



Contra Costa County

Climate Action and Adaptation Plan

2024 Update

Adopted | November 5, 2024







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Contra Costa County

Climate Action and Adaptation Plan

2024 Update

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LIST OF ABBREVIATIONS

AB: Assembly Bill

BAAQMD: Bay Area Air Quality Management District

BARCAP: Bay Area Regional Climate Action Planning

BART: Bay Area Rapid Transit

BayREN: Bay Area Regional Energy Network

BCDC: Bay Conservation and Development Commission

CAL FIRE: California Department of Forestry and Fire Protection

CAP: Climate Action Plan

CAAP: Climate Action and Adaptation Plan

CARB: California Air Resources Board

CCTA: Contra Costa Transportation Authority

CEC: California Energy Commission

CERT: Community Emergency Response Team

CH₄: methane

CO₂: carbon dioxide

CO_{2e}: carbon dioxide equivalent

CPUC: California Public Utilities Commission

CRIPP: County Road Improvement and Preservation Program

CTP: Countywide Transportation Plan

DCD: Contra Costa County Department of Conservation and Development

e-bike: electric bicycle

EBMUD: East Bay Municipal Utilities District

EPP: Environmentally Preferable Purchasing

ESP: Electric Service Provider

EV: electric vehicle

EVSE: electric vehicle supply equipment



List of Abbreviations

- GHG:** greenhouse gas
- GSA:** Groundwater Sustainability Agency
- IPCC:** Intergovernmental Panel on Climate Change
- LCFS:** Low Carbon Fuel Standard
- MTCO_{2e}:** metric tons of CO₂ equivalence
- MWELO:** Model Water Efficient Landscaping Ordinance
- N₂O:** nitrous oxide
- PPD:** pounds per person per day
- PSPS:** Public Safety Power Shutoff
- RPS:** Renewables Portfolio Standard
- SGMA:** Sustainable Groundwater Management Act
- TNC:** transportation network company
- USEPA:** United States Environmental Protection Agency
- VMT:** vehicle miles traveled
- WUI:** wildland-urban interface
- ZEV:** zero-emission vehicle

EXECUTIVE SUMMARY

This 2024 Climate Action and Adaptation Plan (2024 CAAP) is part of Envision Contra Costa, the County’s comprehensive update to the General Plan, Zoning Code, and Climate Action Plan. The 2024 CAAP, an update of the 2015 Climate Action Plan (CAP), is Contra Costa County’s plan to achieve its vision for a sustainable future, adapt to changing

climate conditions, and rapidly reduce greenhouse gas (GHG) emissions to support a pathway to statewide net-zero emissions by 2045. The 2024 CAAP is intended to serve as a companion to the Contra Costa County 2045 General Plan (2045 General Plan) and to mitigate GHG emissions in the unincorporated county that result from implementation of the General Plan. The 2024 CAAP features a planning horizon out to 2045 and provides updated information and an expanded set of GHG emissions reduction and climate adaptation strategies that apply to the unincorporated county.

This 2024 CAAP builds on the work that was established in the 2015 CAP and reflects the latest developments in county- and regional-level climate action planning initiatives, GHG emissions reductions in County operations, and climate action planning policies and practices at the State level. The 2024 CAAP allows the County’s decision makers, staff, and communities to understand the sources and magnitude of local GHG emissions and the impacts of climate change on communities in the unincorporated areas of Contra Costa County (“unincorporated communities”), prioritize steps to achieve long-term GHG emissions reduction goals, and increase resilience to climate change-related hazards consistent with the County’s goals for land use, transportation, housing, and environmental justice.

The Contra Costa County Department of Conservation and Development led preparation of the 2024 CAAP at the direction of the County’s Board of Supervisors. Preparation of the 2024 CAAP occurred from 2018 to 2024 as part of Envision Contra Costa and in collaboration with a consultant team, the Board Sustainability Committee, the County’s Sustainability Commission, County departments, and community members.

The Contra Costa Board of Supervisors has declared that climate change “threatens the long-term economic and social well-being, health, safety, and security of the County, and that urgent action by all levels of government is needed to immediately address this climate emergency”.
(Resolution No. 2020/256)

The County remains committed to achieving the ambitious GHG emission reductions adopted by the State of California in response to the increasing impacts and threat of climate change. The 2024 CAAP provides strategies and actions that support the State’s GHG emissions reduction goals through 2045, as established by State laws and regulations, including:

- Reduce community-wide¹ GHG emissions by 40 percent from the 1990 levels² by 2030.
- Reduce community-wide GHG emissions by at least 85 percent from the 1990 levels by 2045 and be on a pathway to support statewide carbon neutrality by 2045.

The County’s business-as-usual forecasted GHG emissions and associated emissions reduction goals are summarized in Table ES-1. The 2024 CAAP is designed to enable Contra Costa County to meet the State’s regulatory emissions reduction goals while attaining other County land use, economic growth, and environmental justice objectives.

TABLE ES-1. GHG EMISSIONS IN UNINCORPORATED CONTRA COSTA COUNTY AND EMISSION REDUCTION GOALS (MTCO_{2e})

	2019	2030	2045
GHG emissions	986,310 ¹	1,125,230 ¹	1,288,490 ¹
GHG emissions goal	N/A ²	658,700	164,680
GHG emissions to be reduced	N/A ²	466,530	1,123,810

Note: Numbers rounded to the nearest 10.
¹ GHG emissions for 2019 were inventoried, and GHG emissions for 2030 and 2045 are projected from 2019 based on growth assumptions in the General Plan.
² There is not an adopted GHG reduction goal for 2019.

¹ Community-wide is defined as operative or effective throughout the whole community. In this case, this means throughout the unincorporated areas of Contra Costa County.

² The State’s Assembly Bill 32 Scoping Plan identifies 15 percent below 2005–2008 emissions levels as the local government equivalent of 1990 GHG emissions levels. The County uses 2005 as the baseline year.

CLIMATE ACTION STRATEGIES

The 2024 CAAP presents climate action strategies that build on the County's past achievements and will allow the County to attain its GHG emissions reduction goals while improving community resilience and achieving its goals for growth, economic development, and environmental justice. These climate action strategies include those that directly reduce GHG emissions and those that help lower emissions but are not as easy to directly track, as well as strategies to help improve community resilience to climate hazards through adaptation.

