling challenges) in December 2023, with work on the synthesis document continuing in between meetings. The work of the Roundtable included: reviewing and refining draft design principles to guide PCAP measure development; discussing the draft community engagement synthesis document and developing implementation priorities to incorporate into the document; and prioritizing specific community benefits and disbenefits identified in the synthesis document to inform the frontline communities benefits analysis.

Three Roundtable members participated in a series of four Working Sessions with other critical stakeholders to design the PCAP measures during October – December 2023. (More information on the Working Sessions can be found in *Section 6* and *Appendix B*.)

OTHER ENGAGEMENT EFFORTS

Additionally, the Air District engaged representatives of frontline communities during development of the PCAP in the following ways:

- ***Working Sessions:*** The Air District and AWG members invited CBOs who work closely with frontline communities in the Bay Area region to attend a series of four Working Sessions to develop the PCAP measures. (For more information on the Working Sessions, see *Section 6*.) CBOs were offered stipends to support their participation. In advance of the Working Sessions, the Air District held a background webinar to share information on the CPRG grant, the BARCAP process and the Notice of Funding Opportunity, how the measure focus areas were selected, and the intent and structure of the Working Sessions. The Air District also hosted an information session specifically for CBOs to answer any questions they had before participating in the Working Sessions.
- ***CCA meetings with community partners:*** The Air District presented on the BARCAP to the MCE Community Power Coalition[114] – a network of social, racial, and environmental justice organizations – in June 2023, and to a meeting of Peninsula Clean Energy and its community partners in September 2023.
- ***Online resources:*** The Air District developed a webpage[115] on its agency website to share information about the planning effort and post materials from public meetings, like the background webinar and public workshop.
- ***Direct email:*** The Air District also established an email listserv for updates on the planning effort and an email account (climate@baaqmd.gov) for the public, including frontline community members, to send comments and suggestions.

See *Appendix B* and *Section 6: Coordination and Outreach* for more details on the engagement plan and a record of outreach activities.

[114] https://www.mcecleanenergy.org/energy-equity/#communitypower

[115] Bay Area Regional Climate Action Planning Initiative (baaqmd.gov)

IMPACT OF PCAP IMPLEMENTATION ON FRONTLINE COMMUNITIES

The anticipated benefits and potential disbenefits for frontline communities associated with implementation of the priority measures are summarized in this section. More detailed information is available in *Appendix D*.[116]

ANTICIPATED BENEFITS AND DISBENEFITS OF SAFE, ACCESSIBLE, CLEAN, AND EQUITABLE MULTI-MODAL TRANSPORTATION

The anticipated benefits from implementation of the measure include:

Table 4.1 Anticipated benefits from implementation of the Mobility Hubs measure.

Improved Public and Community Health	• Reduced use of passenger vehicles decreases traffic-related air pollution. • Potential physical health benefits of hubs that focus on active transportation alternatives like walking and biking, which encourage people to exercise as part of their daily routine and avoid the stress of traffic. • Safety improvements can help address fatalities and severe injuries, particularly in high-fatality or high-injury sections of bike/ped infrastructure.
Increased Transportation Access and Affordability	• Increased multi-modal connectivity results in increased use of transportation alternatives, with enhanced accessibility and the promotion of sustainable and healthier commuting habits. Increased access to diverse mobility options can help reduce barriers to accessing employment, educational opportunities, health care, and other key services and amenities. • Public transportation and active transportation offer a more affordable mode of transport for low-income households than vehicle ownership. • Discounted fare programs and discounted bike share passes for low-income and underserved populations and e-bike incentives can help keep transportation costs low for these communities.
Job Creation and Workforce Development	• Mobility hubs have the potential to produce and sustain high-road jobs and improve access to employment opportunities.
Climate Resilience Co-Benefits	• Urban greening along pedestrian, bicycle, and transit infrastructure can help shade surfaces and reduce travelers' discomfort and risk of heat illness during periods of extreme heat. It can also reduce risk to infrastructure of flooding during heavy rains.[117]

[116] The list of benefits and disbenefits is drawn from the list provided by the USEPA in their CPRG guidance document, with additions from priorities identified in the community engagement synthesis and Roundtable input. The synthesis and Roundtable provided the Air District with a deeper understanding of how the measures might impact frontline communities. The Air District, AWG members, and Working Session participants brought additional perspectives. A consultant conducted a qualitative analysis of the measures and identified key literature. Results of the qualitative analysis are provided in *Appendix D.*

