Bay Area Air District

BAY AREA REGIONAL CLIMATE ACTION PLANNING INITIATIVE

Bay Area Regional Climate Action Plan

MARCH 2026

Land Acknowledgement

The land that makes up the eight-county BARCAP region is home to diverse groups of Indigenous peoples with unique cultures and deeply rooted relationships to the land for over 10,000 years. This land is unceded Indigenous land and the territories, or counties, the Bay Area Air District (Air District) represents are of the Indigenous people. To acknowledge this history of our country – that this nation was built on genocide, the exclusion and erasure of Indigenous people – grounds our work in truth. The Air District acknowledges the Ohlone as the traditional caretakers of the land – including the water and air that makes up the Bay Area. We honor their connection to the land and the deep respect they hold for this region.[1]

Ohlone is the most commonly used term for the predominant Indigenous group of the Bay Area, who are made up of linguistically similar but ethnically diverse Native American tribes. These tribes include the Chochenyo and the Karkin of the East Bay, the Ramaytush of San Francisco, the Yokuts of the South Bay and Central Valley, and the Muwekma tribe from throughout the region. Other Indigenous groups in the region distinct from the Ohlone linguistic group including the Coast Miwok and Southern Pomo of the Graton Rancheria community; the Kashaya, Patwin and Mishewal Wappo of the North Bay; and the Bay Miwok of the East Bay.[2,3]

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Acronyms

AB: Assembly Bill

ABAG: Association of Bay Area Governments

ACC II: Advanced Clean Cars II

AEA: Association for Energy Affordability

AWG: Advisory Work Group

BACHI: Bay Area Clean Homes Initiative

BayREN: Bay Area Regional Energy Network

BARC: Bay Area Regional Collaborative

BARCAP: Bay Area Regional Climate Action Plan Initiative

BCD: Bay Conservation and Development Commission

BTM: Behind-the-meter

BUG: Backup generation

CAHPP: CA Heat Pump Partnership

CAL FIRE: California Department of Forestry and Fire Protection

CALGreen: California Green Building

CARB: California Air Resources Board

CBO: Community-based organization

CCAP: Comprehensive Climate Action Plan

CCA: Community Choice Aggregator

CCUS: Carbon capture, utilization, and storage

CEC: California Energy Commission

CH_4: Methane

CO: Carbon monoxide

CO_2: Carbon dioxide

CO_2e: Cabon dioxide equivalents

CPRG: Climate Pollution Reduction Grants

DC: Direct current

EE: Energy efficiency

EV: Electric vehicle

EVSE: Electric vehicle supply equipment

GHG: Greenhouse gas

GW: Gigawatt

GWh: Gigawatt hour

GWP: Global warming potential

HFCs: Hydrofluorocarbons

HPWH: Heat pump water heater

IPCC: Intergovernmental Panel on Climate Change

kW: Kilowatt

MSA: Metropolitan Statistical Area

MTC: Metropolitan Transportation Commission

MT C: Metric tons of carbon

$MTCO_2e$: Metric tons of carbon dioxide equivalent

$MMTCO_2e$: Million metric tons of carbon dioxide equivalent

MW: Megawatt

NEEA: Northwestern Energy Efficiency Alliance

NF_3: Nitrogen trifluoride

N_2O: Nitrous oxide

NO_x: Nitrogen oxides

NWL: Natural and working lands

PBA: Plan Bay Area

PCA: Priority Conservation Area

PCAP: Priority Climate Action Plan

PFCs: Perfluorocarbons

PG&E: Pacific Gas and Electric Company

PM: Particulate matter or secondary aerosols

RCDs: Resource Conservation Districts

SB: Senate Bill

SCTCA: Sonoma County Transportation and Climate Authorities

SF_6: Sulfur hexafluoride

SLCP: Short-Lived climate pollutant

SO_2: Sulfur dioxide

SPUR: San Francisco Bay Area Planning and Urban Research Association

TDM: Transportation demand management

TOC: Transit-Oriented Communities

UCCE: University of California Cooperative Extension

UEF: Uniform energy factor

US DOE: United States Department of Energy

US EPA: United States Environmental Protection Agency

VMT: Vehicle miles traveled

VOC: Volatile organic compound

WAIRE: Warehouse Actions and Investment to Reduce Emissions

WUI: Wildland-urban-interface

ZE: Zero-emission

ZEV: Zero-emission vehicles

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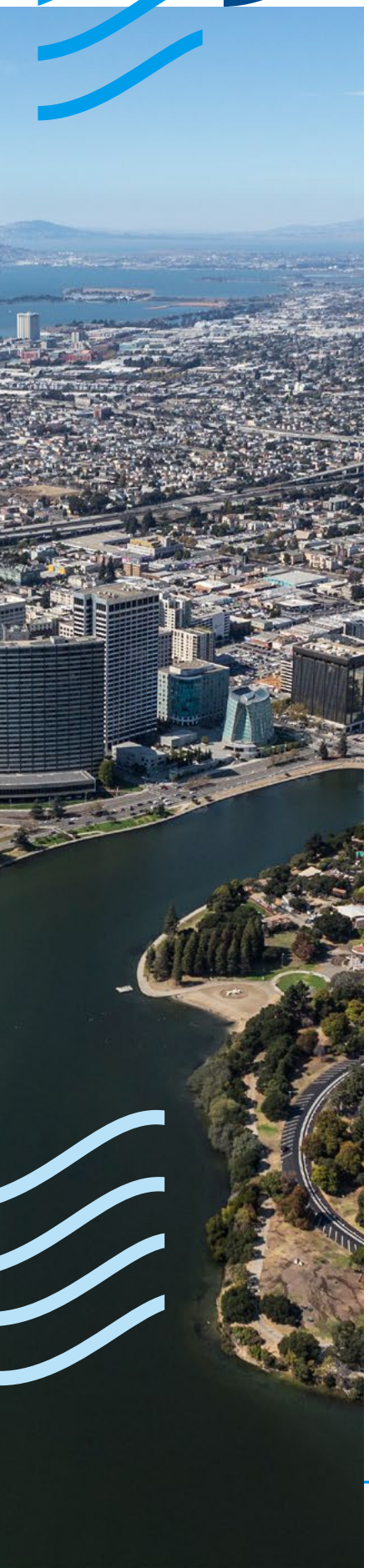


1 Introduction

Climate change is already happening in the San Francisco Bay Area (Bay Area) today, as evidenced by wildfires and smoke-filled skies, record-breaking heatwaves, major storms, flooding, and continually rising seas. Bold action to reduce climate pollution (or greenhouse gas (GHG) emissions) is critical to address the climate crisis and prevent its most devastating impacts – and bring key quality of life improvements and economic development benefits to the region.

The State of California and many local governments in the Bay Area have committed to ambitious GHG emission reduction goals. They have also adopted climate action plans that specify what must happen to meet them. Because nearly 80% of GHG emissions in the region come from the burning of fossil fuels, a core strategy is shifting from a fossil fuel-based economy to one that is based on clean energy. Solutions that work with nature (nature-based solutions) and keep waste to an absolute minimum (circularity) will be critical as well. Not only do these solutions reduce emissions, they also benefit the region by improving the health and quality of life for Bay Area residents, supporting healthy natural systems, and creating a more sustainable and prosperous economy. To ensure that all communities have equal access to these benefits, historically underserved communities must be centered in how these solutions are designed and implemented.

These climate goals and benefits will require everyone to play their part at the state, local, and regional levels. This is where the Bay Area Regional Climate Action Plan (BARCAP) comes in. Rather than duplicating the measures in state and local climate plans, it complements these plans with a focus on filling key gaps and enabling state and local plans to be successfully implemented. The BARCAP tackles common challenges that cross city and county boundaries and slow or impede local action, like misaligned policies, hard-to-get financing and funding, supply and workforce shortages, insufficient technical support, and unequal access to programs. Regional collaboration – on programs, outreach, development of policies and standards, data-sharing, acquiring funding/financing, and access to benefits – can help make local action easier, faster, cheaper, and more equitable. The BARCAP identifies where regional action is essential to

ensure that state plans and policies succeed in the Bay Area, and in ways that are equitable and bring tangible benefits to the region. It also encourages the expansion of promising local solutions across the region, bringing economies of scale and centering equity in deployment. Equity in this context refers to "increasing access to power, redistributing and providing additional resources, and eliminating barriers to opportunity, in order to empower low-income communities of color to thrive and reach full potential."[4] More information on how equity will be centered in BARCAP implementation is included in Chapter 12.

As the Bay Area's first regional climate action plan, the BARCAP lays out a set of feasible, actionable, and widely supported strategies to accelerate the region's transition to a clean energy economy and a carbon neutral future.[5] Implementation of the BARCAP will reduce GHG emissions, criteria air pollutants, and hazardous air pollutants; create jobs and spur economic growth; and enhance health and quality of life for Bay Area residents. The plan is designed to help ensure these benefits reach communities that have historically been marginalized, and frontline communities that bear the brunt of the impacts from fossil fuel dependence, including poor air quality, and are often the first to experience climate impacts such as extreme heat.

Vision for the BARCAP:

Together, we envision a Bay Area where achieving our climate goals fosters thriving communities, healthy natural systems, and a sustainable and prosperous economy. On the path to that future, we will create family-sustaining jobs, inspire innovation, improve air quality and public health, and prioritize environmental justice.[6]

The BARCAP is rooted in regional collaboration. While the Air District coordinated development of the plan, the Air District is only one of many implementers. Other agencies and organizations will lead the implementation of different parts of the plan, including in areas that extend beyond the Air District's jurisdiction.

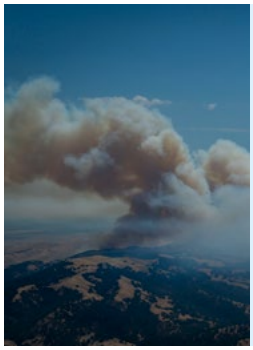
Together, the Bay Area has a strong foundation to lead on climate action: supportive state policies and ambitious local plans and policies, world-class academic institutions, an innovative business community, diverse, knowledgeable and engaged residents, and a strong network of non-profits and community organizations. With a thoughtful approach, the region is well-positioned to tackle climate change in a way that improves health and quality of life for everyone, boosts the economy, and benefits frontline communities. The BARCAP is a crucial piece of this strategy.

1.1 THE NEED FOR CLIMATE ACTION NOW

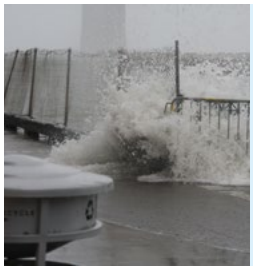
Reliance on fossil fuels to power the region's economy, homes, and transportation results in GHG emissions that warm our atmosphere, alter our climate, and threaten the Bay Area's people, economy, environment, and infrastructure.

Over the past two decades, the Bay Area has seen increasingly frequent and severe climate-related challenges, including:

Extreme Heat: The Bay Area's average annual maximum temperature has risen 1.5˚F since 2001.[7] By mid-century, the mean annual temperature is projected to increase by 3.3˚F.[8] The Bay Area is experiencing more heatwaves as a result and the number of extreme heat days (90-100˚F) is projected to increase to 30-50 days by the end of the century.[9] Intensifying extreme heat and wildfires are impacting air quality and public health. Higher temperatures accelerate the formation of ground-level ozone, worsening air quality and respiratory health.[10] Extreme heat is now the leading cause of weather-related deaths in California, underscoring the growing risk to Bay Area communities.[11]

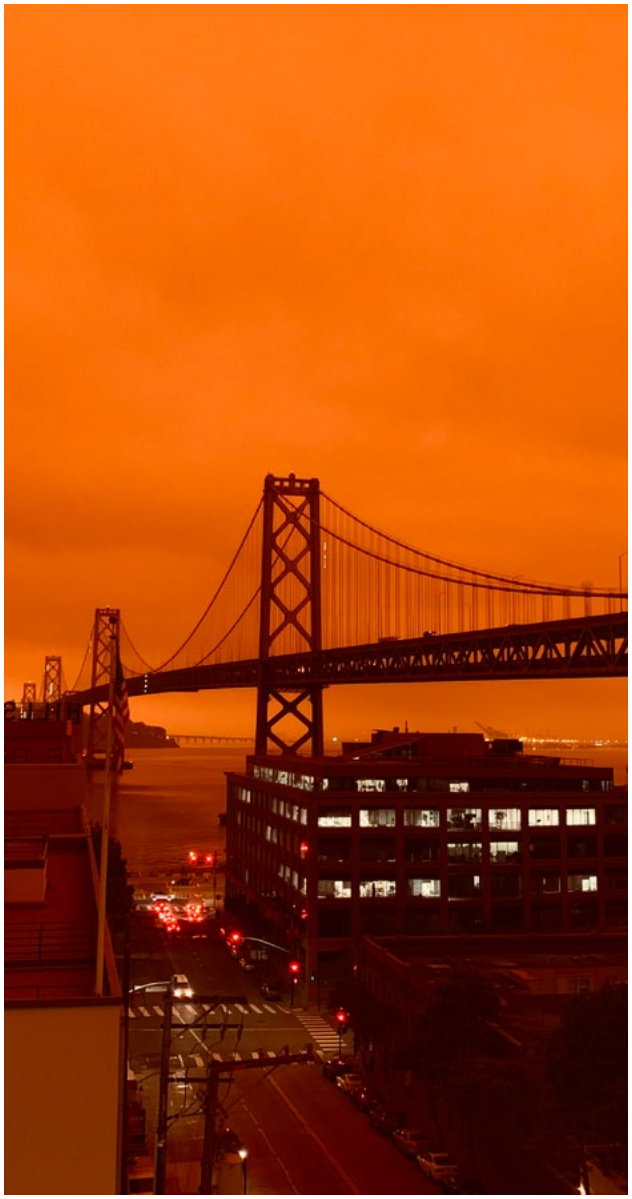


Wildfires: Drier, hotter conditions are conducive to wildfires, which further degrade air quality and increase health risks. Six out of the 15 most destructive wildfires in California history have occurred in the Bay Area, five of which have taken place in the last decade.[12] This destruction has immediate and lasting impacts. In 2018, 354,000 individuals were displaced in California due to wildfires.[13] Fire risk is projected to increase in the Bay Area as temperatures rise, particularly when paired with the potential expansion of the wildland-urban interface.[14]



Sea Level Rise: The Bay Area has seen an eight inch increase in sea level over the past century, with an additional 3.4 to 4.4 feet expected by 2100.[15] Future sea level rise threatens vital ecosystems, infrastructure, and frontline communities.[16] In combination with extreme storms, sea level rise also increases the risk of toxic chemicals leaking from hazardous sites.[17]

Drought and Extreme Precipitation: The Bay Area faces more frequent cycles of drought and extreme precipitation.[18] For example, the drought of 2012-2016 led to the greatest water deficits seen in 1,200 years. In contrast, during the winter of 2022–2023, California experienced a dozen atmospheric rivers, resulting in major flooding and landslides. Across the state, 43 out of 58 counties declared states of emergencies that winter.[19]



Climate-driven hazards such as extreme heat, wildfires, and declining air quality are increasing rates of respiratory and cardiovascular disease, hospitalizations, and premature deaths.[20] The economic consequences are also becoming apparent. In the past two decades, California was impacted by 31 weather and climate disasters with a billion dollars or more in damages. The two decades prior only experienced 14 events of the same caliber.[21] Here in the Bay Area, the San Francisco Bay Conservation and Development Commission (BCDC) estimates that, without adaptation, the cost of sea level rise could surpass $230 billion by 2050, accounting for property, infrastructure, and environmental losses from flooding and shoreline degradation.[22] Increased risks of natural disasters, including climate-related ones, translate to higher risks of property damage, with serious impacts on the homeowner insurance market.[23] State and local authorities are often first responders during a disaster and lead preparedness and long-term recovery efforts. As the cost and frequency of these events grows, greater portions of constrained public budgets may be diverted to these purposes, leaving fewer resources for other vital functions.

These impacts and the associated costs will not be experienced equally. Frontline communities are often disproportionately exposed to climate hazards due to historic discriminatory policies and practices such as redlining and disinvestment in infrastructure. As a result, these communities face higher health and economic risks today, with fewer resources to adapt to climate change.[24] Other groups such as people with disabilities or chronic conditions, people of color, Indigenous populations, older adults, children, pregnant people, low-income individuals, and people working outdoors or in hot environments are also at higher risk. These groups can experience differences in exposure, sensitivity, or ability to adapt to climate hazards, making them more vulnerable. For example, people with disabilities can face challenges responding to extreme weather events, especially if evacuation instructions and actions are inaccessible.[25]

1.2 THE BAY AREA CONTEXT

The Bay Area is well-positioned to lead boldly on climate action. In addition to the strong state, regional, and local climate plans and policies described throughout the BARCAP, the region can leverage its strengths to accelerate progress toward carbon neutrality while advancing equity and affordability. For the purposes of the BARCAP, the region includes eight counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Solano, and Sonoma (see Figure 1-1). It is referred to in this document as the BARCAP region. (Santa Clara County was funded by the U.S. Environmental Protection Agency (US EPA) to complete its own regional climate action plan.)

Figure 1-1: Map of the BARCAP region

1.2.1 Population

The greater Bay Area is one of the most diverse metropolitan areas in the United States.[26] Fifty-nine percent of the population are people of color, including many different racial and ethnic groups.[27] The Bay Area is home to speakers of more than 160 languages, nearly half (43%) of whom speak a language other than English at home.[28] The BARCAP region includes a population of approximately 5.5 million across eight counties and 81 cities that range from very small and rural, to large and dense. The region's diversity can support innovation by providing fresh perspectives and challenging conventional thinking. Bay Area residents understand that climate change is real and requires greater action. According to recent polling, over 70% of Bay Area residents are worried about climate change, and believe that governments, corporations, and citizens should do more to address the issue.[29] The BARCAP leverages this awareness and popular support for climate action while balancing climate goals with other goals of Bay Area residents, including affordability and economic security.

1.2.2 Community-based organizations

The Bay Area has a strong network of community-based organizations (CBOs) and an active climate youth movement dedicated to addressing existing inequities and improving the lives and well-being of the Bay Area's diverse communities. There are over 300 non-profits and CBOs supporting climate change mitigation in the Bay Area. Youth-led

climate action groups in the Bay Area are organizing and advocating for energy system reform, equitable decarbonization, and corporate accountability for pollution and GHG emissions.[30] Many Bay Area CBOs specifically serve non-English speaking and frontline communities, with an increasing focus on inclusion in the clean energy transition and protection from the effects of pollution and climate change. CBOs are experts in environmental justice and the lived experiences of community members and are, and will continue to be, key stakeholders for equitably implementing climate action. Their role in BARCAP implementation is further described in Chapter 12.

1.2.3 Economy

The BARCAP region's economy generated almost $869 billion in output in 2023.[31] Many leading-edge industries like aerospace and defense, biotech, clean tech, high-tech (e.g., hardware, software and services, semiconductors, and microelectronics), and manufacturing are based in the Bay Area.[32] The Bay Area is globally recognized as a center for climate technology. The BARCAP region is also home to many academic institutions and national research laboratories, an innovative business sector, engaged and knowledgeable residents, robust network of non-profits and CBOs, and strong environmental ethos. The Bay Area includes expansive natural and working lands as well, which support a large wine industry, dairy farms, tourism and outdoor recreation industries. The Bay Area Jobs First Collaborative Regional Plan identifies several areas for the region that present potential competitive advantages for

future job creation, including transportation electrification, battery storage and other renewable technologies, sustainable agriculture, and alternative fuel production.[33] The BARCAP region is home to refineries, power plants, and commercial ports too. While these industries play a key role in the regional economy, the emissions from their activities also have exacted a toll on the health of nearby residents, many of whom live near these facilities due to historic redlining. A history of venture capitalism and a robust network of philanthropic organizations complement the rich diversity of the region.[34]

The Bay Area's economy is also a polarized economy with a visible economic divide between high- and low-income earners and deep wealth inequality. Income inequality between low- and high-income earners has been growing rapidly over the past four decades.[35] Additional factors contributing to significant economic disparities include the cost of living, rising costs of housing, and lingering impacts on the job market from the COVID-19 pandemic.[36] In 2023, 31% of Bay Area residents spent over 35% of their income on housing, the threshold to be considered cost-burdened due to housing.[37] In conjunction with rising inflation and mortgage rates, homeownership and market rate rentals are becoming increasingly unattainable, particularly for low-income residents.[38] This inequality is compounded by the legacy of systemic and prolonged environmental injustice, disinvestment, and structural and institutional racism.[39] Today, the per capita median income of white Bay Area residents is two times greater than the median incomes of Hispanic/Latino, Indigenous, and Black residents.[40]

1.3 LOCAL AND REGIONAL CLIMATE ACTION

The BARCAP builds on the region's long history of leadership on climate action and a rich foundation of climate-related plans, programs, projects, and policies already in place.

1.3.1 Local action

Nearly every city and county in the BARCAP region (83 out of 88) has adopted a plan focusing on climate change, including climate action plans.[41] Roughly half of these jurisdictions have set targets for reducing GHG emissions that are at least as ambitious as the state's targets and many of them include equity as a key consideration. Other important local policies and programs

to reduce GHG emissions include building energy codes that exceed state mandated codes, general plans that address climate change, housing elements that aim to reduce vehicle miles traveled (VMT), and plans focused on transportation, urban forestry, and building decarbonization (i.e., transitioning gas appliances to clean electric alternatives paired with energy efficiency). In addition, six out of eight counties and over 30 cities in the BARCAP region have declared climate emergencies, making climate change a priority for immediate and accelerated action.

1.3.2 Regional action

Regional agencies are complementing local action through regional planning, programs, projects, and funding efforts for transportation, land use, buildings, energy, and more.

- The Metropolitan Transportation Commission and Association of Bay Area Governments (MTC-ABAG) develop and help implement Plan Bay Area 2050+, the Bay Area's long-range plan for transportation, housing, the economy, and the environment. This plan focuses on ensuring the Bay Area is affordable, connected, diverse, healthy, and vibrant for all by 2050.[42] Priorities include sufficient housing options for residents, a well-functioning multi-modal transportation system, clean air and water, conserving natural resources and open space, creating quality job opportunities for all, and providing ample fiscal resources for all communities.

- The Air District and MTC-ABAG provide incentives for clean transportation in the Bay Area. Examples include the Air District's Clean Cars for All program, which provides grants to offset the cost of new electric vehicles, and MTC's regional component of the Active Transportation Program, which provides funding to build bicycle and pedestrian infrastructure.[43]
- The Air District adopted amendments to existing rules to establish zero-NO_x emissions standards for natural gas-fired furnaces and water heaters that are typically found in residential and commercial buildings. These amendments will result in reduced air pollution, improvements in public health, and are expected to also reduce GHG emissions.
- The Bay Area Regional Energy Network (BayREN) at MTC-ABAG, a coalition of Bay Area counties working together, promotes resource efficiency at the regional level, through outreach, training, technical assistance, funding, and resources.
- Five Community Choice Aggregators (CCAs) purchase clean energy on behalf of residents and businesses and provide rebates and other incentives for clean vehicles and heat pumps.[44]
- Resource Conservation Districts (RCDs) work with landowners and communities to implement projects related to water conservation, soil health, and carbon farm planning. RCDs, working with the Carbon Cycle Institute and other collaborators, have organized into seven Regional Agriculture and Climate Hubs comprised of 45 California RCDs and spanning 12.5 million acres of agricultural lands, to better implement a Carbon Farming Network in the Bay Area and beyond.

1.4 CALIFORNIA'S CLIMATE ACTION FRAMEWORK

The State of California's climate action plan, the 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan), is comprised of a robust collection of statewide policies, programs, and sector-specific goals spanning every sector of the economy. The Scoping Plan provides a strategic policy roadmap to achieve statewide targets of reducing GHG emissions 40% below 1990 levels by 2030, and achieving carbon neutrality by 2045, with an 85% reduction in GHGs from 1990 levels. The Scoping Plan was shaped by extensive stakeholder engagement, including an Environmental Justice Advisory Committee. Since adoption, state agencies have implemented industry-leading regulations, initiated groundbreaking voluntary programs, and updated standing efforts to advance their goals, which are discussed in the sector-specific chapters (Chapters 6-10).

A core component of the state's climate action framework is its Cap-and-Invest program, which places declining GHG emissions caps on large-emitting facilities. In 2025, the Cap-and-Invest program was reauthorized and extended to 2045. Current state law prohibits local air districts from regulating carbon dioxide (CO_2) emissions – the most prevalent GHG emitted when fossil fuels are combusted – from facilities that are included in the Cap-and-Invest program. In the BARCAP region, these facilities account for most of the CO_2 emissions from the industrial sector, leaving the Air District with a very limited ability to directly address industrial GHG emissions. The BARCAP does not, therefore, include measures addressing the industrial sector. However, the Air District is exploring ways to maximize the GHG reduction co-benefits of its regulations that focus on other (non-CO_2) GHGs.

Embedding equity

Frontline communities, which may include communities of color, lower-income neighborhoods, and other historically marginalized groups and communities, tend to contribute the least to climate change yet often face disproportionate exposure to negative climate impacts and greater susceptibility due to underlying social and health inequities. These disparities are often due longstanding structural inequities such as red-lining and housing discrimination, occupational segregation, and lack of access to the funding and financing required to adapt. New climate solutions should prioritize building the resilience of and bringing benefits to these communities.

Frontline and historically marginalized groups, though, face persistent barriers due to long-standing systemic inequities. Housing instability, food insecurity, limited mobility access, and lack of time or money, can significantly limit people's ability to participate in voluntary climate programs or comply with mandatory requirements. If these obstacles are not addressed, climate actions will be less effective, as the people who are most affected by climate change will be the least able to take part in the solutions and benefit from them. Building the capacity of communities to fully participate in and benefit from local and regional actions to reduce GHG emissions should be central to new climate solutions. Embedding equity in climate action is a critical opportunity to invest in, and build resilience in frontline communities, while pushing for tangible improvements in everyday lives through deployment of climate solutions.

If not designed equitably, GHG reduction measures could exacerbate unfair or unequal outcomes and environmental injustices. For example, inequitable building electrification can leave people on legacy fossil fuel infrastructure that becomes increasingly expensive to maintain, worsen housing insecurity, and cause displacement. The BARCAP region risks repeating historical patterns of disinvestment and perpetuating past environmental injustices unless equitable and just approaches are incorporated when developing GHG reduction measures.

Environmental justice is defined by the pioneering environmental justice scholar Dr. Bunyan Bryant as: "Environmental Justice … refers to those cultural norms and values, rules, regulations, behaviors, policies, and decisions [that] support sustainable communities where people can interact with confidence that the environment is safe, nurturing, and productive. Environmental justice is served when people can realize their highest potential … where both cultural and biological diversity are respected and highly revered and where distributive justice prevails." Equitable climate action that advances environmental justice means no community is treated as "other" or expendable. This starts by valuing and prioritizing the lived experiences and leadership of historically marginalized communities. Centering equity and environmental justice involves approaching conversations with humility and sustaining community dialogue throughout implementation to inform actions — not just during the planning stage.

Equity and environmental justice were designed into the BARCAP through community vetted design principles, inclusion of frontline community feedback in draft measures, and working partnerships with CBOs.[45] Environmental justice values like biological diversity, sustainable communities, and safe environments can be found woven throughout BARCAP measures and actions as measure language. Measure benefits paint a fuller picture of how climate actions can improve frontline community lives beyond purely GHG reductions. As the BARCAP moves into the implementation stage, equity and environmental justice will continue to be centered.

For more information on equity in BARCAP implementation, see Chapter 12. For more information on the BARCAP's approach to engaging frontline communities, see Chapter 4 and Appendix E, as well as the Air District's commitment to center environmental justice as described in the 2024-2029 Strategic Plan.[46]

1.5 APPROACH TO DEVELOPING THE BARCAP

1.5.1 Overview of Climate Pollution Reduction Grant Program

In July 2023, the Air District received funding from the U.S. Environmental Protection Agency's (US EPA) Climate Pollution Reduction Grant (CPRG) Program. 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. This funding enabled the Air District to launch the Bay Area's first region-wide climate action planning effort, resulting in two plans required by the US EPA.

The first plan is the Priority Climate Action Plan (PCAP).[47] It 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. The PCAP was submitted to US EPA February 29, 2024. The second plan is this comprehensive BARCAP covering all sectors, which will be submitted to US EPA by December 1, 2025.[48]

1.5.2 BARCAP goals

The BARCAP focuses on four core goals:

Given the robust climate leadership in the Bay Area and the state's climate action framework, the BARCAP focuses on regional action and collaboration that addresses the space in between, helping advance local action and ensuring state plans and goals are more achievable and equitable in the BARCAP region. It does not seek to duplicate

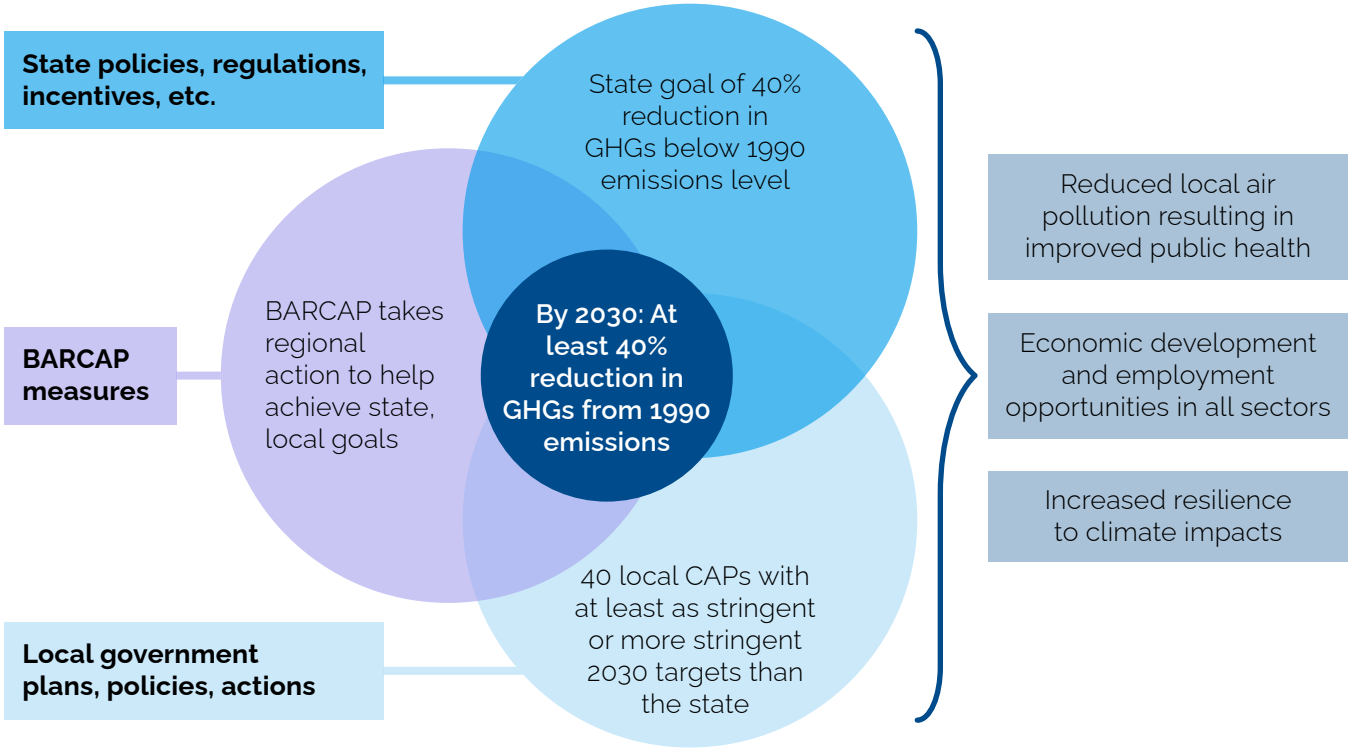
work already being done but rather focuses on filling gaps and tackling key challenges and obstacles to local action that only regional action can effectively address. It provides a vehicle to identify and encourage wider adoption of promising local climate solutions across the Bay Area. The BARCAP approach elevates and centers the priorities of frontline communities, building on the extensive work that cities and counties in the region have been doing for years.

While the Air District is coordinating development of the BARCAP, it is not the only implementer. Many sectors extend beyond the Air District's jurisdiction and expertise. Other agencies and organizations are well-suited and well-positioned to lead implementation in these areas. The general roles in implementation played by lead and supporting agencies and organizations are defined in Chapter 5. Specific lead and supporting implementing agencies and organizations are described in the sector-specific chapters (Chapters 6-10).

1.5.3 Supporting successful state and local climate action

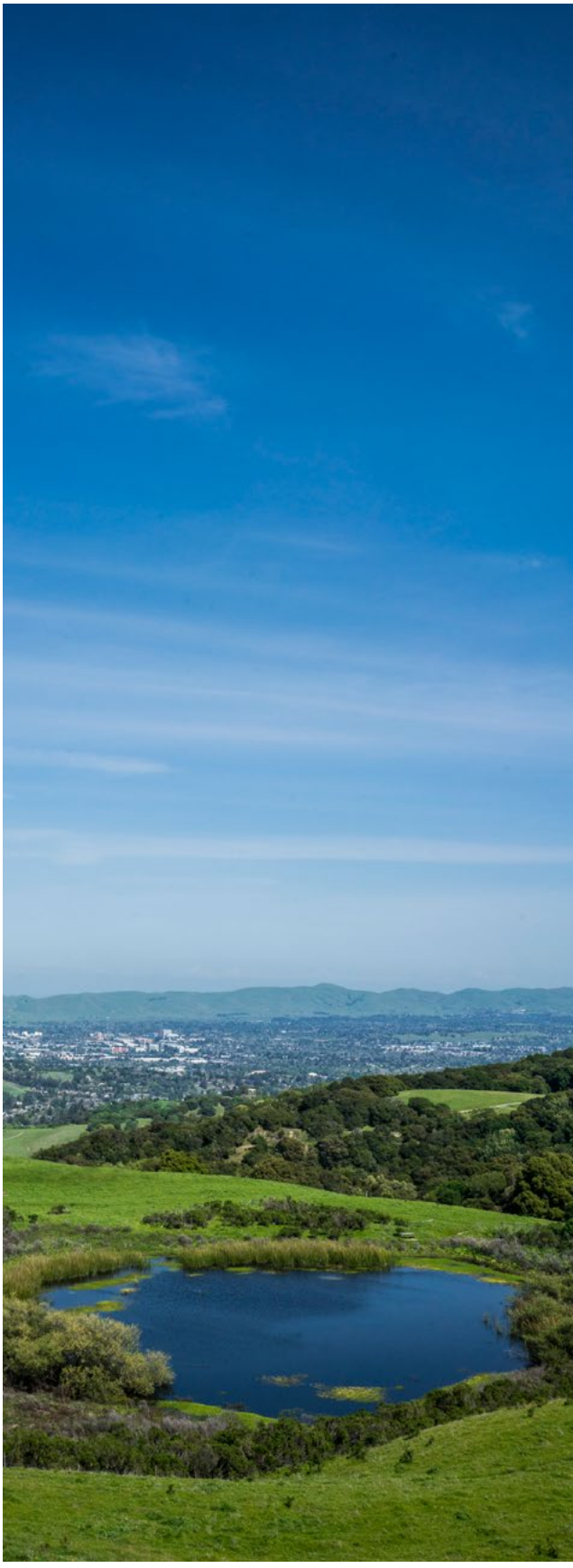
The BARCAP focuses on setting up key enabling conditions necessary to ensure that the GHG emission reductions outlined in state and local climate action plans are achieved – in full and on time. BARCAP measures are additive and not duplicative of state and local actions.

Figure 1-2: BARCAP measures contributing to local and state goals



Many Scoping Plan measures rely on local and regional action to fully realize their GHG reduction potential. For example, Senate Bill 1383 (2016) requires reducing the amount of organic waste disposed in landfills by 75% below 2014 levels by 2025. While the state has set this target, it cannot be achieved without alternatives for managing organic waste, local waste diversion, and education programs. Similarly, the Scoping Plan includes the statewide goal of 100 percent of in-state sales of new passenger cars and trucks being zero-emission by 2035. This goal cannot be met without a robust regional electric vehicle (EV) charging network and local policies that enable a rich local charging infrastructure. Without sufficient local and regional action, the state is unlikely to meet its climate goals.

Local governments often face common challenges that can slow or impede local climate action. These barriers include misaligned policies, hard-to-get financing and funding, supply and workforce shortages, insufficient technical support, and unequal access to programs. The BARCAP focuses on where regional collaboration – on programs, outreach, development of policies and standards, data-sharing, acquiring funding/financing, and access to benefits – can help make local action more efficient, effective, and equitable. Increased regional coordination also enables the scaling of promising local solutions.



1.5.4 Overview of BARCAP development

Foundational research

From May 2024 to November 2025, the Air District partnered with regional agencies, local governments, and other stakeholders across the region to develop the BARCAP. The thoughtful and phased approach began with an assessment of existing local climate action plans and the Scoping Plan, as well as key state and regional policies and programs. Air District staff also reviewed other state and regional PCAPs for innovative and impactful measure concepts to consider for inclusion in the BARCAP.

Stakeholder engagement

Building on the foundational research, the Air District engaged local governments to learn about specific challenges and barriers to local climate action that could be addressed through a regional approach, and opportunities to advance local climate action that cross jurisdictional borders. Local governments also provided feedback through a virtual input session on preliminary measures, specifically on alignment with city and county efforts, potential interest in implementation, and other critical concerns and opportunities.

The Air District partnered with eight local CBOs to hold a series of four workshops with frontline communities. Through these workshops, members of frontline communities shared community priorities and how the preliminary BARCAP measures might benefit or negatively impact their everyday life. The public was invited to provide feedback on the BARCAP vision, initial measure concepts, and final proposed measures through a series of three public workshops. There was also a public survey that resulted in 680 responses. Information about these engagement opportunities was shared through a dedicated BARCAP website and email list, the Air District's social media channels, and local government communication channels.

The Air District established an Advisory Work Group (AWG) composed of representatives from each county, the City of Oakland, regional agencies, and community-serving and community-based organizations. It served as a key forum for regional coordination and collaboration to support the Air District's development of the BARCAP. Members helped identify key gaps, challenges, and opportunities for the plan to address, and helped connect the BARCAP with local governments and communities in their jurisdictions. They also reviewed key BARCAP deliverables.

Measure development

The Air District developed a GHG inventory and projections to understand the main drivers of current and future GHG emissions in the BARCAP region. The agency also identified a set of core criteria and design principles to guide measure development. Combining GHG emissions data, foundational research, and initial stakeholder input, the Air District worked with sector-specific technical working groups composed of potential implementers, community organizations, and subject matter experts to develop measure concepts, which were further refined with a technical consultant. The Air District also met with regional agencies and potential implementers to finalize draft measures prior to a four-week public review period. The final measures reflect public feedback and the results of several technical analyses, including a frontline communities impacts analysis, workforce planning analysis, and a funding analysis.

ENDNOTES

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3 This land acknowledgment is closely adapted from and includes direct references to indigenous land acknowledgements in Plan Bay Area 2050, developed by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) (2021) (https://planbayarea.org/digital-library/plan-bay-area-2050-indigenous-land-acknowledgement) and the Air District Community Advisory Committee Land Acknowledgement (2022) (https://www.baaqmd.gov/en/about-the-air-district/community-advisory-council).

4 The definition of equity is from the Air District's CEQA Air Quality Guidelines (2023).

5 According to the California Air Resources Board's 2020 report, Achieving Carbon Neutrality in California, carbon neutrality means that all GHG emissions emitted into the atmosphere are balanced in equal measure by GHGs that are removed from the atmosphere, either through carbon sinks or carbon capture and storage.

6 The vision for the BARCAP draws from and/or aligns with visions from other climate-related planning efforts in the region including several county climate action plans and Plan Bay Area 2050+.

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2 Regional Greenhouse Gas Inventory and Projections and Carbon Stock Inventory

The regional greenhouse gas (GHG) emissions inventory and projections detail the major GHG emission sources in the Bay Area Regional Climate Action Plan (BARCAP) region while the carbon stock inventory shows where carbon is stored in both plants and soils (i.e., carbon stocks) on natural and working lands. These inventories and the projections were used to inform the BARCAP measure development.

2.1 GHG INVENTORY

2.1.1 Overview

The GHG emissions inventory provides emissions data for the base year of 2022.[1] It accounts for county-level emissions from the BARCAP region across six major sectors – transportation, industrial, buildings, power, waste, and agriculture (as part of natural and working lands).[2] Specific emissions sources within each sector are defined and discussed in Appendix A. The natural and working lands carbon stock inventory is discussed in Section 2.3.

For all sources, the following GHG emissions are quantified: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several fluorinated gases, including hydrofluorocarbons (HFCs),

perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). GHG emissions are reported in terms of CO_2-equivalents (CO_2e), which is a standardized metric to compare emissions across different GHGs. This metric is calculated using 100-year time-horizon global warming potentials (GWP). GWP is a measure of how much heat a specific GHG traps in the atmosphere relative to the same amount of CO_2. The 100-year time horizon represents how much a given GHG will contribute to global warming over a 100-year time frame. Some GHGs, like CH_4, N_2O, and particularly fluorinated gases, have high GWPs and thus make greater contributions to global warming on a per ton basis than CO_2. The BARCAP inventory uses GWPs from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5).[3]

2.1.2 Inventory methodology

The Air District applied a production-based methodology to develop the GHG emissions inventory. This approach focuses on the emissions released directly into the atmosphere from sources located within the BARCAP region. This differs from a consumption-based methodology, which attributes emissions to regional consumers by accounting for the full life-cycle emissions of goods and services consumed locally, regardless of where those emissions occur globally. For example, emissions from electricity generated from power plants in the BARCAP region are included in the inventory, whereas emissions from electricity consumed in the BARCAP region but generated beyond the BARCAP region's borders are excluded.

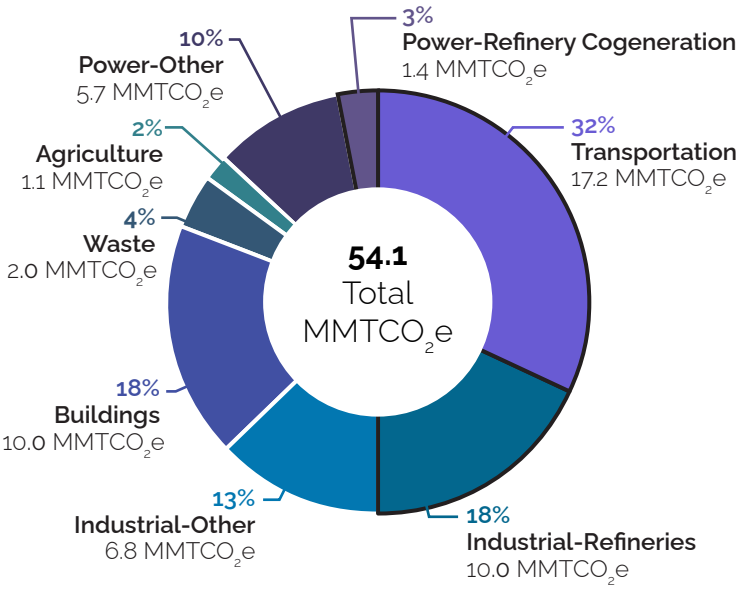
Within the production-based methodology, the Air District uses two approaches to estimate GHG emissions, depending on the type of emissions source:

- A bottom-up approach where emissions are derived by combining activity data and/or throughputs with GHG emissions factors and local or regional controls;[4]
- 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.).

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

2.1.3 GHG inventory key results

Figure 2-1: GHG emissions for the different sectors, in $MMTCO_2e$ and in percent relative to the total of 54.1 $MMTCO_2e$. Emissions related to transportation are outlined in black.



The annual GHG emissions for the Bay Area region for the year 2022 total 54.1 million metric tons of CO_2e ($MMTCO_2e$), as shown in Figure 2-1 (subsector detail in Table 3-2 and Figure 3-1 in Appendix A). For context, this total represents about 15% of California's statewide GHG emissions in 2022.[5] Transportation (32%) is the largest contributing sector to the annual total GHG emissions, followed by industrial (31%) emissions. Other high contribution sectors include buildings (18%) and power (13%).

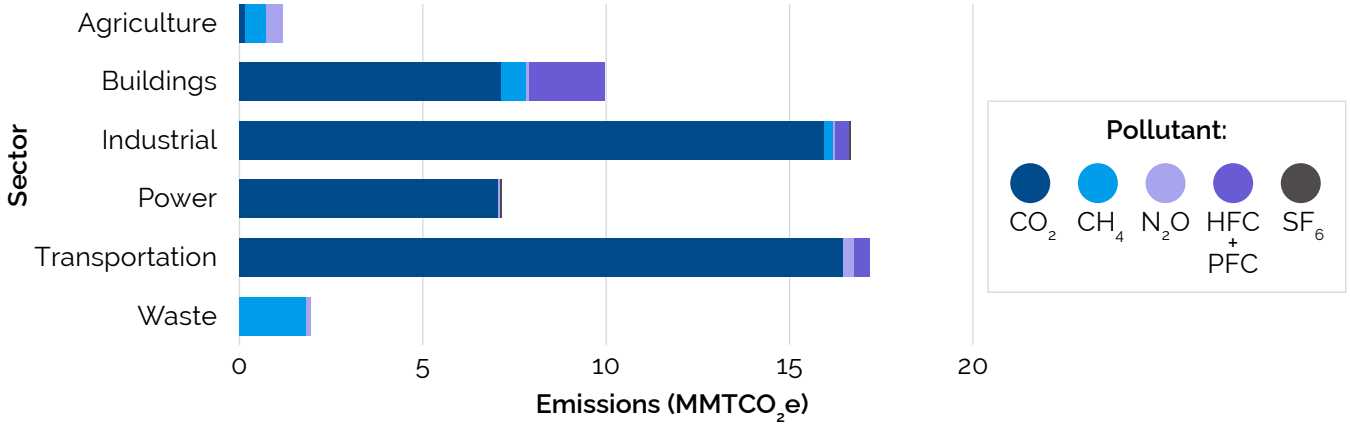
As currently defined for the BARCAP, the transportation sector only accounts for GHG emissions from the combustion (end-use) of fossil fuels to move people and goods (e.g., tailpipe emissions from on-road motor vehicles, fuel combustion exhaust from ships and airplanes, etc.). However, every lifecycle stage of fossil fuel extraction, processing, and use for the transportation sector generates GHG emissions. While the BARCAP region has negligible fossil fuel extraction sources, processing of fossil fuels for the transportation sector at the BARCAP region's refineries contributes significantly to the industrial sector emissions, accounting for over 60% (~10 $MMTCO_2e$) of that sector's total GHG emissions. In addition, on-site cogeneration of electricity for use at these refineries, categorized under the power sector, adds another 1.4 $MMTCO_2e$ or 20% to that sector's total. When combined with the transportation sector emissions, the GHG emissions related to transportation that are associated with both production (extraction and processing) and consumption (combustion) of fossil fuels account for over half of the total regional GHG emissions in 2022 (53% or 28.6 $MMTCO_2e$), as seen by the sectors outlined in black in Figure 2-1.

2.1.3.1 By GHG pollutant

CO_2 is the predominant GHG pollutant, representing 86% of the GHG emissions in the BARCAP region, mostly from combustion of fuels across the transportation, buildings, power, and industrial sectors. About half of CH_4 emissions, which constitute >6% of the BARCAP GHG inventory, are emitted from landfills in the waste sector; however, recent measurement studies have indicated that current inventory approaches may be

underestimating landfill methane emissions (see Appendix A Chapter 4 – Uncertainties and Future Improvements). About 44% of all N_2O emissions in the BARCAP region can be attributed to the agriculture sector, mostly due to fertilizer use. Nearly 6% of regional GHG emissions are attributed to leakages and fugitive losses of fluorinated high-GWP gases (including HFCs, PFCs, CFCs, HCFCs, and SF_6), a majority of which occur in the building sector as refrigerants.[6] The distribution of the different climate pollutants by sector in the BARCAP region is shown in Figure 2-2.

Figure 2-2: Pollutant contributions by sector to the greenhouse gas emissions inventory for 2022



2.1.3.2 *By county*

Figure 2-3: Relative percentages of GHG emissions from each county in the BARCAP region

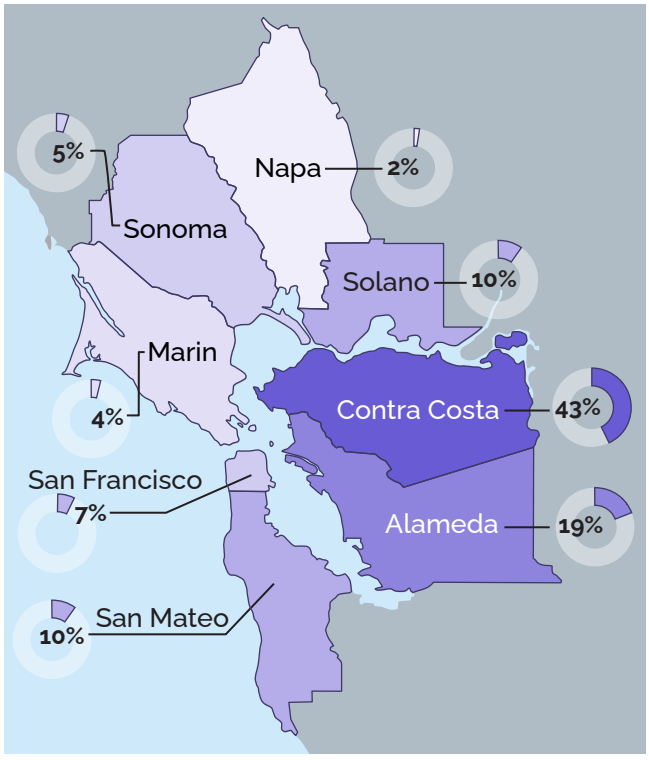


Figure 2-3 shows the distribution of emissions by county across the BARCAP region in 2022. Contra Costa County stands out as the county with the most GHG emissions (~45%). This is, in large part, because the county is home to four refineries and the majority of the power plants in the BARCAP region. The fifth refinery is in Solano County, which otherwise has relatively low GHG emissions, due to only the southern part of the county being included in the BARCAP region. In the other six counties, the transportation sector and buildings sector account for the majority of GHG emissions. A detailed breakdown is provided in Table 3-2 in Appendix A, showing emissions by county and sector.