The 2024 CAAP includes goals, actions, and strategies for County operations and facilities. Some jurisdictions prepare a separate "municipal CAAP" document. Contra Costa County is including County operations in the CAAP to ensure the County is modeling its commitment to climate action and equity.

The 29 comprehensive strategies in the 2024 CAAP reflect input and feedback from communities and County staff and incorporate regional regulations and State laws that are expected to be enacted in the future. All strategies are listed in **Table ES-2**. Out of the 29 climate action strategies, 11 directly result in GHG emission reductions. The remaining 18 strategies are focused on climate hazard resilience, leadership, equity, and other sustainability goals. The 29 climate action strategies are organized into eight categories.

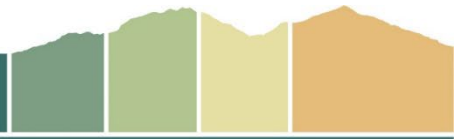


TABLE ES-2. 2024 CLIMATE ACTION STRATEGIES

	<p>Clean and Efficient Built Environment (BE) Homes, workplaces, and businesses in unincorporated Contra Costa County run efficiently on clean energy.</p>
<p>BE-1: Require and incentivize new buildings and additions built in unincorporated Contra Costa County to be low-carbon or carbon neutral. *</p>	
<p>BE-2: Retrofit existing buildings and facilities in the unincorporated county, and County infrastructure, to reduce energy use and convert to low-carbon or carbon-free fuels. *</p>	
<p>BE-3: Increase the amount of electricity used and generated from renewable sources in the county. *</p>	
	<p>No Waste Contra Costa (NW) Contra Costa County disposes of no more solid waste than 2.2 pounds per person per day (PPD).</p>
<p>NW-1: Increase composting of organic waste. *</p>	
<p>NW-2: Reduce waste from County operations. *</p>	
<p>NW-3: Increase community-wide recycling and waste minimization programs. *</p>	
<p>NW-4: Reduce emissions from landfill gas. *</p>	
	<p>Reduce Water Use and Increase Drought Resilience (DR) Contra Costa County uses less water, and communities are prepared for drought.</p>
<p>DR-1: Reduce indoor and outdoor water use. *</p>	
<p>DR-2: Ensure sustainable and diverse water supplies.</p>	
	<p>Clean Transportation Network (TR) Contra Costa County's transportation network provides safe and accessible options for walking, biking, and transit. If residents and workers are driving, they are in zero-emission vehicles.</p>
<p>TR-1: Improve the viability of walking, biking, zero-emission commuting, and using public transit for travel within, to, and from the county. *</p>	
<p>TR-2: Increase the use of zero-emission vehicles. Transition to a zero-emission County fleet by 2035 and a community fleet that is at least 50 percent zero-emission by 2030. *</p>	



Resilient Communities and Natural Infrastructure (NI)

Contra Costa County will increase resilience to climate hazards and foster community health.

NI-1: Protect against and adapt to changes in sea levels and other shoreline flooding conditions.

NI-2: Protect against and adapt to increases in the frequency and intensity of wildfire events.

NI-3: Establish and maintain community resilience hubs.

NI-4: Sequester carbon on natural and working lands in Contra Costa County. *

NI-5: Minimize heat island effects through the use of cool roofs, green infrastructure, tree canopy, cool paint and pavement, and other emerging strategies.

NI-6: Protect communities against additional hazards created or exacerbated by climate change.



Climate Equity (CE)

Contra Costa County will address environmental factors leading to health disparities, promote safe and livable communities, and promote investments that improve neighborhood accessibility.

CE-1: Provide access to affordable, clean, safe, and healthy housing and jobs.

CE-2: Invest in solutions to support climate equity.

CE-3: Increase access to parks and open space.

CE-4: Ensure residents have equitable, year-round access to affordable, local fresh food.

CE-5: Ensure that large industrial facilities act as good neighbors.



Leadership (L)

Contra Costa County is a model for how local government can take action on climate issues.

L-1: Establish Contra Costa County as a leader among local governments for addressing climate issues.

L-2: Continue to recognize the climate crisis as an emergency for Contra Costa County and make addressing climate change a top County priority.



Implementation (IS)

Contra Costa County will ensure it follows through to achieve the goals and actions in this Climate Action and Adaptation Plan.

IS-1: Monitor and report progress toward achieving Climate Action and Adaptation Plan goals on an annual basis.

IS-2: Continue collaborative partnerships with public agencies, private partners, and community groups that support Climate Action and Adaptation Plan implementation, with an emphasis on residents and community-based organizations from Impacted Communities.



IS-3: Secure necessary funding to implement the Climate Action and Adaptation Plan.
IS-4: Continue to update the baseline emissions inventory and Climate Action and Adaptation Plan every five years.
IS-5: Maintain and update the Climate Action and Adaptation Plan to allow for greater resilience.
*Indicates strategy with quantified GHG emissions reductions.