[117] https://nacto.org/publication/urban-street-stormwater-guide/streets-are-ecosystems/complete-streets-green-streets/, https://www.c40knowledgehub.org/s/article/Reducing-climate-change-impacts-on-walking-and-cycling?language=en_US

Community Engagement, Awareness, and Capacity	• A community-informed approach can help build awareness and interest in mobility hubs and identify major challenges and opportunities.[118] Involving residents in the design process, understanding affordability implications of development in a neighborhood, and advocating for the needs of long-time, low-income residents are important to avoid displacement and champion community interests and support.[119] • Mobility hubs will include a variety of components to meet the needs of the community (determined through engagement with CBOs and participatory community processes). • Community outreach and education efforts will engage CBOs to encourage a shift away from single occupancy vehicles to other mobility options.

Implementation of the measure is designed to minimize potential disbenefits:

Table 4.2. Potential disbenefits that implementation of the Mobility Hubs measure is designed to minimize.

Potential Increased Housing Insecurity	• Potential transit-induced gentrification may lead to displacement of low-income populations that are likely to benefit most from transit access. Proximity to bike infrastructure is linked to higher property values, although the research is not conclusive.[120] Urban greening strategies tend to increase property values and may contribute to gentrification and displacement.[121] Implementation of the measure incorporates policies that produce, preserve, and protect affordable housing and stabilize businesses to prevent displacement and help increase housing security.
Increased Transportation Costs	• Fare integration, infrastructure updates, and operational adjustments may result in increased transit costs in the short-term, with expected long-term savings. Implementation of the measure includes discounted fare programs and discounted bike share passes for low-income and underserved populations.
Increased Safety Risks	• As the number of walkers and cyclists increases on or adjacent to a communities' roads, exposure to vehicles and potential fatalities and severe injuries may increase as well, if the infrastructure is not designed appropriately. Implementation of the measure includes safety improvements.

[118] https://octa.net/pdf/MobilityHubsStudyFinalReport.pdf

[119] https://housingmatters.urban.org/articles/how-transit-oriented-housing-can-advance-access-opportunity-while-curbing-climate-change#:~:text=When%20done%20thoughtfully%2C%20TOD%20could,the%20effects%20of%20climate%20change

[120] https://www.sparcchub.org/wp-content/uploads/2020/04/Climate-and-Displacement-Lit-Review-6.19.2020.pdf

[121] https://www.sparcchub.org/wp-content/uploads/2020/04/Climate-and-Displacement-Lit-Review-6.19.2020.pdf, https://doi.org/10.1016/j.landurbplan.2014.01.017

ANTICIPATED BENEFITS AND DISBENEFITS OF HOLISTIC BUILDING DECARBONIZATION FOR CLEAN, HEALTHY, AND SECURE HOUSING

The anticipated benefits from implementation of the measure include:

Table 4.3. Anticipated benefits from implementation of the Residential Building Decarbonization measure.

Improved Public and Community Health	• Electrification of appliances in homes can result in local indoor air quality improvements[122] and outdoor air quality improvements.[123] Unhealthy levels of air pollution have been linked with disease or damage to the lungs in the form of asthma, bronchitis, and emphysema. There is increasing evidence that air pollution contributes to heart attacks, strokes, diabetes, and dementia.[124] • Building envelope improvements can increase indoor air quality;[125] energy efficiency retrofits can protect against wildfire smoke[126] and other outdoor air pollution. Frontline communities regularly experience disproportionate air pollution exposure. • There are expected health benefits from addressing residential health and safety concerns such as lead, mold, and asbestos.
Better Housing Quality and Security	• Health and safety upgrades reduce exposure to unhealthy living conditions, such as mold and moisture, lead, asbestos, and structural deficiencies in homes. Frontline communities regularly experience poor housing quality. • The identification and implementation of housing security and anti-displacement best practices for retrofits and health and safety upgrades can help renters stay in their homes, while the identification and implementation of best practices to engage and encourage rental property owners' to retrofit buildings can help increase the quality of rental housing.
Decreased Energy Cost Burden and/or Increased Energy Security	• Energy efficiency retrofits reduce energy demand and utility bills. • Incentives, rebates, and direct installs focused on homes in frontline communities will reduce the cost of electrification retrofits in these communities. • Transition to electricity can help insulate frontline communities from anticipated gas price increases as more households in the region transition to electricity, leaving fewer customers to cover the fixed costs of the natural gas system.[127]