2.2 GHG INVENTORY HISTORICAL EMISSIONS AND FUTURE PROJECTIONS

2.2.1 Overview

Historical emissions (back-cast to 1990) and future emissions projections (projected forward to 2050) provide insight into past emission trends and expected future trends. The historical back-cast uses the most recent available data to analyze emissions over the past 35 years. This information helps identify major emission sources and evaluate progress over time.[7] Future emissions projections extend through 2050 and are largely based on the California Air Resources Board's 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) reference scenario and incorporate anticipated population growth and economic development for the BARCAP region. Additionally, the Air District's regulations for residential appliances (Rules 9-4 and 9-6) are incorporated into the future projections.[8] Together, the historical back-cast and the future projections provide a foundation for prioritizing measures and understanding the effectiveness of implemented measures over time.

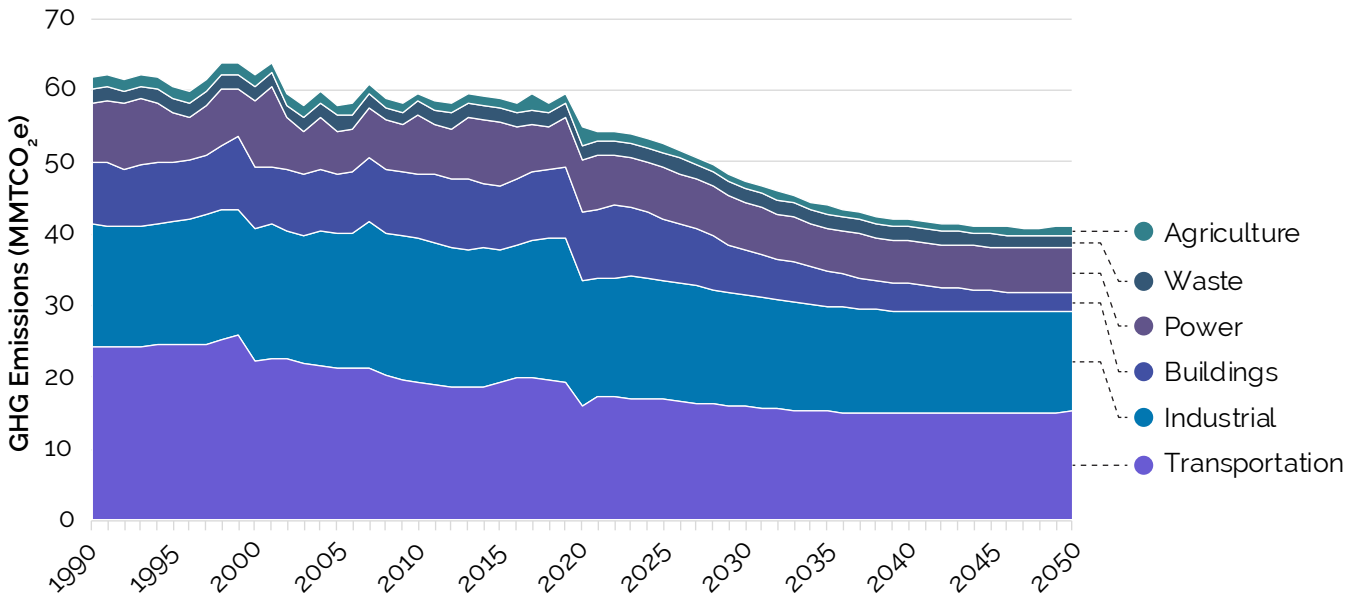
2.2.2 Historical emissions and future projections key results

The BARCAP region's total GHG emissions have dropped from 62.2 $MMTCO_2e$ in 2000 to 54.1 $MMTCO_2e$ in 2022, representing a 13% decrease, primarily resulting from reduction in emissions in the transportation (-23%) and power (-23%) sectors, as shown in Figure 2-4. For the transportation sector overall, on-road mobile source GHG emissions have declined significantly over the past few decades despite a growing vehicle population

and long-term increase in vehicle miles travelled (VMT) in the BARCAP region. This is largely due to reduced fossil fuel use from improved fuel economy and increased use of electric vehicles. In the power sector, the decline in GHG emissions is largely driven by the growing proliferation of renewable energy, which has reduced the BARCAP region's reliance on natural gas for power production. This trend is further strengthened by an increase in residents opting to purchase cleaner and renewable energy through public Community Choice Aggregators.[9] Over the past two decades, declining natural gas use in electricity generation has been offset by increased demand for natural gas use for space- and water-heating in the buildings sector, driven by the region's economic growth and rising population.

Annual GHG emissions for 2050 (which does not include emission reductions expected from the measures included in the BARCAP) are projected to decline to 36.7 $MMTCO_2e$ in the BARCAP region across major sectors including transportation (-12%), industrial (-16%), and power (15%). This anticipated trend reflects the impact from California's efforts to reduce fossil fuel use through promoting zero-GHG transportation, the state's Cap-and-Invest program that disincentivizes and puts a cap on GHG emissions from large emitters (power plants, landfills, etc.), and the continuing decarbonization of the Bay Area's electric power generation mix as required under the Renewables Portfolio Standard.[10] In comparison, annual GHG emissions of the buildings sector are expected to decline by 73% by 2050, with 70% primarily resulting from the Air District's Rule 9-4 and Rule 9-6, which require newly installed furnaces and water heaters to meet a zero-NO_x standard. While Rules 9-4 and 9-6 do not require the use of electric appliances, currently only electric appliances will meet the zero-NO_x standard.[11] Figure 2-4 shows the change in GHG emissions for each sector over time. More information on historical emissions and future projections can be found in Appendix A.

Figure 2-4: Changes in GHG emissions (in $MMTCO_2e$) by sector over time[12].



2.3 CARBON STOCK INVENTORY

2.3.1 Overview

The Air District developed a carbon stock inventory for the BARCAP region for the year 2022. This inventory illustrates where carbon is stored across the landscape in both plants and soils (i.e., carbon stocks). It can be used to understand the overall importance of natural and working lands for climate action, quantify and locate carbon at risk of being lost due to wildfire or development, and understand the impact of natural and working lands climate measures described in Chapter 10.

The carbon stock inventory does not include historical carbon stock amounts or project future carbon stock amounts. CARB is currently updating its Natural and Working Lands Carbon Inventory, which will include detailed data for the BARCAP region for carbon stock amounts.[13] This updated analysis may also lead to changes in statewide future carbon stock projections. The Scoping Plan shows that despite the vast amounts of carbon stored across lands in the state, natural and working lands are projected to be a source, not a sink, of carbon into the mid-century due to estimated carbon losses mainly from drought and wildfire.[14] These statewide projections are expected to hold true for the Bay Area.

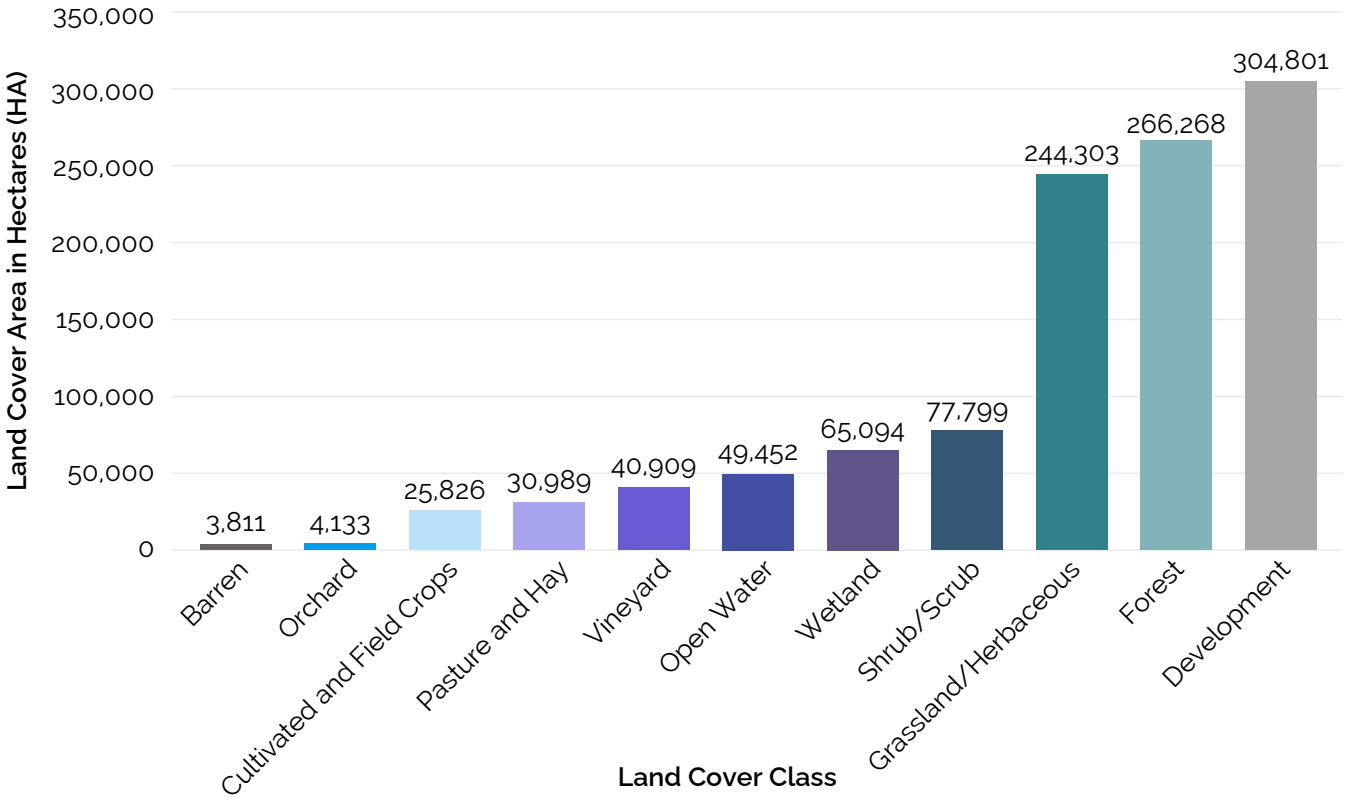
2.3.2 Carbon stock inventory methodology

The BARCAP region carbon stock inventory aligns with the most recent 2018 statewide carbon stock inventory described in the Scoping Plan, as well as local analyses conducted in Sonoma and Contra Costa counties. Santa Clara County conducted its own parallel and aligned carbon stock inventory for its own U.S. Environmental Protection Agency (US EPA)-funded Climate Pollution Reduction Grant (CPRG) effort. For a more comprehensive description of the carbon stock methodology and regional and state alignment, refer to Appendix B.

2.3.3 Carbon stock inventory key results

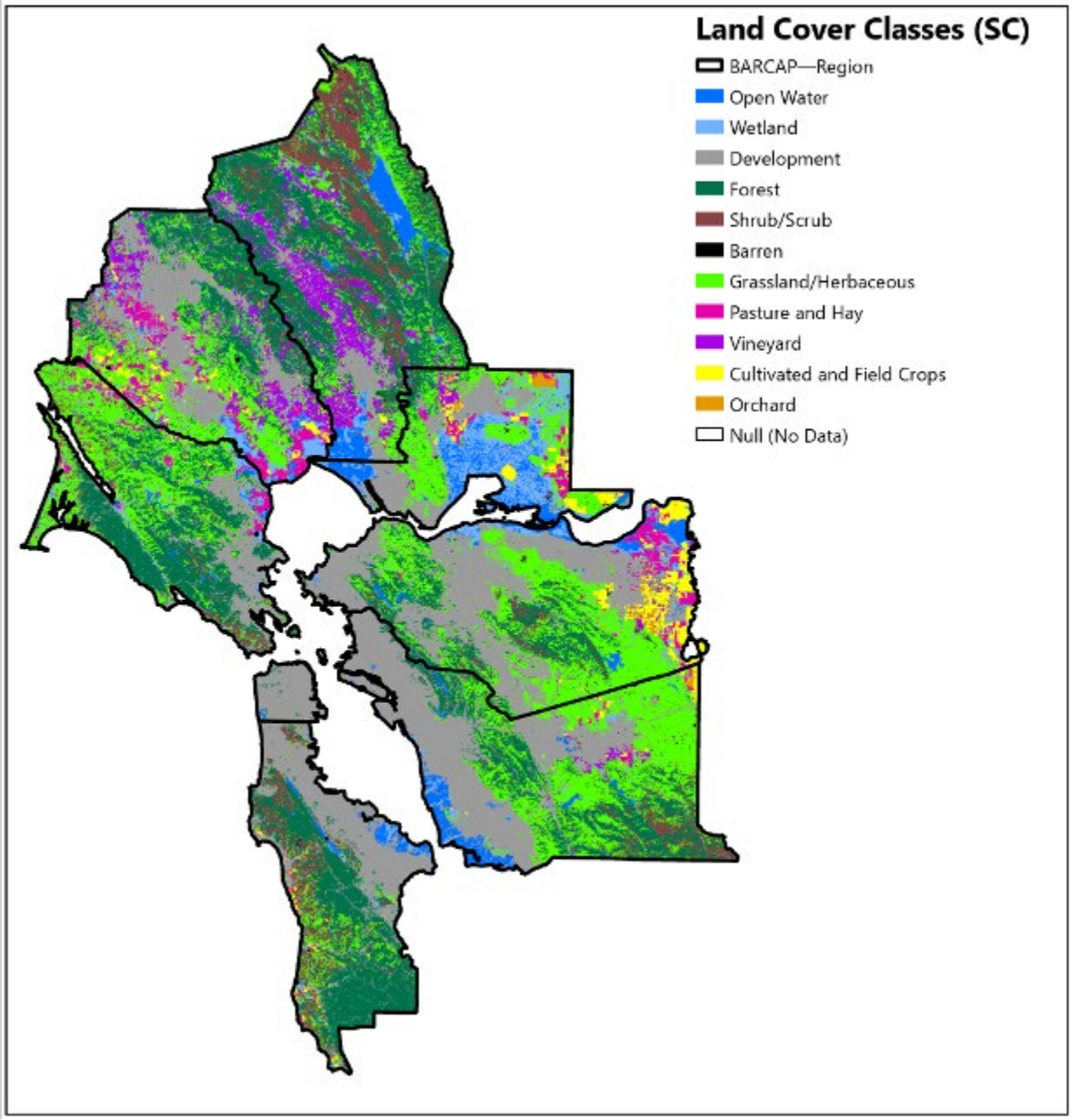
In order to quantify carbon stocks held in plants and soils across the eight counties, landcover types across the BARCAP region must first be mapped. As shown by the maps and figures below, the eight-county BARCAP region is mainly comprised of developed urban, forested, and grassland/herbaceous lands. Developed urban and suburban lands cover the largest area across the BARCAP region, taking up 27% of total hectares. Forested lands are the second largest category, covering 24%, followed by grassland/herbaceous lands at 21% of total hectares. All other landcover types are less than 10% of the total as shown in Figure 2-5, which displays all mapped landcover types from lowest to highest proportion, with total hectares identified. As carbon held in plants and soils is calculated in part based on landcover type, it is important to first identify prevalence of different kinds of landcovers across the BARCAP region.

Figure 2-5: BARCAP region total land cover in hectares



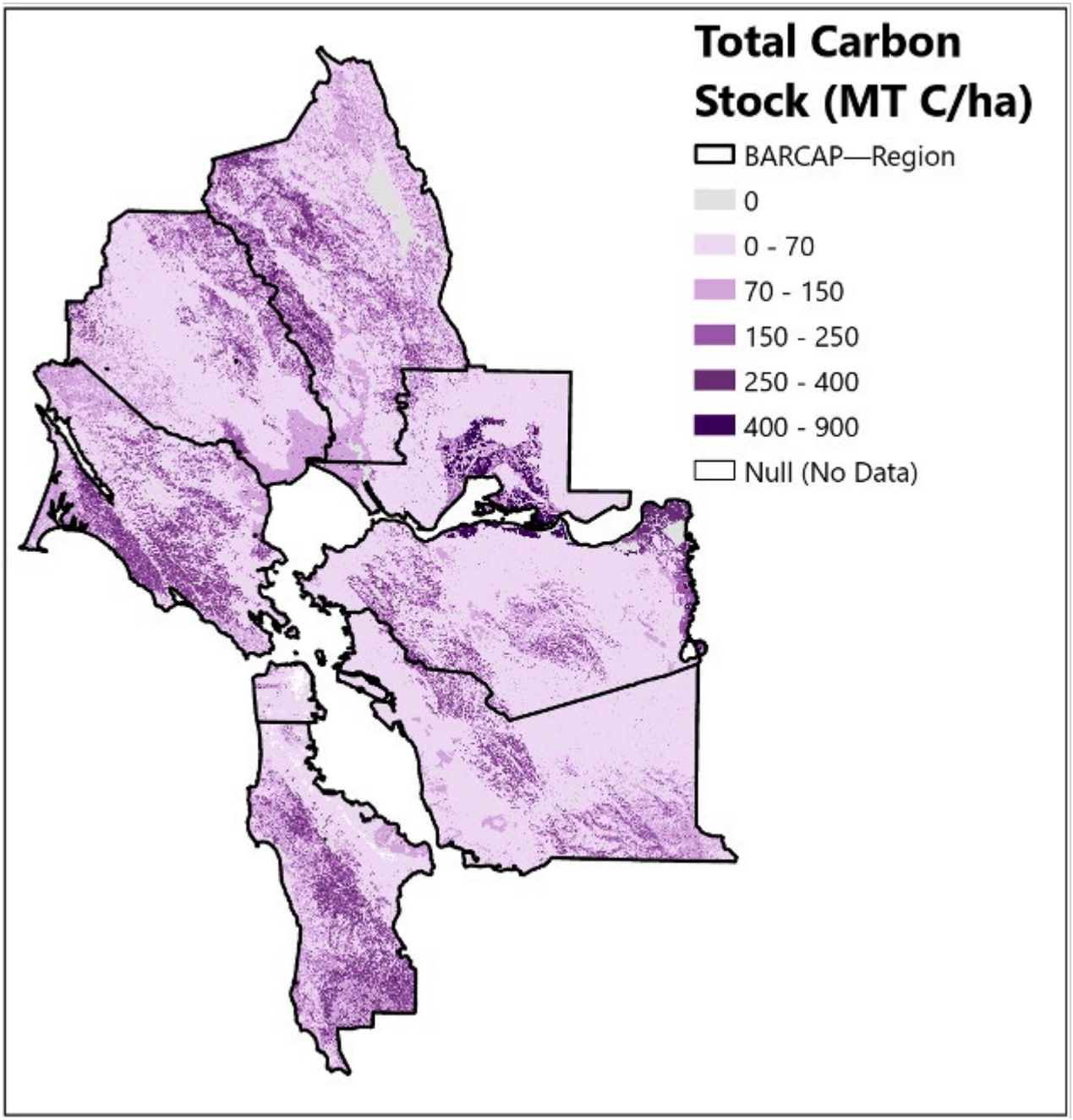
The geographic distribution of these landcover types is illustrated across the region in Figure 2-6. Highlights from the mapped landcover types include high densities of forests in Napa, Marin, and San Mateo counties, dominance of wetlands in mapped portions of Solano County, and high proportions of developed lands in Contra Costa, Alameda, and San Francisco counties.

Figure 2-6: Land cover types across the BARCAP region



Plants and soils across the region held 92,335,131 metric tons of carbon (MT C), as shown in Figure 2-7. These carbon stocks are six times larger than total GHG emissions across the BARCAP region for 2022, underscoring the importance of natural and working lands for Bay Area climate action.[15] While the BARCAP GHG Inventory uses units of MT CO_2e, MT C is used to describe carbon held in plants and soils to be consistent with the State and Intergovernmental Panel on Climate Change (IPCC) standards.[16]

Figure 2-7: Total carbon stock per hectare (metric tons carbon/hectare)



Forests and wetlands hold the highest density of carbon across Bay Area lands. Forests on average store 175 MT C per hectare, while wetlands store 133 MT C per hectare - both are significantly higher than the average of all land cover classes of 83 MT C per hectare, as shown in Table 2-1.

Table 2-1: 2022 Total Carbon Stock by Landcover Type

LAND COVER CLASS	AREA IN HECTARES	TOTAL CARBON STOCK IN MT C	AVG. TOTAL CARBON STOCK IN MT C PER HECTARE
Barren	3,811	139,387	37
Orchard	4,133	377,494	91
Vineyard	40,909	1,673,057	41
Cultivated and Field Crops	25,826	2,397,443	93
Pasture and Hay	30,989	2,570,126	83
Open Water	49,452	3,668,746	74
Shrub/Scrub	77,799	5,270,461	68
Wetland	65,094	8,632,855	133
Grassland/Herbaceous	244,303	10,296,937	42
Development	304,801	10,652,489	35
Forest	266,268	46,656,135	175
Total	***1,113,384***	***92,335,131***	***83***

Total ecosystem carbon stocks are nearly equally split between carbon held in plants (biomass) and carbon held in soils.[17] Carbon in soils comprises 51% (47,455,018 MT C, or 174,001,733 MT CO_2e) of total ecosystem carbon, while carbon in plants comprises 49% (44,880,113 MT C, or 164,560,414 MT CO_2e).[18] These soil and plants carbon values have been converted to units of CO_2e in order to emphasize their importance for regional climate action, and compare to total GHG emissions: carbon in soils is over 3.2 times larger than total regional emissions (54.1 MMT CO_2e), while carbon in plants is ~3 times larger than total regional emissions (see Figure 2-8). This distribution is shown on the following pages in Figure 2-9 and Figure 2-10, with separate visualizations for carbon held in soils (Figure 2-9), and carbon held in plants (Figure 2-10).

Figure 2-8: Comparison of soil and plant carbon values to total regional emissions (CO_2e)

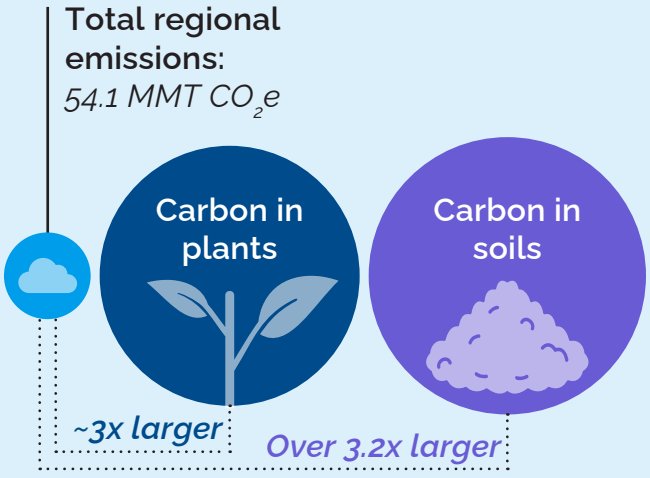


Figure 2-9: Soil carbon stock per hectare (metric tons carbon/hectare)

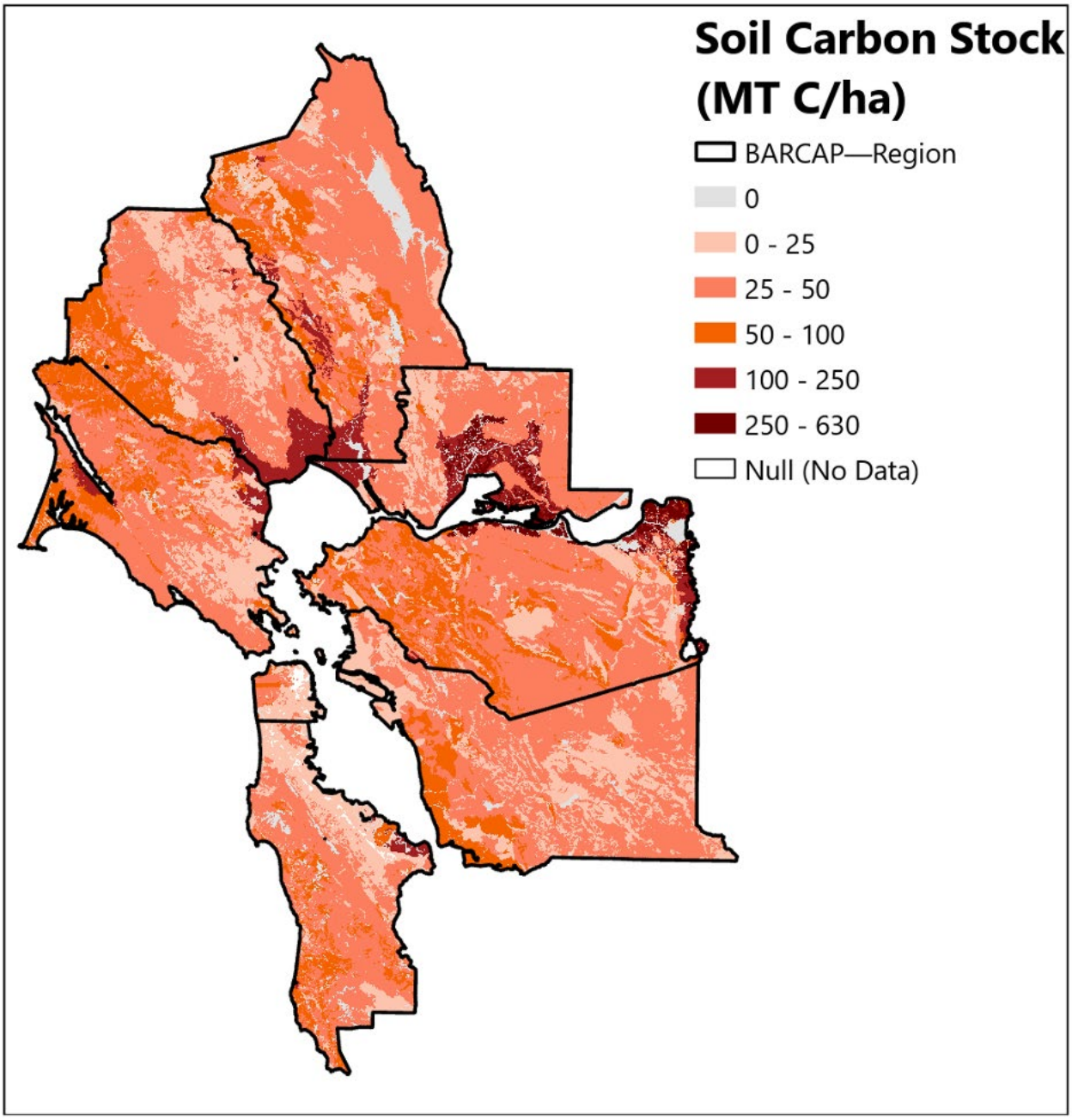
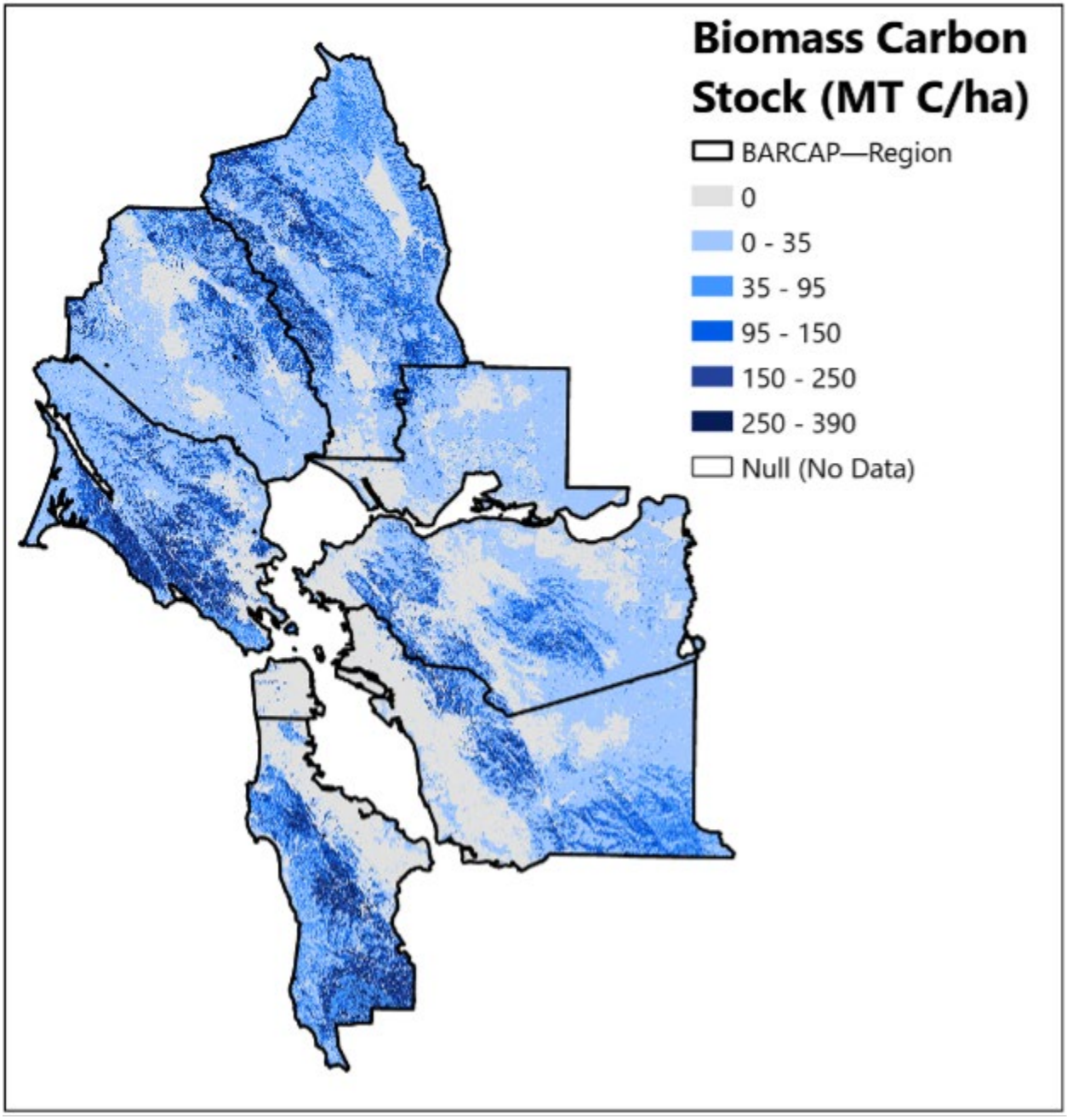


Figure 2-10: Plant (biomass) carbon stock per hectare (metric tons carbon/hectare)



Wetlands are notable for the density of carbon held in their soils. Despite comprising only 6% of total landcover, wetlands account for 14% of total soil carbon stocks across the BARCAP region. However, developed lands, forests, and grassland/herbaceous lands are the three largest total pools of carbon held in soils due to a combination of their soil carbon density (i.e., in forests and grasslands), and/or sheer area across the BARCAP region.

Forests are the most significant pool of carbon held in plants, accounting for 82% of the total plant carbon pool, with significant density of forest landcover types in Napa, San Mateo, Sonoma, and Alameda Counties. Scrub and shrub lands account for the second largest pool of carbon held in plants, accounting for 6% followed by wetlands, which account for 4% of total carbon held in plants.

The results of the carbon stock inventory informed the potential for GHG emissions reductions from measures and actions in the natural and working lands sector, which are described in further detail in Chapter 10. For more information on the carbon inventory methodology and results, please refer to Appendix B.

GHG emissions beyond the BARCAP region

Unlike local air pollution, GHGs impact our environment at the global scale. This means that in a globalized economy, the BARCAP region's actions have the potential to reduce not only GHG emissions within the region, but anywhere that supplies energy and materials consumed in the region. The GHG emissions inventory for the BARCAP categorizes and quantifies the GHG emissions produced or emitted within the geographic boundaries of the BARCAP region. However, this emissions inventory does not tell the whole story of the BARCAP region's impact on the global climate since a significant portion of the goods and services consumed by residents are produced outside the region.

To more fully describe the amount of GHGs generated by a region, a consumption-based GHG emissions inventory can be developed, similar to the one incorporated in the Air District's 2017 Clean Air Plan in collaboration with the Cool Climate Network at UC Berkeley.[19] This type of inventory is typically based on a full life-cycle analysis of the emissions generated by the production, use, and disposal of each activity or product. By estimating the GHG emissions embedded in the goods, services, and activities consumed by residents, regardless of where the goods were produced or the emissions were released, a consumption-based inventory provides insight into the full scale of the impact and benefit of GHG reduction actions.

There are currently several efforts to develop consumption-based inventories for the Bay Area and other regions of the state led by the Cool Climate Network which would provide a different view of the region's GHG impact.

ENDNOTES

1 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.

2 The Air District's complete GHG inventory includes nine counties, but the GHG inventory for the BARCAP excludes Santa Clara County to align with the geographic scope of this planning effort. Both inventories exclude the portions of Sonoma County and Solano County that fall outside the Air District's jurisdiction.

3 Gunnar Myhre et al., "Anthropogenic and Natural Radiative Forcing," in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, ed. T. F. Stocker et al. (Cambridge: Cambridge University Press, 2013), 714, table 8.7, https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf.

4 An emission factor is a standardized value describing the mass of GHGs emitted per unit of activity. Activity data includes data such as vehicle miles traveled or landfill gas emitted; A throughput indicates how much material or fuel is being used, which directly influences the amount of pollutants released. E.g., a substance that is consumed during a process, and, while being consumed, produces emissions, such as the type and amount of waste processed at composting facilities or the amount of natural gas consumed for electricity production at power plants; A local control is a local rule or policy that limits emissions in ways not done by state and federal regulations, such as Air District Regulation 9 Rules 4 and 6 which aim to prohibit the use of space and water heating appliances that produce nitrogen oxides emissions, with co-benefits of reducing GHG emissions; "Regulation 9 Rule 4: Nitrogen Oxides from Natural Gas-Fired Furnaces – 2023 Amendment (Current)", Bay Area Air District, accessed September 4, 2025, https://www.baaqmd.gov/rules-and-compliance/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces; "Regulation 9 Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters – 2023 Amendment (Current)," Bay Area Air District, Accessed September 4, 2025, https://www.baaqmd.gov/rules-and-compliance/rules/reg-9-rule-6-nitrogen-oxides-emissions-from-natural-gasfired-water-heaters.

5 "California 2000-2022 GHG Inventory (2024 Edition)", California Air Resources Board, accessed October 30, 2025, https://ww2.arb.ca.gov/ghg-inventory-data.

6 With the adoption of SB1206 in 2022, HFCs will be phased-out in California by 2033, to be replaced with lower-GWP and/or non-GHG options. Senate Bill No. 1206, Skinner. Hydrofluorocarbon gases: sale or distribution; "SB 1206 and AB 663," California Air Resources Board, Accessed November 11, 2025, https://ww2.arb.ca.gov/our-work/programs/sb-1206-and-ab-663/about.

7 This scenario represents "what GHG emissions would look like if (the state) did nothing at all beyond existing policies that are required or already in place to achieve the 2030 target of at least 40 percent below 1990 levels. across all sectors statewide; "CARB 2022 Scoping Plan for Achieving Carbon Neutrality," California Air Resources Board, December 2022, https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf; More information on historical and future projections is provided in Appendix A.

8 "Regulation 9 Rule 4: Nitrogen Oxides from Natural Gas-Fired Furnaces," Bay Area Air District; "Regulation 9 Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters," Bay Area Air District; California's

Advanced Clean Cars II regulation and MTC-ABAG's Plan Bay Area 2050+ were not incorporated into the future projections of the inventory but are accounted for separately from GHG and co-pollutant emissions quantification of measures in the transportation sector.

9 "Community Choice Aggregation (CCA): What is it?" CALCCA, Accessed October 21, 2025, https://cal-cca.org/powered/.

10 "2022 Scoping Plan for Achieving Carbon Neutrality"; "Cap-and-Invest Program," California Air Resources Board, Accessed January 21, 2026, https://ww2.arb.ca.gov/our-work/programs/cap-and-invest-program; "Renewables Portfolio Standard – RPS," California Energy Commission, Accessed October 21, 2025, https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard.

11 "Regulation 9 Rule 4: Nitrogen Oxides from Natural Gas-Fired Furnaces – 2023 Amendment (Current)," Bay Area Air District; "Regulation 9 Rule 6: Nitrogen Oxides Emissions from Natural Gas-Fired Water Heaters – 2023 Amendment (Current)," Bay Area Air District.

12 The large peaks in the agriculture sector trendline are due to major fire events in 2017 and 2020.

13 "2025 Natural and Working Lands Cabon Inventory update", California Air Resource Board, accessed October 30, 2025. https://ww2.arb.ca.gov/our-work/programs/nature-based-strategies/natural-and-working-lands-carbon-inventory/2025-natural.

14 "APPENDIX I – NATURAL AND WORKING LANDS TECHNICAL SUPPORT DOCUMENT," California Air Resources Board, November 2022, https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-i-nwl-modeling.pdf.

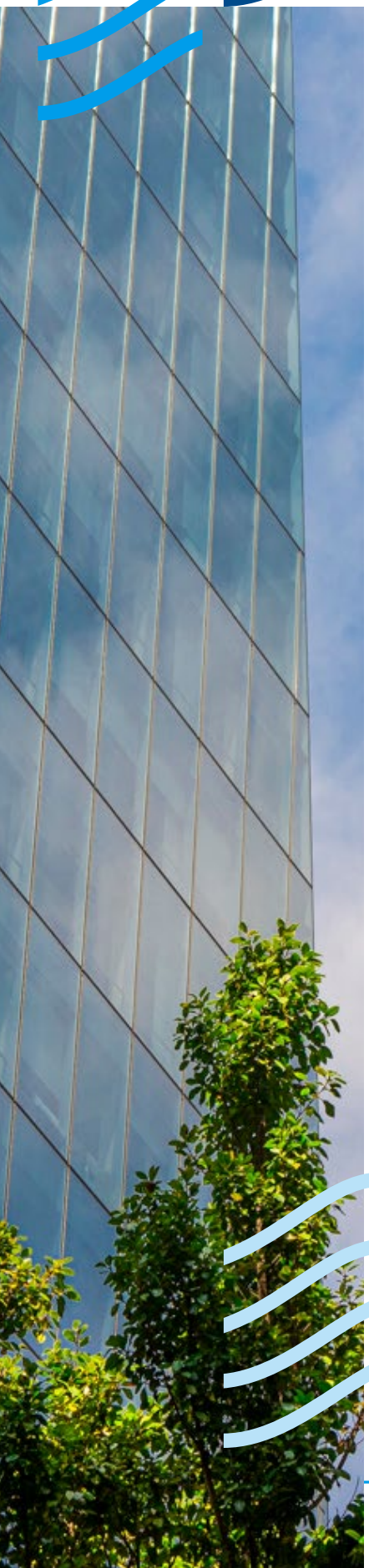
15 The U.S. Environmental Protection Agency's (EPA) Greenhouse Gas Equivalencies Calculator was used to convert carbon held in NWL to carbon dioxide equivalent (CO_2-e) units in order to make this comparison. MT C is used throughout this section as opposed to MT CO_2-e, as carbon (C) is the standard unit of measurement used for carbon stocks in plants and soils used by the International Panel on Climate Change, State of California, and local Bay Area analyses. As described by the EPA Greenhouse Gas Equivalencies calculator, units of Carbon to CO_2-e are converted by multiplying by a factor of 3.67 based on molecular weight.

16 At certain points in this section, such as presenting total carbon stock values for plants and soils, units of carbon are converted into CO_2-e for the purposes of helping the reader understand their magnitude of importance compared to the GHG inventory and emissions reductions measures.

17 Biomass carbon describes carbon held in the total mass of organic material at a given time including both above and below ground live plant matter like roots, trunks, and branches, as well as dead plant material like litter and dead wood. Soil carbon describes the amount of carbon held in the top 30 centimeters of the soil column. Source: Appendix B Carbon Stock Inventory.

18 The U.S. Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator was used to convert carbon held in NWL to carbon dioxide equivalent (CO_2-e) units in order to make this comparison.

19 The Bay Area Air District Consumption-based GHG Emissions Inventory can be accessed here: https://www.baaqmd.gov/en/about-air-quality/emission-inventory/consumption-based-ghg-emissions-inventory; The UC Berkeley CoolClimate Network's updated database can be accessed here: https://www.ecodatalab.com/.



3 GHG Emission Reduction Targets

The Bay Area Regional Climate Action Plan (BARCAP) is designed to complement climate planning efforts at the state, county, and city levels by focusing on filling gaps, addressing common challenges, building on, expanding, and accelerating climate solutions that are already underway in the BARCAP region. The BARCAP aligns with and supports achievement of the state's greenhouse gas (GHG) reduction targets. It also supports achieving targets set by other regional and local agencies.

3.1 STATE TARGETS

The BARCAP is aligned with and supports state targets. The State of California adopted the following GHG emission reduction targets, as established in statute:

- **40% below 1990 levels by 2030,** which translates to roughly 47% below 2005 levels;[1]
- **Carbon neutrality by 2045,** with at least 85% of reductions from 1990 levels from direct emissions reductions.[2]

Carbon neutrality is achieved when the amount of carbon dioxide emissions (CO_2) emitted into the atmosphere is offset by an equivalent amount removed, such as through sequestration, resulting in net-zero CO_2 emissions. To achieve this, the state's 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) maps out a pathway that includes directly reducing GHG emissions by 85% and achieving the rest of the carbon neutrality target by removing carbon in the atmosphere and storing it through natural carbon sequestration as well as a variety of mechanical approaches such as direct air capture and carbon capture, utilization, and storage (CCUS). In the BARCAP, regional and local governments and partner organizations have focused on helping the state maximize direct GHG emission reductions and minimize reliance on CCUS in order to maximize the public health co-benefits of reducing dependence on fossil fuels.

3.2 REGIONAL TARGETS

Regional agencies in the Bay Area have adopted GHG reduction targets in support of the state's GHG reduction goals. Under Senate Bill 375, the Sustainable Communities and Climate Protection Act of 2008, the state set a Bay Area regional target for GHG emissions from passenger vehicles of a 19% reduction in per capita emissions below 2005 levels by 2035.[3] The Metropolitan Transportation Commission and the Association of Bay Area Governments' (MTC-ABAG) Plan Bay Area 2050+ aims to meet the state mandated target through strategies that integrate transportation and land use planning. The Air District adopted a regional GHG emissions reduction target aligned with the state's target in Assembly Bill 32 (2006) to reduce emissions 80% below 1990 levels by 2050. This target is reflected in the Air District's 2017 Clean Air Plan.

3.3 LOCAL TARGETS

Many local climate action plans in the Bay Area include equal or more stringent GHG reduction targets than the state. For example, some jurisdictions have set targets for net-zero emissions by 2030, fifteen years before the state plans to achieve carbon neutrality. Additionally, six out of eight counties and over 30 cities in the BARCAP region have declared climate emergencies, acknowledging the urgency of climate mitigation and prioritizing accelerated action.

- **By 2045,** the State of California plans to achieve carbon neutrality
- **By 2035,** the Bay Area plans to reach -19% per capita passenger vehicle GHG emissions relative to 2005
- **27 local climate action plans** set targets for GHG emissions reductions that surpass the state's targets
- **Nearly 40 cities and counties** in the BARCAP region have declared a climate emergency

ENDNOTES

1 SB 32 (2016); Rhodium Group, the Scoping Plan has a 2030 goal of 48% below 1990 levels (55.8% below 2005 levels).

2 AB 1279 (2022).

3 "SB 375 Regional Targets," California Air Resources Board, Accessed January 20, 2025, https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/sb-375-regional-targets#:~:text=Senate%20Bill%20375%20requires%20CARB,if%20feasible%20to%20do%20so.

4 Engagement

Successfully achieving the Bay Area Regional Climate Action Plan (BARCAP) vision will require everyone.[1] The BARCAP engagement process provided a forum to hear from local governments, regional agencies, technical experts, community-based organizations (CBOs), climate solution implementers, frontline communities, and the general public. Local governments, regional agencies, and other potential implementers identified existing hurdles and standout opportunities for regional climate action. Giving frontline communities a seat at the table was critical to ensure that the actions in the BARCAP center environmental justice by improving the daily lives of frontline communities and minimizing unintentional harms to the extent feasible.[2] Engaging with the general public helped provide broad information on regional perspectives and values related to climate action.

The project team incorporated the knowledge gathered during engagement into the BARCAP to ensure it is both feasible and aspirational, reflecting the challenges and opportunities encountered by climate action implementers as well as the values of diverse communities across the BARCAP region. Implementing the BARCAP will require continuing and building on this foundation of thoughtful, collaborative engagement.

4.1 OVERVIEW OF APPROACH

The BARCAP region's large geographic area and diverse communities required an engagement approach with both breadth and depth, reaching across the BARCAP region while achieving a deep understanding of local priorities and concerns. The BARCAP region encompasses rural areas, farmland, and urban centers. It is diverse and populous – home to 5.5 million people, with a growing share of Asian, Pacific Islander, and Latino populations.[3] The Bay Area is one of the most diverse regions in the nation, with speakers of more than 160 languages, forty-three percent of whom speak a language other than English at home. Fifty-nine percent of the population identify as people of color, and there is a wide diversity of different racial and ethnic groups.

The BARCAP region is also home to over 80 climate action plans at the county, city, and town level across 88 jurisdictions in the BARCAP eight-county region.[4] Engagement activities helped determine how the BARCAP could complement and build on these local efforts and not duplicate them, in particular where there had been strong local engagement. The BARCAP engagement strategy sought to minimize potential 'engagement fatigue' experienced by community members, especially frontline community members, who have actively participated in local climate action planning efforts.

Key engagement goals

The following goals shaped the design of the BARCAP engagement strategy and helped ensure there was meaningful and iterative feedback from local governments, technical experts, frontline communities, potential implementers, and the general public.

- **Cultivate a shared understanding** about climate change and key areas for action
- **Gather perspectives and feedback** from community that are representative of the Bay Area
- **Strengthen community partnerships and center equity,** and build community-facing bridges to support future equitable implementation
- **Build on current and past progress** including the Priority Climate Action Plan (PCAP), local jurisdictions' recent climate plans and regional efforts to minimize duplication
- **Identify standout opportunities for regional climate action,** including key gaps and challenges to local climate action
- **Facilitate new conversations** and partnerships
- **Leverage insights and perspectives** from knowledgeable practitioners to inform key areas for action

The BARCAP engagement strategy thoughtfully deployed tools including surveys, multilingual workshops, CBO partnerships, interactive public commenting, and strategic meetings and work groups, which are shown in the infographic below. As a result, members of the public and frontline community members had the opportunity to provide feedback through multiple avenues while measures were being drafted. Technical experts, potential measure implementers, CBOs, nonprofits, local governments, and regional agencies were also engaged throughout BARCAP development.

In total, the BARCAP engagement process resulted in:

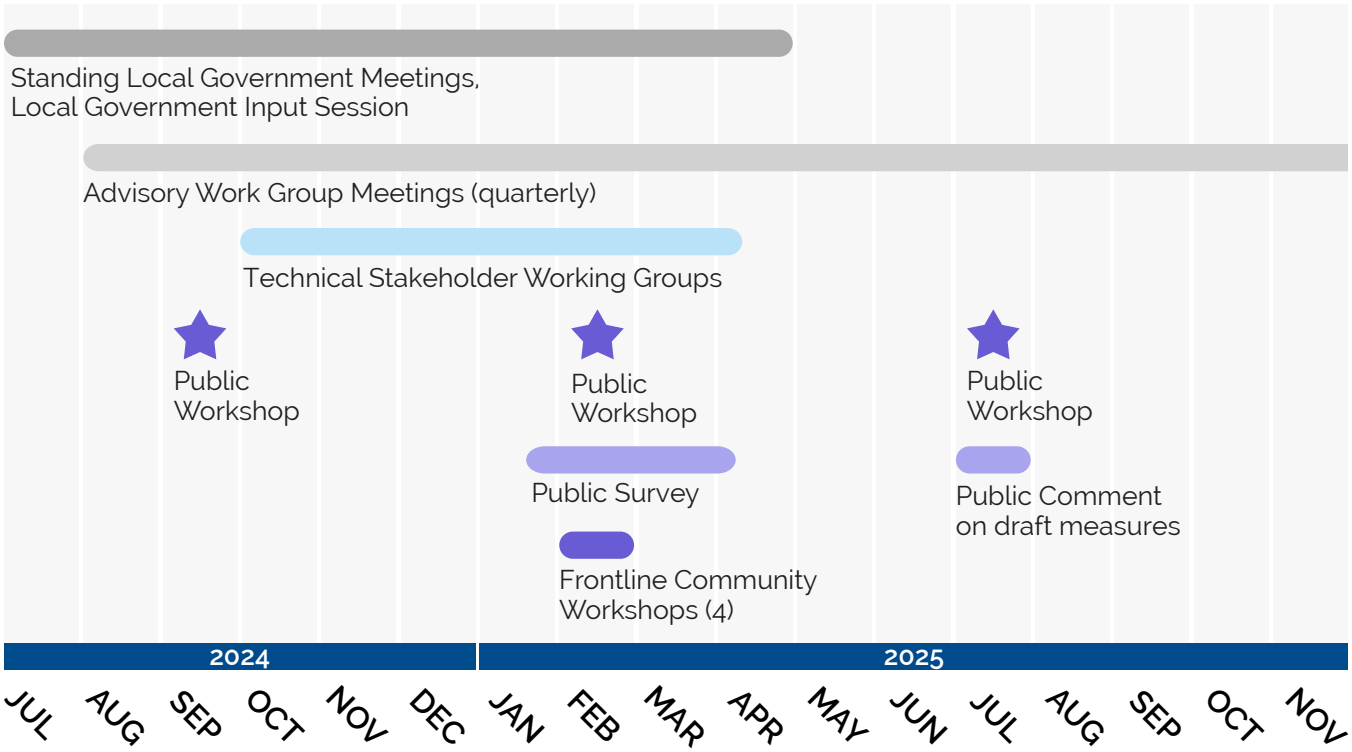
Key stakeholders & engagement toolbox

Each audience played a critical role in ensuring the BARCAP was **implementable, innovative, inspiring, additive (not duplicative), and centered on environmental justice**.