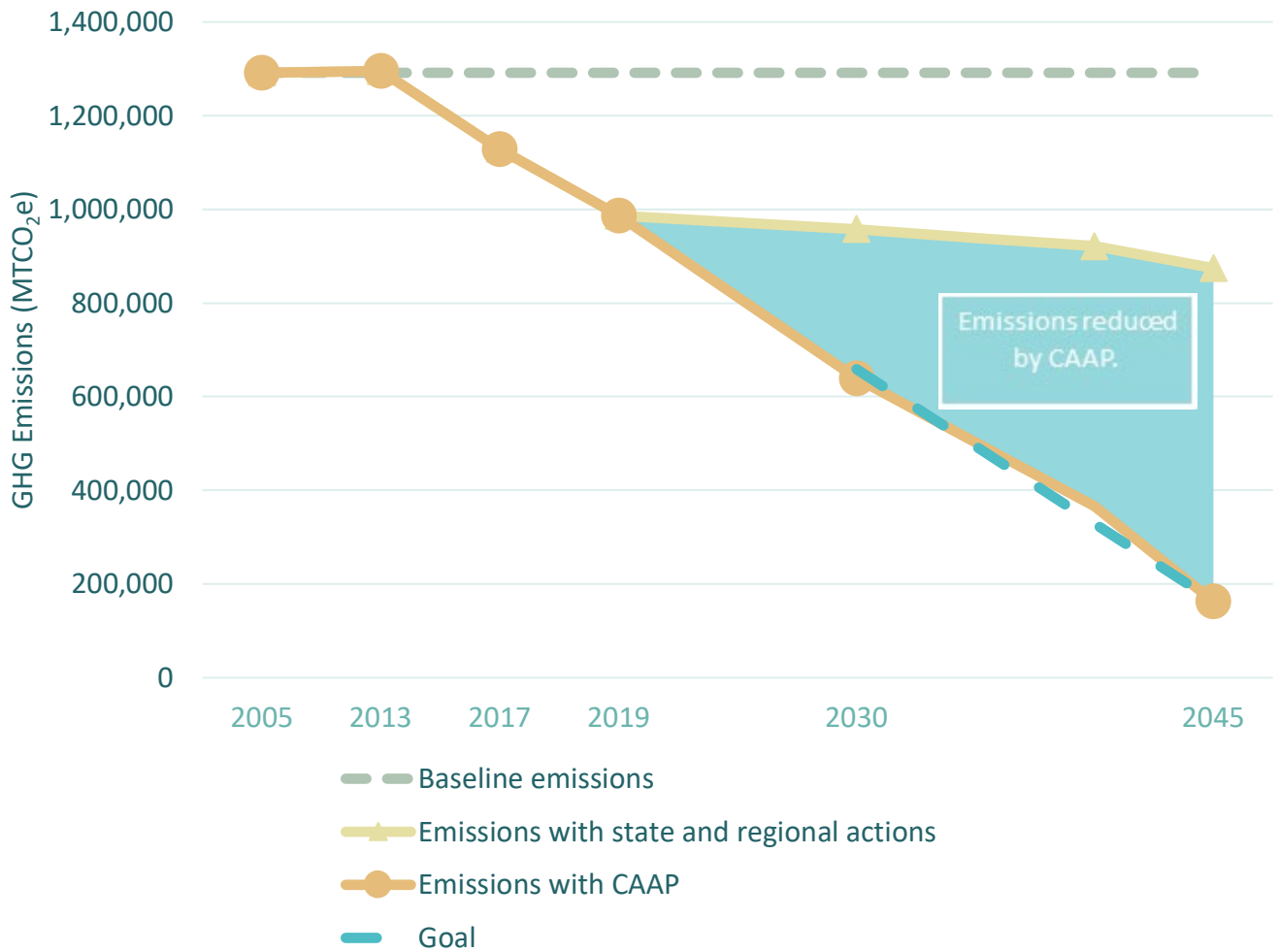
In conjunction with existing local and State programs, these climate action strategies provide a path to reduce the County’s GHG emissions to 639,460 MTCO₂e by 2030 and to 163,130 MTCO₂e by 2045 and support statewide attainment of net carbon neutrality by 2045 (**Table ES-3** and **Figure ES-1**). With the reductions currently projected from the 2024 CAAP GHG emissions reduction strategies, 2045 GHG emissions for the unincorporated county are expected to be reduced to 85 percent below 1990 levels, equal to 87 percent below baseline 2005 levels and 83 percent below 2019 levels. These reductions are predicted to occur across most GHG emission sectors, though emissions within the solid waste sector will continue to be affected by previously deposited waste continuing to decompose in landfills.³ With these reductions as currently assessed, unincorporated Contra Costa County achieves the GHG emissions reduction goals for 2030 and 2045.

TABLE ES-3. GHG EMISSIONS AFTER 2024 CAAP IMPLEMENTATION

	2030 MTCO ₂ E	2045 MTCO ₂ E
GHG emissions goals	658,700	164,680
GHG emissions after CAAP implementation	639,460	163,130
Goal achieved after CAAP implementation?	Yes	Yes

³ The federal Resource Conservation and Recovery Act defines solid waste as “any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities. Nearly everything we do leaves behind some kind of waste. It is important to note that the definition of solid waste is not limited to wastes that are physically solid. Many solid wastes are liquid, semi-solid, or contained gaseous material”.

FIGURE ES-1. GHG EMISSIONS WITH 2024 CAAP IMPLEMENTATION COMPARED TO REDUCTION GOALS



IMPLEMENTATION

Climate change already touches all aspects of life, work, and play within unincorporated Contra Costa County. In the absence of focused, ambitious, and equitable climate action, these effects will only become more pronounced, disruptive, and harmful over time.

Contra Costa County is dedicated to making our communities cleaner and healthier for families, children, and future generations.

The County will use this document to help set climate action planning priorities, allocate resources to the communities and assets that are most vulnerable to climate change, and monitor and evaluate progress towards GHG emissions reduction goals and increases in community equity and resilience. The 2024 CAAP and 2045 General Plan provide a blueprint for how the County, its residents, and businesses can achieve a more sustainable, resilient future.

The County developed the 2024 CAAP with the support and coordination of communities, and continued collaboration between the County and community partners is central to the 2024 CAAP's successful implementation. Residents, workers, and business owners can use this document to better understand their personal and community-level vulnerability to climate change and for guidance on how to reduce their GHG emissions and improve their climate resiliency, including finding information about available financial and educational resources.

This 2024 CAAP guides new development by introducing strategies that will reduce GHG emissions associated with the built environment. The 2024 CAAP is a California Environmental Quality Act (CEQA)-qualified GHG Reduction Plan, which means that future development projects requiring environmental review under State law can streamline their GHG impact analyses by demonstrating consistency with the 2024 CAAP. This streamlining can save time and money during the environmental review process by allowing developers to reduce the number of steps involved in the environmental impact assessment process. Therefore, it is important that developers, landowners, planners, and others familiarize themselves with the strategies in the 2024 CAAP and comply with these strategies when designing, approving, and building new development.

County staff will monitor progress and provide regular updates to communities to ensure the effectiveness of each strategy. To ensure that the implementation process is efficient and transparent, the 2024 CAAP includes a high-level implementation plan that identifies responsible County departments, partners, and time frames associated with each strategy. Implementation of the plan will occur over three time frames—near term (by 2026), mid-term (by 2028), and long term (by 2030). The strategies do not have end dates because they are intended to remain in effect into the future. County staff will lead 2024 CAAP implementation by collaborating with and supporting community organizations, residents, businesses, and stakeholders to create programs that accomplish the goals, strategies, and actions outlined in the 2024 CAAP. To set the 2024 CAAP up for success, the County will integrate the plan’s goals, strategies, and actions into applicable County programs, plans, and initiatives. See [Table 12](#) for complete implementation details for each strategy.