[122] https://doi.org/10.1088/1748-9326/ad08f8, https://doi.org/10.1016/j.scs.2022.1041282

[123] Appendix F: Exposure and Equity Assessment of Natural Gas Appliances in the San Francisco Bay Area (https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-6-nitrogen-oxides-emissions-from-natural-gasfired-water-heaters/2021-amendment/documents/20221220_sr_appf_rg09040906-pdf.pdf?rev=c7a8dc1225b243298e7bd9395a292844)

[124] https://www.baaqmd.gov/community-health/air-pollution-and-community-health

[125] https://doi.org/10.2172/1998661

[126] https://escholarship.org/uc/item/6dn8w9t2

[127] Impact of Electrification and Decarbonization on Gas Distribution Costs; American Council for an Energy Efficient Economy, June 2023

Job Creation and Workforce Development	• Pursuing residential energy efficiency and electrification upgrades will result in jobs in occupations such as HVAC mechanics and installers, plumbers, electricians, and general residential construction and modeling (including new jobs). • Participation of residents in frontline communities in workforce development programs will help ensure these communities benefit from job creation. The inclusion of workforce standards can help increase the number of high-quality jobs.
Climate Resilience Co-Benefits	• Energy efficiency retrofits can protect against wildfire smoke; electric heat pump installation can increase comfort and safety in homes during heat events by providing cooling that is typically not present in older homes along the California coast.[128] • Retrofits such as distributed solar and storage, where strategic and feasible, can help residents stay in their homes during power outages.
Community Engagement, Awareness, and Capacity	• Equitable and inclusive planning and decision-making can help address historic underinvestment and result in community-informed solutions. • A Community Work Group will advise on and participate in implementation of the measure to ensure frontline communities' needs are prioritized. • Implementation will include policy support to local governments and CBOs to address barriers as they emerge.

Implementation of the measure is designed to minimize potential disbenefits:

Table 4.4. Potential disbenefits that implementation of the Residential Building Decarbonization measure is designed to minimize.

Potential Increased Housing Insecurity	• Rental property owners may pass-through costs to retrofit their properties to renters, thereby increasing their rents. Rental property owners may use construction projects to displace residents or evict tenants due to long remodels. Implementation of the measure incorporates implementing housing security and anti-displacement best practices for retrofits.
Increased Energy Costs and Energy Insecurity	• Electrification upgrades can be expensive while an increased reliance on electricity may result in greater energy costs. Reduced electricity rates for homes that electrify[129] and energy efficiency retrofits that reduce energy demand can help address potential energy bill increases. Incentives, rebates, and direct install programs focused on frontline communities will reduce the cost of electrification retrofits and are included in implementation of the measure, along with energy efficiency retrofits. • Increased reliance on electricity may result in greater energy insecurity, including during power outages. Retrofits to improve energy resilience (e.g., distributed solar and storage) can increase energy security.
Unanticipated Health Impacts	• Poor-quality energy efficiency retrofits can worsen indoor air quality by trapping indoor air pollutants in the building, increasing health risks

[128] https://escholarship.org/uc/item/6dn8w9t2

[129] This is beyond the scope of this measure. PG&E has an electric rate home plan (E-ELEC) for ratepayers who have begun to electrify their homes with one of the following: electric vehicles, battery storage, electric heat pump for water heating or space heating or cooling (https://www.pge.com/en/account/rate-plans/find-your-best-rate-plan/electric-home.html)

	particularly for residents who have previously received poorer healthcare services and have lived in historically redlined neighborhoods.[130] Pairing building envelope measures with upgraded HVAC and/or electrification and using trained contractors can help address this issue; these practices are included in implementation of the measure.

ENGAGEMENT OF CBOS DURING IMPLEMENTATION

Community-based organizations will play key roles during implementation of the PCAP measures to ensure that frontline community members' needs are prioritized. Key agencies will determine the scope and design of mobility hubs through engagement with CBOs and participatory community processes. Community-based organizations will also participate in outreach and education efforts in frontline communities to encourage the shift from single occupancy vehicle trips to active and low-carbon or zero-carbon mobility options. A Community Work Group that includes CBOs, community members, and other partners will be established to advise on and participate in implementation of the Residential Building Decarbonization measure.