FRONTLINE COMMUNITIES: Influence design principles, measure development, community benefits and risks	**ENGAGEMENT TOOLS:** four subregional frontline community workshops, multilingual survey, community-based organization partnerships, public comment period, multilingual outreach
COMMUNITY-BASED ORGANIZATIONS AND ENVIRONMENTAL JUSTICE ORGANIZATIONS: Co-create design principles, advise project process, co-create and recruit community members to engage with priority community workshops	**ENGAGEMENT TOOLS:** roundtable, four subregional frontline community workshops, surveys, partnerships, public comment period, Advisory Work Group
LOCAL GOVERNMENTS: Identify key obstacles to local action that regional strategies could address, advise on process, shape and lead measures, provide technical expertise and highlight local climate actions already being implemented to avoid duplication, recommend local successes for potential scaling across the BARCAP region	**ENGAGEMENT TOOLS:** Advisory Work Group, technical stakeholder working groups (working groups), local government outreach
PUBLIC: Contribute to vision and measure development, understand and engage with project process, provide information on regional perspectives and values related to climate action	**ENGAGEMENT TOOLS:** three public workshops, survey, public comment period
TECHNICAL EXPERTS & IMPLEMENTERS: Ground measures and actions in on-the-ground realities, identify areas to advance regional leadership through BARCAP measure implementation	**ENGAGEMENT TOOLS:** technical stakeholder working groups

The timeline for BARCAP outreach is shown below in Figure 4-1.

Figure 4-1: Timeline of BARCAP Engagement Activities



The Air District hired a consultant team with extensive experience in public and community engagement to support implementation of the engagement strategy. Air District and consultant staff worked closely together and are referred to throughout this chapter as the project team.

4.2 ADVISORY WORK GROUP

An Advisory Work Group (AWG) met quarterly with the Air District to help inform decisions on key aspects of the BARCAP, connect the BARCAP to communities and local governments in AWG members' jurisdictions, discuss key challenges and important gaps to be addressed, and review key deliverables. AWG members also participated in the Technical Work Groups, described on the following page, and several contributed to the development of the engagement strategy. The Air District was able to leverage ongoing stakeholder engagement efforts led by AWG members, such as standing county-led local government meetings, and received support from AWG members for targeted engagement and information sharing with their networks as needed.

4.2.1 AWG members

The AWG was composed of representatives from regional agencies (Air District, Association of Bay Area Governments/Bay Area Regional Energy Network (ABAG/BayREN), Bay Area Regional Collaborative (BARC), and Metropolitan Transportation Commission (MTC)), two cities named in the federally-designated planning region (City of Oakland and City and County of San Francisco), the counties comprising the planning region (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), and several community-based and community-serving organizations (Canal Alliance, Climate Resilient Communities, Emerald Cities Collaborative Northern California, Rise South City, and Transform).[5] The full list of participants is available in Appendix E. The Air District also actively coordinated with Santa Clara County, the leader of the Climate Pollution Reduction Grant planning effort for the broader San Jose metropolitan area.

Figure 4-2: Members of Advisory Work Group

4.3 FRONTLINE COMMUNITIES

In order to center environmental justice in BARCAP outcomes and process, the project team and its partners sought to meaningfully engage frontline communities early in the plan development process. Key goals included strengthening community partnerships to center equity and facilitate implementation, and empowering and gathering perspectives and feedback representative of the Bay Area's diverse communities. Engagement was designed to give community members and CBOs a seat at the table, reflecting their position as experts in environmental justice, injustice, and the conditions needed for climate policy to improve the daily lives of their communities.

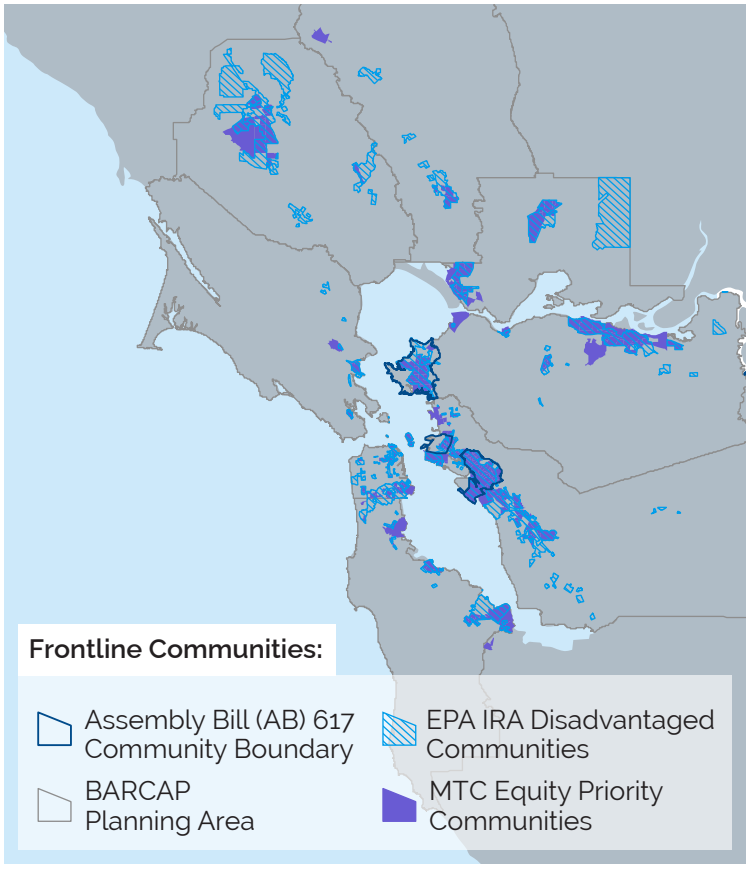
4.3.1 Defining frontline communities

The Air District identified frontline communities for the BARCAP, shown in Figure 4-3,

using a U.S. Environmental Protection Agency (US EPA) screening tool (US EPA Inflation Reduction Act Disadvantaged Communities tool) and two frameworks used by Bay Area regional agencies to identify priority communities for regional planning efforts: Assembly Bill 617 communities, and MTC Equity Priority Communities.[6]

4.3.2 Frontline community workshops

Figure 4-3: BARCAP Frontline Communities



Workshops were held in frontline communities early in the planning process before BARCAP measures were drafted. This allowed workshop participants to provide input on measures at the 'ground floor' and have a role in shaping design principles which were fundamental in guiding measure development. The input and findings gathered from these workshops were essential in shaping the draft measures.

To gather perspectives and feedback representative of the BARCAP region's frontline communities within the timeframe to inform the measures, the project team divided the BARCAP region into four subregions, each of which hosted a frontline community workshop. Eight CBOs were critical partners in planning the workshops, providing invaluable expertise and deep relationships with the communities they serve in the subregions. The CBOs co-developed the workshop agendas and multilingual materials to ensure that workshop content resonated with the needs of community members. CBO partners also recruited workshop participants, which was key in hearing the voices of the community and bringing multilingual community members to the table. The CBOs were compensated for their efforts, recognizing their expertise and role as part of the project team.

In addition to facilitating engagement, CBOs will be critical partners in implementation. Part of the vision for the community workshops was to engage CBOs in a meaningful way to begin building the long-term community partnerships needed to support equitable implementation across the BARCAP region. CBO partners and subregions are described on the following page in Table 4-1.

Table 4-1: Subregional Workshop Areas and Community-Based Organization Partners

FRONTLINE COMMUNITY WORKSHOP SUBREGIONS (COUNTIES)	COMMUNITY-BASED ORGANIZATION PARTNERS
Napa, Marin, Sonoma	North Marin Community Services Graton Day Labor Center
Alameda	Higher Ground Neighborhood Development Corporation Hayward Community Coalition (HayCoCoa)
Contra Costa and Solano	Citizen Air Monitoring Network Sustainable Solano Sustainable Contra Costa
San Mateo and San Francisco	El Concilio of San Mateo

The workshops occurred in the evenings to maximize participation, with options for dedicated Spanish and Cantonese discussion groups, and virtual and/or in-person participation as desired by the partner CBOs. Attendees received stipends for their participation. During the workshops participants brainstormed how preliminary areas of focus for BARCAP measures might impact their daily lives. Figure 4-4 shows a snapshot of participant discussions of risks and benefits of proposed areas for climate action from multilingual breakout rooms for Cantonese and Spanish speakers.

Figure 4-4: Snapshots of Community Feedback from Spanish and Cantonese Breakout Rooms

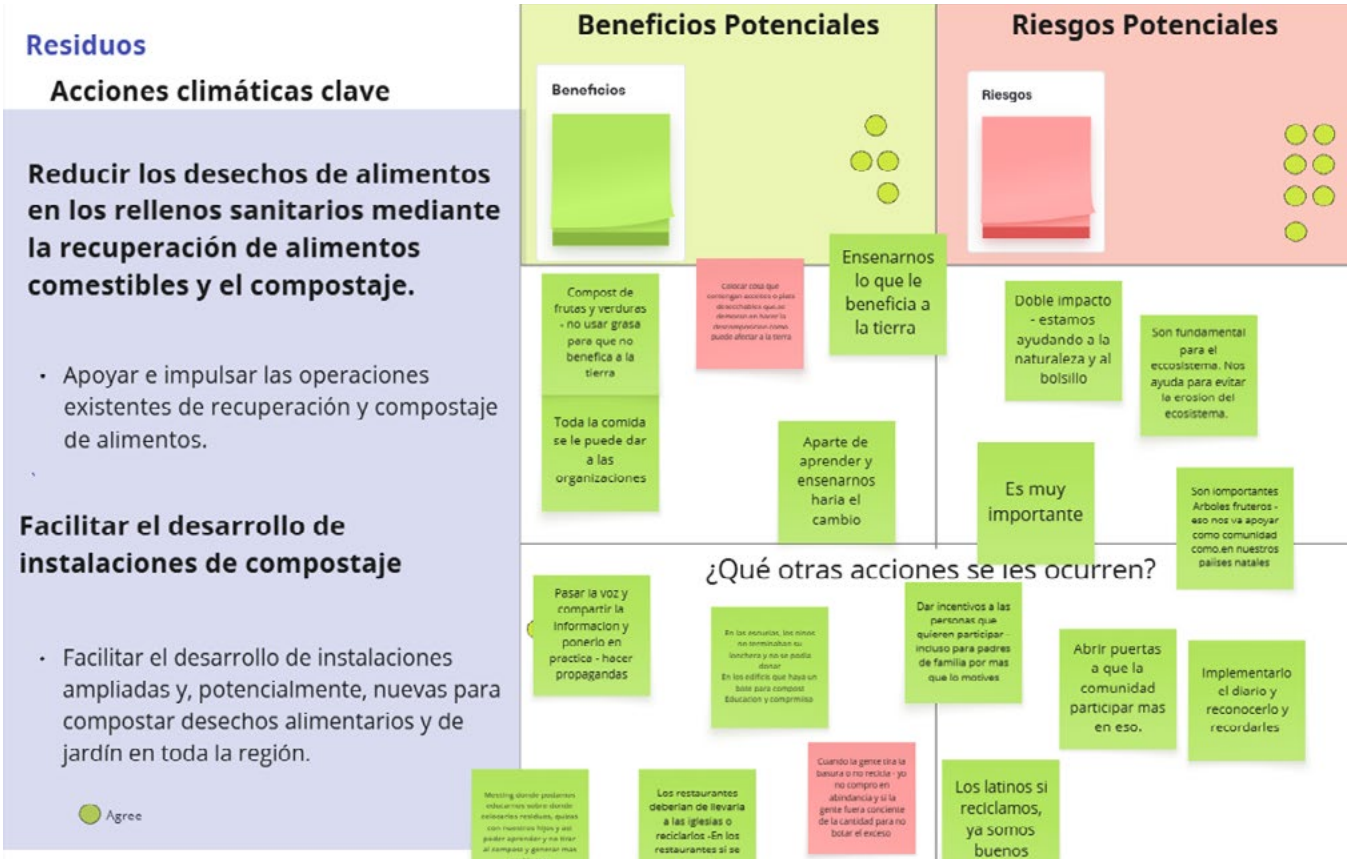


Figure 4-5: Key frontline community themes

Workshop participants also provided feedback on design principles used to guide measure development. The design principles were initially developed in 2023 in partnership with a roundtable of climate justice and equity organizations that served environmental justice communities: Emerald Cities Collaborative Northern California, The Greenlining Institute, PODER, and Transform. The principles were also informed by input from local governments and regional agencies based on what they have heard directly from their communities. Once updated to reflect feedback obtained through the workshops, the Air District assessed BARCAP measures against the revised design principles to ensure alignment with the underlying concepts. The full list of updated design principles can be found in Table 5-1 in Chapter 5- GHG Reduction Measures.

The Air District incorporated findings from the frontline community workshops, particularly the equity concerns, into draft BARCAP measures. The results are measures interwoven with language to center and advance equity, minimize unintended consequences, and lift up and amplify values and priorities identified by communities.

More information on key findings, community feedback, and the process for measure updates from each workshop is available in Appendix E.

4.4 LOCAL GOVERNMENTS

The Air District conducted extensive engagement with local governments in the BARCAP region, recognizing they are key stakeholders that may benefit from the BARCAP and also may serve as key implementation partners. Local governments provided unique insights into opportunities for the BARCAP to advance local climate action by addressing obstacles

and scaling solutions regionally while avoiding unnecessary duplication of efforts. They also shared important equity and implementation considerations. In total, 63 cities, towns, and counties (or roughly 71 percent of the total 88 cities, towns, and counties in the BARCAP region) participated in at least one engagement effort.

AWG members invited the Air District to attend regularly occurring local governments meetings between July and December 2024, including the Contra Costa County Sustainability Exchange, the Marin Clean Energy Partnership, San Mateo County Regional Climate Action Planning Suite Program, Sonoma Regional Climate Protection Authority, and StopWaste's Technical Advisory Group in Alameda County. The Air District attended nine meetings in total to present on BARCAP development and learn about local governments' specific needs and challenges that could be addressed at the regional level to advance local climate action. The Air District also asked local governments for input on what climate actions are more appropriately addressed on a regional scale versus at the individual jurisdiction level.

Local governments participated in other public engagement efforts including the public workshops and public survey, and the Technical Working Groups (working groups) (see member list in Appendix E). The Air District also hosted a virtual Local Government Input Session in April 2025 to garner feedback from local government staff on the preliminary draft measures, particularly asking about measure alignment with city and county efforts, potential local government roles in implementation, and identification of potential implementation challenges. Local governments provided comments during the public review process on the draft measures as well.

4.5 TECHNICAL WORKING GROUPS

To support the development of draft measures and actions for each sector, the Air District assembled and convened sector-level working groups. Members were invited based on subject matter expertise, their potential role as an implementation partner, and geographic diversity. Members included: regional agencies, local governments, community organizations, community choice aggregators and utilities, regional conservation districts, food recovery organizations, ports, subject matter experts, and others.

These working groups fostered broad-ranging conversations among practitioners that generated key insights and important perspectives to help shape measure development and implementation considerations. They supported the co-development of measures and actions for each sector, basing them in on-the-ground realities and identifying areas to advance regional collaboration and leadership. The working group process also helped ensure the measures aligned with BARCAP design principles, would lead to GHG reductions, achieve equity benefits, build on existing efforts, and were advantageous to implement at the regional scale. The working groups leveraged foundational desktop research conducted by the Air District in summer of 2024 assessing the existing policy, programmatic, and funding landscape for each sector (e.g., local climate action plans, the 2022 Scoping Plan, relevant state policies and programs), sectoral GHG emission profiles, key equity considerations, and potential sectoral gaps and opportunities for climate action.

Each working group met three to four times from Fall 2024 through Spring 2025, with smaller group discussions held between meetings as needed to explore and deliberate on specific topics in greater detail. Members for each sector's working group are listed in Appendix E.

4.6 PUBLIC ENGAGEMENT

Several avenues of engagement were made available to the general public to learn about and contribute to the development of the BARCAP, including public workshops, a survey, and a public review and comment period for the draft measures. The project team designed these engagement opportunities to gather information from the public on their perspectives and values related to climate action, cultivate a shared understanding around climate change and key actions, and seek their input on measure development. All public engagement opportunities were shared through the BARCAP listserv (voluntary email sign up list), existing networks (Air District and Advisory Working Group), and the Air District's social media channels. Materials were translated into Spanish and Chinese, and interpretation services were made available to encourage and facilitate participation by non-English speakers.

The project team convened three public workshops, which were held virtually in the early

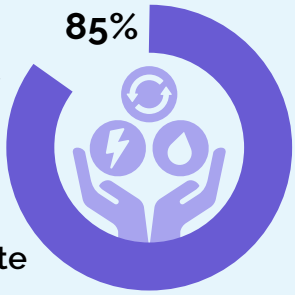
evening and focused on an overview of the BARCAP goals, vision, process, and timeline (September, 2024), a review of early measure concepts (February, 2025), and a deep dive into the draft measures and overview of the public review and comment online platform (July 2025). Strong support for aggressive climate action was expressed consistently at all three workshops. Participants voiced a sense of urgency to maximize all local government and programmatic levers to address climate change, while expressing concern over general affordability and rising costs of living.

To hear from a wider swath of the eight-county BARCAP region, beyond the reach of the frontline community and public workshops, the project team launched a public survey in Spanish, Chinese, and English. The survey was used to better understand community climate action values across the BARCAP region and gather feedback on priorities and concerns regarding the BARCAP's goals and early measure concepts. Across all respondent categories, climate resilience and public health were the most appealing benefits of climate action. More detailed information on survey results is available in Appendix E.

Once draft measures were developed, the project team launched a public review and comment period, utilizing an interactive online platform. Through this platform, the general public was able to review all draft measures and provide comments directly into the document. Comments were viewable by other commenters to enable discussions and deeper input. The public was also able to submit comments via email.

KEY ENGAGEMENT SURVEY FINDINGS

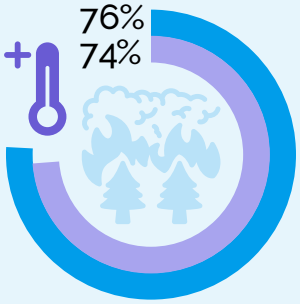
#1 action taken by respondents to support the climate and environment:
Save resources by using less energy, water, or reducing waste



Most observed local climate, environment, and weather pattern changes:

Increased frequency of regional wildfires and days affected by wildfire smoke

More frequent or intense heatwaves and hotter days



Strategies the Bay Area Regional Climate Action Plan should focus on:

59%
Produce energy for electricity using clean, carbon-free energy sources (e.g., solar, wind, geothermal)

★ *Top strategy for respondents across income levels*

49%
Expand and protect green spaces, urban trees, and natural ecosystems

★ *Top strategy for respondents across income levels*

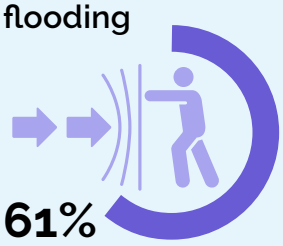
Top strategy for Hispanic, Latino, Latina, or Latinx respondents
***67%** support*

Top strategy for Black/African American respondents
***48%** support*

42%
Shift from driving an automobile to alternative transportation modes (walking, bicycling, transit)

Top strategy for Asian or Asian American respondents
***56%** support*

Top life improvements from actions to reduce GHGs and protect climate:
Communities that are better able to withstand climate impacts, such as extreme heat and flooding



Low-income households are more concerned about **additional cost burden** from climate action than wealthier households, especially where it may **contribute to displacement.**

Most appealing benefits of climate action:
Climate resilience and public health

Lower and middle-income households are:

More supportive of promoting local food production and **consumption, reducing food waste, and strengthening food security** than wealthier households

Less interested in transitioning to EVs than any other strategy

ENDNOTES

1 The BARCAP vision is "Together, we envision a Bay Area where achieving our climate goals fosters thriving communities, healthy natural systems, and a sustainable and prosperous economy. On the path to that future, we will create family-sustaining jobs, inspire innovation, improve air quality and public health, and prioritize environmental justice."

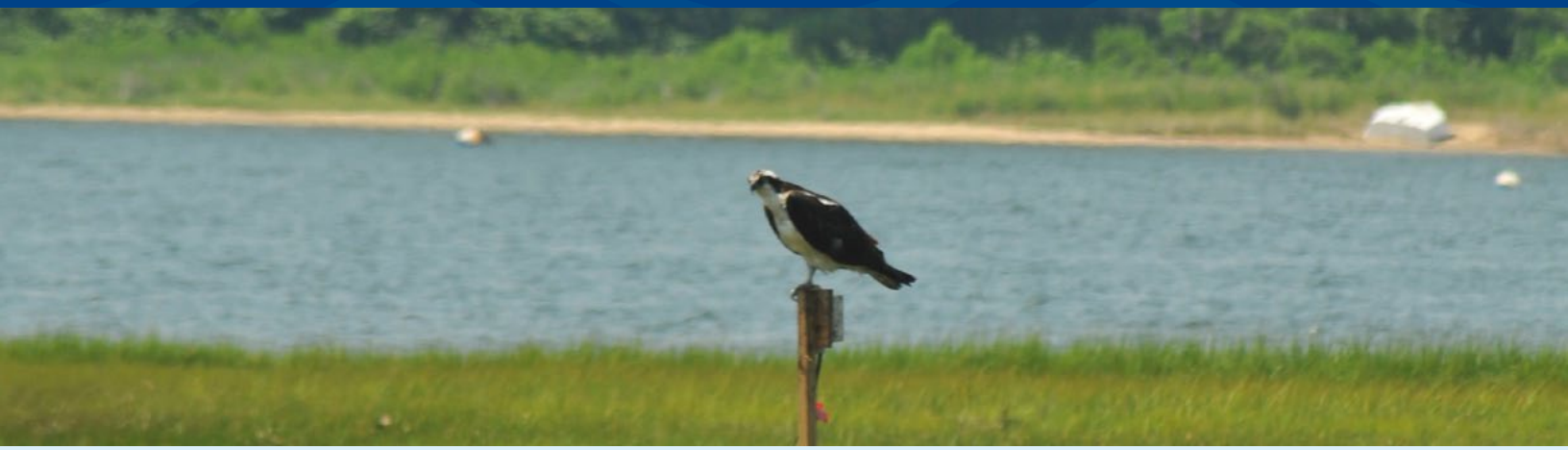
2 Frontline communities bear the brunt of the impact from fossil fuel dependence- and often experience climate impacts first and worst.

3 "Plan for Language Services to Limited English Proficient Populations," Bay Area Air Quality Management District, September 2023, https://www.baaqmd.gov/~/media/files/administration/non-discrimination/final_limited-english-proficiency-and-language-access-plan-lap_103123-pdf.pdf?rev=c62454abcf1346509de7b5fea9482c77&sc_lang=en.

4 This count includes climate action plans, resilience plans, adaptation plans, and climate change chapters in general plans. It also includes plans that may be outdated.

5 US EPA determined planning regions for the Climate Pollution Reduction Grant based on Metropolitan Statistical Area designations.

6 Frontline communities within the BARCAP region: https://experience.arcgis.com/experience/57bdb412b26e4f2eaf8fa762b735652f/page/Map/. For more information on the Air District's other mapping tools for healthy and equitable communities, please visit: https://www.baaqmd.gov/en/plans-and-climate/healthy-and-equitable-communities.



PLANNING FOR CLIMATE RESILIENCE IN THE BARCAP REGION

The BARCAP region is already experiencing the impacts of climate change, presenting urgent challenges for the region's environment, people, economy, and critical infrastructure. These impacts – extreme heat, wildfires and smoky air, sea level rise, heavy precipitation and flooding, and drought – are increasing in frequency and intensity.[1] Local governments, regional agencies, and community networks are responding with collaborative efforts to increase resilience to these climate impacts. The BARCAP, while focusing on reducing GHG emissions, also aims to maximize climate resilience benefits associated with implementation of the plan measures and actions.

Climate adaptation is how natural and human systems adjust to a new or changing climate.[2] This is frequently combined with the term "climate resilience" which is the capacity for individuals, communities, organizations or natural systems to prepare for disruptions, recover from shocks and stresses, and adapt and learn from them. Climate adaptation can include policies, programs, and on-the-ground projects that reduce projected hazard impacts.[3]

In response to these increasing threats, the Bay Area is building climate resilience through regional and local initiatives that emphasize benefits such as increasing workforce development, achieving air pollution reductions, and long-term sustainability measures. At the regional level, Metropolitan Transportation Commission/Association of Bay Area Governments' (MTC-ABAG) Plan Bay Area 2050+ and MTC's Multi-Jurisdictional Hazard Mitigation Plan guide long-term strategies for housing, transportation, and reducing risk from climate.[4] The Bay Area Climate Adaptation Network (BayCAN) further strengthens regional resilience by connecting local governments, agencies, and community partners to share best practices, coordinate, and advance equitable climate solutions across all nine counties.[5] In addition, most counties and cities in the Bay Area have climate adaptation plans and/or local hazard mitigation plans that aim to increase climate resilience. These plans ensure that resilience efforts are responsive to local needs while supporting broader regional goals.

There are also planning efforts tailored to specific, local conditions. Wildfire risk is addressed through county and multi-county prevention plans that focus on reducing hazardous fuels, enhancing emergency response capabilities, and prioritizing resources for the most at-risk communities. While there is no single regional plan for extreme heat, local governments and agencies have implemented a range of strategies, such as integrating climate action and hazard mitigation plans with mapping tools to identify and protect the most vulnerable neighborhoods. On a local scale, heat and climate action plans recognize the importance of urban greening, energy-efficient building retrofits, and resilience hubs to provide immediate cooling, improve air quality, and support community well-being.[6] The Bay Area Regional Energy Network's (BayREN) Extreme Heat Pilot Report provides data and recommendations to support partnerships and education on energy-efficient cooling solutions, while San Francisco's Heat and Air Quality Resilience Plan outlines targeted actions to reduce health risks from heat and poor air quality.[7]

Bay Area jurisdictions have also placed significant focus on sea level rise adaptation planning efforts. The San Francisco Bay Conservation and Development Commission released the Regional Shoreline Adaptation Plan, which lays out guidelines and standards for subregional shoreline adaptation plans and highlights priorities for sea level rise adaptation on a regional level.[8] Similarly, regional and local agencies are advancing extreme precipitation and flooding resiliency through coordinated planning and funding efforts, including the Bay Area Integrated Regional Water Management Plan, developed with the San Francisco Estuary Partnership.[9] To address drought, the East Bay Municipal Utility District and partner agencies have outlined a Drought Contingency Plan focusing on strengthening water supply, reliability, and emergency response.[10]

While the BARCAP focuses on climate mitigation, the resilience design principle emphasizes the plan's commitment to increase resilience in the region. Many climate resilience strategies outlined in the BARCAP—such as building decarbonization and nature-based solutions—not only reduce GHG emissions but also deliver public health and economic benefits. For example, building electrification can improve air quality and heat safety, while urban greening can reduce local temperatures and stormwater runoff. These strategies can also support job creation and equitable economic opportunity through workforce development programs, such as California Jobs First. By maximizing the climate resilience benefits of mitigation-focused measures, implementers of the BARCAP and partners can ensure the Bay Area strengthens both climate action and community well-being. Ongoing collaboration and proactive action across the BARCAP region are essential to safeguard people, the economy, and the environment for generations to come.

ENDNOTES

1 Louise Bedsworth et al., "California's Fourth Climate Change Assessment San Francisco Bay Area Summary Report," California Natural Resources Agency, 2018, https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-005_SanFranciscoBayArea_ADA.pdf; "Climate Change 2023 Synthesis Report Summary for Policymakers," IPCC, 2023, https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf.

2 California Governor's Office of Land Use and Climate Innovation.

3 Bay Area Regional Collaborative provided this description of climate adaptation and resilience.

4 "Final Plan Bay Area 2050, 2021," Plan Bay Area 2050+, Updated January 27, 2025, https://planbayarea.org/finalplan2050; MTC, "Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)," Metropolitan Transportation Commission (MTC), Accessed August 5, 2025, https://mtc.ca.gov/operations/programs-projects/emergency-management/multi-jurisdictional-hazard-mitigation-plan-mjhmp.

5 "About BayCAN," BayCAN, Accessed June 24, 2025, https://www.baycanadapt.org/what-we-do.

6 "2025 Hazards and Climate Resilience Plan," Office of Resilience and Capital Planning, City and County of San Francisco, July 29, 2024, https://onesanfrancisco.org/sites/default/files/inline-files/2025_HCR_PublicReviewDraft_0.pdf.

7 "Heat Mitigation Pilot Research Final," Bay Area Regional Energy Network (BayREN), January 10, 2024, https://pda.energydataweb.com/api/view/3910/Final%20BayREN%20Heat%20Mitigation%20Report_2024_01_10.pdf; "HAQR The Heat and Air Quality Resilience Plan," San Francisco Department of Emergency Management, San Francisco Department of Public Health, and One SF, May 2023, https://media.api.sf.gov/documents/HAQR-2305221_0.pdf.

8 "Regional Shoreline Adaptation Plan: One Bay Vision, Strategic Regional Priorities, and Subregional Shoreline Adaptation Plan Guidelines," San Francisco Bay Conservation and Development Commission (BCDC), December 2024, https://www.bcdc.ca.gov/wp-content/uploads/sites/354/2024/12/regional-shoreline-adaptation-plan-spreads.pdf.

9 "Home," Bay Area Integrated Regional Water Management Program, Accessed October 16, 2025, http://bayareairwmp.org/.

10 "Bay Area Regional Reliability Drought Contingency Plan: Final Report," Bay Area Regional Reliability Partnership, December 19, 2017, https://www.bayareareliability.com/uploads/BARR-DCP-Final-12.19.17-reissued.pdf.

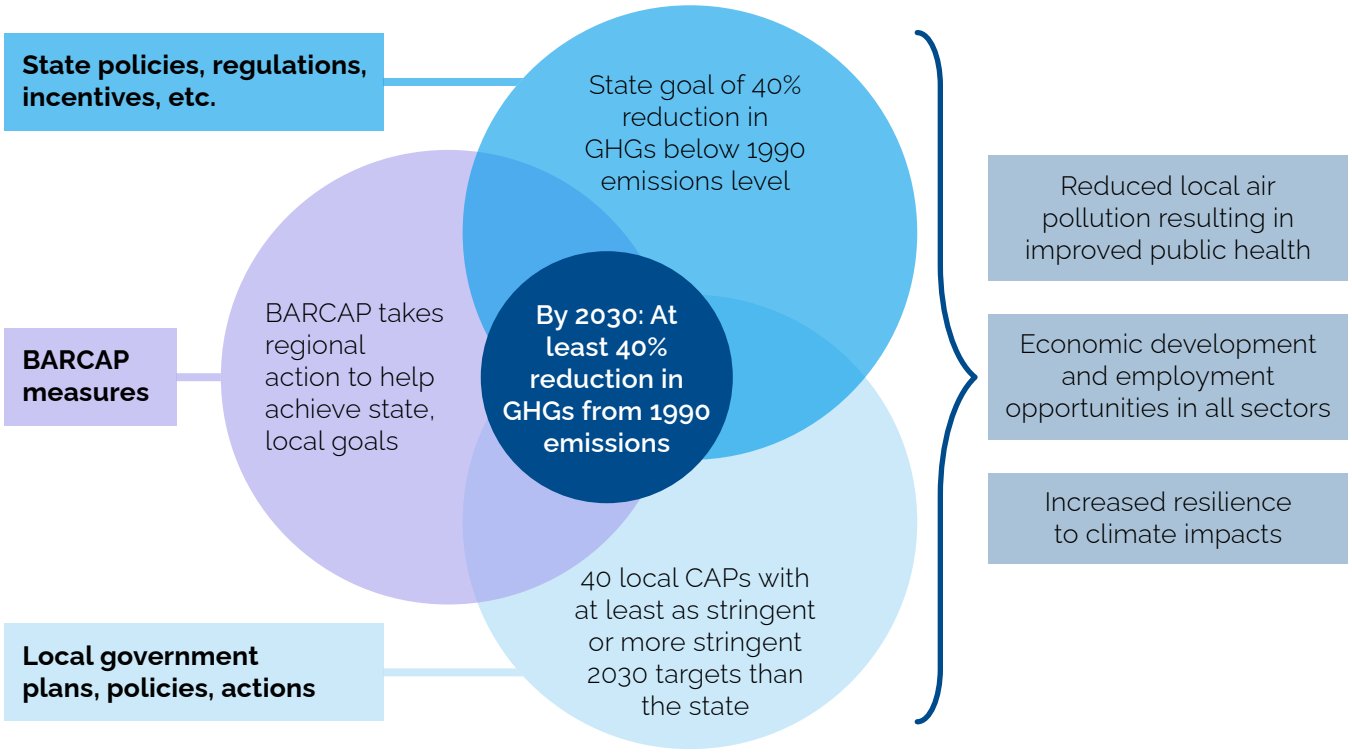
5 Greenhouse Gas Reduction Measures Overview

5.1 OVERVIEW

The Bay Area Regional Climate Action Plan (BARCAP) focuses on the following sectors where local governments and regional agencies have implementing authority: buildings, power, transportation, waste, and natural and working lands.[1] The BARCAP measures are designed to create enabling conditions that help make specific state and local government climate policies and goals more achievable in the BARCAP region and make implementation of regional and local actions more efficient, effective, and equitable. Some measures focus on what must happen regionally to support successful local implementation of state policies and initiatives and ensure that implementation is equitable and brings benefits to the BARCAP region. Other measures focus on removing barriers and building capacity to support local action and scale promising approaches regionally.

Figure 5-1 illustrates how the BARCAP fits into the existing climate action landscape of the eight-county BARCAP region, which already has ambitious goals and measures identified in the state's Scoping Plan and 80+ local climate change plans. The BARCAP seeks not to duplicate efforts, but to complement state and local actions to achieve shared goals. Together, measures from the state's 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan), the 80+ local climate action plans in the Bay Area, and the BARCAP will facilitate meeting the statewide target of reducing greenhouse gas (GHG) emissions 40% below 1990 levels by 2030. The measures and strategies used to achieve this goal will bring a host of additional benefits to the BARCAP region, particularly to frontline communities.

Figure 5-1: How the BARCAP fits in with state and local actions to achieve shared goals and outcomes



The measures in this plan are not an exhaustive list of all GHG emission reduction actions that can be taken in the BARCAP region. Instead, they are feasible, actionable, and broadly supported strategies that complement existing efforts, and when taken together with state and local action and sufficient funding, will help the BARCAP region achieve the state's 2030 emissions reduction target and accelerate its transition to carbon neutrality by 2045. The measure development process was guided by specific criteria (outlined on the following page) and informed by foundational research, the current implementation landscape, and robust stakeholder engagement to identify needs, priorities, concerns, and solutions.

The BARCAP is a plan that contains voluntary strategies and measures; it has not been adopted by the Air District's legislative body—the Board of Directors—and is not a regulatory plan. The Air District acknowledges that the measures or actions described in this plan may ultimately be implemented differently than described, due to changing circumstances including insufficient available funding or shifting political dynamics.

5.1.1 Measure criteria and design principles

All measures in the BARCAP meet the following criteria:

- Results in or enables **meaningful state, regional, and/or local GHG reductions** that might not be achieved otherwise;
- **Advantageous to be implemented regionally** and not duplicative of existing efforts;
- **Achieves key equity benefits** and advances the guiding values, or design principles on the following page (see Table 5-1);
- **Implementation ready** (i.e., implementation leads have been identified or the measure is in an approved plan or resolution, there is a realistic pathway to implementation, community/stakeholder acceptance and buy-in, etc.).

A set of nine design principles guided measure development. They were first developed in 2023 in partnership with a roundtable of climate justice and equity organizations that serve environmental justice communities: Emerald Cities Collaborative Northern California, The Greenlining Institute, PODER, and Transform. The principles were also informed by input from local governments and regional agencies based on what they have heard directly from their communities. The Air District further refined the design principles based on feedback in workshops with frontline communities and then assessed each potential measure and action against the principles to ensure alignment with the underlying concepts.

Table 5-1: Measure Development Design Principles

DESIGN PRINCIPLE
Climate equity: Provide direct, meaningful, desired, and assured benefits to frontline communities.
Cooperative: Build upon and integrate existing efforts to expand impact, rather than introduce duplication.
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, in consultation with community members through culturally relevant, multi-lingual, trusted-messenger-delivered outreach to reach frontline communities and other vulnerable groups including recent immigrants, Indigenous communities, and youth.
Funding & financing: Increase access to critical financing and funding mechanisms (including operations and maintenance) and identify alternative financing mechanisms that provide sustained benefits for frontline communities.
Genuine affordability & access: Increase access to housing, transportation, and other community benefits like green spaces, reduces or does not increase costs (e.g., housing, transportation, energy) and consider options to expand and improve access and affordability.
Health & safety: Improve living and/or working conditions (e.g., indoor and outdoor air quality, safety in green spaces, traffic safety, and pedestrian safety), especially in frontline communities.
Housing & community stability: Support people, especially renters and low-income homeowners, to be housed and remain in their homes. Consider how communities use and connect to spaces.
High-quality jobs & local entrepreneurship: Create lasting, high-quality, family-sustaining jobs and other pathways to economic sovereignty in frontline communities.[2]
Resilience: Build resilience especially for frontline communities to withstand changing climate conditions in the near and long term, increasing preparedness to respond to climate-related emergencies.

5.1.2 Measure development process

The measures were developed over a year and a half period, from May 2024 to September 2025. The Air District began the measure development process with foundational research to understand the existing policy, programmatic, and funding landscapes for each sector (e.g., local climate action plans, the 2022 Scoping Plan, relevant state policies and programs, funding opportunities and gaps) along with key equity considerations. When this research was combined with GHG emissions profiles for each sector, specific potential focus areas, gaps, and opportunities for action began to emerge.

The Air District and subject matter experts convened in technical working groups to consider the measure criteria and design principles, knowledge of the implementation landscape, and input from various engagement activities (as described in Chapter 4) to develop draft measures for the potential focus areas. The draft measures were refined with input from other potential implementing partners, frontline community benefits analysis, and other technical analyses.

5.2 IMPACTS OF MEASURES ON EMISSIONS AND COMMUNITIES

Implementation of the measures will result in GHG emission reductions and less air pollution in the BARCAP region. The measures are designed to help improve the daily lives and health of frontline communities by aiming to maximize potential benefits across five categories: public and community health, jobs and workforce development, climate resilience, decreased cost burdens, housing quality and security, and community engagement, awareness, and capacity.

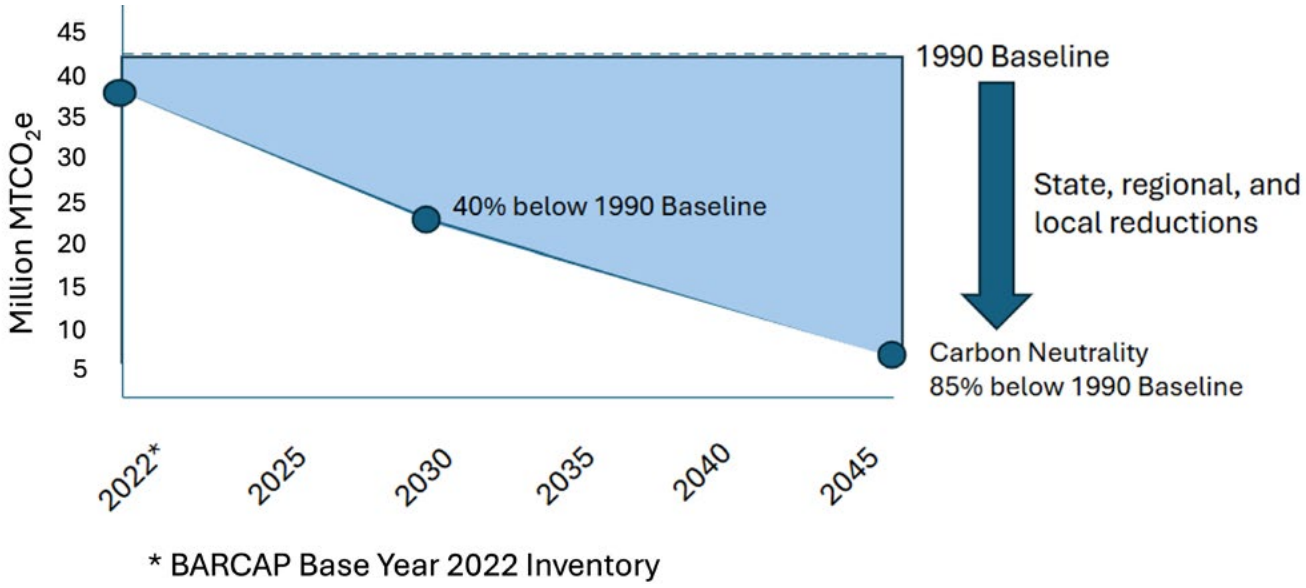
5.2.1 GHG emissions reductions

If the ambitious GHG reduction strategies in the state's Scoping Plan and local climate action plans are realized, the Bay

Area should be on target to reduce GHG emissions by 40% below 1990 levels by 2030 and achieve carbon neutrality by 2045. The BARCAP therefore focuses on complementing and enabling these strategies and filling gaps, rather than proposing duplicative actions in order to claim its own GHG reductions. Though some measures will have a direct GHG emission reduction on their own, emphasis was placed on removing barriers at the local level or complementing work at the state level. For example, in the transportation sector, installation of sufficient EV chargers for light duty vehicles is necessary to support successful implementation of the state's Advanced Clean Cars II (ACC II) regulation. The authority to permit chargers lies with local governments. BARCAP measures aim to support achieving the GHG emission reductions expected from ACC II by incentivizing the deployment of EV chargers and supporting local governments in developing and implementing policies that help accelerate the EV transition, such as permit streamlining. In addition, incentivising the lease or purchase of EVs, especially in frontline communities, will speed up the adoption of EVs, going beyond what is expected from state policies, resulting in direct GHG emission reductions when EVs replace internal combustion engines.

When taken together, the direct GHG emission reductions from the BARCAP measures plus additional reductions from state and local policies and programs – that are enabled by BARCAP measures – will result in meeting the state's GHG emission reduction goals, as shown in Figure 5-2. Put another way, policies, programs, and incentives at the state, regional, and local levels each play vital and complementary roles that contribute to a carbon neutral future.

Figure 5-2: BARCAP measures contribute to meeting GHG emission reduction targets through direct emission reductions and enabling reductions from state and local actions



5.2.2 Criteria air pollutant emission reductions

The BARCAP measures will also reduce emissions of criteria air pollutants, which pose serious risks to public health and the environment. These pollutants, which include ozone, particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and lead, are common pollutants with widespread public health impacts, causing respiratory and cardiovascular diseases, asthma aggravation, and premature death. Their reductions are directly linked to clear public health benefits and regulatory air quality standards.

Criteria air pollutant emissions reductions associated with the BARCAP measures are shown in Table 5-2. These reductions are primarily the result of using less fossil fuels, such as natural gas in buildings and gasoline and diesel in vehicles. In contrast, reductions from natural and working lands (NWL) are not due to decreased emissions, rather they are primarily the result of removal (absorption) of air pollutants from other sectors.[3]

Table 5-2: Cumulative Changes in Criteria Air Pollutant Emissions in metric tons (MT), 2025-2045

POLLUTANT	CUMULATIVE REDUCTIONS FROM CHANGE IN ENERGY USE	REMOVALS FROM NWL
NO_x	11,463	85,554
SO_2	123	20,300
PM_{10}	630	143,734
CO	245,971	14,827
Lead	0.01	0

For more information on criteria air pollutant emission reductions and the quantification methodology see Appendix C.

Unlike criteria air pollutants, direct exposure to ambient levels of GHGs does not directly harm human health. Instead, GHGs have a secondary impact on human health by contributing to climate change which causes negative impacts on air quality and health. For example, rising temperatures due to global warming accelerate ozone and secondary particulate matter formation, and more severe wildfires due to warmer and drier conditions increase human exposure to harmful air pollutants. Additional discussions about climate and air quality-related health impacts are summarized in the textbox on page 74.

5.2.3 Frontline community impacts

The BARCAP measures are designed to generate meaningful benefits for frontline communities. Engaging these community members was critical in embedding equity into BARCAP measures, and developing the design principles that guided measure development, as frontline communities across the region often bear the brunt of

climate change impacts first and worst, while contributing the least to climate pollution. During the BARCAP engagement community members and community-based organizations (CBOs) uplifted how climate action must improve daily lives of Bay Area communities, especially those in frontline communities. These non-GHG benefits are often the primary motivation for these communities and those that serve them to support or take climate action. They shared specific benefits (and unintended consequences) that were most important to them, which helped inform refinement of the design principles and the scope of the frontline communities impacts analysis. At the same time, community members highlighted the urgent need to take climate action, and desire to be a part of advancing climate solutions. These considerations are woven throughout the BARCAP measures and actions, and an analysis was conducted to understand their potential impacts on frontline communities.

The potential benefits generally fall into one of five categories: housing quality and security, public and community health, jobs and workforce development, climate resilience, decreased cost burdens, and community engagement, awareness, and capacity. Implementation can also result in unintended consequences in these areas. While measures have been designed to maximize the benefits and minimize the unintended consequences to the extent feasible, the specific outcomes largely depend on how the measures are implemented. Embedding equity in implementation will be essential in avoiding unintended consequences. Potential benefits and unintended consequences for each measure are described in Chapters 6 to 10. For a more detailed analysis of potential frontline community impacts, see Appendix D. For a detailed description of the role of CBOs in workshops in frontline communities, and in creating design principles, see Appendix E.

Greenhouse gases and public health

While direct exposure to the GHGs covered by the BARCAP at levels normally found in the outdoor air is not usually harmful to human health, these GHGs are the primary drivers of climate change.[4] **Climate change in turn can negatively affect public health and air quality in the Bay Area through multiple pathways.** Several are highlighted below; more complete information can be found in the Climate Change and Health Equity resources published by the California Department of Public Health, or Appendix G of the Scoping Plan published by the California Air Resources Board (CARB).[5]

Rising temperatures are increasing the frequency, intensity, and duration of extreme heat events. Heat exposure poses direct risks such as heat exhaustion, heat stroke, and cardiovascular stress. Higher temperatures also tend to worsen air quality, accelerating the evaporation of reactive organic gases and the photochemical reactions that produce ground-level ozone and secondary particulate matter (PM). Exposure to elevated ozone and PM levels leads to a wide range of serious and well-documented population health impacts, such as worsened asthma and other lung disease, hospitalizations, and even premature death.

Wildfires cause dramatic short-term spikes in pollution levels and significantly increase population exposure to PM and harmful combustion-related gases, including toxic air contaminants such as benzene. Smoke from wildfires causes a variety of short-term and longer-term impacts, including irritation of the eyes and respiratory tract, reduced lung function, bronchitis, asthma attacks, premature death, and worsened pregnancy outcomes. Wildfires can also impact human health through additional pathways, including psychological stress, physical injury, service disruptions, damage to housing, economic hardship, displacement, and loss of community cohesion. GHG emissions are intensifying the conditions that fuel wildfires, which are having more frequent and severe impacts on the Bay Area.

In addition to heat and wildfire-related impacts, climate change influences other health-relevant factors. For example, shifts in temperature and precipitation patterns and ecosystem health also affect water availability, food security, economic stability, infectious diseases, and the built environment in ways that indirectly shape public health outcomes. Climate-related disasters can result in school and work absences and impact mental health as well.

Not all Bay Area residents experience climate-related health impacts equally. **Communities of color, lower-income neighborhoods, working-class residents, and other historically marginalized groups and communities** often face both greater exposure to climate and air pollution hazards and greater susceptibility due to underlying social and health inequities.

For example, neighborhoods with predominantly Black or Latino residents tend to have fewer trees and more paved surfaces, making them hotter on average than wealthier, whiter neighborhoods. Similarly, asthma rates are disproportionately high among Black children, increasing the risks posed by wildfire smoke. These disparities reflect longstanding structural inequities such as housing discrimination, occupational segregation, and unequal access to resources including affordable healthcare and adaptive infrastructure.

Other populations who are particularly sensitive to the health impacts of climate change include older adults, infants and children, people with disabilities, individuals with chronic health conditions, unhoused people, outdoor laborers, immigrants, and people with limited English proficiency. The Air District is committed to working with communities and adopting policies and programs to address air quality and health disparities due to climate change.

5.3 SUMMARY OF MEASURES

Measures and actions are organized by **sector**: Buildings, Power, Transportation, Waste and Materials, and Natural and Working Lands. **Measures** outline the high-level strategy (e.g., expand and maintain urban green spaces), while **actions** describe the specific steps and initiatives needed to achieve the overall aim of the measures. Taken together, these measures and actions chart a path to reduce GHG emissions in each sector, as well as increase carbon sequestration in natural and working lands, and realize many other important benefits for the BARCAP region. Communities across the Bay Area expressed clearly during engagement efforts that these non-GHG benefits are often the primary motivation for action.