The 2024 CAAP should be considered a living document that the County can modify to ensure that the GHG emissions reduction goals are achieved.



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1. PURPOSE



Photo credit: Ben Weise.

What is the Climate Action and Adaptation Plan?

The Contra Costa County Climate Action and Adaptation Plan (2024 CAAP) is the County's strategic plan to reduce greenhouse gas (GHG) emissions and to adapt to changing climate conditions in the unincorporated areas of the county. The 2024 CAAP demonstrates Contra Costa County's leadership and commitment to reduce GHG emissions and enhance community resiliency to long-term changes associated with climate-related hazards such as heat, flooding, droughts, and wildfires.

The 2024 CAAP is an update of the 2015 Climate Action Plan (CAP). It provides updated information, an expanded set of GHG emissions reduction strategies, climate adaptation strategies, and a planning horizon out to 2045. It also establishes an implementation program and a framework to monitor, track, and report progress over time.

The 2024 CAAP builds on several earlier sustainability and energy efficiency efforts and local accomplishments. The 2024 CAAP is intended to serve as a companion to the County's General Plan, Contra Costa County 2045 General Plan, and to mitigate GHG emissions that result from implementation of the General Plan. This approach supports a holistic view of climate action planning and sustainability—it works to reduce Contra Costa County's contribution to climate change while simultaneously preparing for the changes that cannot

be avoided. **Figure 1** depicts the relationship between reducing GHG emissions, also referred to as climate change mitigation, and climate change adaptation.