[130] https://doi.org/10.7930/NCA5.2023.CH12

5. Workforce Planning Analysis

The PCAP measures are designed to help create additional good, high-quality jobs in the growing residential building decarbonization and clean mobility sectors that can be filled by residents in the Bay Area region. These jobs are also referred to as "high-quality" jobs, or jobs that are family-sustaining and provide living wages, comprehensive benefits, and opportunity for career advancement.[131]

This section provides an overview of the most in-demand occupations for implementing the measures; a brief summary of potential skilled labor shortages; a high-level discussion of opportunities to create high-quality jobs and expand economic opportunities to frontline communities and underserved workers; and several workforce development strategies to support implementation. For a more detailed workforce planning analysis, see *Appendix E*.

Based on a review of the literature and interviews, the following five occupations are crucial to the successful deployment of the priority measures and are at high risk of potential supply shortages:[132]

- **Electricians** install, maintain, and repair electrical wiring, equipment, and fixtures. *(Residential Building Decarbonization, Mobility Hubs)*
- **Heating, Air Conditioning, and Refrigeration (HVAC/R) Mechanics and Installers** install or repair heating, central air conditioning, HVAC, or refrigeration systems, including heat pumps for space heating and hot-air furnaces. *(Residential Building Decarbonization)*
- **Plumbers and Pipefitters** assemble, install, alter, and repair pipelines or pipe systems that carry water, steam, air, or other liquids or gases. *(Residential Building Decarbonization)*
- **Construction Laborers** perform tasks involving physical labor at construction sites. *(Mobility Hubs)*
- **Carpenters** construct, erect, install, or repair structures and fixtures made of wood and comparable materials, such as concrete forms; building frameworks, including partitions, joists, studding, and rafters; and wood stairways, window and door frames, and hardwood floors. *(Mobility Hubs)*

POTENTIAL FOR SKILLED LABOR SHORTAGES

In Fall 2023, the number of residents employed in Bay Area region in these critical occupations was roughly:[133]

- Electricians: 13,400
- Plumbers, Pipefitters, and Steamfitters: 8,000
- HVAC/R Mechanics and Installers: 6,700
- Carpenters: 21,300
- Construction Laborers: 21,500

[131] https://www.usdn.org/uploads/cms/documents/workforce-guide_4.12.21_form.pdf

[132] This is based on a review of the literature and interviews with building decarbonization and transportation experts ("CALIFORNIA BUILDING DECARBONIZATION WORKFORCE NEEDS AND RECOMMENDATIONS." 2019 UCLA and Inclusive Economics. https://innovation.luskin.ucla.edu/california-building-decarbonization/; "Evaluating Benefits from Transportation Investments Aligned with the Climate Action Plan for Transportation Infrastructure (CAPTI)" 2023 San Jose State University and Mineta Transportation Institute. https://transweb.sjsu.edu/research/2227-California-Climate-Action-Plan-Transportation-Infrastructure)

[133] Data from JobsEQ. 2023Q4

When compared to the rest of the country, these occupations make up a smaller share of the total Bay Area workforce, except for carpenters, which have a higher concentration in the Bay Area than nationally. At the same time, a 2021 analysis of the job potential from full electrification and deep efficiency retrofits of Bay Area homes projected 13,490 – 20,740 full-time workers.[134] This estimated increase in jobs is greater than that projected for mobility hubs, however the need remains for training and career pathway entry points for workers under both types of activities.

There will be additional workforce demands for these same priority occupations for housing construction and other infrastructure projects beyond the scope of the measures. This will require increased coordination and planning across industries and the workforce ecosystem.

OPPORTUNITIES FOR CREATION OF HIGH-QUALITY JOBS

Growing demand for these occupations provide a significant opportunity overall to create and maintain high-quality jobs[135] throughout the Bay Area since they are associated with good wages,[136] benefits, and access to training pathways.

One key consideration within residential building electrification work is the greater likelihood of generating lower-quality opportunities with residential and small commercial construction firms (versus high-quality jobs more commonly found in large commercial and utility sectors.)[137][138] Given the building decarbonization measure focuses on residential and small multi-family homes, there is a risk of creating lower-quality jobs.