5.3.1 How to read the measure descriptions

For each **measure** in the following chapters, the BARCAP highlights the following points:

- **Summary:** description of the measure and how the measure helps address related challenges
- **Milestones for initiation:** key dates and next steps to initiate measure implementation during the next two years

GHG reductions in 2045: the expected GHG reductions from completing all actions under the measure in 2045 and/or accomplishing the overall aim of the measure.[6] GHG reductions are organized as:

Low **Medium** **High** **Supporting/not estimated**

Potential regional benefits: non-GHG reduction benefits likely to result from measure implementation

Design principles: identifies which design principles are advanced by the measure and actions

- Climate equity
- Cooperative
- Coordinated
- Funding & Financing
- Genuine Affordability & Access
- Health & Safety
- High-quality Jobs & Local Entrepreneurship
- Housing & Community Stability
- Resilience

Climate resilience benefits: highlights climate resilience benefits likely to result from measure implementation

Estimated costs of implementation: cost to implement from 2025-2045 as total cost to society[7]

✚ = Net savings
NE = Not estimated
S = Supporting (cost not estimated)
$ = $0-$100M
$$ = $100-$250M
$$$ = $250-$1B
$$$$ = $1B+

Proposed metrics: data to track for implementation of the measure

For each implementation **action** under a measure:

Action Title

Description to implement part of the measure

Lead Implementers: lead implementers will coordinate or manage the overall implementation of an action and/or lead one or more core components of an action.

Supporting Implementers: supporting implementers will participate in the implementation but will not take a leading role.

Timeframe to begin implementation: each action can start in the short-, medium-, or long-term (even though full implementation of the action may occur over a longer time period), depending on sufficient funding and staff resources

Short-term = all or part of the action can begin implementation within two years from plan finalization

Medium-term = all or part of the action can begin implementation within two to five years

Long-term = all or part of the action can begin implementation after five years

Ongoing = all or part of the action are already underway

5.3.2 Measure summary tables

The BARCAP is composed of 16 measures and 57 actions across five sectors, as shown in the tables below and described in more detail in the following chapters.

Table 5-3: Transportation sector measures and actions

Measure/ Action	Description
Measure T-1:	**Accelerate Light-Duty Electric Vehicle Adoption**
T-1.1	Expand incentives for the purchase or lease of EVs
T-1.2	Provide monetary and non-monetary incentives to deploy EV charging stations at strategic locations to help fill gaps in the existing charging network
T-1.3	Partner with community organizations to provide community outreach, awareness, and technical support for low-income households and small business/nonprofits in navigating incentives
T-1.4	Expand support for local governments in developing and implementing policies that help accelerate the transition to EVs, such as zoning and building code updates, permit streamlining, and parking and curbside policies
Measure T-2	**Accelerate Medium- and Heavy-Duty Vehicle and Equipment Decarbonization**
T-2.1	Expand incentives and loan assistance for the purchase of medium- and heavy-duty zero-emission (ZE) vehicles and equipment
T-2.2	Encourage large fleets (e.g., municipal, transit, or corporate fleets) to serve as anchor tenants for charging and clean-fuel fueling hubs
T-2.3	Develop and disseminate technical design guidance for fleets on how to right-size charging infrastructure
Measure T-3	**Accelerate Decarbonization of Goods Movement**
T-3.1	Pilot policies that expedite the transition to ZE last-mile delivery for goods to identify feasibility and best practices
T-3.2	Explore regulatory and non-regulatory approaches to incentivize or mandate ZE trucks and off-road mobile operations at truck-attracting businesses, such as warehouses
Measure T-4	**Support Implementation of Plan Bay Area 2050+**
T-4.1	Support alternatives to driving alone through land use, transit, biking, and walking strategies identified in Plan Bay Area 2050+

Table 5-4: Building sector measures and actions

Measure/ Action	Description
Measure B-1:	**Support Implementation of the Air District's Zero-NO_x Building Appliances Rules by Addressing Key Opportunities and Challenges**
B-1.1	Leverage partnerships and coordinate with key supply chain entities to develop together a suite of activities to increase zero-NO_x appliance awareness and adoption to support high levels of compliance and equipment performance
B-1.2	Support policy development efforts and disseminate best practices that streamline permitting of heat pump installations and promote electrification readiness in Bay Area jurisdictions
B-1.3	Promote and increase awareness of low-power appliance options and other panel optimization strategies with multi-language communications that will help people avoid unnecessary electrical service upgrades
B-1.4:	Explore new funding and financing opportunities to augment existing sources to further reduce financial burdens, especially for low-income building owners and tenants
B-1.5	Develop and deliver culturally competent and multilingual information, outreach, and marketing campaign about the zero-NO_x building appliance rules, focusing on low-income and overburdened homeowners and renters, and multifamily building owners
B-1.6	Expand engagement with affordable multifamily housing owners (deed-restricted and naturally-occurring) to address technical, financial, and community challenges related to zero-NO_x appliance rules, and co-develop solutions to ensure owners get the resources and support they need so residents and owners benefit from the transition to clean appliances
B-1.7	Provide education regarding best practices for those that choose to self-install heat pump water heaters (i.e., Do-It-Yourself'ers, or DIY'ers)
B-1.8	Collaborate with Northwestern Energy Efficiency Alliance (NEEA) and others to support the development and piloting of split-system heat pump water heaters that can address constrained space installation challenges for Rule 9-6

Measure/ Action	Description
Measure B-2	**Advance Decarbonization and Public Health Goals by Integrating Electrification Incentives with Home Repair and Weatherization Services and Other Non-Energy Programs Targeted Toward Low-Income and Frontline Communities**
B-2.1	Explore new funding and financing opportunities for home repair, public health, energy efficiency, and decarbonization programs to augment existing sources
B-2.2	Make home decarbonization retrofits more affordable and accessible through coordinated efforts to use all capital and programmatic options
B-2.3	Partner with PG&E to map ideal locations for decommissioning, work with counties to coordinate and conduct outreach
B-2.4	Pilot a mini-BACHI retrofit program that combines home repair, energy efficiency, and decarbonization services and incentives
B-2.5	Based on lessons learned from pilot (B-2.4), secure funding to expand the mini-BACHI pilot retrofit program to all Bay Area counties with a focus on partnering with affordable housing programs and owners to identify sites and project opportunities
Measure B-3	**Support Collaborations and Partnerships to Ensure the Building Decarbonization Workforce is Successful, Skilled, and Diverse Enough to Serve the Entire Region Effectively and in a Culturally Competent Manner**
B-3.1	Highlight and promote contractors who hold established certifications and credentials that indicate they are skilled and knowledgeable about heat pumps, and partner with incentive program administrators and other organizations to communicate their value proposition for customers
B-3.2	Explore partnerships to expand education, training, business growth and other targeted support of Minority/Women/ Disadvantaged Business Enterprises (MWDBE) contracting companies to become active in building decarbonization program and project opportunities
B-3.3	Explore the creation of a contractor mentorship program that leverages the experiences and knowledge of high-performing heat pump installers ("volume installers") to share information and tips that explain the business opportunity to gas-centric contractors so they get interested in electric heat pump upskilling and training opportunities
B-3.4	Assemble a regional information-sharing network/directory to increase awareness and opportunities for contracting businesses to connect with training providers and new workers who have demonstrated a commitment to pursuing a career in the field. Integrate information about project and funding opportunities, requests for proposals, and incentive program updates as appropriate

Table 5-5: Power sector measures and actions

Measure/ Action	Description
Measure P-1:	**Increase Development of Local Clean Energy and Storage Projects (with a Focus on Small- to Medium-Scale Projects), Including Behind-the-Meter and Distributed Energy Resources**
P-1.1	Support local governments to promote and incentivize development of clean energy projects on preferred sites in their jurisdiction that are well-suited for small- to medium-scale clean energy development and have community and business support
P-1.2	Develop a roadmap for community solar and brownfield-to-brightfield projects, especially projects serving multifamily renters and frontline communities, and identify options to fund and pilot projects at key sites
P-1.3	Identify and disseminate best practices for local governments to simplify permitting of clean energy and storage projects
P-1.4	Monitor - and explore how to address - key funding and financing gaps for behind-the-meter and in front-of-the-meter small clean energy and storage projects that benefit frontline communities, low-income and moderate-low-income households, small businesses, and community organizations
Measure P-2	**Equitably Expand Customer Programs and Deploy Power System and Grid Technologies More Widely**
P-2.1	Increase the number of critical public facilities with reliable clean backup power and key community facilities with clean resilient energy resources (e.g., solar+storage, microgrids), such as resilience hubs, in coordination with local government emergency response managers and plans. In some cases, solar+storage hybrid may be necessary depending on end use
P-2.2	Accelerate scaling up of different load flexibility solutions across the region in an equitable manner to improve grid reliability, help control costs, and align with state load shift goals to shift electricity usage
P-2.3	Explore mechanisms to minimize or eliminate health risks from fossil-fuel based backup generation (BUG) for large commercial facilities in ways that maximize the GHG co-benefits
P-2.4	Modernize transmission and distribution lines to increase efficiency and improve reliability (e.g., grid-enhancing technologies, reconductoring)

Table 5-6: Waste and materials sector measures and actions

Measure/ Action	Description
Measure W-1:	**Enable Food Access and Clean Compost**
W-1.1	Develop funding and asset-sharing mechanisms to support edible food recovery operations
W-1.2	Coordinate regional efforts to improve sorting of organics discards, including reducing common contaminants of the organics stream
W-1.3	Increase the region's understanding of lifecycle and health impacts of food and goods consumption and the opportunity for community-scale solutions
Measure W-2	**Advance Low-Carbon Building Materials and Reuse**
W-2.1	Collaborate with the state and local governments to implement the California Green Building (CALGreen) and CARB embodied carbon code requirements
W-2.2	Work with construction teams and suppliers to increase availability and adoption of low-carbon building materials and practices
W-2.3	Conduct local assessments to identify opportunities for the region's existing buildings
Measure W-3	**Reduce Methane Emissions from Waste Management Facilities**
W-3.1	Explore rulemaking to minimize emissions of methane, volatile and toxic organic compounds, and odorous substances from organic waste handling facilities, including large composting facilities

Table 5-7: Natural and working lands sector measures and actions

Measure/ Action	Description
Measure NWL-1:	**Accelerate Implementation of Nature-Based Solutions through Regional Funding and Data Analysis**
NWL-1.1	Provide technical assistance for NWL data analysis to support project implementation, results tracking, and incorporation of emerging science
NWL-1.2	Increase long-term funding for nature-based solutions through dedicated support for regional-scale grant writing and exploration of emergent sources of long-term funding

Measure/ Action	Description
Measure NWL-2	**Prevent Losses of Carbon Held in NWL through Land Conservation, Wildfire Management, and Ecosystem Restoration**
NWL-2.1	Support conservation of lands at the regional scale through the Priority Conservation Area (PCA) Program
NWL-2.2	Increase fuel management and reduce wildfire risk on natural and working lands and at the wildland-urban-interface (WUI) through new funding and financing mechanisms, workforce development, and innovation
NWL-2.3	Incentivize private landowners managing large land areas to manage fuel at scale through innovations in cost sharing and financing
NWL-2.4	Protect carbon held in the Bay Area's wetlands through protection, restoration, and enhancement of tidal marsh habitat
NWL-2.5	Contribute to emergent science on blue carbon through research on blue carbon fluxes and beneficial sediment reuse
NWL2.6	Support efforts to protect riparian forests, advancing land and water management strategies that maintain and increase carbon storage
Measure NWL-3	**Enhance Carbon Sequestration and Reduce Greenhouse Gas Emissions through Management and Restoration of Agricultural and Working Lands**
NWL-3.1	Scale climate-beneficial agriculture and catalyze widespread adoption of practices that increase or maintain above- and below-ground carbon stocks, and achieve climate resilience on working lands
NWL-3.2	Increase local implementer capacity by conducting a regional needs assessment and 'shovel-worthy' project portfolio
NWL-3.3	Support integration of climate-beneficial agriculture into climate-related plans and policies through a planning toolkit and training
NWL-3.4	Explore establishment of more renewable energy on agricultural lands
NWL-3.5	Reduce energy-related emissions and increase groundwater recharge through adoption of sustainable water management practices
Measure NWL-4	**Expand and Maintain Urban Green Spaces While Advancing Environmental Justice Outcomes**
NWL-4.1	Expand urban green spaces and prevent loss through new regional funding and technical support, prioritizing green spaces that benefit frontline communities
NWL-4.2	Advance environmental justice-centered approaches for urban greening through policy innovation, community-led planning, and support for frontline community land stewardship

ENDNOTES

1 The BARCAP does not include new measures or actions for the industrial sector as state law prohibits local air districts from mandating carbon dioxide reductions from facilities covered by the state's Cap-and-Invest program (formerly called Cap-and-Trade). The vast majority (85%) of industrial sector's GHG emissions in the BARCAP region are covered by the program.

2 According to the State of California's Future of Work Commission "Quality jobs provide a living wage, stable and predictable pay, control over scheduling, access to benefits, a safe and dignified work environment, and opportunities for training and career advancement"; Institute for the Future, "A NEW SOCIAL COMPACT for work and workers," California Future of Work Commission, March 2021, https://www.labor.ca.gov/wp-content/uploads/sites/338/2021/02/ca-future-of-work-report.pdf#:~:text=Ensure%20that%20more%20workers%20have%20quality%20jobs.,workers%20report%20being%20in%20a%20quality%20job.

3 Criteria air pollution emissions reductions were calculated using the EPA's i-Tree Landscape Module which estimates ecosystem services provided by increasing tree cover. The criteria air pollution emissions reductions for NWL do not include the impacts of wildfire reduction, climate beneficial agriculture (e.g. nitrogen fertilizer reduction), or other benefits from NWL measures.

4 Methane is a precursor for ozone, which is a health-damaging air pollutant.

5 "CLIMATE CHANGE AND HEALTH EQUITY," California Department of Public Health, Accessed November 18, 2025, https://www.cdph.ca.gov/Programs/OHE/Pages/Climate-Health-Equity/Health-Impacts.aspx.

6 For estimates of GHG reductions from measures in 2030, see Appendix C.

7 More information on estimated costs can be found in Appendix C.

6 Transportation Sector

6 Transportation Sector

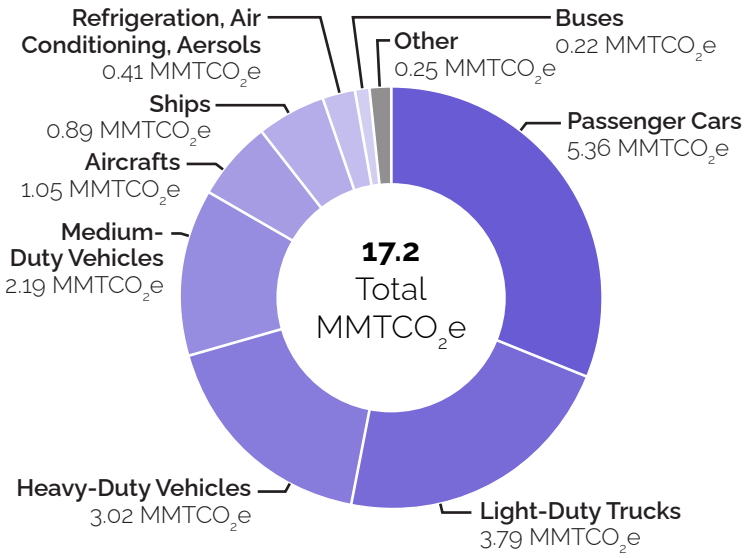
6.1 VISION FOR 2045

In 2045, the transportation sector is a well-connected, safe, and multimodal regional transportation network that prioritizes transit and active transportation, allowing people to connect more easily with where they live, work, and shop. Vehicles and equipment are zero-emission and fossil fuel use in the transportation sector is minimal.[1]

6.2 SECTOR OVERVIEW

The transportation sector includes on-road mobile sources (such as light-duty automobiles, drayage and heavy-duty trucks) and off-road mobile sources (such as transportation refrigeration units, locomotives, ships, and aircraft) whose primary objective is to transport people or goods from one place to another. Although locomotives, ships, and aircraft are included in the inventory for the sector, they fall under the regulatory authority of the state or federal government and have not been explicitly included in the measures for the Bay Area Regional Climate Action Plan (BARCAP). Additionally, greenhouse gas (GHG) emissions from off-road sources whose primary purpose is provide a service (such as lawn and garden equipment, construction equipment, ground support equipment, forklifts, and agricultural tractors) are included in other sectors.

Figure 6-1: GHG emissions by transportation sub-sector for BARCAP region in 2022



GHG emissions from the transportation sector were 17.2 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2022 (or 32% of regional emissions). These emissions are predominantly from fuel combustion in on-road mobile sources, with passenger cars, light-duty trucks, heavy-duty vehicles, and medium-duty vehicles, the largest contributors accounting for approximately 31%, 22%, 18%, and 13% of total emissions from the sector, respectively (see Figure 6-1). GHG emissions from this sector decreased by 29% (7.1 $MMTCO_2e$) between 1990 and 2022 within the BARCAP region.

GHG emissions from on-road mobile sources are not the only emissions that can be credited to the transportation sector. When accounting for all transportation-related emissions, emissions from the refining of transportation fuels should also be considered. The inventory attributes these emissions to the industrial sector (refinery processes and direct combustion at refineries) and power sector (refinery-related cogeneration facilities). Given that these emissions are driven by fossil fuel use in vehicles, the full impact of transportation-related emissions in the BARCAP region in 2022 is higher than from combustion alone, an additional 11.3 $MMTCO_2e$, for a total of 28.6 $MMTCO_2e$ (or 53% of regional emissions). Chapter 2.1.3 and Appendix A describe the contribution of emissions from the refining of transportation fuels in more detail.

On-road mobile source GHG emissions have declined significantly over the past few decades despite a growing vehicle population and long-term increase in vehicle miles travelled (VMT) in the BARCAP region. This is largely due to more efficient vehicles. At the end of 2024, the BARCAP region had made progress electrifying the transportation sector. The BARCAP region is home to approximately 365,000 light-duty zero-emission vehicles which is approximately 10% of all light-duty vehicles in the BARCAP region and almost 26,000 public and shared, Level-2 and

direct current (DC) fast chargers to support those vehicles.[2] The number of medium- and heavy-duty vehicles in the BARCAP region is also growing with over 900 vehicles and over 1,500 private charging stations and over 90 public charging stations to support medium- and heavy-duty vehicles.

Even though progress has been made to electrify the sector, much work is needed to reduce vehicle miles traveled (VMT) throughout the BARCAP region as many of the area's highways cut through frontline communities, and this contributes to the health burden of these communities through increases in air pollution that result from tailpipe exhaust, brake and tire wear, and road dust. Additionally, although private vehicle trips have rebounded since the COVID-19 pandemic – as demonstrated by the Bay Bridge toll crossing numbers – transit ridership across the Bay Area is still greatly suppressed, with Bay Area Rapid Transit (BART) for the first six months of 2025 at only 43% of the average monthly ridership of the year before the pandemic.[3] 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.[4]

In order for the transportation sector to support population and economic growth in the BARCAP region into the future while protecting the health of the environment and our communities, there needs to be a transition to a transportation system primarily powered by zero-emission vehicles (ZEV) and zero- and low-carbon fuels coupled with increased opportunity for trips to be completed through biking, walking, and use of high-quality public transit.

Mobility hubs at affordable housing pilot

The Mobility Hubs at Affordable Housing pilot, led by Transform in partnership with from MTC-ABAG and Shared Use Mobility Center and funding from CARB, demonstrates how community-driven solutions can make sustainable transportation more accessible and equitable across the Bay Area. Located near affordable housing in San Jose, Richmond, and Oakland, the hubs bring together transit, bicycling, EV car share, and ride-hailing credits to meet residents' everyday travel needs. What sets this project apart is its deep community engagement: mobility offerings were determined by a community needs assessment and residents served on paid site level teams, acting as trusted ambassadors to design outreach, beta test services, and connect their neighbors with reduced-fare passes and shared mobility options.

With more than 4,600 residents served, over 13,000 free AC Transit rides taken, and $200,000 in travel incentives distributed, the hubs have already delivered tangible benefits. By pairing strong cross-sector partnerships with grassroots leadership, this model is both scalable and adaptable to other communities across the BARCAP region, offering a proven framework for expanding clean, affordable, and convenient mobility options.

6.3 CONTEXT

The primary method for reducing climate and air quality pollutants from on-road mobile source has been through vehicle emission and fuel economy standards, which have historically been set by three agencies at the federal and state level – U.S. Environmental Protection Agency (US EPA), the National Highway Traffic Safety Administration, and the California Air Resources Board (CARB). In addition to these regulations the state has a variety of funding programs aimed at ZEVs and equipment as well as the associated charging and alternative fueling infrastructure. These incentive programs are primarily through CARB and the California Energy Commission (CEC) and include Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project, Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles Project, California Electric Vehicle Infrastructure Project and others.

Transportation solutions to reduce GHG emissions can be grouped into one of three categories, per CARB's 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan): vehicle miles traveled, fuels, and technology.[5]

- ***Vehicle Miles Traveled (VMT)*** refers to the measure of distance a vehicle travels;
- ***Fuels*** refer to the source of energy used to power vehicles and equipment;
- ***Technology*** refers to vehicles as well as the associated charging or fueling infrastructure.

Reducing the miles people need to drive daily from their homes to work, school, or key services is critical for a more sustainable, zero-carbon, and multi-modal transportation future. Land use, transit, bicycle, and pedestrian policies can reduce VMT, GHG emissions, and air pollution emissions.

The Bay Area is a leader in transportation planning that 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 (PBA) 2050+, developed by the Metropolitan

Transportation Commission and Association of Bay Area Governments (MTC-ABAG).[6] PBA 2050+ aims to have nearly half of all Bay Area residents (and 70% for low-income households) living within one half-mile of frequent transit by 2050, in order to make the Bay Area more affordable, connected, diverse, healthy, and vibrant, with a focus on equity outcomes.[7] Implementation of PBA 2050+ strategies, especially those that focus on active and shared travel modes, combined with the transit-supportive land use pattern in PBA 2050+, are forecasted to significantly decrease per-capita GHG emissions, meeting the state-mandated 19% reduction in per-capita GHG emissions from transportation below 2005 levels by 2035 for the Bay Area region.

The state is focusing on ensuring that an adequate supply of zero-carbon alternative fuels and distribution infrastructure is available to meet the needs of ZEVs into the future. Electricity and hydrogen are currently the primary fuels for ZEVs and both must be produced using low-carbon technology and feedstocks to minimize emissions. The transition to ZEVs will not happen overnight and the state expects conventional vehicles from legacy fleets to remain on the road for some time. As such, in addition to building the production and distribution infrastructure for zero-carbon alternative fuels, the state plans to continue to support low-carbon liquid fuels during this period of transition and for more challenging functions for ZEV technology such as aviation, locomotives, and marine applications. The state is addressing this through investments in the production and distribution of low- and zero-carbon fuels and through the Low Carbon Fuel Standard.

The state's Executive Order N-79-20 calls for 100 percent ZEV sales of new light-duty vehicles by 2035; sets targets for transitioning the medium- and heavy-duty fleet to zero emissions by 2035 for drayage trucks and by 2045 for buses and heavy-duty long-haul trucks, as feasible; and 100 percent sales of new off-road vehicle and equipment by 2035, as feasible. The Scoping Plan reflects these targets, and CARB has a number of regulations to fulfill these goals that serve as the primary mechanism to help deploy ZEVs. Specifically for light-duty EVs, the state has set a goal of 7.1 million EVs sold by 2030 and the Air District has set a target of 90% of vehicles in the Bay Area being zero-emission by 2050.[8] Efforts at the federal level in 2025 to repeal waivers granted to California through the Clean Air Act to facilitate the state in meeting these targets has demonstrated the importance of regional and local governments continuing to focus on zero to low emission solutions for the transportation sector to ensure we meet our climate goals.

Deploying sufficient charging and fueling infrastructure to support ZEVs is critical in meeting these targets. It is also critical to focus on equity to ensure that the transition to ZEVs is affordable for low-income households and frontline communities and that those communities benefit most from the air quality co-benefits of the transition. The Scoping Plan identifies this as a key role for local governments.

Based on feedback from public engagement conducted during the development of the BARCAP, there is strong regional support for active transportation (public survey results ranked this third out of 13 potential focus areas for climate action). The transition to electric vehicles was comparatively less popular among survey respondents (public survey results ranked this tenth out of 13 potential focus areas for climate action).[9] Members of the BARCAP region's frontline communities who participated in the BARCAP engagement process expressed concerns around EV charging reliability and accessibility, costs of EVs, range anxiety, and theft of parts. Additionally, while interested in expanded access to transit, biking, and walking, they had concerns about bike safety. Projects to expand roadways and increased e-commerce leading to increased VMT from goods movement were also concerns.

Embedding equity into the core of transportation sector measures is essential to ensure that the benefits of decarbonization and mobility improvements are shared across all communities. Historically, low-income residents and communities of color in the Bay Area have experienced disproportionate exposure to air pollution, higher portion of their income going toward transportation costs, and limited access to safe, reliable mobility options. As the BARCAP region transitions toward zero-emission vehicles, low- and zero-carbon fuels, and expanded active and public transit, policies must be designed to reduce barriers for frontline communities and prioritize investments that improve air quality, affordability, safety, and connectivity.

6.4 HOW PROPOSED MEASURES WERE DEVELOPED

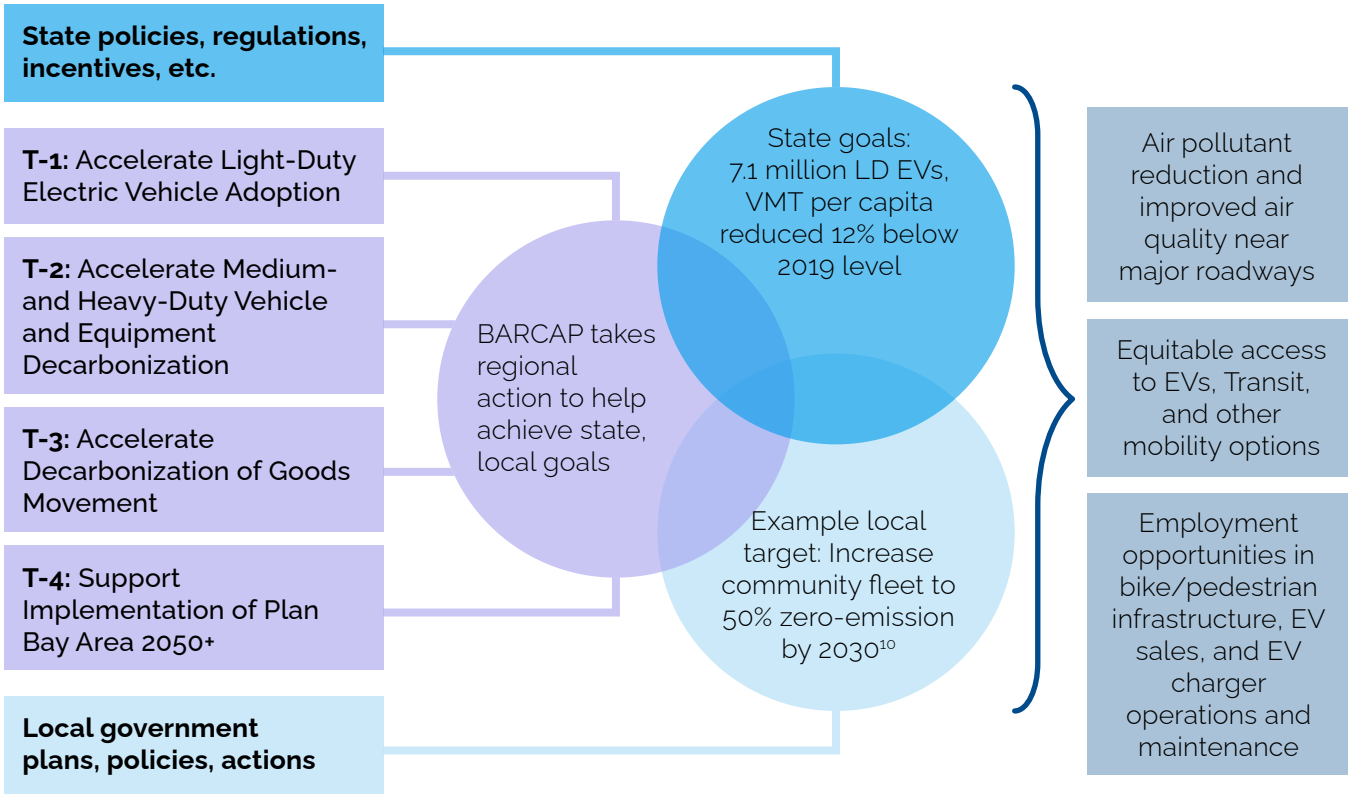
As described in Chapter 4, measures and actions for the transportation sector were developed with extensive input from the public, frontline community members, Advisory Work Group members, and members of a technical stakeholder working group. The technical stakeholder working group was comprised of 11 subject matter experts representing local governments, Community Choice Aggregators, regional agencies, and community-based organizations. These technical experts grounded measures in the current implementation landscape (including key hurdles and areas for action) and helped develop and refine the proposed measures and actions in collaborative meetings over six months. See Chapter 4 for an overview of BARCAP's sector-level technical working groups.

The measures described on the following page can be implemented with implementing partners' existing authorities.

The BARCAP focuses on accelerating the decarbonization of vehicles and equipment through policies and programs that incentivize zero-emission vehicles and deploy the charging and fueling infrastructure to support those vehicles, including vehicles and equipment used for goods movement. Additionally, the BARCAP supports implementation of Plan Bay Area 2050+, focused on per-capita VMT reductions through land use, transit, biking, and walking strategies for the BARCAP region.

6.5 TRANSPORTATION SECTOR MEASURES AND ACTIONS

Figure 6-2: Transportation measures contributing to state and local goals



The measures and actions for the transportation sector contribute to achieving state and local goals for the sector and result in many other key benefits. As shown in Figure 6-2 they complement, rather than duplicate, state and local actions in important ways. The measures and actions support successful local implementation of state policies and initiatives in ways that are equitable and bring benefits to the BARCAP region. They also help remove barriers and build capacity to accelerate local action and scale promising approaches regionally.

Measure T-1: Accelerate Light-Duty Electric Vehicle Adoption

GHG reductions in 2045:
Low *(see Figure 6-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:
+ Reduced exposure to air pollution
+ Health benefits
+ Reduced cost burden
+ Increased access to services
+ Job creation

Design principles:

Climate resilience benefits:
Charging locations should be at sites that have been evaluated for resilience and that support community access to essential services during or after a climate event

Estimated costs of implementation:
$$$$

Proposed metrics:
Percentage of registered light-duty EVs in the BARCAP region, number of Level-2 and DC fast chargers installed (total and in frontline communities)

SUMMARY

Support the acceleration of light-duty electric vehicle (EV) adoption through expanded incentives for EVs, coordinated planning for EV charging locations and installation of EV chargers to meet expected demand across the BARCAP region, and expanded support for low-income residents, frontline communities, and local governments in adopting EVs.

This measure helps to address issues related to the cost of vehicle electrification in low-income residents and frontline communities, ensuring they aren't left behind in the transition to clean transportation.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- **Q3 2026 –** Obtain additional funding
- **Q3 2026 –** Update funding programs to include e-micromobility
- **Q3 2026 –** Expand funding availability for the purchase of EVs and EV charging
- **2027 –** Expand community outreach, education, and technical assistance to increase participation in EV funding programs

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Reduced exposure to health-damaging pollution from fossil fuel-powered vehicles

✖ *Does not reduce exposure to other vehicle-related emissions, e.g., brake and tire wear and road dust, which are already occurring with current vehicles*

Jobs and Workforce Development

✚ Employment opportunities in e-micromobility, EVs, and electric infrastructure

✖ *Reduced employment in servicing internal combustion engine vehicles and fleets as well as at fueling/gas stations*

✖ *Employment opportunities could be challenging for low-income and disadvantaged jobseekers to secure without the necessary training for this new market*

Community Engagement, Awareness, and Capacity

✚ Increased understanding, awareness and engagement in climate solutions, improved trust between communities and government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Climate Resilience Co-Benefits

✚ Increased access during climate-related emergencies if charging infrastructure is sited at trusted local institutions (e.g., schools, community centers)

Housing Quality and Security

✖ *Risk of displacement or gentrification where charger deployment and EV adoptions are concentrated*

Costs Burden

✚ Decreased transportation cost burden

✚ Cost savings when gas prices rise

✖ *High electricity rates can reduce savings achieved*

✖ *Higher upfront costs for EVs*

✖ *Reliance on public charging can be more expensive*

✖ *Limited benefit for non-car owners since many low-income residents rely on transit, walking or biking*

ACTIONS

T-1.1: Expand incentives for the purchase or lease of EVs

Include e-micromobility (e-bikes, e-scooters, etc.) and pre-owned EVs, especially in frontline communities and for low-income residents to lower upfront costs of EV purchase.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
Air District, Community Choice Aggregators, MTC, CARB

Timeframe to start implementation:
Medium-term

T-1.2: Provide monetary and non-monetary incentives to deploy EV charging stations at strategic locations to help fill gaps in the existing charging network

Include a focus on deploying DC fast and multifamily charging in charging deserts and key commute routes to accelerate the adoption and use of EVs and to help reduce range anxiety and provide greater accessibility, especially in frontline communities. Actions may include:

- **Exploring the feasibility of municipalities or Community Choice Aggregators providing non-monetary incentives,** such as subsidized or lower lease rates, providing make-ready infrastructure subsidies, and guaranteeing power availability in areas served by publicly owned utilities;
- **Securing funding for planning/technical assistance** or direct-install programs for multifamily properties and smaller businesses/nonprofits interested in hosting public or workplace charging sites;
- **Securing funding for ongoing maintenance** to keep chargers available and operational;
- **Securing funding for low-cost, Level-1 charging** at multifamily properties;
- **Exploring including charger uptime requirements** when funding public charging stations to improve availability, performance, and accessibility;
- **Working with communities to identify trusted institutions** for locating low-cost, community-facing EV charging.

Proposed Lead Implementer:
Regional agency

Proposed Supporting Implementers:
Air District, MTC, Community Choice Aggregators, CARB, CEC, county transportation agencies, SCTCA, local governments, utilities

Timeframe to start implementation:
Medium-term

T-1.3: Partner with community organizations to provide community outreach, awareness, and technical support for low-income households and small business/ nonprofits in navigating incentives

Actions may include:

- **Expanding programs** to directly assist low-income households, affordable housing developers, and community-based organizations with funding applications and grant writing;
- **Supporting light-duty fleet electrification** for small merchants, Transportation Network Company drivers (e.g., Uber, Lyft), etc.; support charger installation site hosts such as community centers;
- **Ensuring community outreach and support is culturally relevant and multi-lingual**; include information about comparative costs for operations and maintenance of EVs, EV safety issues, theft issues, and range-anxiety;
- **Working to better understand immigrant community needs** for incentives support including how submitting required paperwork could negatively impact their lives.

Proposed Lead Implementer:
Grid Alternatives

Proposed Supporting Implementers:
Air District, MTC, Community Choice Aggregators, community organizations

Timeframe to start implementation:
Short-term/Medium-term

T-1.4: Expand support for local governments in developing and implementing policies that help accelerate the transition to EVs, such as zoning and building code updates, permit streamlining, and parking and curbside policies

Include local government approaches that may involve strengthening local requirements for new developments or parking facilities to include EV charging infrastructure; simplifying and expediting the permitting process for charger installations to reduce delays and costs; designating EV charging zones, prioritizing public right-of-way access for chargers, or implementing preferential parking policies.

Proposed Lead Implementer:
Regional Agency

Proposed Supporting Implementers:
MTC, SCTCA, local governments, community organizations

Timeframe to start implementation:
Short-term/Medium-term

Measure T-2: Accelerate Medium- and Heavy-Duty Vehicle and Equipment Decarbonization

GHG reductions in 2045:
Low *(see Figure 6-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:
- \+ Reduced exposure to air pollution
- \+ Health benefits
- \+ Job creation

Design principles:

Climate resilience benefits:
A more resilient transportation system that is less vulnerable to disruptions in fuel supply chains

Estimated costs of implementation:
+

Proposed metrics:
Number of zero-emission medium- and heavy-duty vehicles replaced and/or purchased, number of charging and fueling hubs deployed

SUMMARY

Accelerate zero-emission medium- and heavy-duty vehicles and equipment adoption through expanded incentives, coordinated deployment of EV chargers and fueling infrastructure to meet expected demand across the BARCAP region, while incorporating the needs of low-income and frontline communities.

This measure helps to ensure that medium- and heavy-duty vehicles continue to electrify given that the state has withdrawn the request for a federal waiver and authorization of the Advanced Clean Fleets rule. The measure leverages existing programs such as the Carl Moyer Program to ensure there is continued funding to expedite the transition to clean vehicles and equipment.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q4 2026 –** Identify opportunities to expand funding
- ★ **Q4 2026 –** Develop programs to fund the purchase of medium- and heavy-duty EVs and charging/fueling infrastructure
- ★ **Q4 2026 –** Identify fleets that could act as anchor tenants at charging/fueling hubs
- ★ **2027 –** Outreach to fleets identified to encourage them to be anchor tenants

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Reduced exposure to health-damaging pollution from fossil fuel powered vehicle tailpipe emissions

✚ Noise reduction in neighborhoods where diesel trucks and equipment operate

✖ *Does not reduce exposure to other vehicle-related emissions, e.g., brake and tire wear and road dust, which are already occurring with current vehicles*

✖ *Potential air quality impacts from additional brake and tire wear or road dust if charging/fueling hubs are located in frontline communities*

✖ *Incentives for the purchase of new trucks, instead of replacing existing trucks, could lead to the expansion of EV fleets and increased truck traffic*

Jobs and Workforce Development

✚ Employment opportunities in electric truck maintenance and electric infrastructure

✖ *Employment opportunities could be challenging for low-income and disadvantaged jobseekers to secure without the necessary training for this new market*

✖ *Existing internal combustion engine fleet maintenance jobs would become obsolete*

Climate Resilience Co-Benefits

✚ Local charging and fueling hubs may increase energy resilience by reducing dependence on fossil fuel supply chains

Costs Burden

✚ Potential lower long term maintenance costs for fleet operators

✖ *Unstable or increased fueling/charging increase risk, especially for small fleet operators*

✖ *Electricity cost and reliability concerns if high power demand from large charging hubs raise local utility costs or stress the grid*

ACTIONS

T-2.1: Expand incentives and loan assistance for the purchase of medium- and heavy-duty zero-emission (ZE) vehicles and equipment

Actions may include:

- **Targeting incentives** to electrify equipment at marine ports and airports;
- **Creating a streamlined voucher incentive program** to electrify small fleets of heavy-duty trucks;
- **Increasing participation from operators** of older and dirty heavy-duty diesel vehicles and equipment that operate in frontline communities.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
Community Choice Aggregators

Timeframe to start implementation:
Medium-term

T-2.2: Encourage large fleets (e.g., municipal, transit, or corporate fleets) to serve as anchor tenants for charging and clean-fuel fueling hubs

Increase economic feasibility of independent charging/fueling hubs by sharing charging among multiple fleets domiciled or operating in the same neighborhood/logistics hub. Work regionally to identify and engage with fleets that operate regionally but may frequently stop/fuel in specific neighborhoods to inform this effort.

Proposed Lead Implementer:
Regional agency

Proposed Supporting Implementers:
MTC, Community Choice Aggregators, counties, SCTCA, local governments, ports, private fleets

Timeframe to start implementation:
Medium-term

T-2.3: Develop and disseminate technical design guidance for fleets on how to right-size charging infrastructure

Provide technical design guidance to fleets, especially private fleets, to ensure charging infrastructure build out matches the fleets needs more closely to prevent overbuilding, keeping costs of electrification down and avoiding unnecessary service infrastructure upgrades that would result in increased costs for rate payers.

Proposed Lead Implementer:
Regional agency

Proposed Supporting Implementers:
Community Choice Aggregators, SCTCA, state agencies

Timeframe to start implementation:
Medium-term

Measure T-3: Accelerate Decarbonization of Goods Movement

GHG reductions in 2045:
Low *(see Figure 6-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:
+ Reduced exposure to air pollution
+ Health benefits

Design principles:

Climate resilience benefits:
A more resilient transportation system less vulnerable to disruptions in fuel supply chains

Estimated costs of implementation:
$$$

Proposed metrics:
Number of pilots deployed, development, and dissemination of policy for warehouses

SUMMARY

Pilot and implement policies that accelerate decarbonization of goods movement and deliveries of goods and reduce emissions that result from increased e-commerce.

This measure helps to ensure that medium- and heavy-duty vehicles continue to electrify given that the state has withdrawn the request for a federal waiver and authorization of the Advanced Clean Fleets rule. This measure is aimed at requiring EVs for last mile delivery as well as at warehouses to continue to expand the use of EV medium- and heavy-duty vehicles and equipment.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q3 2026 –** Develop pilot projects with local governments to pilot ZE delivery zones and/or ZE loading zones
- ★ **Recently initiated –** Begin rule development process for an indirect source rule for warehouses and/or policy guidance for local governments

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

- ✚ Reduced exposure to health-damaging pollution from fossil fuel powered vehicle tailpipe emissions
- ✚ Noise reduction in neighborhoods where diesel trucks and equipment operate
- ✖ *Does not reduce exposure to other vehicle-related emissions, e.g., brake and tire wear and road dust, which are already occurring with current vehicles*
- ✖ *Potential air quality impacts from additional brake and tire wear or road dust if charging/fueling hubs are located in frontline communities*

Jobs and Workforce Development

- ✚ Employment opportunities from building and maintaining micro-hubs, ZE delivery infrastructure, and supporting new delivery technologies
- ✖ *Risk for warehouse and truck drivers if jobs shift from diesel fleets to electrified fleets without work force transition and retraining support*
- ✖ *Employment opportunities could be challenging for low-income and disadvantaged jobseekers to secure without the necessary training for this new market*

Costs Burden

- ✚ Lower cost to energize transportation compared to fueling
- ✖ *High electricity rates can reduce savings achieved*

ACTIONS

T-3.1: Pilot policies that expedite the transition to ZE last-mile delivery for goods to identify feasibility and best practices

Actions may include:

- **Piloting ZE delivery zones and/or ZE loading zones** in frontline communities and urban centers to facilitate and promote the use of ZE delivery trucks or e-cargo bikes for last-mile delivery of goods;
- **Piloting urban micro-hubs** to encourage last-mile ZE deliveries with ZE vehicles or e-cargo bikes (a micro-hub is a small-scale, strategically located facility equipped with basic storage facilities and loading docks that act as an intermediary point for the consolidation and distribution of goods);
- **Developing and disseminating best practices and technical assistance** that is informed by pilots to increase deployment of urban distribution centers and ZE delivery zones more broadly.

Proposed Lead Implementer:
Regional agency, local governments

Proposed Supporting Implementers:
Air District, SCTCA, counties

Timeframe to start implementation:
Medium-term

T-3.2: Explore regulatory and non-regulatory approaches to incentivize or mandate ZE trucks and off-road mobile operations at truck-attracting businesses, such as warehouses

Actions may include:

- **[Non-regulatory] developing and disseminating model policies** for local governments that require the use of ZE trucks and ZE off-road mobile operations at new or expanded warehouses;
- **[Regulatory] investigating the feasibility of a Bay Area indirect source (magnet source)** rule similar to the South Coast Air Quality Management District's Warehouse Actions and Investment to Reduce Emission (WAIRE) Rule Program to address NO_x and diesel particulate matter from warehouses. The rule concept is a phased approach that incorporates a WAIRE style rule along with robust reporting requirements that will support future refinements and a more targeted disparity-reduction strategy.[11]

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
Local governments, SCTCA, warehouse operators, private fleets

Timeframe to start implementation:
Medium-term

Measure T-4: Support Implementation of Plan Bay Area 2050+

GHG reductions in 2045:
Supporting *(See MTC-ABAG Plan Bay Area 2050+ for GHG reductions from the plan)*

Potential regional benefits:

- \+ Reduced exposure to air pollution
- \+ Health benefits
- \+ Bike/ped safety improvements
- \+ Increased access to multiple transportation options
- \+ Improved signage and wayfinding

Design principles:

Climate resilience benefits: Urban greening along pedestrian, bike, 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. Expanded public transit options can increase accessibility to critical infrastructure during or ahead of climate events like extreme heat waves.

Estimated costs of implementation:
See MTC-ABAG Plan Bay Area 2050+

Proposed metrics: VMT reductions, change in transit ridership, change in bike/pedestrian activity

SUMMARY

Reduce per-capita GHG emissions from passenger vehicles through supporting implementation of the land use, transit, bike, and pedestrian strategies included in Plan Bay Area 2050+.

This measure supports implementation of Plan Bay Area 2050+ and helps to enable a shift from passenger vehicle travel to trips being made using transit, biking, and walking, reducing VMT and therefore emissions from vehicles. This is done through reducing transportations costs, improving first-mile, last-mile connections to transit, creating a seamless transit experience across different transit agencies in the BARCAP region, etc.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q1 2026 –** MTC-ABAG adopt Plan Bay Area 2050+
- ★ **Q2 2026 –** Begin Implementation of Plan Bay Area 2050+

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

- ✚ Reduced exposure to health-damaging pollution from fossil fuel powered vehicle tailpipe emissions
- ✚ Accessible and safe active transportation (biking and walking) options encourage people to exercise as part of their day
- ✚ Road safety improvements reduce fatalities and severe injuries due to collisions

Increased Transportation Access

- ✚ Increased mobility options and connectivity results in increased use of transportation alternatives
- ✚ Public transportation and active transportation offer a more affordable mode of transport
- ✖ *Increased safety risks due to more cyclists on roadways*
- ✖ *Uncertainty of funding for public transportation could result in transit service uncertainty*

Jobs and Workforce Development

- ✚ Potential to produce and sustain high roads jobs and improve access to employment opportunities
- ✖ *Employment opportunities could be challenging for low-income and disadvantaged jobseekers to secure without the necessary training for this new market*

Community Engagement, Awareness, and Capacity

- ✚ A community-informed approach can build awareness of transit upgrades and interest in transit options
- ✚ Transit, bike, and pedestrian accessibility and safety upgrades can help meet community needs
- ✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

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
- ✚ Nature based solutions can reduce the risk of infrastructure flooding during heavy rains
- ✖ *Higher water usage to maintain new plants and trees*
- ✖ *Invasive species or species that are not right for the location could be planted*

Housing Quality and Security

- ✖ *Potential for transit-induced gentrification that could lead to displacement*

ACTIONS

T-4.1: Support alternatives to driving alone through land use, transit, biking, and walking strategies identified in Plan Bay Area 2050+

Support the implementation of policies and projects that promote multimodal transportation options, while enhancing urban design and connectivity across communities. Advance land use changes consistent with the Transit-Oriented Communities (TOC) policy, active transportation initiatives, and transportation demand management (TDM) efforts.

Actions may include:

- **Implement and monitor the Transit-Oriented Communities (TOC) policy** to foster transit-supportive development and high-quality urban design;
- **Advance Complete Streets implementation** to ensure safe and comfortable travel for people biking, walking, rolling, driving and taking transit, including peer exchanges and workshops on best practices for roadway safety, data management, enforcement, street design, and equity-driven strategies;
- **Design active transportation projects** that accommodate all ages and abilities and close network gaps.
- **Integrate multimodal projects into local plans** and deliver projects that improve experience and connectivity for people biking, walking, rolling, and taking transit.
- **Assess and optimize transportation demand management (TDM) initiatives** based on recent travel trends.

Proposed Lead Implementer:
MTC

Proposed Supporting Implementers:
Air District, cities, counties, county transit agencies, SCTCA, regional organizations

Timeframe to start implementation:
Medium-term

6.6 FUNDING IMPLEMENTATION

Implementation of the transportation sector measures can be supported in part through existing funding and financing approaches. For example, the CEC's California Electric Vehicle Infrastructure Project 2.0 and Communities in Charge programs provide incentives for purchasing and installing light-duty EV charging stations that are available to the public, with prioritization for projects in disadvantaged communities and at multifamily housing. Additionally, the Bay Area Air District administers the Carl Moyer Program, which supports the transition of heavy-duty diesel fleets to ZE and funds the ZE infrastructure to support those vehicles, and the Transportation Fund for Clean Air which funds projects that reduce on-road motor vehicle emissions. The Air District's Clean Cars for All program also provides incentives to replace old vehicles with ZEVs, EVs, or public transit. Furthermore, the CEC's Energize Commercial Vehicles' Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles Project Transit Set Aside program provides funding for medium- and heavy-duty electric vehicle charging infrastructure. The programs listed above are not a comprehensive list of available funding. See Appendix G for other funding and financing sources, programs and partners, and examples of successful implementation. Additional funding and financing mechanisms will be needed to fully achieve the goals of this sector.

ENDNOTES

1 "Zero Emission Vehicle and Infrastructure Statistics Collection," California Energy Commission, Accessed July 15, 2025, https://www.energy.ca.gov/zevstats; Data includes all of Sonoma County and Solano County.

2 Includes battery electric, plug-in hybrid, and fuel cell electric light-duty vehicles, "Zero Emission Vehicle and Infrastructure Statistics Collection," California Energy Commission.

3 "Monthly Transportation Statistics," MTC-ABAG, Accessed September 11, 2025, https://mtc.ca.gov/tools-resources/data-tools/monthly-transportation-statistics.

4 In April 2020, the Metropolitan Transportation Commission (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.

5 "CARB 2022 Scoping Plan for Achieving Carbon Neutrality," California Air Resources Board, December 2022, https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

6 "Plan Bay Area 2050+" MTC-ABAG, Accessed September 15, 2025, https://planbayarea.org/.

7 Plan Bay Area 2050+ defines frequent transit as any of the following: (1) a rail or bus rapid transit station; (2) a ferry terminal served by either bus or rail transit service; or (3) a bus stop served by a route with a headway of 15 minutes or less during the a.m. peak (6-10 a.m.) and p.m. peak (3-7 p.m.) periods.