FIGURE 1. RELATIONSHIP OF CLIMATE CHANGE MITIGATION AND ADAPTATION

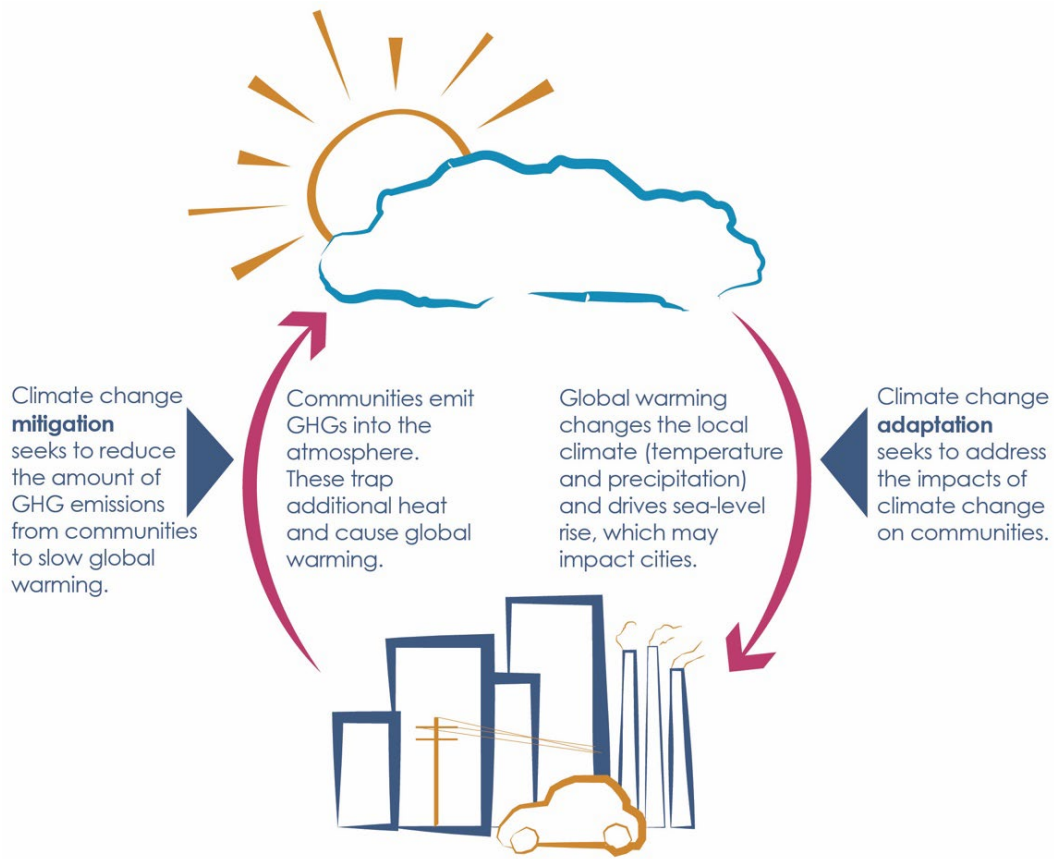


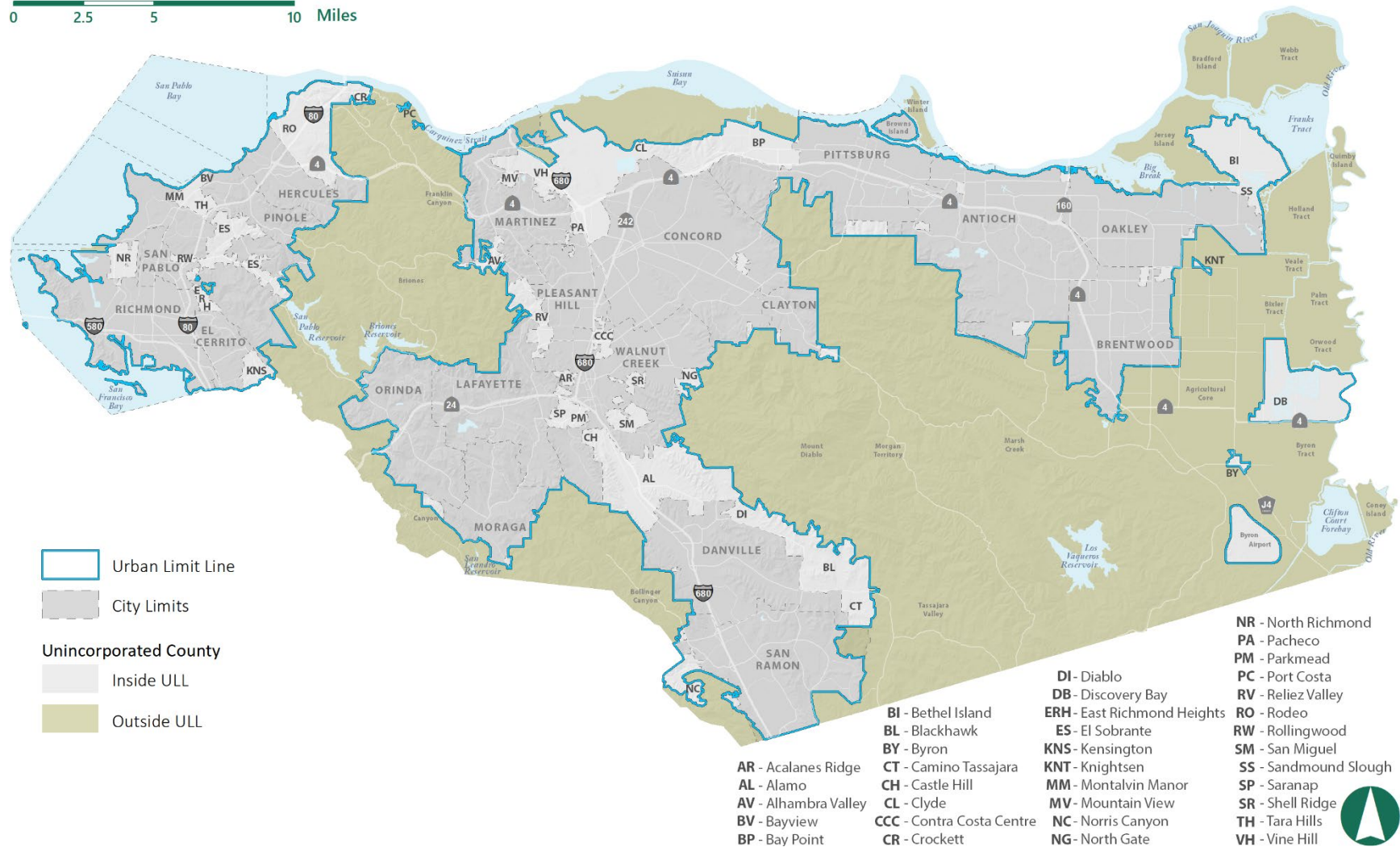
Image credit: California Adaptation Planning Guide.

The 2024 CAAP allows decision-makers, residents, businesses, and community stakeholders to understand the sources and magnitude of local GHG emissions from the energy, solid waste, water, and transportation sectors of the unincorporated county (see **Figure 2** for the jurisdiction of the 2024 CAAP⁴); establish goals to reduce GHG emissions; and prioritize steps to achieve reduction goals. The 2024 CAAP includes goals, strategies, and actions that the County and community can take to achieve significant GHG emission reductions in the unincorporated areas of the county and ensure that the County is on track to support the State’s goal to achieve statewide net carbon neutrality by 2045.

⁴ **Figure 2** shows the Urban Limit Line (ULL), which limits urban development to certain areas of the county and helps preserve farmland, open space, and habitat.

FIGURE 2. JURISDICTION OF CONTRA COSTA COUNTY CAAP (UNINCORPORATED COUNTY)

0 2.5 5 10 Miles



Contra Costa County is dedicated to making our communities cleaner and healthier for families, children, and future generations.

This 2024 CAAP includes strategies that directly reduce GHG emissions as well as strategies that help lower GHG emissions but are not as easy to directly track. The 2024 CAAP includes information about how climate change may affect natural hazards and identifies the populations, infrastructure, services, facilities, and natural resources in the unincorporated county that are most vulnerable to the effects of climate change. The 2024 CAAP has a suite of strategies to help improve community resilience to these hazards, also known as adaptation.

The County developed the 2024 CAAP between 2018 and 2024 as part of the County's General Plan update process, Envision Contra Costa. The Contra Costa County Department of Conservation and Development prepared the 2024 CAAP at the direction of the County's Board of Supervisors and in collaboration with a consultant team, the Board Sustainability Committee, the County's Sustainability Commission, County departments, and community members. This 2024 CAAP builds on the work that was established in the 2015 CAP and reflects the latest developments in county- and regional-level climate action planning initiatives, County GHG emissions reductions, and climate action planning policies and practices at the State level.

The County has continued its work on climate action as the CAAP and General Plan were under development. [Interim climate action work plans](#) for 2021-2022 and 2023-2024 have guided progress during this time. This work has been recorded and shared with the public in [annual progress reports](#).

Climate Action and Equity

Climate action is closely intertwined with equity issues, and a comprehensive approach to addressing climate change must also address the entrenched inequities in our society. In Contra Costa County and elsewhere in California,

Equity: The state in which each individual or group is allocated the resources needed to reach an equal outcome.

Impacted Communities⁵, such as low-income, disabled, senior, and communities of color, have faced extensive discrimination, negligence, and economic disempowerment. Members of Impacted Communities often live in areas that are more at risk from climate change-related natural hazards. These persons also often lack the financial means and other resources or authority to act on climate change. These may include purchasing an electric vehicle, learning skills to pursue jobs in an emerging green economy, and if they own a home, retrofitting their home to better withstand climate change impacts, and renovating their home to improve energy efficiency, or installing solar panels on their house. As seen in **Figure 3**, Impacted Communities in the unincorporated county are concentrated along the county's northern waterfront.

The 2024 CAAP acknowledges such inequities and recognizes that Contra Costa County must play a role in resolving them. Though this 2024 CAAP cannot solve inequity by itself, it can contribute to a more equitable future by:

- Providing resources to persons and communities who have historically been denied them.
- Integrating equity considerations into County decision-making processes.
- Supporting Impacted Communities in taking action to address climate change.
- Creating a Just Transition that helps address the root causes of climate change and system inequities.
- Ensuring that Impacted Communities have a voice in climate action planning through community-driven planning.