Strategies outlined in *Appendix E* aim to help new workers, existing workers, and workers in adjacent fields have access to high-quality jobs through activities to implement the measures. Meeting all requirements of the most ambitiously defined high-quality job may take time and there are many immediate and short-term steps that can boost the quality of local jobs. These range from establishing labor standards and wage requirements to monitoring and enforcing workplaces to ensure worker safety

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[134] "San Francisco Bay Area Residential Building Decarbonization Estimates" Inclusive Economics

[135] The Department of Labor defines "good jobs" through a set of principles that are summarized as: 1) Recruitment and Hiring – applicants are recruited from all communities, and evaluated free of discrimination, based on skill-based requirements, 2) Benefits – workers are provided and encouraged to use family-sustaining benefits such as health insurance, a retirement plan, and work-family benefits, 3) Diversity, Equity, Inclusion, and Accessibility – all workers have equal opportunity in a workplace that centers DEIA, 4) Empowerment and Representation - workers can form and join unions and have agency in the performance and direction of their work, 5) Job Security and Working Conditions – workers operate in a safe workplace, with job security and predictability, and proper classification of their status, 6) Organizational Culture – workers are valued and engage in respected work, 7) Pay – workers are fairly paid a living wage that increases with increased skills and experience, and 8) Skills and Career Advancement – workers have equitable opportunities to advance and access to training and education. These principles are mirrored in the categories that the California High Road Training Partnership (CA HRTP) proposes as comprising job quality. They include: 1) Family-sustaining wages and benefits that include health care, pension, paid sick leave, 2) Career pathways that are clearly defined and include access to education, training and support services, 3) Stable and predictable schedules that are reliable and consistent, 4) Worker voice and agency that includes respecting and valuing the worker and the right to organize and join unions, and 5) Healthy work environment with adequate training and protection, that incorporates racial equity practices.

[136] The median hourly wage for all but one of these occupations (construction laborers) offers a living wage for single adults with no dependents as well as family-sustaining wages for households with two working parents. The 25th percentile wage for electricians, HVAC/R mechanics and installers, plumbers, pipefitters, and steamfitters, and carpenters is a living wage for single adults with no dependent and family-sustaining wages for households with two working parents and one child.

[137] "CALIFORNIA BUILDING DECARBONIZATION WORKFORCE NEEDS AND RECOMMENDATIONS." 2019 UCLA and Inclusive Economics

[138] Current market dynamics within residential building decarbonization often favor lowest-bid contracting, which can make it challenging for high-road contractors to operate within the existing market.

and health and establishing clear career development opportunities. Roundtable members who participated in the development of the PCAP measures identified the establishment of workforce standards as an implementation priority (for a description of the Roundtable see *Section 4*).

Several stakeholders during the Working Sessions mentioned the potential tension between maximizing residential building decarbonization efforts while ensuring job quality and equity in accessing opportunities. Specifically, should cost efficiencies not sufficiently offset additional project costs from high-quality labor standards, the uptake of residential building decarbonization may occur at a slower rate—or may require greater public investment to subsidize. Conversely, stronger workforce standards may produce barriers to participation in the market by minority, women, and disadvantaged business enterprises that may lack the administrative capacity or profit margin to meet such standards. These challenges should be considered in implementation of the PCAP measures.

EXPANDING ECONOMIC OPPORTUNITY TO FRONTLINE COMMUNITIES AND HISTORICALLY EXCLUDED WORKERS

Just under a third of the region's working age population lives within frontline communities. These communities faced higher unemployment rates in 2022 (6.5% compared to 4.8% in non-frontline areas) and lower median household incomes (non-frontline communities' household income was 78% higher than in their frontline counterparts).[139] Other populations of historically excluded workers include formerly incarcerated people and people with other barriers to employment. Some job seekers from within these communities may require additional resources and supports—such as transportation, housing, childcare, and other assistance—during any unpaid training to help prevent life circumstances from precluding these job seekers from completing their training and entering a new career.

The PCAP measures support projects within frontline communities and benefit from the inclusion of CBOs, which can increase career awareness and accessibility to employment opportunities. By partnering with and augmenting local workforce training programs that target historically excluded workers (including potential partners listed in *Appendix E*), implementation of the PCAP measures aims to support these workers' entry into residential decarbonization and transportation careers, while workforce standards can help ensure these jobs offer living and family-sustaining wages.