8 "Assembly Bill 2127 Second Electric Vehicle Charging Infrastructure Assessment: Assessing Chargin Needs to Support Zero-Emission Vehicles in 2030 and 2035," California Energy Commission, Accessed December 4, 2025, https://www.energy.ca.gov/publications/2024/assembly-bill-2127-second-electric-vehicle-charging-infrastructure-assessment; "2017 Bay Area Clean Air Plan," Bay Area Air District, 2017, https://www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf.

9 More information can be found in the Appendix E.

10 "Contra Costa County Climate Action and Adaptation Plan 2024 Update," Contra Costa County, November 5, 2024, https://www.contracosta.ca.gov/DocumentCenter/View/84967/Contra-Costa-County-2024-Climate-Action-and-Adaptation-Plan-PDF?bidId=.

11 The WAIRE Program is an indirect source rule that regulates warehouse facilities to reduce emissions from the goods movement industry. For more information: https://www.aqmd.gov/home/rules-compliance/compliance/waire-program.

Gentrification and housing affordability

The Bay Area's housing and affordability challenges are well-known, persistent, and deeply entrenched. There is a high percentage of renters (~40%) in the region who face some of the most expensive rents in the nation, with nearly half considered to be "rent-burdened" (i.e. spend more than 30% of monthly income on rent). Multiple factors intertwining over the past decades have led to housing insecurity and lack of affordable housing in the Bay Area today. Recent plans and policies such as those found in Plan Bay Area 2050, Assembly Bill 1482 (2019), newly mandated regional housing production targets established by the State of California, and the recent passage of California Environment Quality Act (CEQA) reform legislation (intended to remove barriers to creating new housing) reflect the growing sense of urgency to address these challenges, but more action is needed.[1]

Efforts to reduce greenhouse gas (GHG) emissions from the built environment largely depend on physical and social changes, which themselves result in benefits that improve communities and quality-of-life. For example, energy efficiency reduces emissions by cutting energy consumption, increases comfort and lowers utility bills, saving money in the long term. However, if implemented without thoughtful consideration, planning, and engaging with affected communities, actions to reduce GHGs could result in unintended consequences. For instance, upgrading housing units with new, efficient appliances and equipment could result in rent increases and evictions due to gentrification and displacement.

Minimizing potential unintended consequences for the large population of renters in the Bay Area requires intentional and thoughtful implementation of GHG reduction strategies. For example, landlords installing zero-NO_x appliances could be incentivized or compelled by local authorities to minimize passing through the costs for upgrades to tenants.[2] The same would go for other upgrades like rooftop solar and battery storage and adding electric vehicle charging. Similarly, financial incentive programs that lower costs for building owners could include provisions that establish protections for existing tenants (e.g., provision of temporary relocation assistance and "right to return" policies after work is completed).

ENDNOTES

1 "Plan Bay Area 2050+" MTC-ABAG, Accessed November 18, 2025, https://planbayarea.org/plan-bay-area-2050-plus; California Congress, House, Tenant Protection Act of 2019: tenancy: rent caps, AB-1482, Approved by Governor October 8, 2019, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1482; "California's Housing Future 2040, The Next Regional Housing Needs Allocation (RHNA)," California Department of Housing and Community Development, April 2024, https://www.hcd.ca.gov/sites/default/files/docs/planning-and-community/rhna/cahf-2040-rhna-report-2024.pdf; "Governor Newsom signs into law groundbreaking reforms to build more housing, boost affordability," Governor Gavin Newsom, June 30, 2025, https://www.gov.ca.gov/2025/06/30/governor-newsom-signs-into-law-groundbreaking-reforms-to-build-more-housing-affordability/.

2 For a recent and comprehensive analysis of the Bay Area's complex landscape of local renter protection laws, how they interact with state laws, and the challenges related to their implementation as well as recommendations to mitigate risks, please see this "Renter Protections Policy Landscape Summary" report, which was completed in 2024 as part of the Zero-NO_x Building Appliance Rule Implementation Working Group.

7 Building Sector

7 Building Sector

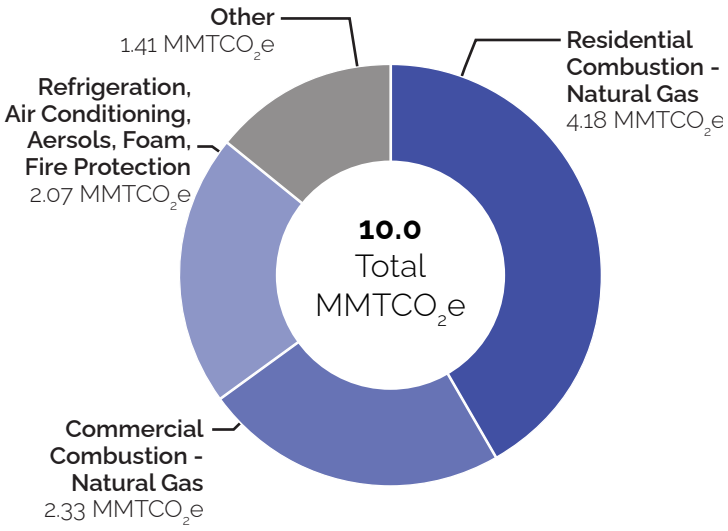
7.1 VISION FOR 2045

In 2045, there are healthy, zero emission homes for all through the equitable implementation of existing regulations, integrated programs to reduce emissions while improving housing conditions for those most in need, and a successful, well-trained, and diverse workforce to serve the entire community.

7.2 SECTOR OVERVIEW

The building sector includes homes, commercial businesses, office spaces, places of worship, entertainment venues, etc. Greenhouse gas (GHG) emissions in this sector primarily result from the direct combustion of natural gas for space and water heating, clothes drying, and cooking, as well as leaks of refrigerants from building equipment such as air conditioning and refrigeration units, and leaks from the natural gas distribution system. Although the GHG inventory for this sector includes lawn and garden equipment, airport ground support equipment, and off-road recreation vehicles, they together account for under 4% of sector-level emissions and are not explicitly addressed in the Bay Area Regional Climate Action Plan (BARCAP).

Figure 7-1: GHG emissions by buildings sub-sector for BARCAP region in 2022



Total emissions from the building sector (as defined above) were 10.0 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2022 (or 18% of regional GHG emissions), as shown in Figure 7-1. Combustion of natural gas in residential and commercial buildings are the largest contributors, accounting for approximately 42% and 23% of total emissions from the sector, respectively. GHG emissions from this sector increased by 15% (1.14 $MMTCO_2e$) between 1990 and 2022 within the BARCAP region.

California buildings constructed over the past century – including most Bay Area homes – mainly rely on natural gas for space and water heating, which together comprise the vast majority of the building sector's GHG emissions. Therefore, for the BARCAP, the building sector focuses on the GHG emissions generated by the combustion of fossil fuels from space heating, water heating, cooking, and clothes washing and drying, primarily in residential buildings. As the state's supply of renewable electricity continues to increase toward a goal of 100% by 2045, a larger share of remaining building emissions will be attributable to natural gas usage. Switching natural gas burning appliances to clean, efficient, electric alternatives like heat pumps is commonly referred to as building decarbonization or building electrification.

State and local governments in the Bay Area have made considerable progress towards building decarbonization (as described in the paragraph above) over the past decade. Successful approaches include developing and implementing local building codes that go beyond state requirements to advance building decarbonization, funding and operating innovative heat pump incentive programs (such as the "Technology and Equipment for Clean Heating" or "TECH Clean California" program), and delivering effective public outreach education about the multiple benefits of electric appliances. New regulatory efforts, such as the Air District's zero nitrogen oxides (NO_x) building appliance rules (further described below), are currently expected to significantly reduce GHG emissions from natural gas combustion in the residential sector. Still much more needs to be done in the building sector to help achieve state and local climate goals.

7.3 CONTEXT

At the state level, the California Air Resources Board's 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) scenario for the building sector reflects the following policy goals established by Governor Newsom.[1]

- ***Install six million heat pumps by 2030*** (water and space heating);
- ***Deliver three million "climate ready" (all-electric and electric-ready) homes with heat pumps by 2030*** (seven million by 2035);
- ***Direct 50% of state climate funding*** to low-income and disadvantaged communities.

In 2023, the Bay Area Air District adopted amendments to Rules 9-4 and 9-6 ("appliance rules") which phase in requirements to reduce nitrogen oxides (or "NO_x," which worsens air quality and harms public health when released to the atmosphere) from space and water heating appliances.[2] While these rule amendments establish limits on air pollutants to protect public health, they are also expected to dramatically reduce GHG emissions by displacing natural gas with electricity. While the rules do not require the use of electric equipment, it is expected that most property owners will choose efficient electric heat pump technologies to meet the regulatory requirements. If everyone chooses electric appliances, at full implementation (i.e., when all NO_x-emitting appliances covered by the rules have been replaced with zero-NO_x options), the appliance rules could reduce residential and commercial building natural gas combustion emissions by approximately 70% below 2022 levels.

Also, as noted earlier, local governments play a vital role in piloting bold and innovative policies, programs, and partnerships that can establish new models and best practices for others to learn from and adopt widely. While Assembly Bill 130 (passed in 2025) will impede the development of local residential reach codes until 2031, cities and counties will continue to seek other ways to advance equitable and impactful building decarbonization.[3]

It is important to note that energy efficiency, which has been a staple of state and local efforts to reduce building sector emissions over the past several decades, is currently being addressed by programs administered by the Bay Area Regional Energy Network (BayREN). So, while not explicitly its own measure, the BARCAP acknowledges energy efficiency as a critical tool to achieve building sector goals and takes a strategic and targeted approach to driving its benefits to traditionally underserved Bay Area populations (see measure B-2 and supporting actions).

Based on feedback from public engagement conducted during the development of the BARCAP, there is strong regional support for transitioning buildings from gas to all-electric (public survey results ranked this fifth out of 13 potential focus areas for climate action). That said, members of the BARCAP region's frontline communities who participated in the BARCAP engagement process expressed concerns about how renters would be financially impacted by implementation of the appliance rules and perceived challenges with finding skilled contractors for zero-NO_x appliances. They also expressed support for a simplified permit process for zero-NO_x appliances, increasing the availability of multilingual contractor training, and expanding efforts to combine health and safety retrofits with electrification and energy efficiency upgrades.

El Concilio of San Mateo County

El Concilio is a non-profit, community-based organization committed to increasing education, employment, and access to quality-of-life services for underserved communities in San Mateo County, which experiences deep social and racial inequities despite being one of the richest counties in the country. While climate action programs are easily accessible to many in the county, El Concilio aims to close the gap for low-income and non-English speaking households who face financial and language barriers. El Concilio recently partnered with Peninsula Clean Energy (PCE) to provide multilingual outreach to promote programs aimed at helping people save energy, money and reduce emissions such as their Green Access Program. By partnering with trusted community organizations like El Concilio, PCE can better serve households in frontline communities and equitably distribute resources and benefits. El Concilio delivers written, oral, and in-person workshops entirely in Spanish, ensuring that target audiences get the information in a way they can use.

The Bay Area is rich with community organizations that are deeply trusted and well-positioned to partner with government agencies so that more people across the spectrum can participate in important and beneficial climate initiatives.

Because buildings and homes play a direct role in the daily lives of communities everywhere, equity must be a central consideration when developing and implementing building decarbonization programs and policies. Key issues include protecting low-income owners and renters from economic hardship, housing insecurity, and displacement risks; supporting workforce readiness and increasing employment opportunities for disadvantaged workers; ensuring that financial incentives are directed to those most in need; and prioritizing culturally appropriate communications and inclusive stakeholder engagement so that marginalized communities are not left behind in the transition to healthy, low emission buildings. Any and all measures aimed at reducing building emissions must include implementation mechanisms that do not exacerbate housing displacement.

The BARCAP focuses addressing key challenges with implementing regional zero-NO_x appliance rules; supporting low-income households by integrating home repair, energy efficiency and weatherization services with building decarbonization incentives; and growing the building decarbonization workforce by connecting employers with diverse and well-trained personnel.

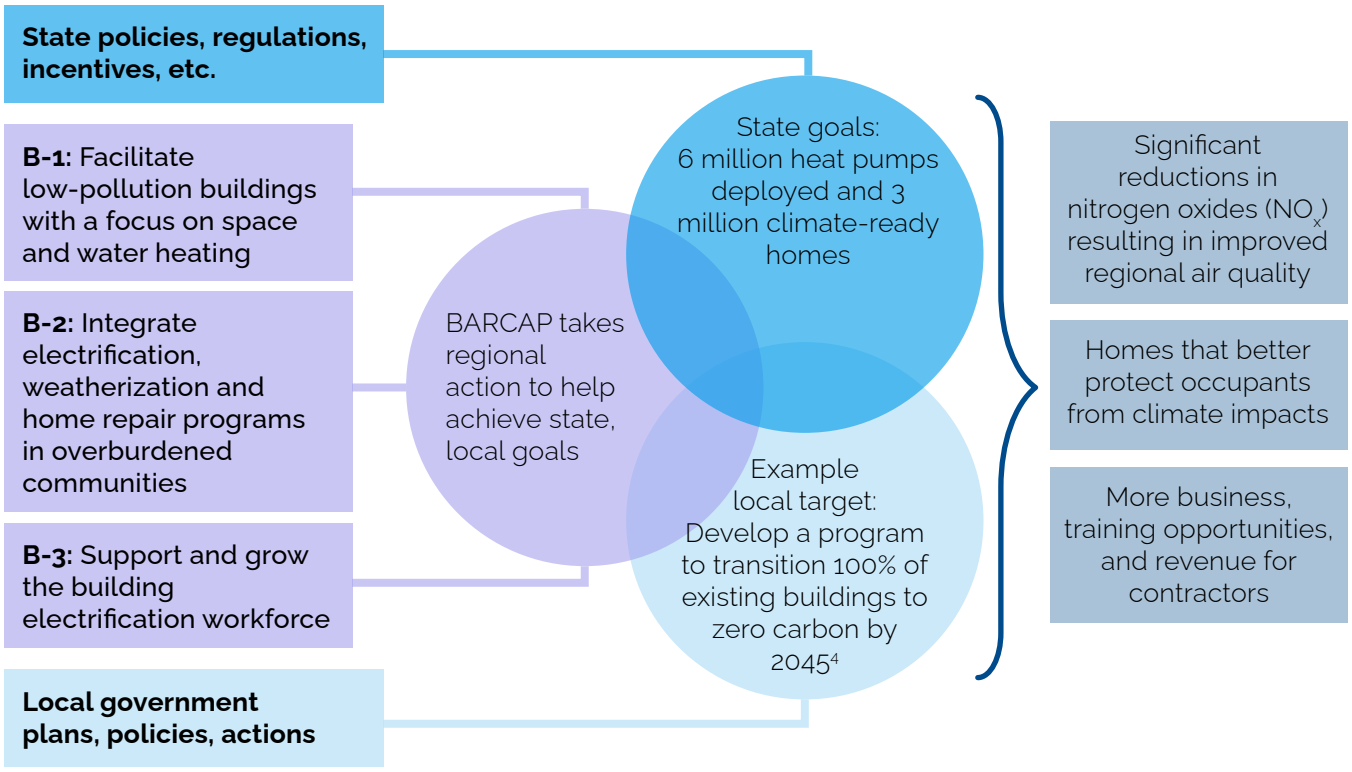
7.4 HOW PROPOSED MEASURES WERE DEVELOPED

As described in Chapter 4 on Engagement, measures and actions for the building sector were developed with extensive input from the public, frontline community members, Advisory Work Group members, and members of a technical working group. The technical working group was comprised of 17 subject matter experts representing local governments, Community Choice Aggregators, incentive program administrators, affordable housing providers, workforce specialists, and others knowledgeable about the opportunities and challenges of the sector. These experts grounded measures in the current implementation landscape (including key hurdles and areas for action) and helped develop and refine the proposed measures and actions in collaborative meetings over a six-month period. See Chapter 4 for an overview of BARCAP's sector-level technical working groups.

The measures described on the following page can be activated with implementing partners' existing authorities.

7.5 BUILDING SECTOR MEASURES AND ACTIONS

Figure 7-2: Building measures contributing to state and local goals



The measures and actions for the building sector contribute to achieving state and local goals for the sector and result in many other key benefits. As shown in Figure 7-2, they complement, rather than duplicate, state and local actions in important ways. The measures and actions support successful local implementation of state policies and initiatives in ways that are equitable and bring benefits to the BARCAP region. They also help remove barriers and build capacity to accelerate local action and scale promising approaches regionally.

Measure B-1: Support Implementation of the Air District's Zero-NO_x Building Appliances Rules by Addressing Key Opportunities and Challenges

GHG reductions in 2045:
Low *(see Figure 7-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:
- \+ Reduced exposure to air pollution
- \+ Climate resilience
- \+ Job creation
- \+ Reduced energy costs
- \+ Improved housing quality
- \+ Enhanced community engagement

Design principles:

Climate resilience co-benefits:
The transition to zero-NO_x appliances will provide air conditioning in addition to space heating which can protect communities from extreme heat.

Estimated costs of implementation:
$$$

Proposed metrics: Number of new outreach activities and/or information resources provided (including how the information was delivered), particularly in or for overburdened communities. Examples include tabling at events, sending online communications, or presenting at industry gatherings about appliance rules and/or sharing resources regarding supportive strategies e.g., low-power appliance options, permit streamlining approaches. Number of jurisdictions adopting the model code or streamlined permitting for zero-NO_x appliances.

SUMMARY

Support an equitable and affordable transition to healthy, zero-NO_x water and space heating for buildings in the BARCAP region by addressing key implementation challenges of the Air District's appliance rules, which go into effect for small gas residential water heaters in 2027 and gas furnaces in 2029. Actions are informed by the Air District's Implementation Working Group in addition to BARCAP stakeholder engagement.

This measure addresses key challenges such as increasing awareness of the rules among contractors and building owners by creating innovative partnerships and solutions to help realize the important air quality, health, and climate benefits of the appliance rules.

Milestones for Initiation:

- ★ **Q2-Q3 2026 –** Solidify key partnerships, secure commitments and develop work plans for key actions, including supply chain collaboration and increased engagement with affordable housing providers
- ★ **Q3 2026 –** Work with key partners to conduct outreach to local governments about permit streamlining best practices
- ★ **Q4 2026 –** Launch broad public awareness campaign about zero-NO_x appliance rules, including DIY-installation best practices
- ★ **Q1 2027 –** Work with partners to pilot small form factor heat pump water heaters (HPWHs)

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Housing Quality and Security

✚ Improved housing conditions and increased comfort

✖ *Increased housing costs due to cost of appliance installation*

Public and Community Health

✚ Reduced exposure to health-damaging indoor and outdoor air pollution

✖ *Limited funding and financing could reduce benefits to low-income building owners and tenants*

Jobs and Workforce Development

✚ More employment opportunities in zero-NO_x appliance installation

✖ *Reduced work in gas appliance installation*

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Climate Resilience Co-benefits

✚ Reduced exposure to wildfire smoke and extreme heat contributes to improved health outcomes

✖ *Lack of engagement and financial support for low-income and disadvantaged communities excludes them from cooling and air filtration benefits*

Cost Burden

✚ Decreased energy cost burden from more efficient appliances

✖ *High electricity rates can reduce savings achieved*

ACTIONS

B-1.1: Leverage partnerships and coordinate with key supply chain entities to develop a suite of activities to increase zero-NO_x appliance awareness and adoption to support high levels of compliance and equipment performance

Example activities could include:

- **Coordinate and deliver consistent outreach and marketing campaigns** through distribution networks regarding zero-NO_x appliance benefits, products, and services;
- **Promote aligned/consistent contractor training and sales tools** (aligns with and supports Measure B-3);
- **Support the provision of non-equipment retrofit materials at distribution centers** such as duct kits/terminations, insulated flex duct, grilles, louvered doors, enclosures, etc.;
- **Collect and share data regarding contractor installations** (models, Unified Energy Factor (UEF) ratings, voltage, etc.) to help distributors fine-tune inventory stocking to best match local housing stock and to inform incentive program design.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
CA Heat Pump Partnership (CAHPP), Energy Solutions' Trade Ally Management Program

Timeframe to start implementation:
Short-term

B-1.2: Support policy development efforts and disseminate best practices that streamline permitting of heat pump installations and promote electrification readiness in Bay Area jurisdictions

Coordinate local development and implementation of supportive policies with regional partners such as BayREN and Community Choice Aggregators. Collect and disseminate model code language to support local code updates that focus on preparing buildings for future electric appliances.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
BayREN, Community Choice Aggregators, SPUR, Sonoma County Transportation and Climate Authorities (SCTCA) and other local governments

Timeframe to start implementation:
Short-term

B-1.3: Promote and increase awareness of low-power appliance options and other panel optimization strategies with multi-language communications that will help people avoid unnecessary electrical service upgrades

Reduce upfront costs for zero-NO_x appliance replacements by helping avoid expensive panel upgrades by propagating the knowledge and use of low power appliance options like 120 Volt heat pump water heaters (HPWH) and panel optimization strategies (e.g., circuit splitters and/or smart electric panels which can balance home electric loads in real-time to make the most of existing service capacity). Collaborate with key partners to spread knowledge and best practices to a range of key audiences.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
CAHPP, SPUR, POWER group, Community Choice Aggregators, utilities, community organizations

Timeframe to start implementation:
Short-term

B-1.4: Explore new funding and financing opportunities to augment existing sources to further reduce financial burdens, especially for low-income building owners and tenants

Seek out new capital sources and mechanisms, including easy-to-use financing options with strong consumer protections, which solve upfront cost barriers.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
Community Choice Aggregators, BayREN, State of California, specialty lenders

Timeframe to start implementation:
Short-term

B-1.5: Develop and deliver culturally competent and multilingual information, outreach, and marketing campaign about the zero-NO_x building appliance rules, focusing on low-income and overburdened homeowners and renters, and multifamily building owners

Develop an awareness-building communications campaign to ensure stakeholders in the Bay Area know about the upcoming compliance dates for the zero-NO_x appliance rules. Partner with key organizations and community partners to leverage their networks and ensure a wide reach.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
BayREN, local governments, Community Choice Aggregators, Building Decarbonization Coalition, CAHPP, community organizations

Timeframe to start implementation:
Short-term

B-1.6: Expand engagement with affordable multifamily housing owners (deed-restricted and naturally-occurring) to address technical, financial, and community challenges related to zero-NO_x appliance rules, and co-develop solutions to ensure owners get the resources and support they need so residents and owners benefit from the transition to clean appliances[5]

Work with key agencies and other partners to engage closely with affordable housing owners to increase shared understanding of opportunities and constraints regarding the transition to healthy zero-NO_x appliances.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
BayREN, local governments, affordable housing providers, community-based organizations who serve residents in affordable housing

Timeframe to start implementation:
Short-term

B-1.7: Provide education regarding best practices for those that choose to self-install heat pump water heaters (i.e., Do-It-Yourself'ers, or DIY'ers)

Provide helpful guidance that promotes safe and correctly done installations by homeowners who have the technical ability and motivation to install their own zero-NO_x appliance, to increase the likelihood that units perform as intended.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
SCTCA and other local governments, Community Choice Aggregators, community-based organizations

Timeframe to start implementation:
Short-term

B-1.8: Collaborate with Northwestern Energy Efficiency Alliance (NEEA) and others to support the development and piloting of split-system heat pump water heaters that can address constrained space installation challenges for Rule 9-6

Collaborate with key partners in the BARCAP region to support market adoption of new small form-factor HPWH designs through pilot projects, performance reporting, and outreach and education activities to share lessons learned.

Proposed Lead Implementer:
Air District

Proposed Supporting Implementers:
Community Choice Aggregators, TECH Clean CA, building owners

Timeframe to start implementation:
Short-term

Measure B-2: Advance Decarbonization and Public Health Goals by Integrating Electrification Incentives with Home Repair and Weatherization Services and Other Non-Energy Programs Targeted Toward Low-Income and Frontline Communities

GHG reductions in 2045:

Low *(see Figure 7-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:

+ Reduced exposure to air pollution
+ Climate resilience
+ Reduced energy costs
+ Improved housing quality and comfort
+ Enhanced community engagement

Design principles:

Climate resilience co-benefits: Weatherized and insulated homes provide better protection from extreme heat and cold. Highly efficient electric heat pumps provide air conditioning in addition to space heating. Homes that address needed repairs and deferred maintenance are safer and healthier for occupants.

Estimated costs of implementation: $

Proposed metrics: Number of homes receiving remediation and energy efficiency upgrades, number of homes electrified and receiving solar power.

SUMMARY

Perform holistic building retrofits that include energy efficiency, electrification, and home repair and remediation by braiding together and augmenting funding, services, and other assistance from existing programs. Focus retrofits in the BARCAP region's low-income and frontline communities. This measure builds upon the Air District's Bay Area Healthy Homes Initiative, and the initial buildings-focused program concept first articulated in the Priority Climate Action Plan (called the "Bay Area Clean Homes Initiative," or "BACHI").[6] The implementation of this measure is highly dependent on seeking and obtaining other funding sources (per B-2.1). BayREN and the Air District are committed to leading this exploration in partnership with other key organizations as noted below.

This measure addresses the need for many building owners to address non-energy compliance and other issues before being able to take advantage of assistance and incentives for energy upgrades. By augmenting and leveraging existing resources with new partnerships and approaches, this measure will help address multiple critical challenges facing Bay Area frontline communities.

Milestones for Initiation:

- **Q2 2026 –** Explore relevant funding and partnership opportunities to support the implementation of all measures
- **Q1 – Q2 2026 –** Work with the California Public Utilities Commission (CPUC), Pacific Gas & Electric Company (PG&E) and county governments to inform the design of voluntary pilot programs for priority neighborhood decarbonization zones
- **Q3 – Q4 2026 –** Work with Rebuilding Together and other partners to design a partnership and funding structure for a pilot program that integrates energy efficiency and remediation
- **Q1 2027 –** Initiate the pilot program and begin to document lessons learned to inform future expansion

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Housing Quality and Security

✚ Improved housing conditions and increased comfort; deferred maintenance remediation

✖ *Increased housing costs due to cost of building retrofits and electrification*

Public and Community Health

✚ Reduced exposure to health-damaging air pollution

Jobs and Workforce Development

✚ More employment and training opportunities in building retrofitting and electrification for frontline communities

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Climate Resilience Co-benefits

✚ Improved home insulation, ventilation and filtration systems reduce wildfire smoke and extreme heat or cold impacts

Cost Burden

✚ Decreased energy cost burden from more efficient appliances and better insulation

✖ *High electricity rates can reduce savings achieved; inaccessibility or inability to leverage incentive programs or cost-saving initiatives*

ACTIONS

B-2.1: Explore new funding and financing opportunities for home repair, public health, energy efficiency, and decarbonization programs to augment existing sources

Identify new, additive financial resources to support the planning, integration, and execution of integrating existing programs that will lead to positive health and climate outcomes and improved housing conditions for frontline communities.

Proposed Lead Implementer:
BayREN

Proposed Supporting Implementers:
Air District, Community Choice Aggregators, PG&E

Timeframe to start implementation:
Short-term/Ongoing

B-2.2: Make home decarbonization retrofits more affordable and accessible through coordinated efforts to use all capital and programmatic options

Braid together existing resources (funding, technical assistance, outreach) to ensure the benefits of building decarbonization are made available to those with the fewest means to participate and who can benefit the most.

Proposed Lead Implementer:
BayREN

Proposed Supporting Implementers:
Community Choice Aggregators, Air District, PG&E, and municipal electric utilities

Timeframe to start implementation:
Short-term/Ongoing

B-2.3: Partner with PG&E to map ideal locations for decommissioning, work with counties to coordinate and conduct outreach

Advance early-stage planning efforts to pilot targeted neighborhood-scale natural gas distribution system decommissioning that can scale-up building electrification and offset future investments in GHG-and-capital intensive gas infrastructure.

Proposed Lead Implementer:
BayREN, PG&E

Proposed Supporting Implementers:
SCTCA and other local governments

Timeframe to start implementation:
Short-term

B-2.4: Pilot a mini-BACHI retrofit program that combines home repair, energy efficiency, and decarbonization services and incentives

Work with Rebuilding Together and Habitat for Humanity to leverage programmatic resources (funding, technical assistance, outreach) to implement holistic home retrofits for low-income and frontline communities within two to three counties.

Proposed Lead Implementer:
BayREN, Rebuilding Together

Proposed Supporting Implementers:
Habitat for Humanity Bay Area, Association for Energy Affordability (AEA), SCTCA and other local governments, Community Choice Aggregators, PG&E

Timeframe to start implementation:
Medium-term

B-2.5: Based on lessons learned from pilot (B-2.4), secure funding to expand the mini-BACHI pilot retrofit program to all Bay Area counties with a focus on partnering with affordable housing programs and owners to identify sites and project opportunities

Use lessons learned from initial pilot experiences (from B-2.4) to adjust and expand efforts to additional Bay Area counties with an added emphasis to work with and support distinct types of affordable housing sites (deed-restricted and naturally occurring).

Proposed Lead Implementer:
BayREN, Rebuilding Together

Proposed Supporting Implementers:
Affordable housing owners, Habitat for Humanity Bay Area, and Association for Energy Affordability (AEA), SCTCA and other local governments, Community Choice Aggregators, PG&E

Timeframe to start implementation:
Long-term

Measure B-3: Support Collaborations and Partnerships to Ensure the Building Decarbonization Workforce is Successful, Skilled, and Diverse Enough to Serve the Entire Region Effectively and in a Culturally Competent Manner

GHG reductions in 2045:
Supporting

Potential regional benefits:

- \+ Reduced exposure to air pollution
- \+ Job creation
- \+ Professional development and employment opportunities
- \+ Enhanced community engagement
- \+ More capitol flowing in the local economy

Design principles:

Climate resilience benefits: More local capacity and knowledge of how to install, maintain and service clean and electric zero-NO_x building appliances, which provide resilience benefits such as air conditioning and better air quality. A well-trained workforce that better represents the members of the community can provide improved service, improve compliance, and support the equitable distribution of the benefits of clean electric appliances.

Estimated costs of implementation:
S

Proposed metrics: Number of activities (such as specialized heat pump trainings, peer-to-peer mentorship sessions).

SUMMARY

Support the transition to healthy, emissions-free buildings by ensuring there is a trained and sufficient contractor workforce equipped with the new skills and knowledge required to install efficient, electric heat pumps.

While public funding for incentives has set a foundation for early adopters in the field, the building decarbonization contractor base needs to scale up significantly to effectively implement the zero-NO_x appliance rules and achieve state, regional, and local building decarbonization goals. This is especially important considering the transition from gas to electric appliances and as incumbent workers age-out of the workforce. These actions support this outcome by creating an attractive and sustainable business environment that highlights today's heat pump contractors, increasing their overall numbers, and focusing on building the next generation of workers that reflects the diverse and multilingual communities of the Bay Area.

Milestones for Initiation:

- ★ **Q2 2026 –** Solidify key partnerships, secure commitments, and develop work plans for key actions, including seeking funding for B-3.2 (recruiting incumbent and new minority and women owned contractors to building decarbonization training and professional development opportunities) and collecting data for B-3.4 (regional workforce information sharing network)
- ★ **Q3 2026 –** Begin piloting B-3.1 (promoting well-trained contractors) and B-3.3 (implementing a contractor mentorship program) and refine based on early experiences
- ★ **Q4 2026 –** Formal launch of regional workforce information sharing network

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Jobs and Workforce Development

✚ More employment and training opportunities in building retrofitting and electrification for frontline communities

✖ *Lack of investment in upskilling incumbent workers in new technologies leads to job losses for them*

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

✖ *Lack of sufficient engagement and outreach results in reduced trust and disinterest in programs*

Housing Quality and Security

✚ Improved housing quality from more available trained workers deploying projects in their own communities

Public and Community Health

✚ Improved public and community health from more available trained workers deploying projects in their own communities

ACTIONS

B-3.1: Highlight and promote contractors who hold established certifications and credentials that indicate they are skilled and knowledgeable about heat pumps, and partner with incentive program administrators and other organizations to communicate their value proposition for customers[7]

Provide easy-to-access training that "meets contractors where they are" and focuses on enabling quality installations are key to a successful transition to zero-NO_x appliances. Collaborate with key partners to highlight contractor designations obtained through training programs that promote quality installation practices for consumers.

Proposed Lead Implementer:
State and regional organizations

Proposed Supporting Implementers:
Community Choice Aggregators, Sonoma County Transportation and Climate Authorities and other local governments, community organizations

Timeframe to start implementation:
Short-term

B-3.2: Explore partnerships to expand education, training, business growth and other targeted support of Minority/Women/Disadvantaged Business Enterprises (MWDBE) contracting companies to become active in building decarbonization program and project opportunities

Facilitate collaborations with Bay Area entities that empower minority, women-owned and other disadvantaged companies to increase their opportunities and participation in the growing building decarbonization sector.

Proposed Lead Implementer:
Regional organizations

Proposed Supporting Implementers:
Community Choice Aggregators, local nonprofit workforce training organizations

Timeframe to start implementation:
Short-term

B-3.3: Explore the creation of a contractor mentorship program that leverages the experiences and knowledge of high-performing heat pump installers ("volume installers") to share information and tips that explain the business opportunity to gas-centric contractors so they get interested in electric heat pump upskilling and training opportunities

Contractors trust other contractors for good industry advice. Develop and implement a "mentorship-style" program that leverages peer-to-peer learning and information sharing that inspires contractors who have been hesitant to shift to heat pumps to engage in training and business opportunities, and include in-language engagement to ensure non-English speaking contractors are included.

Proposed Lead Implementer:
Regional organization

Proposed Supporting Implementers:
TECH Clean CA, CAHPP, Community Choice Aggregators, SCTCA and other local governments

Timeframe to start implementation:
Short-term

B-3.4: Assemble a regional information-sharing network/directory to increase awareness and opportunities for contracting businesses to connect with training providers and new workers who have demonstrated a commitment to pursuing a career in the field. Integrate information about project and funding opportunities, requests for proposals, and incentive program updates as appropriate

Collaborate with key partners in the BARCAP region to build out an accessible directory that lays out the regional building decarbonization workforce ecosystem in a way that increases transparency and the ability to access information to aid in hiring, employment, training, and project opportunities.

Proposed Lead Implementer:
Regional organization

Proposed Supporting Implementers:
Training and education providers, industry associations/contractor networks, manufacturers, community organizations

Timeframe to start implementation:
Medium-term

7.6 FUNDING IMPLEMENTATION

Implementation of the building sector measures can be supported in part through existing incentive and financing programs. Most notable is the statewide TECH Clean CA program, which offers direct cash rebates to qualified homeowners for high-efficiency heat pumps.[8] BayREN's EASE Program provides technical assistance and financial incentives for energy efficiency measures that can lower energy bills, improve home comfort, and increase the performance of electric heat pumps.[9] The California Energy Commission's Equitable Building Decarbonization program provides and installs similar projects at no cost to low-income households in under-resourced communities.[10] Regarding financing options, both the GoGreen Multifamily Energy Financing and GoGreen Home Energy Financing programs (both backed by the state treasurer's office) leverage credit enhancements to provide low-interest loans for building owners to install a wide range of energy upgrades, including heat pumps.[11] A number of the Bay Area's Community Choice Aggregators are launching 0% interest loan programs for heat pumps as well. The programs listed above are not a comprehensive list of available funding. See Appendix G for other funding and financing sources, programs and partners, and examples of successful implementation. Additional funding and financing mechanisms will be needed to fully achieve the goals of this sector.

7.7 ENDNOTES

1 "Governor Newsom Calls for Bold Actions to Move Faster Toward Climate Goals," Governor Gavin Newsom, Accessed November 18, 2025, https://www.gov.ca.gov/2022/07/22/governor-newsom-calls-for-bold-actions-to-move-faster-toward-climate-goals/.

2 "FAQ ABOUT AIR DISTRICT APPLIANCE RULES," Bay Area Air District, n.d., https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20230522_faq_appliance-rules_final-pdf.pdf?rev=e2d8ff126b8d4e458d611ee5bfe480fb&sc_lang=en; When released to the atmosphere, NO_x reacts with other chemicals in the air to form both fine particulate matter (PM2.5) and ozone (O3), both which contribute significantly to poor air quality and can cause and exacerbate respiratory illnesses such as asthma.

3 California Congress, House, Committee on Budget, Housing, AB-130, Approved by Governor June 30, 2025, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202520260AB130; AB 130, which was added as trailer bill in the California legislature's vote to approve the 2025-25 state budget, included language to freeze certain changes to state and local building codes, including the ability for cities to adopt local "reach codes" for building energy efficiency and decarbonization that go beyond what the state code requires until 2031.

4 Napa County, "Public Draft Regional Climate Action and Adaptation Plan," Napa County, August 2025, https://climateactionnapa.konveio.com/draft-regional-climate-action-and-adaptation-plan.

5 Matt Alvarez-Nissen et al., "324,000 Naturally-Occurring Affordable Homes at Risk," California Housing Partnership, March 2023, https://chpc.net/wp-content/uploads/2023/03/NOAH-2023_final-3.23.pdf

6 "Bay Area Healthy Homes Initiative (Program is now closed)," Bay Area Air District, Bay Area Healthy Homes Initiative, Accessed November 19, 2025, https://www.baaqmd.gov/en/community-health/bay-area-healthy-homes-initiative

7 U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, "DOE-Google Collaboration Will Help Consumers Identify Qualified Technicians for Home Energy Upgrades," U.S. Department of Energy, December 18, 2024, https://www.energy.gov/eere/articles/doe-google-collaboration-will-help-consumers-identify-qualified-technicians-home.

8 "Single Family Incentives," TECH Clean California, Accessed November 18, 2025, https://techcleanca.com/incentives/single-family-incentives/.

9 "Efficiency and Sustainable Energy (EASE) Home Program," BayREN, Accessed November 18, 2025, https://www.bayren.org/ease-home.

10 "EBD Statewide Direst Install Program," California Energy Commission, Accessed November 18, 2025, https://www.energy.ca.gov/programs-and-topics/programs/equitable-building-decarbonization-program/ebd-statewide-direct.

11 "Elevate your multifamily property," GoGreen Financing, Accessed November 18, 2025, https://www.gogreenfinancing.com/multifamily/.

8 Power Sector

8 Power Sector

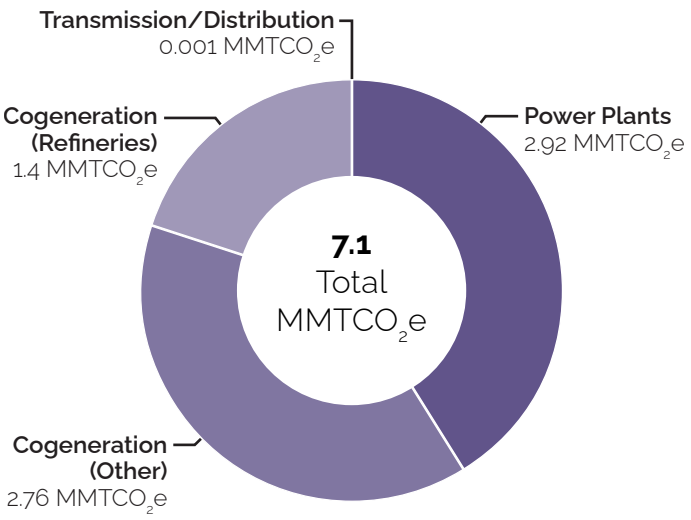
8.1 VISION FOR 2045

In 2045, the electricity produced and consumed in the Bay Area Regional Climate Action Plan (BARCAP) region is 100% clean and affordable for everyone, including frontline communities.[1] The grid is resilient and reliable, able to continuously meet growing electrification needs and support decarbonization in sectors such as buildings and transportation. This is achieved while minimizing rate impacts and in a manner that benefits frontline communities.

8.2 SECTOR OVERVIEW

The power sector includes both the generation and consumption of electricity in the BARCAP region. Because natural gas is the primary fossil fuel used to generate electricity in the BARCAP region, shifting to carbon-free fuels like renewable energy and storage will help reduce greenhouse gas (GHG) emissions for this sector. Shifting electricity demand to periods when renewable energy is abundant can help lessen reliance on polluting fossil fuel-based power plants, reducing GHG emissions even further.[2]

Figure 8-1: GHG emissions by power sub-sector for BARCAP region in 2022



Greenhouse gas emissions from the generation of electricity in the BARCAP region have decreased since 1990, due to requirements under the state Renewables Portfolio Standard that are driving decarbonization of the region's electric power generation mix by increasing the portion of electricity supplied by clean resources. Total emissions from the generation of electricity were 7.1 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) (or 13% of regional GHG emissions) in 2022, as shown in Figure 8-1. These emissions are predominantly from natural gas-fired power plants and cogeneration facilities. (Cogeneration facilities produce electricity on-site and utilize thermal energy, or heat, released during the generation of electricity for other processes.) Approximately 1.4 MMTCO2e of cogeneration emissions (or 2.6% of regional GHG emissions) are from cogeneration at transportation fuel refining facilities (see Figure 9-1). These emissions are associated with the transportation sector when accounting for all transportation-related emissions. Chapter 2.1.3 and Appendix A describe the contribution of emissions from the refining of transportation fuels in more detail.

Some of the electricity consumed in the Bay Area is produced within the region, and some is produced outside the region. The BARCAP inventory focuses on the GHG emissions produced from electricity generated within the BARCAP region and does not include emissions from electricity generated outside the BARCAP region. In this way, the inventory aligns with the state's GHG inventory approach and highlights the impact of local power plants and cogeneration facilities on GHG emissions as well as other air pollutant emissions that impact communities near these facilities (see the co-pollutants analysis in Chapter 5). While the BARCAP inventory focuses on emissions from the generation of electricity in the BARCAP region, it is important to note that state law prohibits local air districts from regulating carbon dioxide (CO2) emissions from sources covered by the state's Cap-and-Invest program, including most of the CO2 emissions from power plants and cogeneration facilities.[3] Therefore the Air District is limited in its ability to directly address these emission sources.

However, the BARCAP region can and is forging ahead by deploying clean energy. In 2022, renewable energy sources in the BARCAP region provided nearly half of the region's total power capacity (or five Gigawatts (GW)).[4] Wind and geothermal provided roughly 27% and 25% of the renewable capacity, respectively, while small-scale solar photovoltaic (PV) supplied 45% and large-scale solar PV resources provided 3%.[5] There were roughly 460 megawatts (MW) of battery storage in the region in 2022 as well.[6] Total renewable energy and storage capacity grew to six GW in 2025.

Electricity providers serving the BARCAP region have ambitious clean energy goals, as shown in Table 8-1, which affect the GHG emissions from electricity consumed in the Bay Area. The BARCAP region is home to five Community Choice Aggregators (CCAs), which purchase electricity on behalf of the residents and businesses in their communities, and two municipal utilities, all of which provide clean electricity at reduced rates. Many local climate action plans include actions to encourage resident and business participation in CCAs and to opt for the 100% renewable power option provided by CCAs. The CCAs, municipal utilities, and the investor-owned utility serving the BARCAP region, Pacific Gas & Electric (PG&E), also provide rebate and incentive programs to support electrification.

Table 8-1: BARCAP region electricity provider clean energy goals

ELECTRICITY PROVIDER	GOAL
Alameda Municipal Power (AMP)	Provide 100% clean energy to all customers (achieved)
Ava Community Energy	Provide 100% carbon-free electricity to all customers by 2030
CleanPowerSF (CPSF) and Hetch Hetchy Power	Provide 100% renewable energy to all customers (achieved)
MCE	Light Green service is 85% renewable energy by 2029 (Deep Green service is 100% renewable energy today)
Peninsula Clean Energy (PCE)	Provide 100% renewable electricity by 2030
PG&E	Net-zero energy system by 2040
Sonoma Clean Power (SCP)	Supply 80% of load with clean resources in winter evenings by 2030

While the BARCAP region has made significant headway, more action is needed to meet state and local clean energy goals. The BARCAP measures focus on helping meet state and local clean energy goals by addressing challenges to deploying small- to medium-scale clean energy (including behind-the-meter) in ways that benefit the BARCAP region, and particularly frontline communities, including increased resilience and access to local clean energy and potential affordability and job creation benefits. The measures also focus on creating a more flexible, efficient, and resilient grid with clean backup power, which can provide cost savings opportunities and help lessen reliance on fossil-fuel-based power plants to meet peak energy demands.

8.3 CONTEXT

The California Air Resources Board's 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) projects electricity demand will increase 76% from 2022 levels in 2045. (This includes projected electricity needs for building and vehicle electrification efforts, which the state and electricity providers then incorporate into energy planning and procurement efforts to help ensure these efforts do not overwhelm the grid.[7]) In addition, Senate Bill (SB) 100 (2018) and SB 1020 (2022) require that 100% of the electricity sold in California comes from renewable energy and zero carbon sources by 2045, with interim milestones of 90% by 2035 and 95% by 2040, helping drive reductions in power plant emissions.[8] CCAs and utilities in the BARCAP region have even more ambitious clean energy goals as shown above. The state also projects 52,000 MW of battery storage will be needed statewide in 2045.[9] Currently, there is a statewide goal of shifting 7,000 MW of electricity consumption to 'off-peak hours' by 2030. Title 24 Energy Code requires all new low-rise residential construction to have solar PV systems installed.[10] State policies influence development of local clean energy projects like microgrids and community solar as well. In addition, the Scoping Plan contains a goal of reducing cogeneration emissions to zero by 2040.[11]

Feedback from public engagement conducted during the development of the BARCAP showed strong regional support for generation of more clean energy (public survey results ranked as the top

strategy among 13 focus areas for climate action). At the same time, members of the BARCAP region's frontline communities who participated in the BARCAP engagement process expressed concern about rising electricity rates and the reliability of the grid. They also expressed interest in more education and outreach to increase their understanding of their electricity bills and opportunities to reduce them.

Based on this input and similar input from local governments and other stakeholders, affordability, rising electricity rates, and the need for resilient and reliable power were key considerations for measure development. Many factors contribute to rising electricity rates in the BARCAP region, including transmission and distribution costs, cost of procuring power, and wildfire mitigation efforts, among others.[12] Distributed energy resources - like solar paired with storage, standalone storage, load flexibility, and energy efficiency - have the potential to lessen the amount of new transmission and generation that is needed, which in turn can help contain future cost increases. They can also help reduce stress on the grid and improve its resilience. In addition, several new state laws focus on addressing affordability, lowering costs to ratepayers, and the reliability and resilience of the energy system, including SB 254 (2025) and Assembly Bill (AB) 825 (2025).

Community decarbonization hub: Glad Tidings church in South Hayward

Glad Tidings International C.O.G.I.C, in South Hayward, is the first of four Black churches in the Bay Area co-developing Community Decarbonization Hubs.[13] These hubs are resilient revenue-generating microgrids owned and operated by key community anchors that support the congregation and community during power outages and advance decarbonization efforts in the surrounding community. The church's microgrid – South Hayward Energy - includes a 0.3MW solar array, 1MWh of energy storage, electrification, energy efficiency, and nine electric vehicle charging stations in a frontline community with few current charging options. It supplies the church's energy needs with emissions-free electricity and the surplus energy powers EV chargers, generating revenue for the church on the order of $500,000 annually that can be invested back into the community through additional clean technologies and other services. The Community Decarbonization Hub model also includes training for local residents to maintain the microgrid.

This model is deployed by Gemini Energy Solutions and Green The Church Renewable Energy Development (GTC R.E.D.), with financial support from a revolving loan by the Kresge Foundation and financing from Freedman Green Bank & Trust. This collaboration is currently working with three other Bay Area churches. These resilient revenue-generating microgrids highlight the vital roles of community anchors in the clean energy transition and the innovative partnerships that can support them.

Not all communities experience energy-related impacts the same, so equity must be at the forefront when developing and implementing energy policies and solutions. Affordability is especially key for many low-income households who are particularly impacted by rising electricity rates, especially if they live in older energy inefficient homes. Those struggling to afford energy bills face the risk of utility service shut off for late or non-payment. Barriers to accessing clean energy technologies and incentives must be addressed, such as language, privacy concerns, and restrictive structural and financial requirements. Renters may also face the additional challenge of landlords who are not motivated to pay for clean energy and resilience upgrades. Ensuring frontline communities are energy resilient during Public Safety Power Shutoffs and blackouts can prevent food from spoiling, which would disproportionately impact low-income household budgets, and ensure cooling and medical devices continue working and medications stay refrigerated. Intentional efforts must be made to ensure these communities have access to the family-sustaining jobs generated by local clean energy and storage projects.

The BARCAP focuses on regional efforts that support small- to medium-scale clean energy and storage projects that can strengthen the resilience of the grid, support local jobs, help lower energy bills for subscribers of these projects, and speed up delivery of clean energy and storage.[14] It also focuses on efforts to equitably expand consumer programs that help customers adjust the timing and amount of their electricity consumption and deploy clean backup power and grid technologies more widely. These strategies can help support integration of new clean energy power and storage resources onto the regional grid to meet growing electricity demand for electrification in the BARCAP region and may help apply downward pressure on rates and GHG emissions.