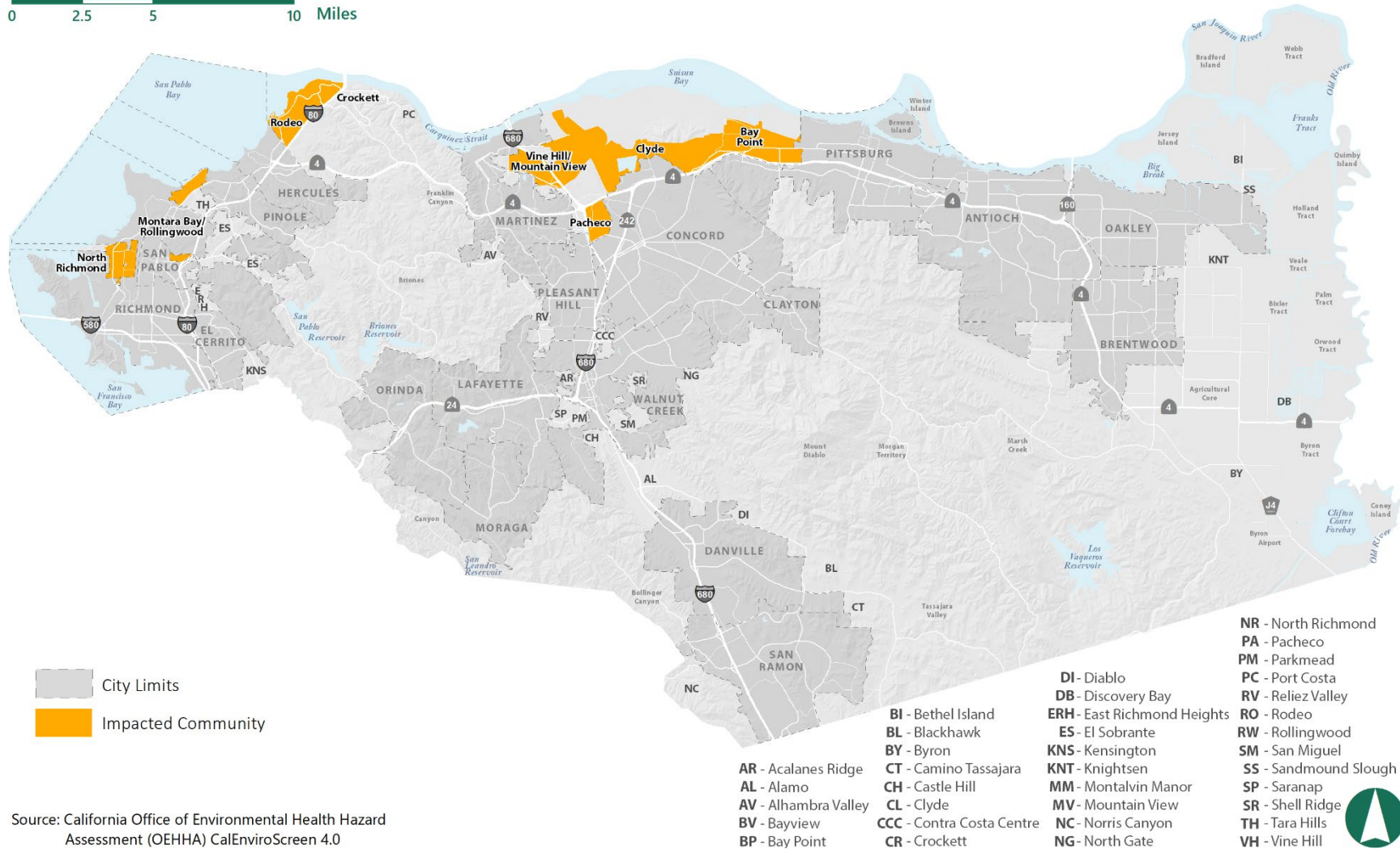
Equity was a key priority of the County in developing the 2024 CAAP and 2045 General Plan. Many of the GHG emissions reduction and climate adaptation strategies in this 2024 CAAP help to improve community equity. Those strategies are marked with the icon shown on the right.



⁵ "Impacted Communities" refers to a designation developed by CalEPA. CalEPA has formally designated four categories of geographic areas as "disadvantaged": 1. Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen 4.0; 2. Census tracts lacking overall scores in CalEnviroScreen 4.0 due to data gaps, but receiving the highest 5 percent of CalEnviroScreen 4.0 cumulative pollution burden scores; 3. Census tracts identified in the 2017 DAC designation as disadvantaged, regardless of their scores in CalEnviroScreen 4.0; and 4. Lands under the control of federally recognized tribes. The term "Impacted Communities" was selected via community input.

FIGURE 3. IMPACTED COMMUNITIES IN THE UNINCORPORATED COUNTY

0 2.5 5 10 Miles



Equity vs. Equality

“Equity and equality are often used interchangeably, but equity and equality do not mean the same thing. Equality is about sameness—meaning that everyone receives the same thing regardless of any other factors. However, equality is only useful if everyone starts from the same place, which is often not the case. Lower-income populations and communities of color often have less access to healthy and energy-efficient housing, transit, or safe bicycling and walking routes. Equity, on the other hand, is about fairness, which is about ensuring that people have access to the same opportunities and have what they need to thrive and succeed. Equity is needed before equality can be reached. This understanding recognizes that people may have different starting points and may need different types and levels of support to flourish”.

Reference: Urban Sustainability Directors’ Network Guide to Equitable Community-Driven Climate Preparedness Planning, May 2017