WORKFORCE DEVELOPMENT ACTIVITIES

There are already several initiatives in the Bay Area listed in *Appendix E* that are aiming to provide current workers with the training they need and increase the number of on-ramps for new workers (through pre-apprenticeship and apprenticeship programs, and vocational and technical schools). Additional funding and collaboration are needed to scale these efforts to meet the anticipated regional need for high-quality building decarbonization jobs. An array of partners — including utility providers and state, regional, and local governments — are already harnessing federal, state, and local funds to propel workforce development initiatives and projects related to residential building decarbonization and mobility hubs.

As for the measures themselves, the Residential Building Decarbonization measure's inclusion of workforce standards, CBO engagement, and contractor support increases the likelihood that jobs created through implementation of the measure will be high-quality, that communities will participate in identifying core issues and developing solutions, and that existing workers and job seekers from frontline

[139] Community unemployment rate and labor participation rate are calculated as weighted averages using population. Data from US Census Bureau. 2022 Estimates

communities and other historically excluded groups will find greater access to economic opportunity. Partnering with and augmenting local workforce training programs for electricians, HVAC/R mechanics and installers, and plumbers and pipefitters will help close skilled labor gaps.

Research shows that the activities outlined in the Mobility Hub measure are likely to support high job quality[140] that is common throughout the transportation infrastructure construction industry, particularly on large infrastructure projects. Training and career pathway entry points for these occupations will continue to be important to support implementation of the Mobility Hub measure.

[140] "Evaluating Benefits from Transportation Investments Aligned with the Climate Action Plan for Transportation Infrastructure (CAPTI)" 2023 San Jose State University and Mineta Transportation Institute. This is often via prevailing wage contracts with labor signatory contractors or Project Labor Agreements for large construction projects.

6. Coordination and Outreach

Throughout development of the PCAP, the Air District conducted extensive coordination and outreach with other government agencies and engaged a range of stakeholders across the Bay Area region. This section describes the framework the Air District used to support robust and meaningful engagement strategies to ensure strong stakeholder representation and reduce potential barriers to engagement.

IDENTIFICATION OF STAKEHOLDERS

The Air District, with input from AWG members, identified stakeholders who either might participate in or be impacted by implementation of the measures in this PCAP or who are representative of the entities, groups, and individuals with relevant subject matter expertise. Stakeholders included, without limitation:

- Regional agencies, including BARC, ABAG/BayREN, and MTC
- Local government staff (city and county)
- Transportation authorities and transit agencies
- Public health agencies
- Community Choice Aggregators and utilities
- Community-based organizations
- Community-serving organizations
- Climate equity organizations and EJ advocates
- Environmental advocacy organizations
- Non-profit organizations (including subject matter experts)
- Non-profit housing developers
- Non-profit organizations that conduct building retrofits
- Bike and active transportation advocacy organizations
- Workforce training organizations
- Organized labor representatives

In addition, residents from the region and representatives of the following types of organizations participated in Air District outreach efforts:

- Higher education institutions
- Ports
- Real estate developers
- Waste reduction agency

The list of stakeholders who participated in the development of the PCAP is included in *Appendix B*. The Air District will update this list of stakeholders as needed. The complete outreach plan is available in *Appendix B*, including a log of participants in interagency and intergovernmental coordination and stakeholder and public engagement efforts associated with development of this PCAP. Meeting and outreach materials and resources are available at https://www.baaqmd.gov/plans-and-climate/climate-protection/bay-area-regional-climate-action-planning-initiative. For a summary of the engagement of frontline communities, see *Section 4*.

The Air District took the following steps to address potential barriers to participation:

- **Stipends:** The Air District offered stipends to support participation of CBOs in the Working Sessions to develop the PCAP measures, which are described in *Section 4*
- **Virtual meetings**: The Air District and its partners held most engagement and outreach events virtually to accommodate participation from across the Bay Area region. In addition, the public

workshop was held virtually and in the early evening to facilitate participation by stakeholders whose jobs prevented participation during the day

- **Online resources:** The Air District developed a webpage on its agency website to share information about the planning effort and post recordings and materials from public meetings, like the background webinar and public workshop, which are described below. There is also an email listserv that interested stakeholders can subscribe to for updates on the planning effort
- **Direct email:** The Air District provided an email account (climate@baaqmd.gov) as another avenue for the public to send comments and suggestions on the PCAP

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION

ADVISORY WORK GROUP (AWG)

The Air District established the AWG composed of representatives from regional agencies (Air District, ABAG/BayREN, BARC, and MTC), the cities named in the federally-designated MSA (City of Berkeley, City of Oakland, and City and County of San Francisco) and the counties comprising the MSA (Alameda County, Contra Costa County, Marin County, Napa County, San Mateo County, and the portions of Solano County and Sonoma County that are within the Air District's jurisdiction). The Air District coordinated with Santa Clara County, who is leading the San Jose-Sunnyvale-Santa Clara MSA's CPRG planning process.