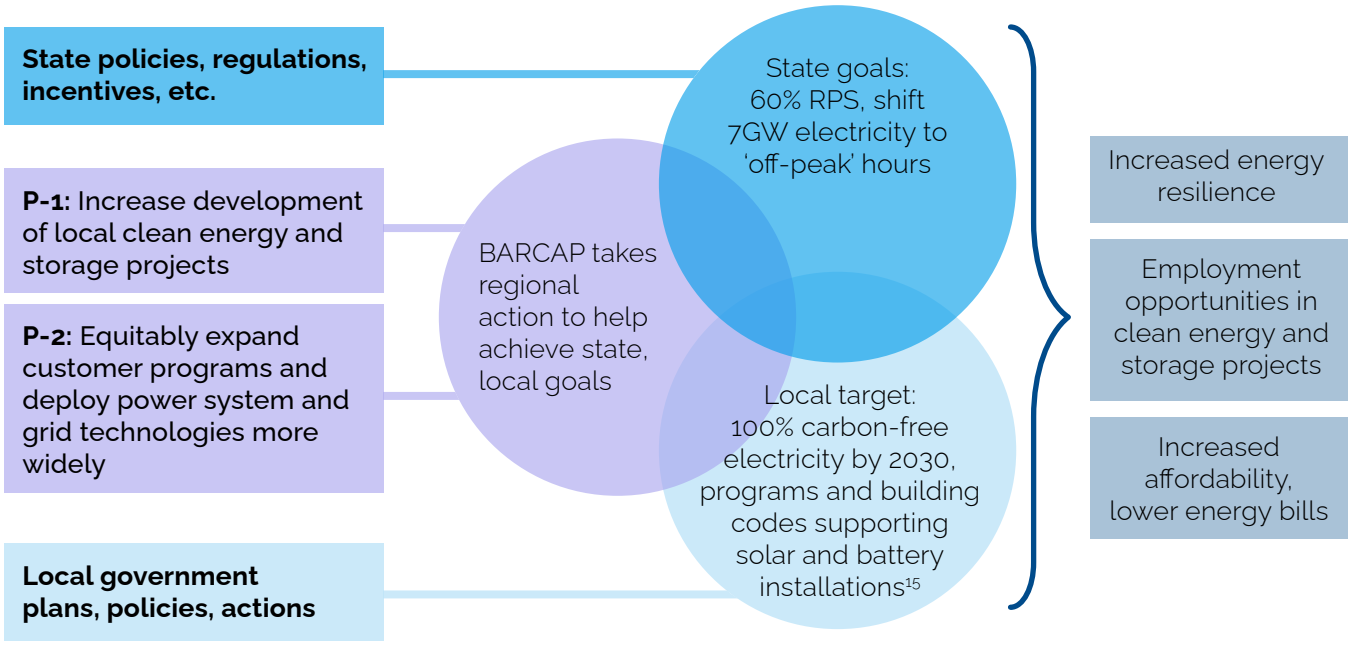
8.4 HOW PROPOSED MEASURES WERE DEVELOPED

As described in Chapter 4, measures and actions for the power sector were developed with extensive input from the public, frontline community members, Advisory Work Group members, and members of a technical stakeholder working group. The technical stakeholder working group was comprised of 14 subject matter experts representing local governments, community choice aggregators, utilities, regional agencies, and community-based organizations. These technical experts grounded measures in the current implementation landscape (including key hurdles and areas for action) and helped develop and refine the proposed measures and actions in collaborative meetings over six months. See Chapter 4 for an overview of BARCAP's sector-level technical working groups

The measures described below can be implemented with implementing partners' existing authorities.

8.5 POWER SECTOR MEASURES AND ACTIONS

Figure 8-2: Power measures contributing to state and local goals



The measures and actions for the power sector contribute to achieving state and local goals for the sector and result in many other key benefits. As shown in Figure 8-2, they complement, rather than duplicate, state and local actions in important ways. The measures and actions support successful local implementation of state policies and initiatives in ways that are equitable and bring benefits to the BARCAP region. They also help remove barriers and build capacity to accelerate local action and scale promising approaches regionally.

Measure P-1: Increase Development of Local Clean Energy and Storage Projects (with a Focus on Small- to Medium-Scale Projects), Including Behind-the-Meter and Distributed Energy Resources[16]

GHG reductions in 2045: Low *(see Figure 8-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:

- \+ Lower energy bills (for subscribers of on-site or community solar projects)
- \+ Strengthened regional grid resilience
- \+ Job creation potential
- \+ Increased/faster access to clean energy and storage
- \+ Reduced reliance on centralized generation and long-distance transmission

Design principles:

Climate resilience benefits: Clean backup power during outages, less strain on grid during periods of high demand by utilizing battery storage

Estimated costs of implementation: ✚

Proposed metrics: MW of clean power and storage installed in the BARCAP region with fraction on locally-identified sites (from P-1) noted, MW of community solar and/or brownfield-to-brightfield (especially serving frontline communities), percentage of low-income households with access to clean energy and storage

SUMMARY

Develop small- to medium-scale local clean energy and storage projects (<20 MW) that contribute to meeting state goals and exceed anticipated behind-the-meter deployment (BTM), and support an equitable and affordable transition to clean energy in the BARCAP region.[17] Focus projects where it is the best possible use of land given local and regional considerations (e.g., brownfields, rooftops, parking lots, capped landfills, under-utilized plots). Clean energy and storage projects might include but are not limited to BTM (including rooftop solar), community solar, microgrids, agrivoltaics, and feed-in tariffs.[18] These projects might include storage or storage might be deployed as a standalone project.

This measure encourages development of clean energy projects by addressing several obstacles and promoting a thoughtful approach to where projects are sited. These projects have the potential to lower electricity bills for subscribers and increase resilience against power outages, while reducing GHG emissions associated with electricity use.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q2 2026 –** Identify and convene interested local governments and refine scope of support, begin identifying incentives and development of toolkit (P-1.1)
- ★ **Q4 2026 -** Kickoff workgroup for brownfield-to-brightfield/community solar to kickstart roadmap process (P-1.2)
- ★ **Q3 2026 -** Establish research scope and kickoff research with project team (P-1.3)
- ★ **Q3 2026 -** Conduct landscape analysis to identify gaps through convening and outreach (P-1.4)

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Reduced exposure to health-damaging pollution from fossil-fuel powered electricity generation, particularly during high demand periods

✖ *Funding and financing gaps for small clean energy and storage projects may limit access to benefits for frontline communities*

Jobs and Workforce Development

✚ More employment opportunities in clean energy and storage projects

✖ *Reduced work in fossil fuel-powered electricity generation*

✖ *Employment opportunities could be challenging for low-income and disadvantaged jobseekers to secure without the necessary training for this relatively new market*

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Climate Resilience Co-Benefits

✚ Increased resiliency of energy grid and households, businesses, and community organizations to power outages, which disproportionately impact frontline households, and during periods of high demand like heat waves

Costs Burden

✚ Decreased energy cost burden for frontline subscribers to on-site or community solar

✖ *Maintenance costs (i.e., roof repair)*

ACTIONS

P-1.1: Support local governments to promote and incentivize development of clean energy projects on preferred sites in their jurisdiction that are well-suited for small- to medium-scale clean energy development and have community and business support

Implementation might include:

- **Identifying monetary and nonmonetary incentives for projects** (e.g., expedited permitting, updated zoning (overlays), including projects in feed-in tariffs, novel financing approaches);
- **Developing a toolkit for local governments with case studies, policy options, and model ordinances**;
- **Providing technical support and assistance**;
- **Supporting community engagement** (in partnership with community organizations).

Sites for consideration would include commercial and industrial sites (e.g., brownfields, landfills, large commercial rooftops, parking lots, under-utilized lots, etc.) and potentially public properties. Sites that serve frontline communities, including low-income and moderate-low-income communities and multifamily buildings, as well as critical community-serving facilities, would be prioritized to receive support. Consider potential climate impacts, like sea level rise or wild-urban interface, and land conservation goals.

Proposed Lead Implementer:
Regional agency or organization

Proposed Supporting Implementers:
Regional agency, local governments, community organizations, Community Choice Aggregators, utilities

Timeframe to start implementation:
Short-term/Medium-term

P-1.2: Develop a roadmap for community solar and brownfield-to-brightfield projects, especially projects serving multifamily renters and frontline communities, and identify options to fund and pilot projects at key sites

Establish a workgroup composed of community organizations representing community interests, developers, property owners (especially brownfield or industrial sites), renewable energy financing companies, local governments and community choice aggregators, focused on identifying solutions to advance and accelerate community solar and/or brownfield-to-brightfield projects in the BARCAP region. Special emphasis would be placed on projects that benefit frontline communities and multifamily renters. Review existing funding and financing options for these projects. Identify options to pilot project(s) from the roadmap.

Proposed Lead Implementer:
Regional agency or organization or community organization

Proposed Supporting Implementers:
Community organizations, Community Choice Aggregators, utilities, local governments

Timeframe to start implementation:
Short-term/Medium-term

P-1.3: Identify and disseminate best practices for local governments to simplify permitting of clean energy and storage projects

Develop best practices for behind-the-meter and small- to medium-sized clean energy and/or storage projects. Development will be informed by a workgroup of local governments and developers and technical and policy analysis. Initial focus might be on sharing best practices for battery storage to encourage more consistency for permitting across the BARCAP region. (The state has streamlined permitting for rooftop solar.[19]) Identify mechanisms to support local governments as they update permitting.

Proposed Lead Implementer:
Regional agency

Proposed Supporting Implementers:
Local governments, project developers

Timeframe to start implementation:
Short-term

P-1.4: Monitor - and explore how to address - key funding and financing gaps for behind-the-meter and in front-of-the-meter small clean energy and storage projects that benefit frontline communities, low-income and moderate-low-income households, small businesses, and community organizations

Conduct a gap analysis or convene a work group to assess the sufficiency of current funding and financing for local clean energy and storage projects. Monitor a subset of the identified gaps. Deploy existing funding and financing in innovative ways to help close the gaps, including through increased awareness and accessibility of these programs (through coordination with Community Choice Aggregators, utilities, community organizations, and others) and potentially helping address building readiness. Explore new funding or financing mechanisms, including public private partnerships or novel financing approaches, and consider ratepayer impacts.

Proposed Lead Implementer:
Regional agency or organization

Proposed Supporting Implementers:
Community Choice Aggregators, utilities, community organizations, regional agency

Timeframe to start implementation:
Short-term

Measure P-2: Equitably Expand Customer Programs and Deploy Power System and Grid Technologies More Widely[20]

GHG reductions in 2045: Supporting *(see Figure 8-2 for an illustration of the GHG emission reductions enabled by these measures and actions)*

Potential regional benefits:

- \+ Increased resilience and reliability of the grid
- \+ Potential downward pressure on electricity rates and reduced customer costs
- \+ Increased access to consumer programs and clean backup power
- \+ Reduced reliance on fossil-fueled-backup generators (and associated noise and air pollution)

Design principles:

Climate resilience benefits: Clean backup power for continued operation of critical facilities, less grid strain during periods of high demand, enhanced wildfire resilience of reconductored power lines

Estimated costs of implementation: S

Proposed metrics: Number of critical public facilities and/or key community facilities with clean backup power, participation in demand flexibility programs and virtual power plants (especially by low-income households and frontline communities), number of local governments provided with information related to P-2.1 and P-2.2

SUMMARY

Expand consumer programs and deploy grid technologies and clean backup power resources to enhance flexibility, efficiency, reliability, and affordability of electricity delivery, while aligning with state goals and plans and reducing carbon emissions. (Consumer programs include demand flexibility solutions, such as demand-side management, virtual power plants, and vehicle-to-everything, and examples of technologies and resources include solar+battery projects that can disconnect from the grid, district geothermal heating and cooling, and grid enhancing technologies.[21]) Ensure access to and direct benefits from these programs, technologies, and resources for frontline communities, including low-income and moderate-low-income households and renters (particularly multi-family). (Note: use of residential batteries (encouraged in P-1) can provide valuable resilience benefits and support this measure).

This measure helps address the need for more resilient and reliable power in the BARCAP region and a more flexible, efficient, and reliable grid. It provides opportunities for customer cost savings through load flexibility solutions and downward pressure on electricity rates. A more efficient and modern transmission system can bring additional clean electricity into the BARCAP region and carry more locally generated clean electricity across the region.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q3 2026 –** Direct local governments and community resilience centers to existing programs and technical assistance, and begin to develop case studies (P-2.1)
- ★ **Q3 2026-** Electricity providers and other implementers share best practices for scaling up demand-side flexibility solutions equitably (P-2.2)

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Reduced exposure to health-damaging pollution from fossil-fuel powered electricity generation, particularly during peak or high demand periods

✚ Reduced exposure to noise and health-damaging pollution from diesel backup generators

Jobs and Workforce Development

✚ More employment opportunities in storage projects

✖ *Reduced work in fossil fuel-powered electricity generation*

✖ *Employment opportunities could be challenging for low-income and disadvantaged jobseekers to secure without the necessary training for this new market*

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

Climate Resilience Co-Benefits

✚ Increased resiliency of energy grid, critical public facilities, and key community facilities to power outages, which disproportionately impact frontline households, and during periods of high demand like heat waves

✖ *Potential harmful impacts to human health if efforts to improve resilience of the grid and facilities rely solely on diesel backup generators*

Costs Burden

✚ Potential downward pressure on electricity rates and customer costs

✚ Increased access to customer programs that can reduce customer costs

ACTIONS

P-2.1: Increase the number of critical public facilities with reliable clean backup power and key community facilities with clean resilient energy resources (e.g., solar+storage, microgrids), such as resilience hubs, in coordination with local government emergency response managers and plans. In some cases, solar+storage hybrid may be necessary depending on the end use[22]

Support local governments and community organizations to identify and access funding and financing for the upfront costs and/or operation and maintenance of projects at key facilities, including resilience hubs. Coordinate this support with local government emergency response plans, managers, and networks. Collect and share case studies of successful procurement, development, and financing. In the near-term, some facilities may need hybrid systems to fully meet their reliability or resilience needs. Explore the important opportunity presented by resilient energy resources at schools to educate youth about clean power resources and clean energy jobs.

Proposed Lead Implementer:
Community Choice Aggregators, utilities, regional agency

Proposed Supporting Implementers:
County emergency operations staff, public facility staff, community organizations

Timeframe to start implementation:
Short-term

ACTIONS

P-2.2: Accelerate scaling up of different load flexibility solutions across the region in an equitable manner to improve grid reliability, help control costs, and align with state load shift goals to shift electricity usage[23]

In the near-term (zero to two years): Electricity providers scale up demand flexibility solutions by:

- **Sharing best practices** (including protecting customer privacy and data), data, and lessons learned from pilots and existing programs;
- **Exploring new incentives and tariffs**;
- **Improving and coordinating customer outreach and education efforts to increase customer enrollment** (including multilingual and culturally relevant outreach and education in partnership with community organizations);
- **Expanding pilots in additional service areas**.

In the medium term (two to five years):

- **Securing funding and financing and conduct outreach in partnership with community organizations and a regional agency**, to support the equitable scaling of virtual power plants and other critical load flexibility solutions, particularly low-income and moderate-low-income households in frontline communities and key public facilities serving these communities;
- **Scaling load flexibility solutions for commercial and industrial customers**.

Proposed Lead Implementer:
Community Choice Aggregators, utilities

Proposed Supporting Implementers:
Regional agency, community organizations

Timeframe to start implementation:
Short-term/Medium-term

ACTIONS

P-2.3: Explore mechanisms to minimize or eliminate health risks from fossil fuel-based backup generation (BUG) for large commercial facilities in ways that maximize the GHG co-benefits

Conduct source evaluation for BUGS, including:

- **Review of current BUG use and impacts**;
- **Review of emission controls and alternative technologies**;
- **Assessment of potential opportunities for rulemaking**, incentive, and/or outreach and education programs.

Lead Implementer:
Air District

Proposed Supporting Implementers:
Local governments, businesses

Timeframe to start implementation:
Medium-term

P-2.4: Modernize transmission and distribution lines to increase efficiency and improve reliability (e.g., grid-enhancing technologies, reconductoring)[24]

Update transmission and distribution lines with technologies that increase their efficiency (and therefore their ability to bring more clean energy into the BARCAP region) and their reliability. Leverage existing grants and loans to support this action.

Proposed Lead Implementer:
Utilities

Timeframe to start implementation:
TBD

Virtual power plants in Richmond

The Richmond Advanced Energy Community Project is a ground-breaking virtual power plant (VPP) pilot that provides up to 100 homes and 20 businesses the opportunity to electrify and save on their electricity bills.[25] This VPP pilot serves low-income households by providing smart, clean energy technologies including energy storage, smart thermostats, rooftop solar, heat pump space and water heating, and electric vehicle charging that are connected into one system which responds to the grid's needs. The VPP reduces appliance energy use during more expensive times of the day, provides clean electricity to the grid when needed, and stores energy from the grid when there is surplus (high generation and low demand), contributing to grid reliability and bill savings. Local small businesses are eligible for battery storage, which can provide resilience during grid outages, bill savings, and revenue generation potential.

The pilot project is a partnership of MCE and ZNE Alliance supported by a $5 million grant from the California Energy Commission and funding from the City of Richmond, CalEPA, and MCE. MCE is working to expand the VPP pilot across all MCE member communities with a priority on frontline communities along San Pablo Bay. Sonoma Clean Power Authority and Ava Clean Energy have VPP pilots as well. These projects provide replicable frameworks to expand VPPs and their significant benefits to customers and the grid.

8.6 FUNDING IMPLEMENTATION

Implementation of the power sector measures can be supported in part through existing funding and financing approaches. For example, California Public Utilities Commission's Self-Generation Incentive Program provides rebates for distributed energy systems at homes and public facilities to increase resilience and emergency preparedness. In addition, the California Energy Commission's (CEC) Electric Program Investment Charge (EPIC) funds research, supports deployment demonstrations, and addresses policy, market, and workforce barriers for clean energy technologies including energy storage projects. The CEC also offers zero- and low-interest loans for energy efficiency, generation, and storage projects.[26] Notably, PG&E's Community Microgrid Enablement Program and Microgrid Incentive Program fully fund microgrids at community facilities such as hospitals, fire stations, and markets. The programs listed above are not a comprehensive list of available funding. See Appendix G for other funding and financing sources, programs and partners, and examples of successful implementation. Additional funding and financing mechanisms will be needed to fully achieve the goals of this sector.

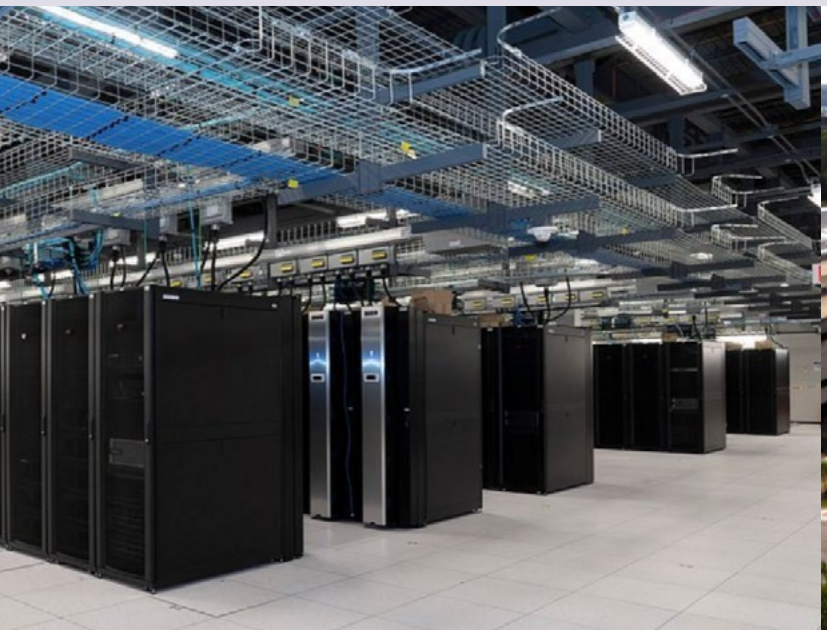
Data centers, air quality, and greenhouse gas emissions

The BARCAP region is home to many data centers powering the digital economy by storing, processing, and transmitting large amounts of information business and industry rely on. For example, data centers are crucial for email, e-commerce transactions, cloud-based computing and data analysis, and artificial intelligence (AI). As the use of power-intensive digital services like AI increases, data center energy demand will climb sharply with important implications for local air pollution, GHG emissions, and the electrical grid.

In California, data centers currently consume 5,580 gigawatt hours (GWh) of electricity annually (equivalent to nearly 3% of all electricity demand in 2023).[27] To meet increased energy demand from powering the digital economy, and importantly from the growth of AI, PG&E expects to add new data center load roughly equal to the demand of 2-3 million new homes in the Bay Area by 2029.[28] Growing data center energy demand may also impact the reliability and affordability of the entire energy system – key concerns for BARCAP stakeholders – when the costs of new energy infrastructure are passed onto ratepayers.[29]

Data centers also require reliable power and often depend on diesel or other fossil fuel-powered backup generators to ensure continuity, which can increase local air pollution exposure, including in areas already burdened with poor air quality. More than four-fifths of California's data centers are in the top 30% worst diesel emission zones, with nearly one-third in the top 10% worst zones.[30]

Meeting the rise in data center load growth with clean energy and backup power, while supporting a reliable grid and minimizing rate impacts, will be critical. The private and public sectors are working to identify innovative solutions to meet these objectives. For example, some local facilities will use low-carbon energy resources as primary on-site power sources and for backup generation.[31] Others are pursuing energy efficiency, demand response, and load flexibility to reduce annual electricity usage and are exploring how data centers could serve as a resource to the electric grid.[32]



ENDNOTES

1 For the BARCAP, clean energy is defined as zero-emissions technologies that produce electricity without emitting GHGs or harmful air pollution. Renewable natural gas and biodiesel are not considered clean energy sources due to air pollution impacts of combustion. Hydrogen, depending on how it is generated and used, may or may not be considered a clean energy source.

2 Load Flexibility," California Energy Commission, Accessed November 17, 2025, https://www.energy.ca.gov/programs-and-topics/topics/load-flexibility#:~:text=Load%20flexibility%2C%20also%20known%20as%20demand%20flexibility%2C,grid**%20*%20**Make%20the%20grid%20more%20resilient**."

3 Nearly all GHG emissions from this sector are CO_2 emission (99.5%), and over 95% of CO_2 emissions from the power sector are covered by the state's Cap-and-Invest program.

4 One MW (or Megawatt) can power about 750 to 1,000 homes, depending on the energy consumption profile of the home. One GW (or Gigawatt) is 1,000 MW.

5 California Energy Commission, "Solar PV Capacity and Installations for Systems 1MW and Smaller: 2022," California Open Data Portal, Accessed November 18, 2025, https://data.ca.gov/dataset/solar-pv-capacity-and-installations-for-systems-1mw-and-smaller-2022; California Energy Commission, "Utility Natural Gas Capacity and Generation by Jurisdiction and County: 2022," California Open Data Portal, Accessed November 18, 2025, https://data.ca.gov/dataset/utility-natural-gas-capacity-and-generation-by-jurisdiction-and-county-2022; California Energy Commission, "Utility Renewable Capacity by Type and County: 2022," California Open Data Portal, Accessed November 18, 2025, https://data.ca.gov/dataset/utility-renewable-capacity-by-type-and-county-2022.

6 California Energy Storage System Survey," California Energy Commission, Accessed November 17, 2025, https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/california-energy-storage-system-survey#:~:text=From%202018%20through%20the%20first%20quarter%20of,battery%20storage%20will%20be%20needed%20by%202045.

7 Stephanie Bailey et al., "Final 2024 Integrated Energy Policy Report Update," California Energy Commission, October 2025, https://efiling.energy.ca.gov/GetDocument.aspx?tn=266416.

8 The state projects that achieving zero carbon electricity by 2045 will require roughly tripling annual grid-scale solar and wind build rates and an eightfold increase in battery storage installation rates; Stephanie Bailey et al., "2023 Integrated Energy Policy Report," California Energy Commission, February 2024, https://efiling.energy.ca.gov/GetDocument.aspx?tn=254463.

9 California Energy Storage System Survey," California Energy Commission, Accessed November 17, 2025, https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/california-energy-storage-system-survey#:~:text=From%202018%20through%20the%20first%20quarter%20of,battery%20storage%20will%20be%20needed%20by%202045.

10 Solar PV, Solar Ready, Battery Energy Storage System (BESS) & BESS-Ready," California Energy Commission, Accessed November 17, 2025, https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/energy-code-support-center/solar.

11 Described as "combined heat and power" in the Scoping Plan.

12 Per California Public Utilities Commission, power lines are responsible for less than ten percent of wildfires, yet have been attributed as the cause of almost half of the most destructive wildfires in California history; "Wildfire and Wildfire Safety," California Public Utilities Commission, Accessed November 18, 2025, https://www.cpuc.ca.gov/industries-and-topics/wildfires.

13 Democratizing Clean Energy for All," Gemini Energy Solutions, Accessed November 19, 2025, https://www.geminiesolutions.com/; Nicole J. Caruth, "A California Network of Black Churches Is Embracing Solar Energy, EV Charging," Inside Climate News, September 7, 2025, https://insideclimatenews.org/news/07092025/california-black-churches-energy-transition/.

14 Siting utility-scale projects in the region (versus smaller projects) may raise concerns by local governments and others over land that otherwise could be used to meet housing demand or other pressing concerns. The BARCAP therefore focuses on small- to medium-scale projects that are less than 20MW.

15 City of Hayward, "Hayward Climate Action Plan," City of Hayward, January 31, 2024, https://www.hayward-ca.gov/sites/default/files/documents/CAP-Adopted-240130.pdf; City of Fairfield, "City of Fairfield Climate Action Plan," City of Fairfield, adopted December 3, 2024, https://www.fairfield.ca.gov/home/showpublisheddocument/12007/638695044261456923.

16 Behind-the-meter refers to generating power on the customer's side of the utility meter. Distributed energy resources refer to "diverse category of devices and technologies that interface with the electricity system at the distribution level, either directly connected to a distribution utility's wires or on an end-use customer's premises, behind the utility meter. Examples include distributed generation and storage, electric vehicles and charging stations, grid-interactive buildings and microgrids, as well as more traditional demand response or load flexibility resources and energy efficiency strategies"; "Distributed Energy Resources," California Energy Commission, Accessed November 18, 2025, https://www.energy.ca.gov/data-reports/california-energy-planning-library/distributed-energy-resources.

17 The capacity levels representing state goals are pulled from existing planning processes and forecasts to ensure alignment with already completed analysis and state goals. They are based on information from California Independent System Operator (CAISO) Transmission Planning Process (TPP) busbar mapping, which generally locates different utility-scale renewable energy and storage resources to various zones within CAISO's footprint to identify transmission constraints and support transmission planning needed to meet state goals. This analysis focused on two PG&E service territories (Greater Bay Area and North of Greater Bay Area. The Greater Bay Area and North of Greater Bay Area do not perfectly align with the BARCAP region. Therefore, the total increase in capacity estimate refers to the broader Bay Area region and some neighboring counties. Estimated forecasts for BTM deployment are from the CEC IEPR distribution generation forecasts (high) for the BARCAP region. For more information on the estimated combined totals for the Bay Area region and some neighboring counties based on these planning and data sources, as well as information on the approach to develop these estimates, see Appendix C.

18 A feed-in tariff (FIT) is "a standardized, long-term, guaranteed contract that allows smaller local renewable energy projects to sell power to the local utility or other load-serving entity. Market-based, cost-effective FITs with streamlined interconnection allow local businesses, residents, and organizations to install clean local energy projects in underutilized spaces…" MCE and Sonoma Clean Power currently have feed-in tariff programs.

19 State law mandates that most cities and counties implement an online, automated permitting platform for residential rooftop solar systems, SolarAPP+; "Residential Solar Permit Program Status Dashboard," California

Energy Commission, Accessed November 18, 2025, https://www.energy.ca.gov/programs-and-topics/programs/residential-solar-permit-reporting-program-sb-379/residential-solar.

20 Implementation of these measures involves voluntary actions, and no additional authority must be acquired by lead implementers to implement the measures.

21 Demand/load flexibility solutions help electricity customers "shift their energy usage to when electricity is cheaper and clean, and use less energy when the grid is under stress or running polluting power plants"; "Load Flexibility," California Energy Commission, Accessed November 18, 2025, https://www.energy.ca.gov/programs-and-topics/topics/load-flexibility; Virtual power plants are a software-based system to manage distributed energy resources - such as rooftop solar, batteries, electric vehicle chargers, and appliances (including smart thermostats, smart water heaters, smart plugs) –to support the grid and reduce costs to consumers. By aggregating distributed energy resources, they can help reduce the need for additional grid infrastructure and enhance local resilience. Vehicle-to-everything, also known as bi-directional electric vehicle charging, allows vehicle owners to use the energy stored in the electric vehicle's battery to power homes, grids, and other devices. Grid-enhancing technologies maximize the electricity transmission across the existing system through sensors, power flow control devices, and analytical tools (Department of Energy). They can reduce the need for new transmission infrastructure and enable the addition of clean, renewable power to the grid.

22 The goal is to produce as much day-to-day and resilient energy from renewable sources as possible and have some on-demand generation for critical missions for only when sun, wind or other intermittent sources or battery storage are inadequate at that time. Hybrid systems refer to including non-solar or storage-based resources along with solar power plus battery storage (and potentially other renewable generating sources like micro hydro, micro wind, etc.). These systems may be necessary if the amount or duration of power necessary to meet a facility's resilience needs cannot be met with solar+storage alone.

23 SB 786 (Dodd) requires the state to adopt a load shift goal. It is 7,000 MW by 2030.

24 Reconductoring is replacing old, existing power line conductors with newer, more efficient conductors, which can increase how much electricity they can carry.

25 MCE and Partners Unveil Virtual Power Plant, Bringing the "Home of the Future" to Life," MCE, August 7, 2024, https://cal-cca.org/mce-and-partners-unveil-virtual-power-plant-bringing-the-home-of-the-future-to-life/.

26 California Energy Commission, "Energy Conservation Assistance Act - Low-Interest Loans," *California Energy Commission, Accessed February 25, 2026, https://w*ww.energy.ca.gov/programs-and-topics/programs/energy-conservation-assistance-act/low-interest-loans.

27 Nanpeng Yu et al., "Enabling Energy Efficient Data Center in Smart Power Distribution Systems," California Energy Commission, May 2024, https://www.energy.ca.gov/sites/default/files/2024-05/CEC-500-2024-035.pdf; Average annual electricity consumption in California was 6,174 kilowatt-hours (kWh) per household in 2019; DNV GL Energy Insights USA, Inc., "2019 California Residential Appliance Saturation Study (RASS)," California Energy Commission, July 2021, https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-PO.pdf.

28 Kristin Koenig, Data centers: energy usage reporting and modeling, U.S. Congress, House, Assembly Committee on Utilities and Energy, April 2, 2025, https://autl.assembly.ca.gov/system/files/2025-04/ab-222-

bauer-kahan.pdf.

29 Kristin Koenig, Data centers: energy usage reporting and modeling.

30 The same analysis found that census tracts in California with data centers have a median CalEnviroScreen pollution score of 7 out of 10. A score of 7 out of 10 means that communities in these census tracts experience more severe cumulative impacts from pollution and specific population characteristics than 70% of other census tracts in California; Cecilia Marrinan, "Data Center Boom Risks Health of Already Vulnerable Communities," Tech Policy Press, June 12, 2025, https://www.techpolicy.press/data-center-boom-risks-health-of-already-vulnerable-communities/.

31 Microsoft's San Jose data center will use renewable natural gas for a portion of its backup generation, and ECL's data center in Mountain View is using hydrogen as its primary power source. These power sources are not considered fully sustainable clean energy per BARCAP definition.

32 Nanpeng Yu et al., "Enabling Energy Efficient Data Center in Smart Power Distribution Systems"; Anuja Ratnayake, "Unlocking AI Potential with Data Center Flexibility," energycentral, Accessed November 18, 2025, https://www.energycentral.com/intelligent-utility/post/unlocking-ai-potential-with-data-center-flexibility-PtPoXIAuRMzs5Ff; Jason Plautz, "Study finds headroom on the grid for data centers," E&E News, February 13, 2025, https://www.eenews.net/articles/study-finds-headroom-on-the-grid-for-data-centers/.

9 Waste and Materials Sector

9 Waste and Materials Sector

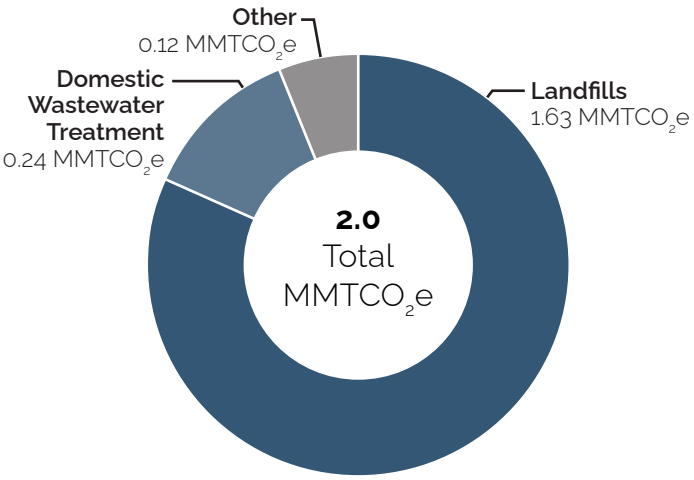
9.1 VISION FOR 2045

In 2045, very few materials are wasted. They are instead treated like valuable resources to meet community needs. Robust local food economies enable communities to thrive and eat healthy meals. Local builders use healthier, lower-carbon materials that are made regionally, and buildings are designed to be durable, adaptable, and use materials efficiently. Where materials are still not fully reused, recycled or repurposed, waste management facilities have better systems to reduce pollution and protect the air we breathe, especially in communities that have been impacted the most.

9.2 SECTOR OVERVIEW

The waste and materials sector include emissions that result from consuming and discarding food, goods, and building materials in the Bay Area Regional Climate Action Plan (BARCAP) region.

Figure 9-1: GHG emissions by waste and materials sub-sector for BARCAP region in 2022



The greenhouse gas (GHG) emissions from materials decomposing in the BARCAP region's waste management facilities were 2.0 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) (or 4% of regional GHG emissions) in 2022, as shown in Figure 9-1. GHG emissions from this sector have remained relatively stable since 1990, with landfills consistently contributing most to overall emissions. GHG emissions from the production of materials that are consumed in the BARCAP region are not included in BARCAP's GHG inventory because they occur predominantly outside the BARCAP region, but they can be as high as ten times greater than landfill emissions.[1] Therefore, the measures in this sector are designed to impact GHG emissions related to the whole lifecycle (from production to waste) of materials consumed in the BARCAP region through better material use.

This work builds on a history of leadership in sustainable materials management in the Bay Area. The BARCAP region is home to hundreds of food recovery groups that save millions of pounds of food each year. Urban and peri-urban farms and local markets help grow and share fresh food with communities. Local start-ups and innovators are making new low-carbon materials from natural materials like straw and mycelium or finding ways to safely reuse wood and other parts of buildings. Others are creating smart tools to track surplus food and measure the climate impact of building materials. Many cities in the BARCAP region include circular economy concepts in their climate action plans that highlight the multiple benefits of using materials more effectively to meet their communities' needs.

9.3 CONTEXT

California's main strategy to reduce waste-related emissions is the Short-Lived Climate Pollutants Act (Senate Bill 1383), which aims to reduce organic waste going to landfills by 75%, and recover and redirect 20% of currently wasted edible food to feed people. While Senate Bill (SB) 1383 is the state's main strategy to reduce waste-related GHG emissions, it is implemented primarily at the local level. Across the BARCAP region, food recovery organizations are rescuing millions of pounds of surplus food each year, and local governments are collecting organic waste including food scraps and yard trimmings to keep organics out of landfills. But the system still faces big challenges and local governments and food recovery organizations lack sustainable funding sources to continue and expand their work to meet the state's ambitious targets.

The United Nations estimates that food systems account for 30 percent of global GHG emissions with food loss and waste accounting for 8-10% of all emissions and costing a trillion dollars annually.[2] Food related emissions within the Bay Area is much smaller, but the BARCAP region can contribute to reducing these emissions by reducing the amount of food that is wasted and shifting consumption away from high-emission foods (meat, dairy, and highly processed foods) to those with lower emissions profiles (plant-based proteins and less processed foods).

Building materials like concrete, steel, and insulation are responsible for over 10%

of global GHG emissions.[3] Although most of these GHG emissions also occur outside of the BARCAP region, they can be reduced regionally through informed design and material selection and sourcing. California is working to cut the GHG emissions associated with the lifecycle production of building materials, or "embodied carbon," by 40% by 2035 through new rules under Assembly Bill 2446. The California Green Building Code (CALGreen) requires projects to reduce embodied carbon by reusing parts of old buildings, choosing low-carbon materials, or designing buildings to reduce overall lifecycle emissions.

Reusing materials that are yielded through deconstruction can reduce waste and pollution, including dust containing hazards such as lead and asbestos. Building for longevity through durability and resilience, retrofitting to increase energy efficiency, and planning for adapting to future uses can extend lifetimes of buildings and reduce the demand for new building materials.[4] The Bay Area's local governments have been leading the low-carbon building movement, including Marin County's low carbon concrete code and San Mateo County's requirements for construction and demolition waste reduction plans. Working with the construction industry and economic development agencies can result in more low-carbon building resources in the BARCAP region, while reducing the region's reliance on imported materials.

Marin County low carbon concrete code

Concrete is a widely used building material, whose production contributes roughly 8% of global greenhouse gas emissions. To address these emissions, Marin County adopted one of the nation's first low carbon concrete building code requirements in 2019. The ordinance places limits on the carbon intensity of concrete used in permitted projects in unincorporated Marin County.

The code was designed for feasibility, allowing a range of carbon limits tied to different concrete strengths and offering multiple compliance pathways. Supported by an Air District grant and facilitated by the Carbon Leadership Forum, development of the code included extensive engagement with stakeholders—concrete and cement producers, local governments, NGOs, architects, engineers, and contractors—as well as analysis of concrete mixes and testing on pilot projects. These steps ensured the limits were practical and effective.

Concrete mixes created to comply with Marin's ordinance are now being used across the region. Marin's process and code language have been documented as a precedent, inspiring two other Bay Area jurisdictions and influencing efforts in Southern California and other states. The ordinance predated and informed California's statewide CALGreen embodied carbon limits on concrete.

Based on the feedback from public engagement conducted during the development of the BARCAP, there is support for waste reduction, recycling, and composting. Public survey results ranked these among the top five of 13 potential focus areas for climate action by nearly a third of respondents. A similar number of respondents also ranked strengthening local food production and consumption through reduced food waste and stronger food security as a top-five strategy for potential focus areas. Members of the BARCAP region's frontline communities who participated in the BARCAP engagement process expressed the importance of having access to healthy, affordable food and buildings. They emphasized the important role of community organizations in filling gaps in the food system and strengthening their ability to grow, distribute, and compost food in their communities. Health impacts were an important concern, particularly related to plastics, toxins in building materials, and an inequitable air pollution burden from waste management facilities.

In an equitable Bay Area, all people would have adequate access to the material resources they need to live healthy lives. This means access to healthy foods, living in homes built with nontoxic materials, and access to clean, odor-free air, even near waste management facilities. It also means that the economies and supply chains that deliver those materials to Bay Area residents provide economic benefits like quality jobs and family-supporting incomes equitably to all Bay Area communities.[5] It is critical that all communities, especially those that have been historically marginalized, have a voice in developing equity-centered policy solutions.

The BARCAP focuses on regional efforts in three areas: supporting community-based initiatives for food recovery, production, distribution, and composting to address food insecurity and reduce the amount of organics sent to landfills; increasing the use of low-carbon, reused, and nontoxic building materials; and enabling proper waste sorting and treatment to decrease the amount of organics going to landfill and to manage waste-related facilities to minimize GHG emissions.

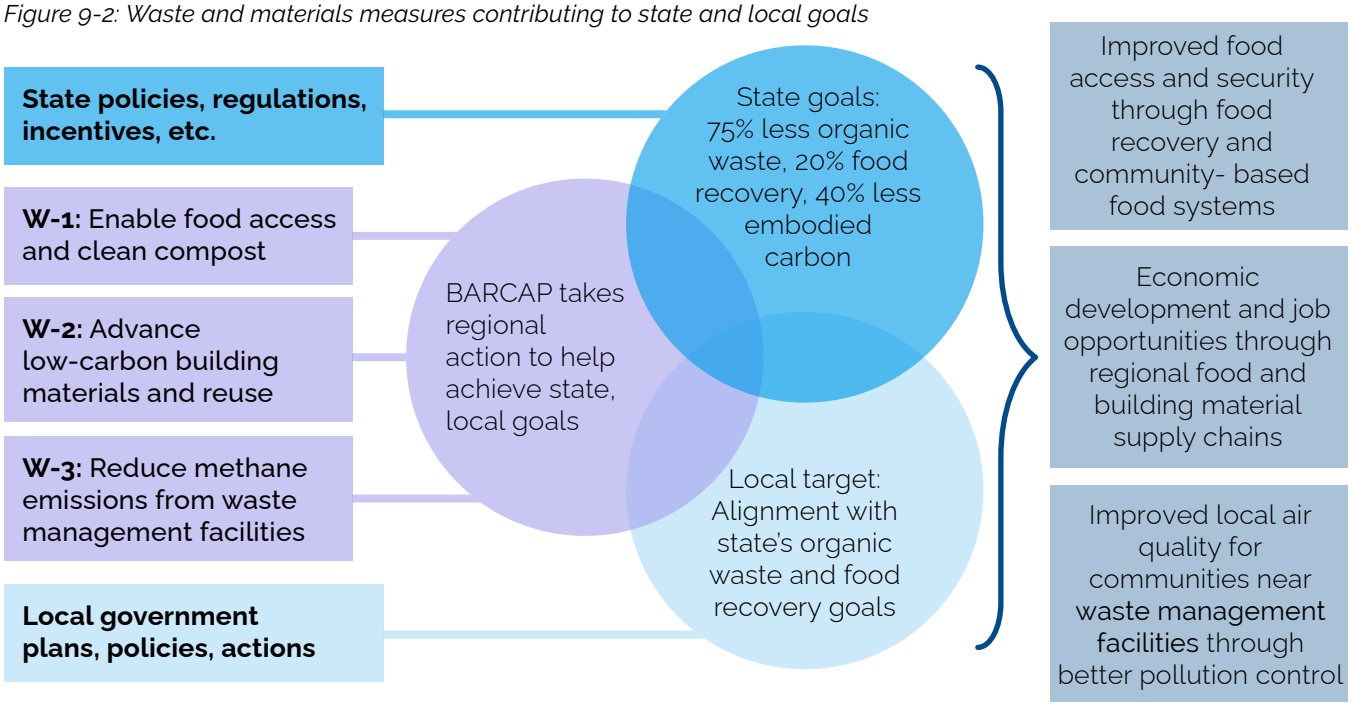
9.4 HOW PROPOSED MEASURES WERE DEVELOPED

The process to develop waste and materials sector measures leveraged existing networks addressing food recovery and building materials. These included convening a group of local governments implementing Senate Bill (SB) 1383 (2016) and their active food recovery organization partners for two conversations to design Measure W-1 Enable Food Access and Clean Compost. Measure W-2 Advance Low Carbon Building Materials built upon a round of conversations by the Bay Area Deconstruction Working Group and an additional convening of local governments considering embodied carbon policies across the Bay Area.[6] These technical experts grounded measures in the current assessment of implementation, key hurdles, and areas for action, and were foundational in shaping these measures. See Chapter 4 for an overview of BARCAP's sector-level technical working groups.

The measures described below can be implemented with implementing partners' existing authorities.

9.5 WASTE SECTOR MEASURES AND ACTIONS

Figure 9-2: Waste and materials measures contributing to state and local goals



The measures and actions for the waste and materials sector contribute to achieving state and local goals for the sector and result in many other key benefits. As shown in Figure 9-2, they complement, rather than duplicate, state and local actions in important ways. The measures and actions support successful local implementation of state policies and initiatives in ways that are equitable and bring benefits to the BARCAP region. They also help remove barriers and build capacity to accelerate local action and scale promising approaches regionally.

Measure W-1: Enable Food Access and Clean Compost

GHG reductions in 2045:
Low[7] *(see Figure 9-2 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:

- \+ Improved community health
- \+ Reduced cost burden through increased access to food
- \+ Reduced exposure to emissions near waste treatment facilities
- \+ Creation of food recovery jobs
- \+ New green spaces and community gardens

Design principles:

Climate resilience benefits: Compost added to agriculture lands to support water retention, soil structure, and stable food production; improves ability of natural lands to recover from climate shocks; creates more local, robust food recovery systems; increased food security during extreme weather

Estimated costs of implementation: $

Proposed metrics: Pounds of food recovered to feed people.

SUMMARY

Support local governments and food recovery organizations to more effectively meet their food recovery and composting goals and overcome implementation hurdles to implement Senate Bill 1383 goals to reduce landfilled organic waste by 75% and recover 20% of edible food.

This measure addresses the persistent lack of resources to fund food recovery and the common barriers to successfully sorting organic waste to create clean compost. Every county in the Bay Area is working toward meeting SB 1383 requirements and regional coordination will make this work more effective across all eight counties in the BARCAP region.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q2 2026:** Begin convening networks of food recovery organizations, counties, and other stakeholders to share data, best practices, and needs
- ★ **2027**: Identify potential funding mechanisms and mutual benefit arrangements for food recovery capacity
- ★ **2028**: Survey BARCAP region's educational materials on lifecycle carbon and health impacts of consumption and strategies for behavior change and community-scale solutions

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Improved food access from edible food recovery

✖ *Sometimes the food recovered is highly processed and unhealthy*

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Jobs and Workforce Development

✚ Funding to enable food recovery workers to be paid instead of relying on volunteer labor

ACTIONS

W-1.1: Develop funding and asset-sharing mechanisms to support edible food recovery operations

Expand capacity for edible food recovery operations and training for businesses and institutions that generate surplus edible food to enable at least the minimum edible food recovery requirement in SB 1383 and deliver food to people experiencing food insecurity. Steps to implement this action include:

- **Assessing the funding need for food recovery**, grounded in data of actual cost of service;
- **Pursuing a sustained and dedicated funding source**, potentially paid for by the BARCAP region's largest food waste generators;
- **Designing the funding to be accessible to food recovery organizations** with effective and equitable food distribution models;
- **Strengthening regional and local networks of food recovery organizations** to enable them to pursue funding collectively;
- **Supporting these networks to develop mutual benefit arrangements for shared assets** (e.g., clean air vehicles, food processing and storage facilities and equipment ideally with low global warming potential refrigerants, and software).

Lead Implementers:
Counties

Supporting Implementers:
Food recovery organizations

Timeframe to start implementation:
Short-term

W-1.2: Coordinate regional efforts to improve sorting of organics discards, including reducing common contaminants of the organics stream

Coordinate joint efforts across counties to minimize duplication of effort and share best practices with local governments and waste haulers, including strategies to:

- **Translate informational materials and target education and incentives to multifamily residents and property owners and managers**, small mom and pop, minority-owned businesses and restaurants, and multi-tenant commercial properties;
- **Reduce single-use foodware and plastics** through regionally aligned messaging, incentives, and policies that advance reusable foodware and other alternatives;
- **Understand and advocate for materials that are truly compostable or recyclable** in current markets and infrastructure;
- **Include in waste hauler agreements the use of new technologies** that enable real-time monitoring and feedback on proper sorting (e.g., cameras in trucks and bins, artificial intelligence analysis of discard streams);
- **Receive feedback from compost users in natural and working lands** to improve strategies to reduce contamination.

Lead Implementers:
Counties

Supporting Implementers:
Waste haulers

Timeframe to start implementation:
Medium-term

W-1.3: Increase the region's understanding of lifecycle and health impacts of food and goods consumption and the opportunity for community-scale solutions

Include information about lifecycle, health, and community impacts of materials in messages distributed to communities by regional and local governments. Partner with schools to educate youth about health, climate literacy, and community-scale entrepreneurship. Impacts and benefits to highlight include:

- **Lifecycle environmental impacts and reduction actions** (such as plant-based diets);
- **Health concerns** including toxic chemicals, microplastics, and food date labeling;
- **Community resilience**, food security, and economic benefits from community-scale food production, distribution, recovery, gleaning, and composting.

Lead Implementers:
Local governments

Supporting Implementers:
Schools, food producers, food recovery organizations, community composters, health agencies

Timeframe to start implementation:
Medium-term

Measure W-2: Advance Low-Carbon Building Materials and Reuse

GHG reductions in 2045: Supporting. *In addition to supporting the reduction of materials entering landfills, this measure has the potential to reduce embodied carbon – which includes emissions outside of the BARCAP region but caused in the production of materials that are used in the region – by up to 50 million $MTCO_2e$ between 2025 and 2045 (or 2.5 million $MTCO_2e$ per year) if embodied carbon is reduced by the Assembly Bill 2446 target of 40%.*

Potential regional benefits:

- \+ Reduced exposure to health-damaging demolition dust containing asbestos, lead, etc.,
- \+ Reduced exposure to health-damaging toxins off-gassing from building materials
- \+ Improved housing quality, job creation (supply chain and deconstruction)
- \+ Anti-displacement if existing buildings are retrofitted to provide more housing units

Design principles:

Climate resilience benefits: Increased building resilience to disasters including wildfire and flooding; increased building durability and lifespans

Estimated costs of implementation: S

Proposed metrics: Amount of used building material salvaged by resellers, amount of carbon dioxide equivalent decrease in embodied carbon from a baseline measured by the California Air Resources Board

SUMMARY

Reduce waste and GHG emissions associated with building materials in alignment with Assembly Bill 2446 (2022) goals to reduce embodied carbon by 40% by 2035 through expansion of the California Green Building Code and economic development initiatives that advance deconstruction and reuse, material efficiency, and the prevalence of carbon storing, low-carbon, and healthy building materials.[8] Actions are informed by a series of convenings of the Bay Area Deconstruction Working Group.

This measure leverages the growing interest among local governments and building sector leaders advancing low carbon building materials and design across the eight counties in the BARCAP region. It is a step to ensuring compliance with Assembly Bill 2446 among the region's construction industry, for which CARB is developing embodied carbon reporting requirements of construction projects and product manufacturers. It seeks to remove barriers to low-carbon construction by providing education and supporting economic development to increase the availability and supply of low-carbon materials.