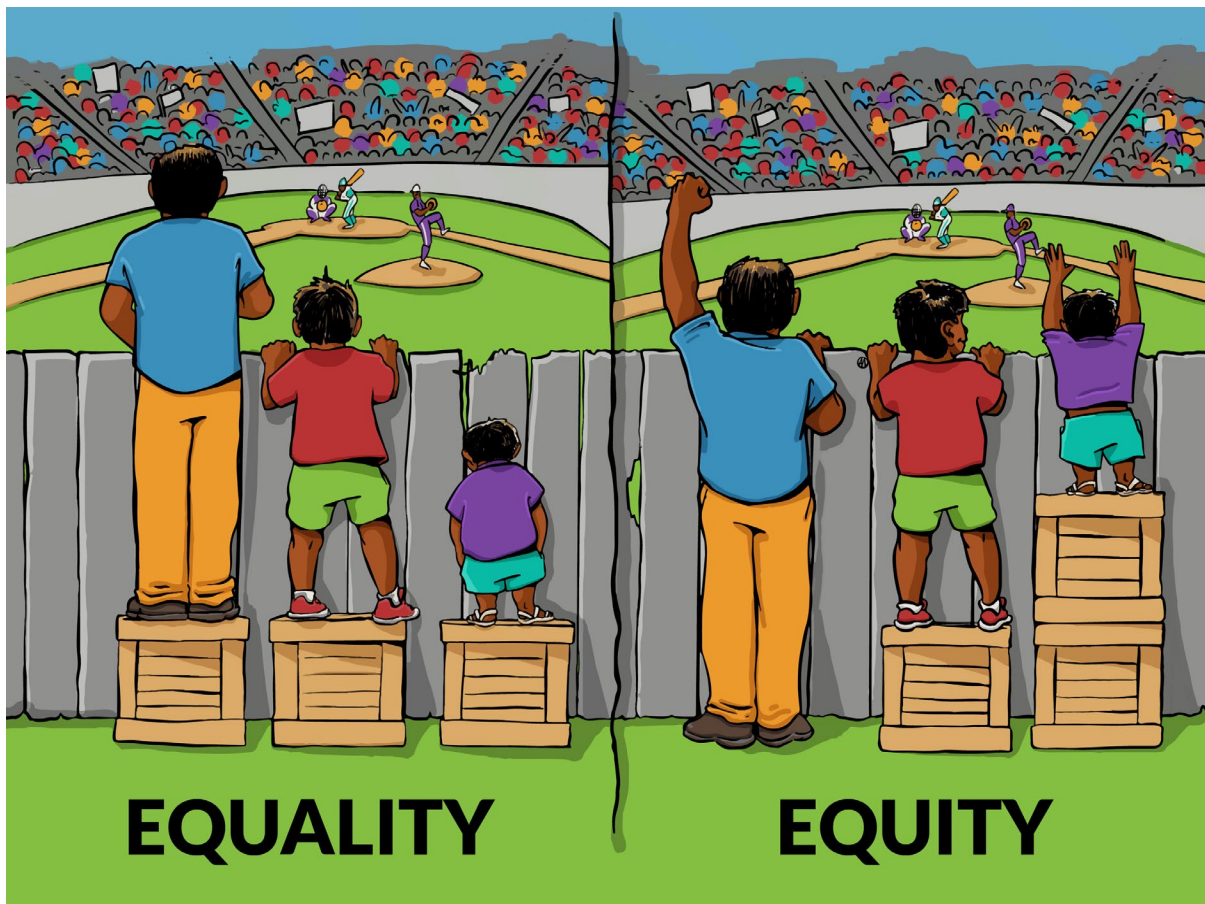



Image credit: Interaction Institute for Social Change | Artist: Angus Maguire

The CAAP and the General Plan

The County updated the CAAP in tandem with the update of the County's General Plan (2045 General Plan). The 2024 CAAP is intended to complement and help implement the General Plan.

There is some overlap in topics addressed by the 2045 General Plan and the 2024 CAAP; the concurrent preparation of the plans ensures they are consistent. The 2045 General Plan acknowledges this connection by highlighting policies that promote

The Contra Costa County 2045 General Plan is the County's primary policy tool to guide physical changes in the unincorporated areas of the county. This General Plan looks over 20 years into the future and establishes a vision for development of our communities and stewardship of our natural environment. It is aspirational and long-range, but also practical, providing a useful, everyday guide for community planning.

sustainability with a special icon: . The climate action strategies presented later in this CAAP include General Plan policies and actions that reduce GHG emissions or increase resilience and are cross-referenced with the General Plan policy or action number in parenthesis. The 2024 CAAP is thus linked with the General Plan in continuing the County's path towards sustainability.

Preparation of the 2045 General Plan included completion of a climate change vulnerability assessment. This assessment considers climate changes likely to affect unincorporated Contra Costa County in the future and projected impacts on populations, assets, and community services. The County used findings from the vulnerability assessment to inform policies related to climate change resilience and adaptation, resource conservation, and energy use in both the 2045 General Plan and 2024 CAAP. The results of the vulnerability assessment are provided in [Chapter 3](#) and **Appendix C**.

The 2024 CAAP focuses on behaviors, regulations, and investment decisions that directly reduce GHG emissions and/or promote climate resilience and lays out an implementation and monitoring program to ensure that the County meets its State GHG emissions reduction goals. GHG emissions are highly dependent on County-level policies regulating land use, resource use and conservation, and transportation. A comparison of the topics addressed in the 2045 General Plan and the 2024 CAAP is provided in **Table 1**.

TABLE 1. COMPARISON OF TOPICS IN THE 2045 GENERAL PLAN AND THE 2024 CAAP

UPDATED GENERAL PLAN	2024 CAAP
SHARED TOPICS	
<ul style="list-style-type: none"> • Agriculture • Air quality • Climate change resilience and adaptation • Economic development • Energy use and generation • Extreme heat • Flood hazards and sea level rise • Greenhouse gases • Solid waste management • Transportation • Water conservation and quality • Wildfire hazards 	<ul style="list-style-type: none"> • Agricultural pests and diseases • Air quality • Climate change effects and vulnerabilities • Economic development and Just Transition • Energy use and generation • Extreme heat • Flooding, shoreline flooding, and sea level rise • Greenhouse gas emissions • Solid waste management • Transportation • Water conservation • Wildfires
DIFFERENT TOPICS	
<ul style="list-style-type: none"> • Community health • Emergency response and evacuation • Hazardous materials • Historic and cultural resources • Housing • Land use patterns • Mineral, oil, and natural gas resources • Noise • Open space and ecological preservation • Public facilities and infrastructure • Seismic and geologic hazards 	<ul style="list-style-type: none"> • Carbon sequestration • Climate change resilience and adaptation • County investments • County leadership • Drought • Fog • Human health hazards • Landslides and debris flows • Severe storms

How To Use This Plan

Climate change already touches all aspects of life, work, and play within Contra Costa County. In the absence of focused, ambitious, and equitable climate action, these effects will only become more pronounced over time. The 2024 CAAP is intended for residents, workers, business owners, County staff, and policymakers to provide information about the science of climate change, to highlight what the County has already done to address climate change, and to establish a road map for further GHG emissions reductions and advances in community equity, adaptation, and resilience.

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The County will use this document to help set climate action planning priorities, allocate resources to the communities and assets that are most vulnerable to climate change, and monitor and evaluate progress towards GHG emissions reduction goals and increases in community equity and resilience.

Residents, workers, and business owners can use this document to better understand their personal and community-level vulnerability to climate change and for guidance on how to reduce their GHG emissions and improve their climate resiliency, including finding information about available financial and educational resources.