The AWG met monthly (for a total of 5 meetings) to discuss and make decisions on key aspects of the PCAP including coordination and engagement with other agencies, organizations, and LIDACs, measure selection, and development of deliverables, as well as provision of information and data and advising on technical analyses. Development of the PCAP leveraged ongoing stakeholder engagement efforts by AWG members, with some support from AWG members for targeted engagement as needed. The Air District co-developed the PCAP workplan and a shared communications approach with AWG members to ensure common messaging to local agencies and organizations, frontline communities, and other stakeholders. Members also participated in the measure design Working Sessions, described below.

The members of the Advisory Work Group are:

- Aleka Seville (ABAG/BayREN)
- Allison Brooks (BARC)
- Avana Andrade (San Mateo County)
- Cyndy Comerford (City and County of San Francisco)
- Dana Armanino (Marin County)
- Jamesine Rogers Gibson (Air District)
- Jody London (Contra Costa County)
- Katie van Dyke (City of Berkeley)
- Kim Springer (San Mateo County)
- Miya Kitahara (Alameda County)
- Shayna Hirschfield-Gold (City of Oakland)
- Therese Trivedi (MTC)

Ex-officio members[141] of the Advisory Work Group are:

- Narcisa Untal (Solano County)

[141] Representatives from Solano County, Napa County, and Sonoma County served as ex-officio members to the AWG to encourage coordination of aligned efforts across the region, since these counties were not officially approved by the USEPA for inclusion in the Bay Area region for the PCAP until January 2024.

- Ryan Melendez (Napa County)
- Tanya Nareth (Sonoma County)

LOCAL GOVERNMENTS

The Air District conducted extensive outreach to local governments in the Bay Area region to understand their priorities and implementation-ready projects for the PCAP, to request the results of recent community engagement efforts (as described in *Section 4*), and to further develop the PCAP measures during a series of Working Sessions. In total, over 50 cities, towns, and counties (or nearly 60 percent total regionwide) participated in at least one outreach effort. ABAG has served as a key partner and sub-awardee, primarily through its BayREN program. Specifically, ABAG/BayREN has supported the Air District in co-leading local government outreach and the measure design Working Sessions.

Surveys

The Air District conducted three surveys of local governments between April and July 2023. The first two focused on gathering initial input and interest from local governments about their priority sectors and implementation-ready projects for reducing GHG emissions. The third asked local governments with frontline communities to share findings from recent or ongoing engagement efforts.

County-Led Meetings and Individual Meetings

AWG members invited Air District staff to attend regularly occurring meetings of local governments convened from June – July 2023, including the Contra Costa County Energy Efficiency Collaborative, the Marin Clean Energy Partnership, Regional Climate Action Planning Suite Program (RICAPS) in San Mateo County, and StopWaste Technical Advisory Group in Alameda County. Air District staff presented on the CPRG effort and PCAP development and sought input from attendees.

Air District staff also met with several city and county staff individually during Summer and Fall 2023 to discuss their priorities, potential efforts that they would recommend scaling up and/or replicating regionally, and any input from their recently completed engagement of frontline communities.

Community Choice Aggregators and Utilities

In addition to robust outreach to local governments, the Air District engaged in targeted outreach and engagement with CCAs and the local investor-owned utility, PG&E. Air District staff held numerous one-on-one meetings with different CCAs in the Bay Area and included CCAs in the Working Sessions. Staff presented on BARCAP and the PCAP development process to the following CCA convenings of CBOs in their service territories:

- MCE Community Power Coalition, June 22
- Peninsula Clean Energy Community Partners Meeting, September 14

WORKING SESSIONS

The Air District designed and facilitated four Working Sessions to develop the PCAP measures during October–December 2023, with support from ABAG/BayREN. Invitations were extended to all local governments in the Bay Area region, with AWG members recommending specific non-governmental entities to invite as well. Staff from thirty cities and counties participated alongside other attendees which included AWG members, Roundtable members, CCAs and a utility, CBOs, transportation agencies, subject matter expert organizations for transportation and building decarbonization, multiple representatives from organized labor and workforce training, non-profit housing, non-profit retrofit

organizations, bike, environment, and other stakeholder organizations. In total over 90 stakeholders participated across all four sessions. The list of organizations represented can be found in *Appendix B*.