As in the buildings sector, recently passed state legislation will impede the development of local residential reach codes related to building materials until 2031.[9] Cities and counties can continue to pursue codes for nonresidential construction and shift their focus to enforcing existing codes. Delayed access to reach codes as an action pathway increases the importance of economic development actions to increase voluntary market adoption.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **2028**: Engage in CALGreen code update cycle
- ★ **2028**: Standardize deconstruction surveys and identify priority materials for salvage
- ★ **2030**: Begin study to understand existing building stock for opportunities to improve utilization rates and future material reuse

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Housing Quality and Security

✚ Improved occupant health from the use of nontoxic materials

✖ *Low-carbon materials or deconstruction practices may have higher upfront costs, passed onto renters or home buyers*

Public and Community Health

✚ Reduced exposure to demolition dust and off-gassing

Jobs and Workforce Development

✚ Employment opportunities in low-carbon building trades

✖ *Employment opportunities could be challenging for low-income, disadvantaged jobseekers to secure without the necessary training for this new market*

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

Climate Resilience Co-benefits

✚ Greater scrutiny and attention paid to building materials, including which materials are more resilient to fire and flooding

Cost Burden

✖ *Introducing new requirements can increase the cost of construction*

ACTIONS

W-2.1: Collaborate with the state and other local governments to implement the California Green Building (CALGreen) and CARB embodied carbon code requirements

Engage with local governments to implement amended building codes and CARB reporting requirements to encourage material efficient building design and lower carbon material choices, deconstruction surveys, and use salvaged materials. Increase the code's effectiveness by supporting its implementation. This action includes:

- **Providing comments and information during code development processes;**
- **Creating templates for local reach code adoption** (as allowable by the state);
- **Providing training and resources** (e.g., those developed by state agencies or architectural associations; potentially providing continuing education credits) to local building officials, engineers, and design teams to support implementation and enforcement of existing codes;
- **Coordination across jurisdictions** for regional consistency to ease compliance by construction teams that work across the BARCAP region;
- **Lead by example through government procurement** using current best practices, materials, and processes for their building and infrastructure projects, and continue to evaluate new options as they become available.

Lead Implementers:
Local governments

Supporting Implementers:
Industry associations

Timeframe to start implementation:
Medium-term

W-2.2: Work with construction project teams and suppliers to increase availability and adoption of low-carbon building materials and practices

Increase adoption of reuse and low carbon practices by project teams (consisting of developers, architects, engineers, contractors) and increase the availability of low carbon materials in the BARCAP region through:

- **Information sharing and education** through existing networks and industry associations;
- **Public recognition**, faster permitting for deconstruction or projects pursuing certifications like TRUE or Zero Carbon;
- **Identification of priority materials and products to focus on for the Bay Area;**
- **Economic development** including workforce training, entrepreneurship support, and physical infrastructure such as space for manufacturing, research and prototyping, and storing salvaged materials;
- **Collaboration with rural economic development** agencies and initiatives in natural and working lands for regeneratively sourced wood and agricultural building materials.

Lead Implementers:
Local governments

Proposed Supporting Implementers:
Industry associations, economic development agencies, research institutions

Timeframe to start implementation:
Medium-term

W-2.3: Conduct local assessments to identify opportunities for the region's existing buildings

Assess how much vacant space and reusable materials are in existing buildings in cities across the BARCAP region. Compile economic, land use, assessments of salvageable materials, and building type and age information to establish a regional understanding that will enable the BARCAP region to:

- **Identify opportunities to retrofit underused commercial and oversized residences** to accommodate more housing units or community-based economic development (e.g., pop-ups in vacant retail spaces) and designing for future adaptive reuse;
- **Identify commercial sites for storing and processing salvaged building materials**;
- **Target materials to deconstruct and salvage** when buildings are taken down or remodeled.

Lead Implementers:
Local governments

Proposed Supporting Implementers:
Regional governments, deconstruction assessors and contractors, research institutions

Timeframe to start implementation:
Medium-term

Measure W-3: Reduce Methane Emissions from Waste Management Facilities

GHG reductions in 2045:
NE

Potential regional benefits:
+ Reduction of odors and other co-pollutants

Design principles:

Climate resilience benefits:
Community health, potential improvements to hazard mitigation at affected facilities

Estimated costs of implementation:
NE

Proposed metrics: Adoption of new or amendment of existing rules

SUMMARY

Reduce methane emissions through expansion or amendment of existing Air District rules or engage in new rulemaking to address sources such as compost facilities.

California's Landfill Methane Regulation requires municipal solid waste landfills to reduce methane and other air pollutant emissions through emissions monitoring and through capturing fugitive methane. The state adopted amendments in Fall 2025 that will help reduce health effects and GHG emissions from landfills in the region.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

★ **Q4 2026**: Begin review of existing rules

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Reduced methane and non-methane volatile organic compounds including odorous substances from organic waste handling facilities may improve air quality

Community Engagement, Awareness, and Capacity

✚ Increased awareness and engagement in solutions builds trust between communities and the government

ACTIONS

W-3.1: Explore rulemaking to minimize emissions of methane, volatile and toxic organic compounds, and odorous substances from organic waste handling facilities, including large composting facilities

Review regulatory mechanisms to reduce emissions. Conduct outreach to facility operators and impacted communities. Develop specific requirements for facilities. Based on findings, determine whether rule development is needed and initiate that process.

Lead Implementer:
Air District

Timeframe to start implementation:
Medium-term

9.6 FUNDING IMPLEMENTATION

Implementation of the waste sector measures can be supported in part through existing funding and financing approaches. Examples of possible opportunities include CalRecycle's Organics Grant Program which funds organic waste facility construction or expansion, and the U.S. Environmental Protection Agency's C-MORE Grant Program which offered funding to support reducing embodied GHG emissions from construction materials. The programs listed above are not a comprehensive list of available funding. See Appendix G for other funding and financing sources, programs and partners, and examples of successful implementation. Additional funding and financing mechanisms will be needed to fully achieve the goals of this sector.

ENDNOTES

1 "Documentation for greenhouse gas emission and energy factors used in the waste reduction model (WARM)," United States Environmental Protection Agency, Office of Resource Conservation and Recovery, 2020, https://www.epa.gov/sites/default/files/2020-12/documents/warm_background_v15_10-29-2020.pdf.

2 "Greenhouse Gas Emissions from Agrifood Systems," Food and Agriculture Organization for the United Nations, 2024, https://openknowledge.fao.org/server/api/core/bitstreams/111b7ee8-282b-42ff-ad95-cccecd90f8ea/content; "Food loss and waste account for 8-10% of annual global greenhouse gas emissions; cost USD 1 trillion annually," United Nations Framework Convention on Climate Change, September 30, 2024, https://unfccc.int/news/food-loss-and-waste-account-for-8-10-of-annual-global-greenhouse-gas-emissions-cost-usd-1-trillion.

3 "Bringing Embodied Carbon Upfront," World Green Building Council, 2019, https://worldgbc.org/climate-action/embodied-carbon/.

4 In some cases, replacing old buildings with new construction that is more energy efficient or space efficient and better serves the land use potential of a site may be more effective at lowering overall GHG emissions.

5 According to the State of California's Future of Work Commission "Quality jobs provide a living wage, stable and predictable pay, control over scheduling, access to benefits, a safe and dignified work environment, and opportunities for training and career advancement." (p. 3); "A New Social Compact for Work and Workers," California Future of Work Commission, 2021, https://www.labor.ca.gov/wp-content/uploads/sites/338/2021/02/ca-future-of-work-report.pdf#:~:text=Ensure%20that%20more%20workers%20have%20quality%20jobs.,workers%20report%20being%20in%20a%20quality%20job.

6 The Bay Area Deconstruction Working Group is composed of representatives of government, construction industry, and nonprofits, in fall 2024 to discuss strategies to increase the use of salvaged materials. It was convened by San Francisco Environment Department, EPA Region 9, and supported by StopWaste. Information can be found on StopWaste's website: https://www.stopwaste.org/at-work/built-environment/construction-demolition-debris/bay-area-deconstruction-workgroup.

7 While emissions reductions are low within the BARCAP region, food waste prevention contributes to avoiding emissions beyond the BARCAP region related to food production - agricultural activities, processing, and transportation.

8 Deconstruction is the systematic dismantling of a structure, or portion thereof, to maximize the salvage of materials for reuse, in preference over salvaging materials for recycling, energy recovery, or sending the materials to the landfill.

9 California Congress, House, Committee of Budget, Housing, AB 130, Approved by Governor June 30, 2025, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202520260AB130

10 Natural and Working Lands Sector

10 Natural and Working Lands Sector

10.1 VISION FOR 2045

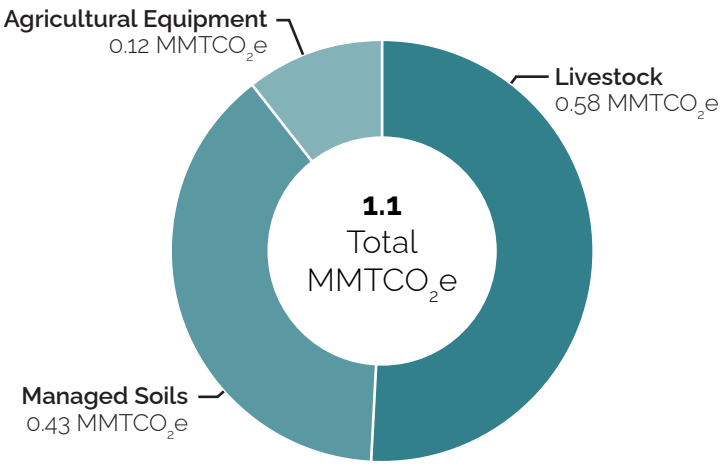
In 2045, natural and working lands are minimally impacted by wildfires, drought, and development, and have been made healthier by implementation of nature-based solutions. These lands will continue to sequester carbon, cool cities, provide clean drinking water, produce economically sustainable food and fiber crops, and support iconic ecosystems like redwood forests.

10.2 SECTOR OVERVIEW

The natural and working lands (NWL) sector includes carbon stocks held in plants and soils in agricultural and forestry lands (working lands) and natural ecosystems like wetlands, forests, and grasslands (natural lands), as well as greenhouse gas (GHG) emissions from agricultural equipment and livestock.[1]

Fossil-fuel powered agricultural equipment and livestock methane accounted for most of the GHG emissions from agriculture (see Figure 10-1), totaling 1.1 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) in 2022 (or 2% of total regional GHG emissions).

Figure 10-1: GHG emissions by agriculture sub-sector for BARCAP region in 2022



The NWL sector is unique as it is the only sector with the potential to be a carbon sink in addition to a GHG emissions source.[2] NWL also provide critical benefits to Bay Area communities beyond carbon sequestration, such as clean drinking water, food and fiber crops, urban green spaces that cool cities and protect communities from flooding, and iconic natural landscapes including wetlands (tidal and delta) and redwood forests. An illustration of land cover types across the Bay Area Regional Climate Action Plan (BARCAP) region is shown on the following page in Figure 10-2, with total carbon stocks held in plants and soils shown in Figure 10-3. In 2022, the BARCAP region's plants and soils held over 92 million metric tons of carbon (MMT C), which is over six times larger than total annual GHG emissions across the BARCAP region.[3] The three largest contributors to carbon stocks are forests (50%), developed lands (12%), and grassland/herbaceous lands (11%). The massive amounts of carbon held in the BARCAP region's plants and soils emphasize the importance of preserving and enhancing these carbon stocks to achieve the region's climate goals. If current statewide trends continue, NWL are projected to be a net source of GHG emissions through 2045, mainly because of loss of plants and soil carbon stocks from land conversion and climate impacts like drought and wildfire.[4] These trends can be observed at the regional level: significant spikes in historic regional emissions from the sector were caused by wildfires in 2017 and 2020, two of the most severe wildfire years in California's history.

Figure 10-2: Land Cover Classes for BARCAP Eight-County Region (2022)

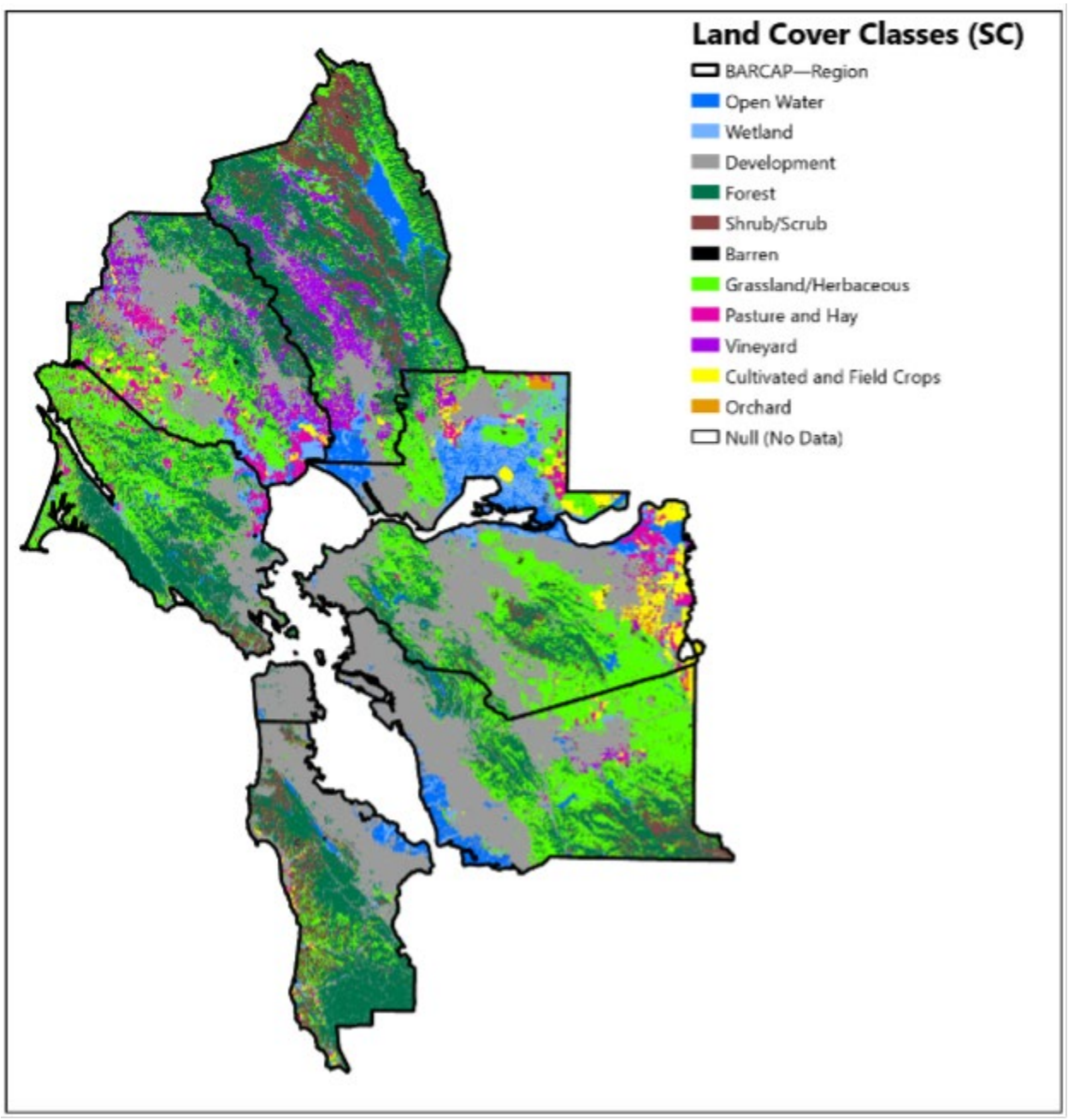
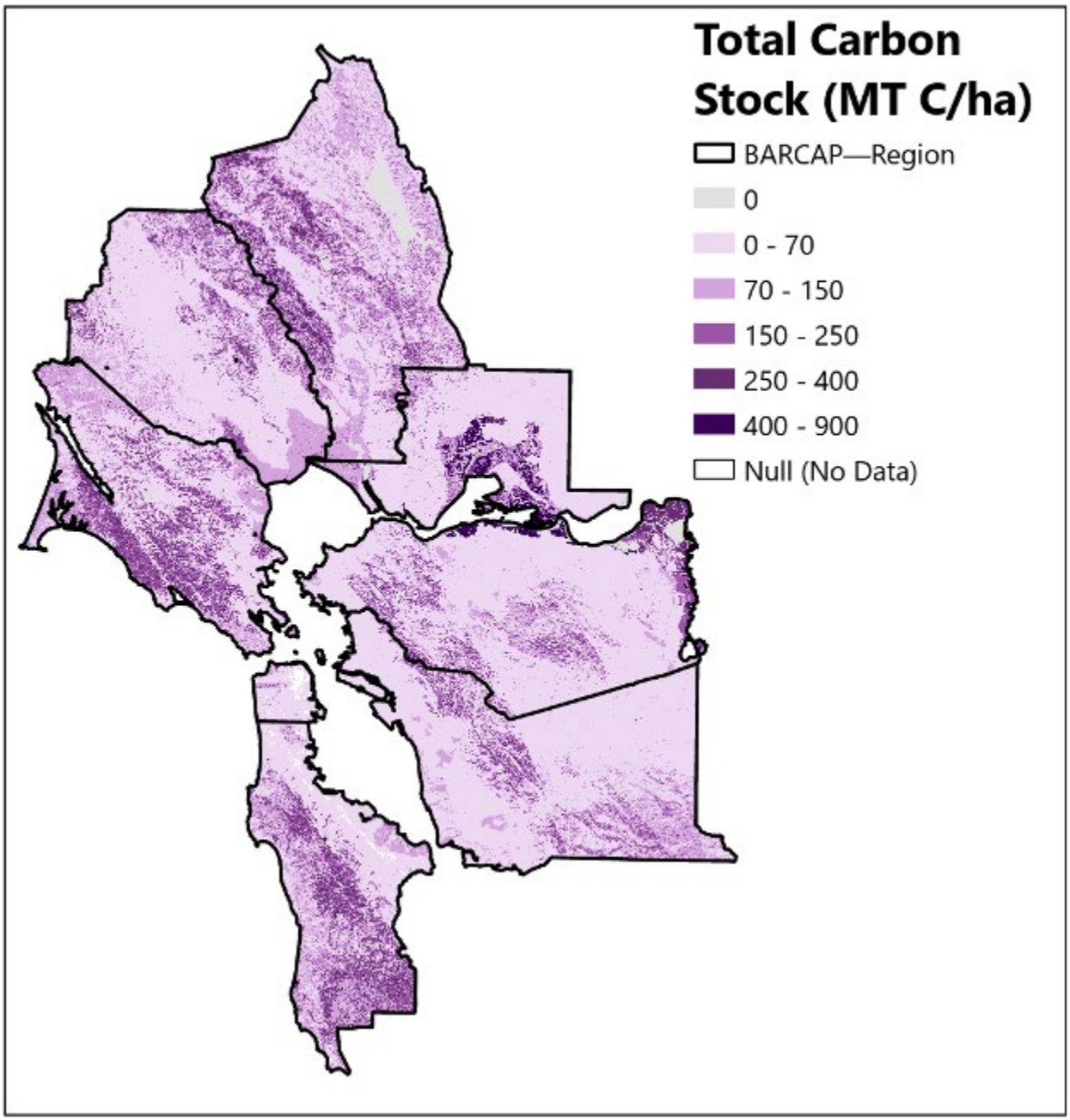


Figure 10-3: Carbon Held in Soils and Plants (2022)



Despite the forecast of declining carbon stocks and intensifying impacts of climate change across the state, implementers in the Bay Area have made important progress in both protecting existing ecosystems and agricultural lands, while also bringing forward nature-based solutions that increase carbon sequestration. Progress of note include:[5]

- Over 2.2 million acres of lands conserved in the BARCAP region by 2024;
- Over $14.3 million invested in climate beneficial agriculture projects in the BARCAP region as of 2025;

- Over 58 thousand acres of fuel treatment applied across the BARCAP region;
- 13 thousand acres of wetlands restored between 2000-2021 in the Bay Area.

10.3 CONTEXT

The State of California is increasingly recognizing the role of NWL in climate action. The California Air Resources Board 2022 Scoping Plan for Achieving Carbon Neutrality (Scoping Plan) included accounting and forecasting of NWL carbon stocks for the first time and included ambitious statewide targets for nature-based solutions, including:

- Conservation of 30% of California lands and waters by 2030;
- Reducing wildfire risk through annual fuel treatments on 2.3 million acres of forest, shrubland, and grassland;
- Increasing organic agriculture to 20% of all croplands;
- Restoring 60,000 acres of delta wetlands;
- Increasing urban forestry investment by 200%.[7]

Even if these targets are achieved, the outcome will slow, but not reverse, losses of carbon stocks across the state. Wildfire in particular is projected to drive large losses of carbon stocks, especially carbon rich forests, through 2045. Fortunately, the BARCAP region is home to a deep bench of technical experts, long-term implementers, and advocates for nature-based solutions. Historically, natural lands preservation and expansion activities are recognized for their value in conservation, outdoor recreation, water quality protection, habitat and biodiversity protection, wildfire prevention, and sustainable agriculture. While these qualities are recognized as 'co-benefits' in the context of the BARCAP, they have been the primary motivation for implementing what

East Bay Regional Park District: 'fighting fire with fire' with the carbonizer

In 2020, climate change-fueled drought produced over 1,500 acres of dead and dying trees in East Bay Regional Parks, including eucalyptus. The dead trees presented both a wildfire risk and a logistical challenge. Typical methods to clear and move wood are carbon intensive and costly (long-distance diesel truck transportation) or produce smoke and GHGs (open pile burning). Instead, the East Bay Regional Park District (EBRPD) turned to the carbonizer, a machine that burns organic matter at over 1,300 degrees Fahrenheit through a lower-emissions process. The carbonizer produces biochar, which can be added to soils to improve water retention, increase crop productivity, capture contaminants in soil, and increase long-term carbon sequestration. This effort was the first of its kind in California, reducing 14,049 tons of biomass tons of dead trees to 821.5 tons of biochar, which was then used at Ardenwood Historic Farm and other regional parks as a beneficial soil amendment. As of 2025, the Park District has thinned and removed hazardous trees and brush on 667 acres at Anthony Chabot Regional Park using a carbonizer, with additional work planned.[6]

is generally referred to as nature-based solutions. Nature-based solutions that protect existing carbon stocks include:

- **Land conservation**, which protects carbon held in natural and working lands from being lost to development;
- **Wildfire mitigation strategies and fuel management**, which reduces the chance of catastrophic wildfire;
- **Ecosystem restoration**, which makes existing carbon-rich landscapes more resilient to the effects of climate change like drought and sea-level rise.

These actions are essential for slowing projected losses of carbon from forests, wetlands, and agricultural lands. BARCAP strategies in this sector go beyond protecting current lands, and advance approaches that can enhance carbon sequestration in plants and soils. Core actions to sequester more carbon and reduce on-farm energy emissions include:

- **Expanding urban green spaces and the urban canopy**, sequestering more carbon and cooling communities;
- **Implementing climate beneficial agriculture**, which increases soil organic matter and soil carbon, and can integrate carbon sequestering trees into row crops and grazing lands;
- **Reducing energy emissions from water pumping and irrigation and expanding renewables on suitable agricultural lands**, which expands the generation of zero-carbon electricity while reducing emissions from pumping and moving water, which takes up 12% of California's total energy use.[8]

Based on feedback from public engagement conducted during the development of the BARCAP, there is strong regional support for expanding and protecting green spaces and natural ecosystems (public survey results ranked this second among 13 potential focus areas for climate action). Public commenters also expressed support for measures that support biodiversity and agriculture worker welfare, youth and school involvement in nature-based solutions, and interest in incorporating nature-based solutions into future regional efforts to support a just transition. Members of the BARCAP region's frontline communities who participated in the BARCAP

The BARCAP focuses on accelerating implementation of nature-based solutions that both protect existing carbon stocks and increase carbon sequestration through new funding and technical assistance to the BARCAP region's rich network of implementers.

Key areas for action include policy and data innovation, conservation, wildfire risk reduction, ecosystem restoration, climate beneficial agriculture, and environmental justice-centric urban greening.

City of Oakland land back to the Lisjan (Ohlone) people: Rinihmu Pulte'irekne project

The City of Oakland worked with a local tribe and an Indigenous land trust to return 3.8 acres of land in a city park to Indigenous stewardship. Confederated Villages of Lisjan Nation (Lisjan) is a Bay Area tribe without federal recognition status. They work with Sogorea Te' Land Trust, an intertribal nonprofit organization to rematriate and access their ancestral land. Together with the City, a Cultural Conservation Easement was created to transfer stewardship of Rinihmu Pulte'irekne. While the City retains ownership and liability, all other rights, including monitoring and conservation were transferred to the land trust, with perpetual access rights for Lisjan people.

The Tribe led care of the land, incorporating traditional approaches to habitat restoration, including removal of invasive species, fire fuels reduction and the reintroduction of native plants.

Oakland is the first known city to return land back to a tribe without federal recognition status. Returning land to Indigenous stewardship is increasingly recognized as a key climate solution because of its potential to shift historical and environmental harms mitigating catastrophic climate events and impacts.

The Rinihmu Pulte'irekne project and strategy of a Cultural Conservation Easement offer a possible legal framework and model for other cities to replicate.[9]

engagement process expressed support for the creation of food-growing spaces, expansion of urban green spaces that beautify communities and reduce urban heat and flooding, restoring indigenous land ownership, access to nature, and desire for community-led land stewardship. At the same time, they were concerned that new green spaces might unintentionally cause gentrification and displacement, increase wildfire impacts, and reduce water availability.

Equity issues are interwoven throughout the sector. Urban areas affected by the legacy of discriminatory policies such as redlining face greater danger from urban heat and have fewer green spaces.[10] When green spaces are built in disinvested communities, they may factor into gentrification unless additional guardrails are in place.[11] Displacement of Native American Tribes from land, and historic criminalization of land management practices like cultural burning, have contributed to overstocked and unhealthy forests that are more prone to catastrophic wildfire.[12] Opportunities to interact and play in the Bay Area's natural spaces can be inequitable, running the risk of unequal access for Black, Indigenous, and People of Color (BIPOC) communities.[13] Finally, outdoor workers like firefighters and farmworkers are disproportionately exposed to climate impacts like extreme heat and wildfire smoke.[14] Real progress has been made across the BARCAP region to address these key environmental justice issues, led by implementers like community-based organizations, advocates, Native American Tribes, parks departments, and local governments. Equity-centered policy solutions, investments, and innovations woven throughout the BARCAP highlight where additional regional action can be taken to build upon this progress.

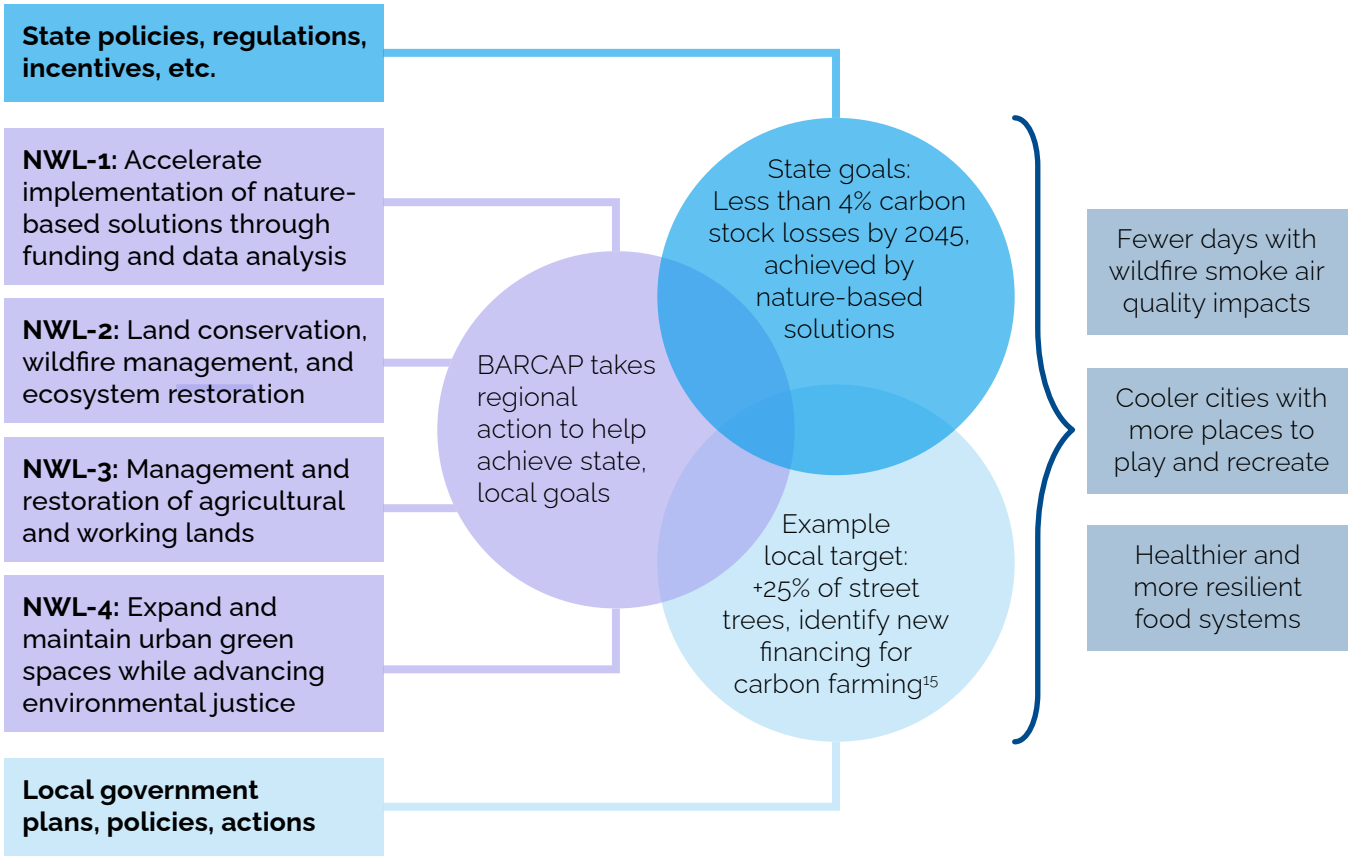
10.4 HOW MEASURES WERE DEVELOPED

As described in Chapter 4, measures and actions were developed with extensive input from the public, frontline community members, and members of the NWL technical stakeholder working group. The technical stakeholder working group was comprised of 22 local experts in policy and implementation, who met, conferred, and advised over the course of six months in collaborative meetings to develop and refine the proposed measures and actions. Technical stakeholder working group members included resource conservation districts, implementers of urban forestry, regional conservation organizations, firewise councils, regional wetland protection organizations, local government staff involved in land management, and nonprofits with expertise in climate-beneficial agriculture. These technical experts grounded measures in the current assessment of implementation, key hurdles, and areas for action, and were foundational in shaping these measures.

The measures described on the following pages can be implemented with implementing partners' existing authorities.

10.5 NATURAL AND WORKING LANDS MEASURES AND ACTIONS

Figure 10-4: NWL measures contributing to state and local goals



The measures for the NWL sector contribute to achieving state and local goals for the sector and result in many other key benefits. As shown in Figure 10-4 they complement, rather than duplicate, state and local actions in important ways. The measures support successful local implementation of state policies and initiatives in ways that are equitable and bring many benefits to the BARCAP region. They also help remove barriers and build capacity to accelerate local action and scale promising approaches regionally.

Measure NWL-1: Accelerate Implementation of Nature-Based Solutions through Regional Funding and Data Analysis

GHG reductions in 2045:
Supporting

Potential regional benefits:

+ Reduced duplication of work and administrative burden
+ Increased implementer capacity
+ Integration of best available science and data

Design principles:

Climate resilience benefits: Improved data for climate resilience and mitigation crossover areas

Estimated costs of implementation:
NE

Proposed metrics: Number of data projects supported, usage of datasets by implementers, funding allocated to new nature-based solution implementation projects across the BARCAP region

SUMMARY

Accelerate implementation of nature-based solutions by providing land stewards and other implementers with regional-scale technical assistance for carbon data analysis and long-term funding and financing.

This will allow for more focus on-the-ground transformation of land management practices by reducing competition among implementers for funding or the need to conduct duplicative data analysis.

Milestones for Initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- **Q4 2026 –** Identify lead organization/ organization(s) to lead collaborative regional efforts
- **2027 –** Launch new, or contribute significant resources to enhance existing regional data initiatives
- **2027 –** Launch new, or contribute significant resources to enhance existing regional funding

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Community Engagement, Awareness, and Capacity

✚ Increased community capacity, awareness of solutions/projects and results, and trust between communities and the government

✖ *Potential low uptake of funding and technical assistance by smaller community-based organizations without specific outreach and partnership*

ACTIONS

NWL-1.1: Provide technical assistance for NWL data analysis to support project implementation, results tracking, and incorporation of emerging science

Increase capacity for implementers of nature-based solutions to meet data tracking and inventory needs and reduce duplicative work across the BARCAP region by enhancing existing tools and resources, and/or providing technical assistance and standardization of regional approaches for analysis.

Implementation actions may include:

- **Obtain funding and/or provide professional expertise** to provide long-term maintenance of public data and technical assistance;
- **Create a public library for spatial and carbon sequestration datasets** and tracking metrics consistent with state analyses and latest science, include spatial data on equity, public health, and climate impacts;
- **Provide technical assistance to conduct standardized NWL carbon inventories** and landcover changes over time, including analysis of equity concerns to support implementation of nature-based solutions by local governments, resource conservation districts, community organizations, and other implementers.

Proposed Lead Implementer:
Regional agency or organization

Proposed Supporting Implementers:
Bay Area Greenprint, TOGETHER Bay Area, regional agency, San Francisco Estuary Institute (EcoAtlas), San Francisco Bay Joint Venture

Timeframe to start implementation:
Short-term

NWL-1.2: Increase long-term funding for nature-based solutions through dedicated support for regional-scale grant writing and exploration of emergent sources of long-term funding

Support long-term implementation of nature-based solutions by obtaining regional-scale, transformative levels of funding. Implementation actions may include:

- **Offer grant writing assistance** to support nature-based solution implementation by multi-agency or organization coalitions including parks departments, local governments, open space districts, community-based organizations, nonprofits, resource conservation districts, and tribes;
- **Explore new long-term funding sources for nature-based solutions** including Proposition 4 and other state bonds, public banks, green banks, and market mechanisms;
- **Provide outreach to key environmental justice groups** to increase their knowledge and uptake of new regional supports.

Proposed Lead Implementer:
Regional agency or organization

Proposed Supporting Implementers:
Regional agency or organization, TOGETHER Bay Area

Timeframe to start implementation:
Short-term

Measure NWL-2: Prevent Losses of Carbon Held in NWL through Land Conservation, Wildfire Management, and Ecosystem Restoration

GHG reductions in 2045:
High *(see Figure 10-4 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:

+ Biodiversity
+ Climate resilience
+ Outdoor access
+ Stewardship opportunities for frontline communities
+ Community health
+ Climate resilience
+ Green jobs
+ Access to services and amenities

Design principles:

Climate resilience benefits: Reduced wildfire severity, resilience to sea level rise and flooding

Estimated costs of implementation: **$$**

Proposed metrics: Number of new projects launched, acreage covered, funding provided, number of programs supporting implementation, changes in project-level carbon storage (if available)

SUMMARY

Prevent losses of carbon held in NWL from development and wildfire, while managing and restoring key carbon-rich lands to maximize carbon sequestration.

This measure addresses the challenge of predicted losses of carbon stocks which are expected statewide through the mid-century. Enhancing carbon sequestration and increasing carbon drawdown must build on a foundation of protecting existing pools of carbon held in regional natural and working lands.

Milestones for initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- **Q3 2026 –** Continue to monitor and support existing programs across NWL-2
- **Q4 2026 –** Start pilot and private owner financing model innovation with existing funds
- **2027 –** Leverage Proposition 4 and Other Funding at Regional Scale
- **2027 –** Regional update on blue carbon and beneficial reuse linkage

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Public and Community Health

✚ Reduced exposure to wildfire smoke, increased access and community health benefits from access to natural spaces

✖ *Incentives for private owners of large land areas primarily benefit the wealthy*

Jobs and Workforce Development

✚ Post training employment and sustained work opportunities in land management and ecosystem restoration

✖ *Employment opportunities may not be sustained, well-paying or have benefits*

Climate Resilience Co-Benefits

✖ *Increased resiliency to climate-related impacts including wildfire, extreme heat, and sea level rise*

ACTIONS

NWL-2.1: Support conservation of lands at the regional scale through the Priority Conservation Area (PCA) Program

Support regional implementation of California's 30 x 30 goals through conservation of NWL in the Bay Area region through the Priority Conservation Area (PCA) Program. Conservation priorities for protection and/or enhancement may be informed by emerging regional analysis on carbon stocks and sequestration, such as the 2022 carbon stock BARCAP inventory, and potential deliverables from NWL-1.1.

Proposed Lead Implementer:
MTC - PCA Grants Program, San Francisco Estuary Partnership

Timeframe to start implementation:
Short-term

NWL-2.2: Increase fuel management and reduce wildfire risk on natural and working lands and at the wildland-urban-interface (WUI) through new funding and financing mechanisms, workforce development, and innovation

Contribute to state targets for increased fuel management through treatments on NWL with high-fire risk. Treatments may include vegetation management, cultural and prescribed fire, and targeted grazing. Implementation actions to increase fuel management uptake may include:[16]

- **Exploration of new funding and financing strategies** to increase incentives for landowners to manage fuels, with a focus on smaller landowners and rural communities that may struggle to fund projects, including development of markets for woody material at high-fire risk, and climate co-benefit products like biochar;[17]
- **Identify and scale innovative and successful pilot projects** in fuel management;[18]
- **Reduce ignition risk in the WUI** by providing new incentives and exploring new policies to encourage homeowners to adopt home hardening practices, including "zone zero" practices that manage flammable materials within five feet of structures by managing flammable material;
- **Address the workforce gap for fuel management** through job training, emphasizing opportunities for indigenous land stewards and agricultural workers.

Proposed Lead Implementer:
Resource conservation districts (RCDs), fire safe councils, county governments (long-range planners), State agencies, Federal agencies, local fire protection districts

Proposed Supporting Implementers:
Community organizations, tribes, conservation corps, water agencies, local governments, University of California Cooperative Extension (UCCE)

Timeframe to start implementation:
Short-term/Medium-term

NWL-2.3: Incentivize private landowners managing large land areas to manage fuel at scale through innovations in cost sharing and financing

Overcome challenges for incentivizing private landowners to manage fuels on large land parcels through innovative financing mechanisms that allow for re-consideration of risks, pooling of costs, and benefits at the multi-parcel scale. This may include cost-sharing grants provided by local governments, existing regional cost-share programs (e.g. North Bay Forest Improvement Program), and emergent insurance-based mechanisms.

Proposed Lead Implementer:
RCDs, fire safe councils, county governments (long-range planners), State agencies, local fire protection districts

Proposed Supporting Implementers:
Community organizations, tribes, conservation corps, water agencies, local governments

Timeframe to start implementation:
Medium-term

NWL-2.4: Protect carbon held in the Bay Area's wetlands through protection, restoration, and enhancement of tidal marsh habitat

Contribute to the achievement of targets from the 2022 San Francisco Estuary Blueprint Task 10, and Baylands Ecosystem Habitat Goals Science Update (2015):

- **23,000 acres of tidal marsh restored** in the Bay, and 5,500 acres of tidal marsh restored in the Delta, which is achieved through collaboration with diverse partners, and consideration of climate adaptation in project design;
- **3,000 acres of tidal marsh enhanced** in San Francisco Bay;
- **20,000 acres of Baylands protected** through various mechanisms including acquisition, transfer of fee title, or easement.

Implementation may depend upon funding availability.

Proposed Lead Implementer:
Nonprofits, government agencies, private entities, San Francisco Bay Joint Venture

Proposed Supporting Implementers:
Regional organizations for estuary partnership and restoration

Timeframe to start implementation:
Short-term

NWL-2.5: Contribute to emergent science on blue carbon through research on blue carbon fluxes and beneficial sediment reuse[19]

Monitor and research blue carbon fluxes – both sequestration and emissions – to inform wetland restoration and management, supporting San Francisco Estuary Partnership 2022 Blueprint Tasks 7-2 and 7-5.

Study and share knowledge on beneficial reuse of sediment for wetland restoration and adaptation – and how this can affect carbon sequestration.

Lead Implementers (Fluxes): State agencies, Federal agencies, and Universities

Proposed Supporting Implementers (Fluxes):
Delta Stewardship Council

Lead Implementers (Reuse): SF Estuary Institute/Regional Monitoring Program, federal implementing agencies

Proposed Supporting Implementers (Reuse):
Long Term Management Strategy Implementers (Federal agencies, regional commissions, State water agencies)

Timeframe to start implementation:
Short-term/Medium-term

NWL-2.6: Support efforts to protect riparian forests, advancing land and water management strategies that maintain and increase carbon storage

Facilitate knowledge sharing about the carbon sequestration, wildfire mitigation, and climate resilience benefits of riparian protection and restoration.

Coordinate efforts to compile data and conduct monitoring on the rates of vegetation growth and carbon sequestration in riparian restoration under various conditions in the Bay Area.

Collaborate with stakeholders to leverage potential funding sources to achieve greater protection, restoration, and climate resilience of riparian areas.

Proposed Lead Implementer:
San Francisco Bay Regional Water Quality Control Board

Proposed Supporting Implementers:
Resource conservation districts (RCDs), nonprofits, community organizations, tribes, conservation corps, water and flood management agencies, Sonoma County Transportation and Climate Authorities (SCTCA), local governments

Timeframe to start implementation:
Short-term/Medium-term

Measure NWL-3: Enhance Carbon Sequestration and Reduce Greenhouse Gas Emissions through Management and Restoration of Agricultural and Working Lands

GHG reductions in 2045:
Low *(see Figure 10-4 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:

+ Reduced water consumption
+ Community health
+ Climate resilience
+ Green jobs
+ Resilient food and fiber production
+ Renewable energy generation
+ Reduced worker exposure to toxins and pollution[21]

Design principles:

Climate resilience benefits: Increased resilience in agricultural practices that allow for greater preparedness for droughts, floods, and extreme weather

Estimated costs of implementation: $

Proposed metrics: Number of growers assisted, acreage applied, funding provided, number of programs supporting implementation, MW new renewable energy on agricultural lands, number of water projects implemented on farms, water savings (in terms of acre feet and/or percentage)

SUMMARY

Increase carbon draw-down into agricultural lands by scaling up climate beneficial agriculture and reducing implementation challenges, helping to achieve state and local governments' agricultural targets and goals.[20] Explore areas to increase cross-sector benefits and GHG emission reductions through energy-efficient sustainable water management and integration of renewable energy on agricultural lands.

This measure addresses implementation challenges and builds on existing opportunities to enhance and scale implementation of climate-beneficial agriculture practices.

Milestones for initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- ★ **Q2 2026 –** Continue to monitor and support existing programs across NWL-3
- ★ **Q2 2026 –** Start funding search to enable NWL-3.2 and all connected actions
- ★ **2027 –** Kickstart P-1 and connect convenings to NWL-3.4, NWL-3.5

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Jobs and Workforce Development

✚ Access to employment and sustained work opportunities once training is complete

✖ *Employment opportunities may not be sustained, well-paying or have benefits*

Community Engagement, Awareness, and Capacity

✚ Increased community capacity, awareness of solutions/projects and results, and trust between communities and the government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Climate Resilience Co-Benefits

✚ Increased resiliency to climate-related impacts such as drought

ACTIONS

NWL-3.1: Scale climate-beneficial agriculture and catalyze widespread adoption of practices that increase or maintain above- and below-ground carbon stocks, and achieve climate resilience on working lands

Implement scaled adoption of climate-beneficial agriculture practices including agroforestry, hedgerows, cover crops, conservation cover, windbreaks, compost application, riparian forest buffer, residue and tillage management, alternative manure management strategies, on-farm compost production, and critical area planting, contributing to state targets.

Support scaled adoption through actions including:

- **Increasing technical assistance** to support land managers plan, design, implement, and monitor multi-benefit climate-beneficial agriculture practices, with a particular focus on ensuring technical assistance access for small-scale and disadvantaged producers;
- **Strengthening education and partnerships** at the local and regional level to understand and overcome barriers to adoption;
- **Enhancing applied research** by supporting trials, research, and monitoring on working lands to refine local data and effectiveness of climate- beneficial practices;
- **Supporting development of key infrastructure** to reduce cost on the individual grower/organization and expand adoption of climate-beneficial practices, explore opportunities for local equipment and infrastructure sharing and improve access to plant materials and other supplies which may be supported through implementation of NWL-3.2;

- **Continuing to support urban and community-scale gardeners** and food growers to increase food sovereignty and urban agriculture as feasible;
- **Developing new equity-centric land access strategies** to increase access to agricultural lands, advancing environmental justice outcomes for disadvantaged producers, and new farmers and ranchers.

Proposed Lead Implementer:
Growers and land stewards, public and private landowners

Proposed Supporting Implementers:
RCDs, Carbon Cycle Institute, statewide farming organizations, UCCE

Timeframe to start implementation:
Short-term

NWL-3.2: Increase local implementer capacity by conducting a regional needs assessment and 'shovel-worthy' project portfolio

Secure funding for and conduct a regional needs assessment. Implementation actions may include:

- **Identify gaps in existing locations** of staff and infrastructure (compost spreading equipment, nurseries) to support necessary investments, leveraging existing needs assessment work done by resource conservation district regional hubs;
- **Identify a portfolio of projects** that could be implemented within five years, including those that could be aggregated to achieve economies of scale and leverage funding, especially for multi-benefit projects;
- **Include specific analysis of needs and opportunities** for tribal, disadvantaged, and small-scale producers, which should be co-created with these implementers.

Proposed Lead Implementer:
RCDs, including Bay Area and North Coast Hub

Proposed Supporting Implementers:
Carbon Cycle Institute, UCCE, statewide farming organizations

Timeframe to start implementation:
Short-term

NWL-3.3: Support integration of climate-beneficial agriculture into climate-related plans and policies through a planning toolkit and training

Support local, county, and regional governments in adopting strong agricultural climate solutions as part of future climate plans and policies by producing a toolkit on climate mitigation, co-benefits, resilience and adaptation impacts of climate beneficial agriculture. Implementation actions may include:

- **Update and finalize existing toolkit** developed by the Carbon Cycle Institute and partners;
- **Provide technical assistance** to government staff using toolkit to inform County climate action plan updates;
- **Work with counties to identify updates** to agriculture and working lands climate action plan chapters and targets;
- **Advocate for strengthening the integration of climate beneficial ("regenerative") agriculture** in the Priority Conservation Area Program lead by the Metropolitan Transportation Commission and funding priorities.

Proposed Lead Implementer:
Carbon Cycle Institute, county governments (climate, sustainability, planning staff)

Proposed Supporting Implementers:
RCDs, Air District, SCTCA, UCCE

Timeframe to start implementation:
Short-term

NWL-3.4: Explore establishment of more renewable energy on agricultural lands

Explore areas where working lands can house and generate clean energy, including agrivoltaics, wind power, storage, and geothermal power resulting in a regional roadmap for renewable energy on agricultural lands to contribute to Measure P-1 in the Power Sector.

Implementation actions may include:

- **Mapping suitable sites,** establishing criteria for site suitability (e.g., presence of animal agriculture and existence of renewables like wind);
- **Identifying** financing models;
- **Pilot project identification** and opportunities for replication and expansion.

Proposed Lead Implementer:
Farmers, ranchers and growers, power providers

Proposed Supporting Implementers:
RCDs, research organizations, community organizations, local governments

Timeframe to start implementation:
Medium-term

NWL-3.5: Reduce energy-related emissions and increase groundwater recharge through adoption of sustainable water management practices

Support higher rates of adoption for sustainable water management practices through promotion of best practices and technical assistance, contributing to energy efficiency targets for the BARCAP region.

Implementation actions may include:

- **Promote climate-friendly irrigation and stock watering practices** that increase water use efficiency and, where possible, recharge groundwater, including: solar-powered irrigation equipment, conversion to drip irrigation, winter stormwater capture, groundwater recharge basins, increasing soil organic matter and cropping system flexibility to maximize resilience to a changing climate;
- **Support farmers and ranchers in successful water management** through irrigation evaluations, permitting assistance, incentive program application assistance and whole-operation planning for improved water use efficiency, soil carbon enhancement, and climate benefits.

Lead Implementers: Regional water agencies, farmers, ranchers, and growers, RCDs, UCCE

Proposed Supporting Implementers: Groundwater sustainability agencies, local governments with groundwater resources, statewide farming organizations

Timeframe to start implementation: Short-term

Measure NWL-4: Expand and Maintain Urban Green Spaces While Advancing Environmental Justice Outcomes

GHG reductions in 2045: Medium *(see Figure 10-4 for an illustration of the GHG emission reductions enabled by these measures and actions and Appendix C for quantified reductions)*

Potential regional benefits:

+ Local food production
+ Community health
+ Climate resilience
+ Green jobs
+ Access to nature
+ Enhanced community engagement
+ Improve housing quality, comfort, and safety
+ Biodiversity

Design principles:

Climate resilience benefits: Reduced urban heat, increased opportunities for urban cooling and shade, equitable access to urban cooling, increased ability for urban landscapes to withstand damage from floods and extreme weather

Estimated costs of implementation: $$$

Proposed metrics: Percent urban canopy increase, funding invested in urban greening, number of new urban green spaces, number of new programs and supports for operations and maintenance

SUMMARY

Increase carbon stored in urban plants and soils through expansion and maintenance of green spaces that reduce the effects of flooding and extreme heat, build food sovereignty, and beautify and connect communities. Achieve these outcomes through new regional funding, staffing, and technical assistance resources. Ensure that frontline communities benefit from urban green spaces and avoid unintended consequences by supporting a policy shift towards community-led planning to embed environmental justice and anti-gentrification approaches in urban greening.