Sessions met virtually, with one hybrid meeting, and covered the following topics:

- **Working Session 1:** Establish a common understanding of existing programs, gaps and opportunities, and key agencies. Discuss a common vision for the necessary changes so that frontline communities have clean and healthy homes and convenient and safe mobility options. Obtain feedback on draft design principles to guide measure development.
- **Working Session 2:** Agree upon key elements of each measure, including a topic focus and geographic location. Begin to define potential coalitions.
- **Working Session 3:** Share finalized design principles (incorporating feedback from Roundtable). Review and refine initial measure descriptions and geographic locations. Continue to discuss coalitions.
- **Working Session 4:** Discuss final measure details and answer outstanding questions on measure language. Share feedback from the Roundtable. Discuss key implementation questions and share the process moving forward to develop funding proposals. Celebrate work together.

Ahead of the sessions, the Air District convened a background webinar in October 2023 to share information on the CPRG grant, the BARCAP process, and the Notice of Funding Opportunity, how the measure focus areas were selected, and the intent and structure of the Working Sessions. Attendees included AWG members, local government staff, CCAs and utilities, CBOs, community-serving organizations, subject matter expert non-profit organizations, and environmental advocacy groups. Slides and a recording of the webinar are available on the Air District's BARCAP website.[142] Staff also offered to meet with CBOs ahead of the Working Sessions to provide additional background and answer questions.

ADDITIONAL OUTREACH EFFORTS

The Air District held a public workshop in November 2023 for attendees to learn about the BARCAP effort and provide input on draft PCAP measure concepts in an interactive format. The workshop occurred virtually in the early evening. Attendees included local government staff, housing developers, building energy and transportation experts and NGOs, environmental advocacy organizations, the Port of Oakland, and interested individuals. Feedback from the public workshop was incorporated into the Working Sessions described above. The agenda, slides, and recording of the workshop is available here: https://www.baaqmd.gov/plans-and-climate/climate-protection/bay-area-regional-climate-action-planning-initiative

Air District staff also presented on the BARCAP at a public meeting of its Board of Directors' Stationary Source and Climate Impacts Committee on September 13, 2023. There is an additional presentation, to the Board's Policy, Grants, and Technology Committee scheduled for March 20, 2024.

[142] https://www.baaqmd.gov/plans-and-climate/climate-protection/bay-area-regional-climate-action-planning-initiative

7. Next Steps

This PCAP is the first deliverable under the USEPA CPRG planning grant awarded to the Air District. The next deliverable due to USEPA in 2025 is a regional comprehensive climate action plan (CCAP) to reduce GHG emissions across all sectors of the economy. In late spring 2024, the Air District will begin engagement for the CCAP, building upon the foundation of the PCAP through meaningful community engagement. Work with technical and facilitation consultants is already underway in preparation for the CCAP.

The CCAP will lay out the critical regional actions needed to support an equitable transition to a clean energy economy that enhances the quality of life for those living in the northern and central Bay Area. It will continue the work begun during the PCAP to identify areas where regional collaboration and action can accelerate our ability to meet ambitious near- and long-term climate goals. The CCAP will include near- and long-term GHG emissions targets and a suite of emission reduction measures, along with a robust analysis of measure benefits, plans to leverage federal funding, and a workforce planning analysis. It will also continue to elevate and center the priorities of frontline communities in the planning process and build on the extensive work that cities and counties in the region have been doing for years.

In 2027, the Air District will publish a status report that details implementation progress for measures included in the PCAP and CCAP, any relevant updates to PCAP and CCAP analyses, and next steps and future budget and staffing needs to continue implementation of CCAP measures.

If you have questions about this PCAP or suggestions for the upcoming CCAP and status report, contact Abby Young (ayoung@baaqmd.gov) or Jamesine Rogers Gibson (jrogersgibson@baaqmd.gov).