This measure addresses the challenge of current gaps in the funding and implementation landscape to support long-term operations and maintenance issues faced by urban greening implementers. It also addresses challenges linked to gentrification and displacement in relation to urban greening through community planning, empowerment, and policy innovation.

Milestones for initiation:

Initiation dates assume funding and staff resources are available and obtained. If not, shifting initiation dates may be necessary.

- **Q3 2026 –** Continue to monitor and support existing programs across NWL-4
- **Q3 2026 –** Start funding search to enable NWL-4.1 and NWL-4.2
- **Q3 2026 –** Plan for regional convening to support NWL-4.1 and NWL-4.2

✚ = Potential Benefits
✖ = *Potential Unintended Consequences*

FRONTLINE COMMUNITY IMPACTS:

Housing Quality and Security

✚ Improved housing conditions, increased comfort, protection from extreme heat

✖ *Potential for increased housing costs, displacement risk and rent increases unless protections are provided*

Public and Community Health

✚ Reduced exposure to health-damaging pollution, improved food access, and reduced heat island effect from new green spaces and community gardens

✖ *Potential inequitable access to health benefits if communities are left out of the planning process and/or greening sites are not accessible to community members*

Jobs and Workforce Development

✚ Access to employment and sustained work opportunities once training is complete

✖ *Employment opportunities may not be sustained, well-paying or have benefits*

Community Engagement, Awareness, and Capacity

✚ Increased community capacity, awareness of solutions/projects and results, and trust between communities and the government

✖ *Outreach may only engage people in one area, one language, or those with more time and resources, and omit many individuals with possibly greater vulnerabilities*

Climate Resilience Co-Benefits

✚ Increased resiliency to climate-related impacts, including flooding and extreme heat

✖ *Potential inequitable access to climate resilience benefits if communities are left out of the process and or greening sites are not accessible to community members*

Cost Burden

✚ Potential decreased energy cost burden from reduced need for air conditioning due to cooling effects of greening

✖ *Potential inequitable access to cooling and reduced energy costs if greening sites are not adjacent to communities*

ACTIONS

NWL-4.1: Expand urban green spaces and prevent loss through new regional funding and technical support, prioritizing green spaces that benefit frontline communities

Contribute to state and local goals for urban forestry investment and drought resistant watering. Green spaces that may garner particular focus because of air quality, environmental justice, or climate resilience benefits include parks and trees in formerly redlined or under-greened communities, community farms and gardens, freight corridor buffers, and green stormwater infrastructure. Implementation actions may include:

- **Increase funding through new regional-scale funding sources** such as Proposition 4/ state bonds, which may be provided to coalitions of local governments/implementers for urban greening implementation;
- **Increase technical assistance, funding, and long-term maintenance support** for urban green spaces by providing tree inventories, and hands-on arborist support to local governments and other implementers at the regional scale;
- **Identify, support, and scale pilot projects** for emergent or difficult to implement urban green spaces like green buffer zones along freight corridors and urban agriculture;
- **Explore opportunities to integrate green spaces** into transportation, active transportation, transit, and road infrastructure upgrades;
- **Regularly convene local governments and other implementers** to understand and overcome barriers to implementing "right tree right place" urban greening, allowing for iterative and targeted future technical assistance;
- **Dedicate regional staff time and expertise to help local governments** integrate best practices into urban greening by providing policy resources, research, and case study support that will aid implementers in achieving urban greening goals.

Proposed Lead Implementer:
Regional agencies, local governments, community organizations, parks departments, public works, urban farms and gardens, SCTCA, UCCE

Proposed Supporting Implementers:
State agencies, Bay Area Regional Collaborative (BARC), water agencies, San Francisco Estuary Institute [Urban Nature Program]

Timeframe to start implementation:
Short-term

NWL-4.2: Advance environmental justice-centered approaches for urban greening through policy innovation, community-led planning, and support for frontline community land stewardship

Implementation might consist of regional support to local governments and other implementers for policy and plan updates and to frontline community-lead stewardship for capacity building, including:

- **Provide local governments and community organizations with a best practices policy toolkit,** including emergent projects across the BARCAP region, for environmental justice approaches including case studies, and local examples that embody community-led planning and outcomes for equitable urban greening that avoid unintended gentrification consequences;
- **Develop and share best practices on air quality and urban greening intersection-** facilitate establishment of low volatile organic compound (VOC)-emitting native new trees through exploration of resources and best available research on community health and air quality benefits of urban greening, amplifying similar work being done at Sacramento Metropolitan Air Quality Management District;
- **Advocate for a regional shift towards community-led planning in urban greening** by encouraging new urban greening projects to include frontline community members and community-based organizations early, and often in planning stages to guard against gentrification, space conflict, and other unintended harms of urban greening, explore collaboration points with AB 617 community emission reduction plans;
- **Provide financial and technical assistance** for local planners to identify and collaborate with trusted messengers and community organizations to deliver multilingual, culturally relevant urban greening outreach;
- **Seek additional technical and financial support opportunities** to build long-term land stewardship capacity among frontline communities through education programming, exploration of community ownership models, and job training to implement urban greening.

Proposed Lead Implementer:
Regional agency, local governments (planning), community organizations

Proposed Supporting Implementers:
Community members, conservation corps, nonprofits, Air District, schools and youth organizations

Timeframe to start implementation:
Short-term

10.6 FUNDING IMPLEMENTATION

Implementation of the NWL sector measures can be supported in part through existing funding and financing approaches. For example, both California Natural Resources Agency's Urban Greening Program and CAL FIRE's Urban and Community Forestry Grant provide funding for green infrastructure and urban forest management. Additionally, CAL FIRE's Forest Health Grants and California Forest Improvement Program provide funding for forest improvement, restoration, and fuels reduction.[22] The US Department of Agriculture's Environmental Quality Incentives Program (EQUIP) also provides financial assistance for agricultural producers to apply conservation practices that conserve resources and mitigate climate risks. RCDs, who are instrumental in enacting NWL climate actions at the county-level do not have guaranteed funding, and have historically relied on state and federal funding, including EQUIP on a project-by-project implementation basis.[23] Voters in California are increasingly recognizing the importance of nature-based solutions, with the 2024 passage of Proposition 4 dedicating $10 billion to wildfire resilience, protecting drinking water, and other climate actions.[24] The programs listed above are not a comprehensive list of available funding. See Appendix G for other funding and financing sources, programs and partners, and examples of successful implementation. Additional funding and financing mechanisms will be needed to fully achieve the goals of this sector.

ENDNOTES

1 While carbon stocks and carbon sinks are oftentimes used interchangeably, carbon stocks in the context of the BARCAP carbon stock inventory specifically refer to the amount of carbon held in a carbon pool, or stock, such as soil organic carbon or forest biomass. Carbon sinks, as described further in footnote two, refer more specifically to the process of carbon drawdown, or movement of carbon from the atmosphere into natural carbon pools; "Carbon Stocks, Fluxes and the Land Sector," Forest Carbon and Climate Program, Michigan State University, February 7, 2022, https://www.canr.msu.edu/news/carbon-fluxes-and-carbon-stocks.

2 Carbon sinks describe the role of plants and soils to sequester carbon by capturing carbon dioxide from the atmosphere and transform it into biomass and soil organic matter, where it is stored for long periods of time. When more carbon is drawn down than these natural carbon cycles emit, these reservoirs of carbon in plants, oceans, and soils are called carbon sinks because they are net sinks, not net emitters; "Soil-Based Carbon Sequestration," MIT Climate Portal, accessed October 28, 2025, https://climate.mit.edu/explainers/soil-based-carbon-sequestration; "Carbon Sinks and Sequestration," United Nations, Accessed October 28, 2025, https://unece.org/forests/carbon-sinks-and-sequestration.

3 The US Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator was used to convert carbon held in NWL to carbon dioxide equivalent (CO_2-e) units in order to make this comparison; "EPA Greenhouse Gas Equivalencies Calculator," United States Environmental Protection Agency, Accessed October 28, 2025, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

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8 "Water Energy Nexus," California Department of Water Resources, Accessed October 28, 2025, https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Water-Energy-Nexus.

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10 "50 Years after Being Outlawed, Redlining Still Drives Neighborhood Health Inequities," University of California Berkeley Public Health, May 20, 2025, https://publichealth.berkeley.edu/articles/spotlight/research/50-years-after-being-outlawed-redlining-still-drives-neighborhood-health-inequities#:~:text=Access%20to%20parks%2C%20trees%2C%20and,from%20the%20Mapping%20Inequality%20Project.

11 Isabelle Anguelovski et al., "Green gentrification in European and North American cities," Nature communications 13, no. 1 (2022): 3816.

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17 'Fire-at-risk' wood refers to woody biomass classified as Very High, or High Fire Hazard Severity under agencies like CALFire; "Fire Hazard Severity Zones," California Office of the State Fire Marshal, Accessed October 28, 2025, https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones; Biochar created via pyrolysis or gasification is subject to Air District permitting.

18 Strategies like prescribed fire require a submittal of a Smoke Management Plan to the Air District under Air District Regulation 5: Open Burning (Regulation 5). As of October 2025, the Air District adopted amendments to Regulation 5 to waive operation fees for all persons conducting prescribed burns, expanding the previous exemption that applied only to public agencies. The amendments to Regulation 5 support statewide efforts to expand beneficial fire practices for wildfire prevention and land stewardship.

19 The National Oceanic and Atmospheric Administration defines blue carbon as "carbon dioxide that is absorbed from the atmosphere and stored in the ocean…underwater sediments, coastal vegetation and soils; carbon-containing molecules such as DNA and proteins; and ocean life from whales to phytoplankton." Michon

Scott and Rebecca Lindsey, "Understanding blue carbon," National Oceanic and Atmospheric Administration, Archived June 25, 2025, https://www.climate.gov/news-features/understanding-climate/understanding-blue-carbon#:~:text=Blue%20carbon%20refers%20to%20carbon,than%20even%20a%20tropical%20rainforest.

20 Climate beneficial agriculture is the term preferred by implementing partners at Carbon Cycle Institute and Bay Area resource conservation districts (RCDs) and can also be described interchangeably as 'carbon farming', 'climate-smart agriculture' and 'regenerative agriculture'. Climate beneficial agriculture, as articulated by the California Department of Food and Agriculture's 2025 definition of regenerative agriculture describes an integrated approach to farming and ranching rooted in principles of soil health, biodiversity and ecosystem resiliency leading to improved targeted outcomes; "RCD Regional Ag and Climate Hub Coordinators," California Association of Resource Conservation Districts, Accessed October 28, 2025, https://carcd.org/page/rcd-regional-ag-and-climate-hubs; "Defining Regenerative Agriculture for State Policies and Programs," California Department of Food and Agriculture, Accessed October 28, 2025, https://www.cdfa.ca.gov/RegenerativeAg/.

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11 Industrial Sector

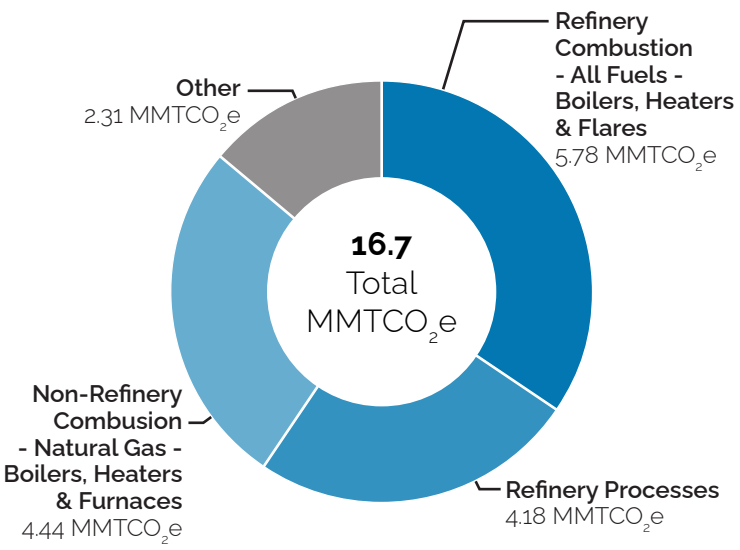
11 Industrial Sector

11.1 SECTOR OVERVIEW

The industrial sector includes activities related to the manufacturing and processing of goods and raw materials. The sector includes businesses and operations that produce fuels, machinery, motor vehicles and aircraft, electronics, furniture, and clothing. It also includes construction equipment.

The industrial sector is the second largest source of greenhouse gas (GHG) emissions in the Bay Area Regional Climate Action Plan (BARCAP) region. In 2022, the industrial sector accounted for 31% of GHG emissions in the BARCAP region (16.7 million metric tons of carbon dioxide equivalent ($MMTCO_2e$)) (see Figure 11-1). Generally, emissions from this sector come from fuel combustion at facilities (70%) (e.g., burning natural gas at power plants, refineries, factories, or other industrial facilities). Processes (e.g., chemical reactions in metal, cement, mineral and fuel production) account for 26% of sector emissions, while fugitive/evaporative emissions (e.g., from industrial processes, equipment, oil and gas systems) and leaks of high-global warming potential (GWP) gases) accounted for 4% of industrial emissions.

Figure 11-1: GHG emissions by industrial sub-sector for BARCAP region in 2022



In 2022, the refining of fuel for the transportation sector accounted for 60% of the industrial sector's emissions (10 $MMTCO_2e$). These emissions are associated with the transportation sector when accounting for all transportation-related emissions. Chapter 2.1.3 and Appendix A describe the contribution of emissions from the refining of transportation fuels in more detail. Another significant emissions source in the industrial sector was combustion of natural gas in boilers, heaters, furnaces, ovens, and afterburners for industrial uses at facilities other than refineries, which accounted for 27% (or 4.4 $MMTCO_2e$) in 2022. The GHG emissions from the industrial sector in the BARCAP region are roughly similar in 2022 to emission levels in 1990.

11.2 CONTEXT

Current state law prohibits local air districts from regulating carbon dioxide (CO_2) emissions from sources covered by the state's Cap-and-Invest regulation. The vast majority of the BARCAP region's industrial sector GHG emissions (85%) are covered by Cap-and-Invest. The BARCAP therefore does not include new measures or actions to reduce CO_2 from these covered sources. Section 11.2.1 below describes different approaches the Air District has taken to address GHG emissions from the industrial sector.

11.2.1 History of Air District GHG reduction actions for industrial sector

The Air District regulates air pollutant emissions at large industrial sources such as refineries. Regulation of GHG emissions from these sources, however, has been complex and has changed over time. As part of implementation of the 2017 Clean Air Plan, the Air District initiated a region-wide strategy to systematically address emissions, including GHG emissions, from stationary fossil fuel combustion, beginning with the three largest industrial sources: petroleum refineries, power plants, and cement plants.[1] As a first step, the Air District began developing two rules to address refinery emissions. The first proposed rule, Regulation 12, Rule 16: Petroleum Refining Greenhouse Gas Emissions Limits, sought to place a numeric cap on GHG emissions at refineries.[2] The second rule, Regulation 13, Rule 1: Petroleum Refinery Carbon Intensity Limits, proposed limiting

refining carbon intensity[3] to a level consistent with each refinery's current operations. It aimed to complement and serve as a backstop for state climate efforts, which, at the time, were expected to require refinery carbon intensity reductions equivalent to a 20% reduction in GHG emissions by 2030.[4] The Air District held public workshops on both rules and was poised to present draft Rule 12-16 to the Board of Directors for adoption in Summer 2017. However, the state's Cap-and-Invest program was extended with the passage of Assembly Bill 398 (2017), and the Air District lost its authority to regulate CO_2 emissions from large industrial sources. As a direct result, the Air District suspended further action on these rule development efforts.

After losing the authority to regulate CO_2 from most industrial sources, the Air District shifted its focus to the second largest climate pollutant, methane. Initial success came with the adoption of the first methane rule: Rule 13-5: Industrial Hydrogen Plants, adopted in May 2022.[5] This rule limits vented emissions of methane and organic compounds (precursors to smog formation) from hydrogen production plants and hydrogen carrying systems. The rule reduces methane emissions from hydrogen production plants by at least 90% - a reduction of 78,000 $MTCO_2e$ annually in a typical year.

11.3 SUPPORTING ACTION IN THE INDUSTRIAL SECTOR

While the BARCAP does not include measures and actions to address industrial GHG emissions, the Air District is helping to advance California's climate goals by supporting important state policies for this sector. The most significant policy for the industrial sector is the California Air Resources Board's (CARB's) Cap-and-Invest program, which is the state's chief mechanism for reducing CO_2 emissions in the industrial sector. CARB is also implementing a Short-Lived Climate Pollutant (SLCP) Reduction Strategy (required by Senate Bill 1383).[6] Below is a discussion of these policies and Air District actions to support them.

11.3.1 Cap-and-Invest Program

The Cap-and-Invest Program is the state's main policy mechanism to reduce CO_2 emissions from the industrial sector, and the Air District is prohibited from regulating CO_2 emissions from sources covered by the program. Within the BARCAP region, emissions from industrial facilities that are not covered by the Cap-and-Invest Program totaled 0.44 $MMTCO_2e$ in 2022, just 3% of total BARCAP industrial emissions. Roughly a third of industrial GHG emissions from non-Cap-and-Invest sources are from natural gas combustion in boilers and heaters.

Air District support:

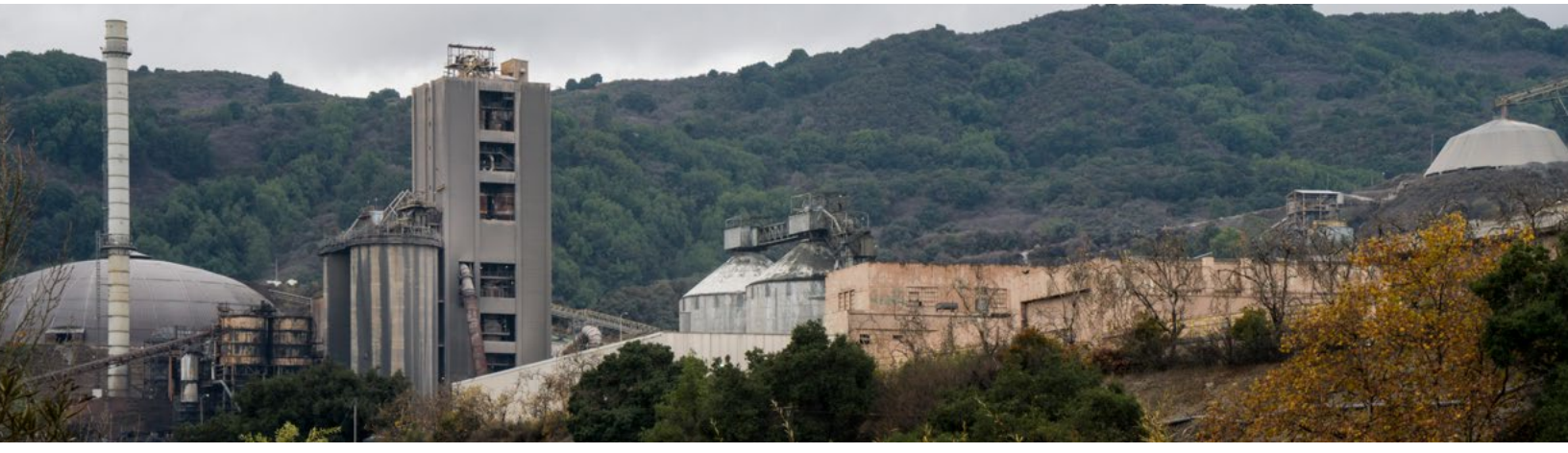
- The Air District's Strategic Plan commits the agency to maximize the climate change benefits of its regulations and nonregulatory programs. This includes a loan guarantee program to support commercialization of technologies, which can increase industrial efficiency and/or promote decarbonization.

11.3.2 Short-lived climate pollutants

The SLCP Strategy is California's plan for reducing emissions of high GWP gases with short atmospheric lifetimes. Short-lived climate pollutants include the GHGs methane and hydrofluorocarbons (HFC are high GWP gases mostly used in refrigeration, aerosols, fire protection, and solvents), as well as black carbon. The SLCP Strategy includes goals of reducing methane and HFC emissions each by 40% below 2013 levels by 2030. This Strategy sets a target for human-produced black carbon emissions (or soot, which is a dominant component of diesel particulate matter) to decrease by 50% from 2013 levels by 2030.[7]

Air District support:

- The Air District is investigating possible rule amendments to reduce methane emissions from refineries.



ENDNOTES

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3 Carbon intensity is the amount of GHG emissions per unit of total oil feedstock (crude plus non-crude) processed (thousands of barrels) and can be an indication of the energy and process efficiency of a refinery when compared to similar facilities. "DRAFT Regulation 13 Climate Change Pollutants Rule 1 Petroleum Refining Carbon Intensity Limits or Facility-wide GHG Emission Limits", Bay Area Air District, March 21, 2027, https://www.baaqmd.gov/~/media/files/planning-and-research/rules-and-regs/workshops/2017/reg-13-rule-1/draft-rg1301.pdf?rev=a4d538b872bd427bb27bd7c69a74c2b8&sc_lang=en.

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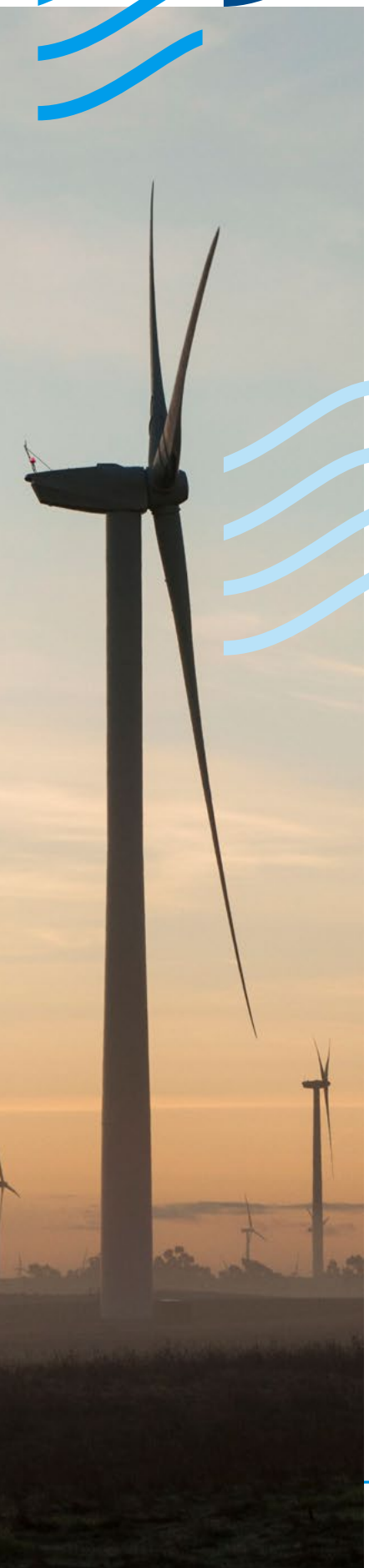
7 See California Air Resources Board's Short-Lived Climate Pollutant Reduction Strategy (2017) for more discussion and a definition of black carbon.



12 Implementing the BARCAP

Successful and thoughtful implementation is critical to realizing the greenhouse gas (GHG) emission reductions and other core benefits from the Bay Area Regional Climate Action Plan (BARCAP) measures. This requires collaboration across many agencies and organizations, accountability through tracking and reporting, and the necessary workforce, funding, and financing to execute the plan.

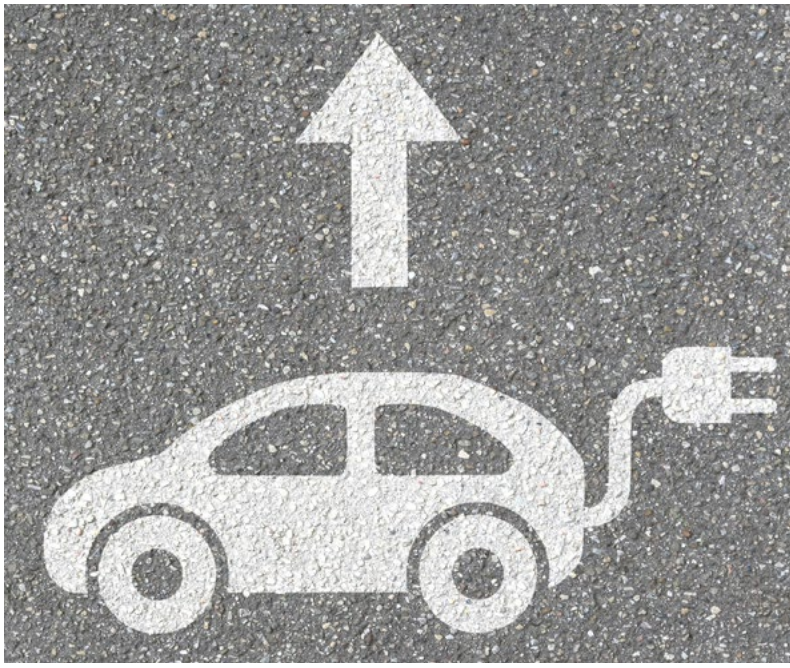
12.1 COLLABORATIVE PROCESS

While the Air District played the lead role in coordinating plan development, it will be only one of many key agencies and organizations that together implement this plan. The scope of the BARCAP, which covers eight counties and five economic sectors, requires a broad coalition of agencies and organizations with different authorities, expertise, and networks including regional agencies, city and county governments, utilities and community choice aggregators, resource conservation districts, business networks, community-based organizations (CBOs), and others. Implementing the BARCAP will require the same high degree of collaboration that was used to develop the plan.

12.1.1 Implementation partners and details

The BARCAP identifies a variety of lead and supporting implementers for each action in the plan. Lead implementers are agencies or organizations that would coordinate or manage the overall implementation of an action. In some cases, they would lead one or more core components of an action. Supporting implementers would participate in implementation of an action but would not take a leading role. For most actions, the lead and supporting implementers are known. However, for several actions – particularly those with longer timelines to begin implementation – conversations to identify key implementers are ongoing are will be identified as the details of implementation are more fully

developed.



Many actions already include specific information on how they will be implemented. For others, details such as specific implementing partners and their roles, programmatic components, equitable outreach and engagement, etc., will be determined during the early stages of the implementation process. Many helpful comments were made during the public review of the draft BARCAP measures that will be considered during the early implementation stage. Many public comments received online and in workshops offered useful information and detailed suggestions for the implementation phase. Comments included specific organizations and existing resources to leverage, ways to involve and further expand opportunities for different types of contractors, and potential funding sources to explore to provide financial support. Across sectors, for many actions, the first implementation steps will include convening conversations to discuss the implementation approach, including funding sources.

12.1.2 The Air District's role

While implementation of the BARCAP will be a collaborative process, the Air District will play a central role in tracking the implementation of BARCAP measures, tracking progress on implementation milestones and metrics, and reporting on the status of implementation to partners and the public. The Air District will also serve as a lead or supporting implementer for several BARCAP measures and actions and may play a convening role in some instances.

12.2 IMPLEMENTATION TIMELINE

Nearly all BARCAP actions are designed so that implementation of all or part of the action can begin in the short- to medium-term timeframes. A short-term timeframe means that implementation can be initiated within two years from when the BARCAP is finalized, and medium-term would begin within two to five years. Long-term refers to implementation beginning after five years. Chapters 6 to 10 provide more information on the timing for specific BARCAP actions. The timeframes assume that funding and staff resources are available and obtained. If staff capacity and funding resources are not secured, shifting the estimated initiation dates may be necessary.

12.3 FUNDING

Changes in funding priorities at the federal level have introduced uncertainty regarding the future of funding for climate programs and initiatives. Without reliable federal funding sources, state and local resources and existing and innovative new funding and financing approaches will become even more critical for BARCAP implementation.

Several BARCAP actions directly address the need for additional funding by leveraging existing funding streams, identifying and securing new funding sources, and adjusting existing funding to better support frontline communities. These actions include:

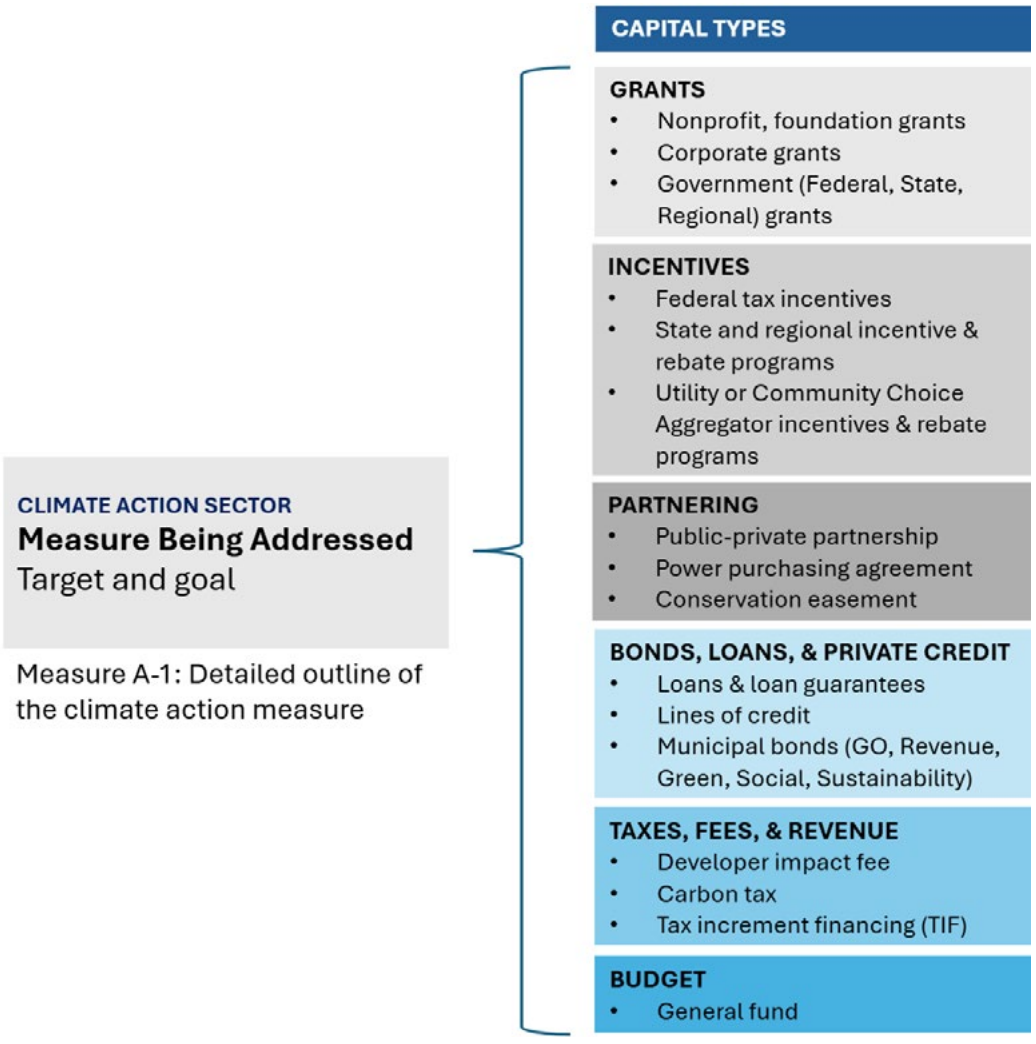
T-1.1: Expand incentives for the purchase or lease of EVs
T-1.2: Provide monetary and non-monetary incentives to deploy EV charging stations at strategic locations to help fill gaps in the existing charging network
T-2.1: Expand incentives and loan assistance for the purchase of medium- and heavy-duty zero-emission (ZE) vehicles and equipment
B-1.4: Explore new funding and financing opportunities to augment existing sources to further reduce financial burdens, especially for low-income building owners and tenants
B-2.1: Explore new funding and financing opportunities for home repair, public health, energy efficiency, and decarbonization programs to augment existing sources
B-3.2: Explore partnerships to expand education, training, business growth and other targeted support of Minority/Women/Disadvantaged Business Enterprises (MWDBE) contracting companies to become active in building decarbonization program and project opportunities
P-1.4: Monitor - and explore how to address - key funding and financing gaps for behind-the-meter and in front-of-the-meter small clean energy and storage projects that benefit frontline communities, low-income and moderate-low-income households, small businesses, and community organizations
W-1.1: Develop funding and asset-sharing mechanisms to support edible food recovery
NWL-1.2: Increase long-term funding for nature-based solutions through dedicated support for regional-scale grant writing and exploration of sources of long-term funding
NWL-2.2: Increase fuel management and reduce wildfire risk on natural and working lands and at the wildland-urban-interface (WUI) through new funding and financing mechanisms
NWL-2.3: Incentivize private landowners managing large land areas to manage fuel at scale through innovations in cost sharing and financing

12.3.1 Leveraging existing funding sources

State agencies, such as the California Energy Commission (CEC), California Public Utilities Commission, California Natural Resources Agency and CalRecycle, and regional programs implemented by utilities and Regional Energy Networks (funded by ratepayers) provide a variety of funding mechanisms including grants, rebates, low-interest loans, and other incentives. Regional agencies, like the Air District provide financial incentives to advance climate and clean energy solutions. It will be critical to prioritize funding for implementing actions that benefit frontline communities and ensure these communities have access to funding and financing opportunities.

The roadmap below (Figure 12-1) draws from many sources to provide an approach to funding and financing implementation of BARCAP measures.[1] It includes grants, loans, vouchers, rebates and other mechanisms as possible sources of funds. It includes examples of existing case studies from within the BARCAP region and California, as well as innovative approaches from elsewhere in the United States.

Figure 12-1: HIP plan-level funding map



Detailed funding roadmaps for specific BARCAP measures are included in Appendix G.

12.3.2 Identifying and developing new funding sources

Additional funding and financing will be needed to fully implement all BARCAP measures, even after taking advantage of all the programs described above. The BARCAP region and state are facing an affordability crisis, which means funding is needed to not just implement the measures but to do it in a way that does not further impact affordability. Along with the state, the Bay Area region must find or create new funding and financing mechanisms to backstop the decrease in federal funding and increase the total overall financial resources supporting climate action, particularly in frontline communities. This will require collaborative and creative thinking, and drawing on innovative examples including public-private partnerships such as city-business climate alliances, utilizing strategic financing mechanisms such as on-bill financing, partnering with philanthropic organizations, the business community, creating land-based financing such as special districts, etc.

12.4 TRACKING AND REPORTING

The Air District will play a central role in tracking overall implementation of the BARCAP and tracking progress. This will involve regularly conferring with the lead implementers of each action to assess implementation progress.

Metrics for tracking progress have been identified for each BARCAP measure and are included in the measure descriptions in Chapters 6 to 10. These metrics are indicators of progress towards key desired outcomes of measures. The Air District will work with implementation partners to determine the most appropriate metrics from these lists to track progress and then work together to compile and periodically report on the status of implementation.

As part of its grant obligation to the U.S. Environmental Protection Agency, the Air District will submit a report on the status of BARCAP implementation in the summer of 2027.

12.5 CONSIDERATIONS FOR IMPLEMENTATION

The public and community engagement processes and the workforce planning and frontline communities impact analysis raised several important considerations for how to implement the BARCAP. The following issues should be thoughtfully considered and incorporated into implementation of the BARCAP measures to ensure the measures achieve their intended goals.

12.5.1 Workforce

Implementation of the BARCAP provides an opportunity for the BARCAP region to create additional high-quality jobs.[2] While some BARCAP measures explicitly address workforce needs, efforts to grow the qualified, trained workforce necessary to implement the BARCAP over the coming decades are needed across all sectors. This requires a commitment to partnering and investing in workforce development and providing work opportunities and pathways to residents in the BARCAP region, including frontline communities.

A workforce planning analysis of the BARCAP measures found that each sector will need to grow its trained workforce in the key occupations listed below, and by varying magnitudes depending on the measures.[3] Many of these occupations pay more than the regional median wage ($33.93 per hour).

Buildings: carpenters; construction laborers; electricians; plumbers, pipefitters, and steamfitters; and HVAC mechanics and installers

Natural and Working Lands: farmworkers and laborers: crop, nursery, and greenhouse workers; firefighters; farmers, ranchers, and other agricultural managers; environmental scientists and specialists; tree trimmers and pruners; urban and regional planners; forest and conservation technicians; conservation scientists; foresters; agricultural engineers; and forest fire inspectors and prevention specialists

Power: electrical, electronic, and electromechanical equipment assemblers; electrical engineers, power-line installers and repairers; solar photovoltaic installers; power plant operators; and wind turbine service technicians

Transportation: retail salespersons; electricians; automotive service mechanics; and electrical and electronics installers and repairers

Waste: refuse and recyclable materials collectors; light-duty truck drivers; heavy-duty and tractor-trailer truck drivers; operating engineers and other construction equipment operators; mobile heavy-duty equipment mechanics; hazardous materials removal workers; and shipping, receiving, and inventory clerks

In many cases, the BARCAP region's current workforce has the necessary skills, while in a few instances, such as plumbers (who may need training for installing heat pump water heaters, which run on electricity instead of gas), upskilling may be necessary. Fortunately, the Bay Area is home to a robust network of training programs and resources that can support workers in this transition.

The accessibility of these roles and training opportunities, however, may not be equal for everyone. Job seekers residing in frontline communities may also require additional resources, such as childcare, transportation assistance, interpretation and translation, and other services to overcome systemic barriers to participation in certification and training programs and securing high-quality employment.

For a detailed analysis of the current and future state of the Bay Area workforce, critical occupations for successful implementation of the measures, and existing training opportunities, see Appendix F.

The workforce planning analysis also identified core recommendations that should be considered when implementing the measures that extend across all five sectors, including:

- Greater K-16 education communication and awareness of careers related to implementing the BARCAP;
- Coordination with community colleges, vocational and technical schools, private and non-profit training organizations, workforce development boards, and unions;
- More consistent funding to help support job creation related to the BARCAP and training to help frontline community members to secure those jobs;
- Tracking how the energy transition is impacting the local workforce and partnering to support workers facing disruptions;
- Considering ways to encourage high-quality employment in local and regional government projects.

Just transition in the BARCAP region

A carbon neutral future means shifting to a clean energy economy powered by zero-emitting fuel sources. However, this shift can significantly impact workers from fossil-fuel reliant industries and impact not only workers but the surrounding communities. While there are many working definitions of just transition, one helpful framework is that a just transition "refers to an integrated policy approach offering protection, support, and compensation for displaced workers and communities in specific industries or regions."[4] In the BARCAP region, a key industrial focus for a just transition is the fossil fuel refining industry.

The BARCAP region has five refineries, which, when including refinery reliant industries such as construction and trucking and transportation, employ roughly 18,000 people in the Bay Area. In 2020, the Marathon Martinez refinery in Contra Costa County idled (paused its refining operations) and laid off over 750 workers. A year later, 26% of these former employees remained unemployed, while former employees who found new jobs often faced a decline in wages and/or working conditions.[5] Assuming refinery exports from the Bay Area region decline at the same rate as projected in-state consumption, by 2045 the decrease in demand will likely lead to refinery shutdowns or a transition to new, cleaner products. Two refineries in the region have shifted production to renewable fuels.[6]

Unions and labor councils, CBOs, non-profit organizations, and local governments are working together to shape the just transition. The Contra Costa Refinery

Transition Partnership created 31 recommendations for how local and state governments can ensure a just transition for the refinery sector in Contra Costa County. The partnership includes worker associations, CBOs including the Asian Pacific Environmental Network, and non-profit organizations like the Blue Green Alliance. Recommendations include requiring a two-year notice to the public of a refinery closure or idling, establishing worker and community safety nets, and creating refinery decommissioning or clean-up standards.[7]

Just transition initiatives need to extend beyond refineries to other parts of the economy and ensure that workers and communities have a voice in these decisions. For example, in the City of Richmond, a coalition of CBOs – the Richmond Our Power Coalition – is working to advance a just transition, including a Project Support Fund that provides grants to projects directly serving local residents.[8] In addition, the Northern Waterfront area of Contra Costa County has been designated a Green Empowerment Zone (GEZ) to identify key projects in the area that can revitalize a clean energy economy. This includes designing and implementing a strategy to help grow a high-road clean energy manufacturing ecosystem in and around the GEZ that will advance a just transition.[9] Another example, the Bay Area High-Road Manufacturing Initiative led by Working Partnerships USA alongside other CBOs and labor organizations, is coordinating multiple pilot projects to grow the manufacturing sector in a way that achieves climate goals and supports workers.[10] Plans and projects like these will be integral in ensuring a clean economy that centers and protects workers in the transition to a carbon neutral future.

12.5.2 Frontline communities

In addition to the potential benefits and unintended consequences for each BARCAP measure, the Frontline Communities Impacts Analysis highlighted recommendations for implementation in each sector. A snapshot of the recommendations is below. For the full list of impacts, see Appendix D.

Building sector: Consider opportunities to pair building electrification with health and safety, weatherization, and building efficiency upgrades; emphasize workforce development and contractor support, building workforce transition into program design and budgeting.

Natural and Working Lands sector: Make funding flexible, offering sustained, low-barrier funding options for frontline groups; invite frontline and tribal co-leadership in land stewardship and management activities; pair urban greening with anti-displacement strategies (e.g., land trusts, rent control).

Power sector: Use equity criteria in project siting and design; protect low-income and medically vulnerable customers and ensure renters benefit from programs; fund inclusive community engagement processes; develop and utilize community benefits agreements for large energy projects.

Transportation sector: Encourage public and private fleet owners to deploy EVs in frontline communities; subsidize frontline community transition to EVs; emphasize public input opportunities in planning EV transitions; install charging infrastructure near affordable and multifamily housing.

Waste sector: Support smaller community-scale, decentralized composting options; increase multilingual, multi-media education and communication strategies for waste sorting; minimize siting large-scale compost facilities near residential areas of frontline communities; consider developing community benefit agreements near waste management sites to increase facility accountability and reduce impacts of odors.

12.5.3 Outreach and engagement

The BARCAP was shaped by an intentional and rigorous outreach and engagement process. As the finer details of implementation are developed, the Air District and implementing partners will continue to center outreach and engagement, particularly with CBOs and frontline communities.

CBOs play a critical role in implementation, and the Air District will continue to encourage

lead implementers to form meaningful partnerships with them throughout BARCAP implementation. They are not only 'trusted messengers' in delivering information and encouraging frontline community members to engage in climate efforts, but they are subject matter experts in embedding environmental justice in climate action and may lead climate actions themselves (e.g., cultural burning or 'good fire', urban tree planting). CBOs also play a critical role in holding institutions and implementers accountable in making sure that frontline communities benefit from climate actions. The Air District will also work with CBOs in providing updates on how the implementation of BARCAP measures has benefited frontline communities. Including community voices in the implementation of BARCAP measures provides an opportunity for people who are underrepresented in decision-making processes to take ownership in their future and climate impact outcomes.

The Air District recognizes the importance of continuing the conversation on climate action in the BARCAP region, particularly with frontline communities and young people, and will work to uplift all voices in implementation. Youth engagement, a priority brought up during the public comment period, will also be an important component of the implementation process. Young people bring fresh perspective, innovative thinking, and a sense of urgency to conversations around climate action. The Bay Area includes numerous youth organizations and movements that are leading advocacy and education among their peers. Talking about climate change – including climate impacts, solutions, and specific roles people can play – is one of the most important actions individuals can take to inspire hope and collective action. Outreach and educational efforts should support these conversations and more collective action.

12.5.4 Economic development

A history of concurrent climate action and economic growth in the Bay Area and California shows that economic growth and reducing GHGs are not at odds; rather, climate action can drive economic development. The Air District and implementing partners can refer to recent economic roadmaps like the State Economic Blueprint and the Bay Area Jobs First Collaborative Regional Plan and other local plans to understand how implementation of the BARCAP can align with and support regional economic development priorities. For instance, many measures in the BARCAP are consistent with the sectors identified by the State Economic Blueprint as critical to include in future economic development efforts.[11]

The region should also be intentional in how implementation of this plan leads to local job creation and new businesses and spurs innovation and public-private partnerships. Private investment resulting from BARCAP-related economic development activities may in turn be a key source of funding and financing for implementation.

12.6 MOVING FORWARD TOGETHER

Several of the 16 measures and 57 actions in the BARCAP are already underway. They include ongoing activities that will ramp up and/or expand in scope over the next year or two. Other measures may depend upon new funding or staff resources to be secured before implementation can begin. In those cases, preliminary implementation activities may include convening conversations with lead and supporting implementers and stakeholders, including CBOs, to determine initial organizational stages and steps to be taken toward securing resources. Implementation will also include identifying opportunities for collaboration and coordination with Santa Clara County on related and complementary measures in the Santa Clara County/San Benito County Comprehensive Climate Action Plan.

No single agency or plan, however, can solve the problem of climate change on its own. Achieving the critical transition to a clean economy will require a collaborative effort on the part of governmental agencies at all levels, business and industry, community and environmental groups, educational institutions and Bay Area residents. It will also necessitate a commitment to ensure that all Bay Area

communities benefit from this transition, particularly frontline communities.

Everyone has a role to play in the transition to a clean energy economy and carbon neutrality. Individual actions among residents, households and businesses to reduce GHG emissions are important, but when they are combined with coordinated, collective action, they can become transformational. Such collective action can include community-based initiatives like tree-planting, coordinated purchasing of low-carbon products, community education and outreach, participating in civic forums, joining advocacy groups, and talking about climate change action with family, friends, and community members. Individuals can bring climate action into shared spaces like neighborhood groups, schools, workplaces, faith-based congregations, or local government councils and commissions. Tackling actions together enables more people to join in, begins to shift norms, and motivates leaders to invest in infrastructure solutions. Working collectively on climate action can bring shared joy and agency. Similar to how the BARCAP aims to amplify state and local actions through regional collaboration, community action can amplify the impacts of individual action.

The Bay Area has many necessary attributes that are needed to tackle the climate challenge. It is one of the most socially and technologically innovative regions in the world, with a strong environmental ethos, world-class academic institutions, robust networks of non-profits and CBOs, and progressive leadership in business and government. By rising to the challenge together, the BARCAP region can achieve local, regional, and state climate goals while fostering thriving communities, healthy natural ecosystems, and a sustainable, inclusive, and prosperous economy that continues to lead in developing new technologies and innovations needed to address the climate challenge.

ENDNOTES

1 This funding and financing roadmap was developed for the Air District by HIP Investors, Inc.

2 According to the State of California's Future of Work Commission "Quality jobs provide a living wage, stable and predictable pay, control over scheduling, access to benefits, a safe and dignified work environment, and opportunities for training and career advancement." Institute for the Future, "A NEW SOCIAL COMPACT for work and workers," California Future of Work Commission, March 2021, https://www.labor.ca.gov/wp-content/uploads/sites/338/2021/02/ca-future-of-work-report.pdf#:~:text=Ensure%20that%20more%20workers%20have%20quality%20jobs.,workers%20report%20being%20in%20a%20quality%20job.

3 These occupational titles are used by the federal government for tracking purposes.

4 Caro Zabin et al., "Putting California on the High Road: A Jobs and Climate Action Plan for 2030," California Workforce Development Board, 2020, cwdb.ca.gov/wp-content/uploads/sites/43/2020/09/AB-398-Report-Putting-California-on-the-High-Road-ADA-Final.pdf; Community-based organizations have developed a more expansive definition, which can be found here: CJA_JustTransition_Principles_final_hi-rez.pdf.

5 Jessie HF Hammerling et al., "Refining Transition: A Just Transition Economic Development Framework for Contra Costa County, California," UC Berkeley Labor Center, 2025, https://laborcenter.berkeley.edu/wp-content/uploads/2025/01/Refining-Transition.pdf.

6 Christina E. Simeone and Ian Lange, "San Francisco Bay Area Refinery Transition Analysis," The BlueGreen Alliance Foundation, 2022, https://www.bluegreenalliance.org/wp-content/uploads/2025/01/San-Francisco-Bay-Area-Refinery-Transition-Analysis.pdf.

7 The BlueGreen Alliance Foundation, "Report and Recommendations of the Contra Costa Refinery Transition Partnership," The BlueGreen Alliance Foundation, 2025, https://www.bluegreenalliance.org/wp-content/uploads/2025/01/Contra-Costa-Refinery-Transition-Report-and-Recommendations-2025.pdf.

8 "Funds," Richmond Our Power Coalition, Accessed October 16, 2025, https://www.ourpowerrichmond.org/funds.

9 John Gioia and John Kopchik, "Overview of the Green Empowerment Zone," Contra Costa County, 2025, https://www.baaqmd.gov/~/media/files/board-of-directors/2025/ssc_presentations_070925_rv_op-pdf.pdf?rev=1aa920d8b0ec41b5bac4a876e7ab16cc&sc_lang=en.

10 "Bay Area High-Road Manufacturing Initiative," All Home, Accessed September 1, 2025, https://www.allhomeca.org/catalyst-projects/bay-area-high-road-manufacturing-initiative/.

11 The State Economic Blueprint identified four categories of sectors that are critical to future economic development. The sectors that align with BARCAP measures include Strengthen: Sectors where the state has a competitive position and/or significant employment but where growth and wages are leveling, including working lands & water (agricultural production). Accelerate: Sectors with moderate to high projected growth that are read for expansion where additional investments could bend the curve to generate growth, including clean economy (batteries, solar, zero emission vehicles, onshore wind) and working lands and water (agtech and farm equipment). Bet: Emerging sectors with significant investment or high strategic importance to the innovation ecosystem, including clean energy economy (carbon management, hydrogen), working lands & water (bioeconomy, blue economy and tech), and high-tech (artificial intelligence). Anchor: Regional anchors that are critical for attracting and supporting industry activities while often providing quality, good-paying jobs within local communities, including education & skilled workforce, infrastructure (transmission, transportation infrastructure).