This 2024 CAAP guides new development by introducing strategies that will reduce GHG emissions associated with the built environment. The 2024 CAAP is a CEQA-qualified Climate Action and Adaptation Plan or GHG reduction strategy, which means that future development projects in the unincorporated county that require environmental review under State law will have the option to streamline their GHG impact analyses by demonstrating consistency with this CAAP. This streamlining can save time and money during the environmental review process by allowing developers to reduce the number of steps involved in the environmental impact assessment process. Therefore, it is important that developers, landowners, planners, and others familiarize themselves with the strategies in the 2024 CAAP and comply with these strategies when constructing new development.

The remainder of this 2024 CAAP covers the following topics:

- **Chapter 2** (Climate Action Framework) discusses the State, regional, and local regulatory framework that informs the 2024 CAAP and related climate action planning efforts. It also highlights some of Contra Costa County's recent and ongoing efforts to reduce GHG emissions and improve resilience to climate change. Chapter 2 is supported by the Climate Change Policy and Legislation Appendix (**Appendix A**).
- **Chapter 3** (Climate Change and GHGs) presents the results of two analyses: the GHG inventory and forecast for unincorporated Contra Costa County, which assesses recent and projected future GHG emissions; a discussion of the County's consumption-based inventory; and a study of the expected future changes to climate change-related hazards.
- **Chapter 4** (GHG Emission Reduction Strategy) identifies the levels of GHG emissions reductions that the 2024 CAAP seeks to achieve and presents the County's set of strategies and actions to meet or exceed these reductions. It also shows the GHG emissions that have already been reduced through existing and planned State, regional, and local efforts. Chapter 4 is supported by the GHG Technical Appendix (**Appendix B**).
- **Chapter 5** (Climate Adaptation Strategy) presents the findings of the vulnerability assessment, which looks at how people and community assets may be harmed by climate change-related hazards. It lays out the County's strategies to improve resilience to these hazards and adapt to changing conditions. Chapter 5 is supported by the Vulnerability Assessment Technical Appendix (**Appendix C**).
- **Chapter 6** (Realizing the 2024 CAAP) presents the implementation details and high-level work plan of the 2024 CAAP, emphasizing the County's leadership on climate action planning.



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2. CLIMATE ACTION FRAMEWORK



Photo credit: Envision Contra Costa picture gallery.

The 2024 CAAP builds on a legacy of climate action planning in California on the State level and at the regional and local level. Existing State and regional plans, regulations, and programs inform future GHG emissions projections, GHG emissions reduction strategies, and climate action, adaptation, and resilience strategies that appear in this document. This chapter provides an overview of State actions and regulations that informed the development of the CAAP and climate action that is already underway at the local and regional level. GHG savings from these activities attributed to unincorporated Contra Costa County are presented in [Chapter 4](#).

State Climate Action and Regulation

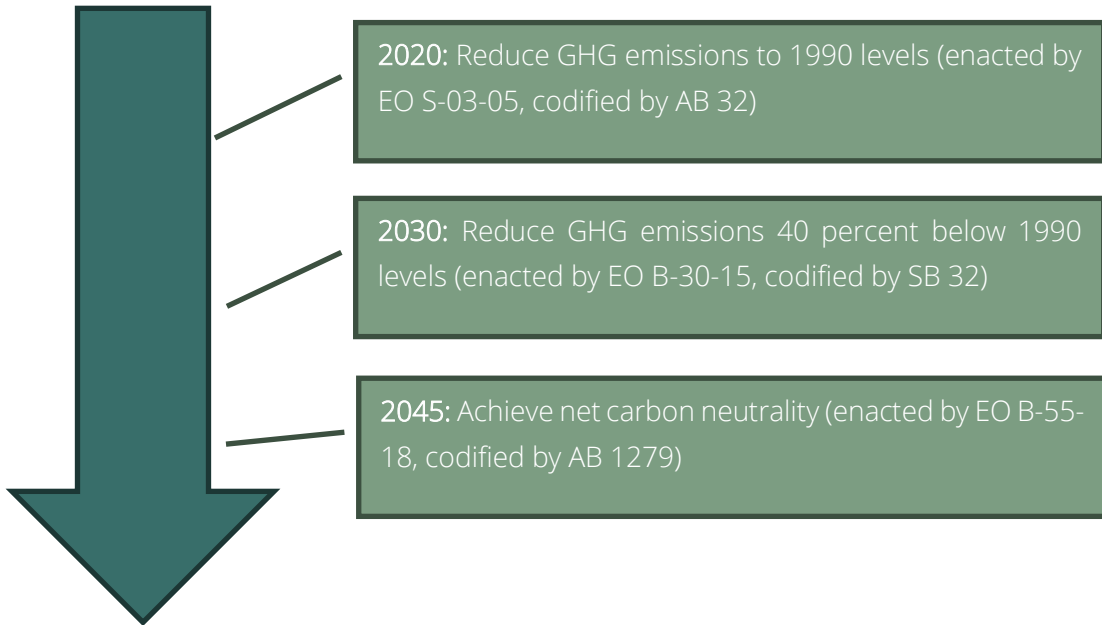
California has a history of enacting legislation aimed at reducing the state's GHG emissions and ensuring resiliency in the face of a changing climate.

California has a history of enacting legislation aimed at reducing the State's GHG emissions and ensuring resiliency in the face of a changing climate. California law first addressed climate change directly in 1988, when Assembly Bill (AB) 4420 directed the State to prepare a GHG

inventory and study the impacts of climate change. Since then, California’s governors have signed several executive orders, and the legislature has adopted several laws to assess climate change, analyze GHG emissions and their effects, reduce emissions, and prepare for the impacts of climate change. Many of these laws and regulations affect local governments, but not all create specific requirements for individual communities.

This section provides brief summaries of key climate change legislation, and **Appendix A** provides more detailed descriptions of climate change legislation. The State’s major goals are shown in **Figure 4**.

FIGURE 4. CALIFORNIA’S GHG EMISSIONS REDUCTION GOALS



EXECUTIVE ORDER S-03-05 AND ASSEMBLY BILL 32 – CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006

In 2005, former Governor Schwarzenegger issued Executive Order S-03-05, which established the first statewide GHG emissions reduction goals for California and directed the State to:

- Reduce emissions to 2000 levels by 2010.



- Reduce emissions to 1990 levels by 2020.⁶
- Reduce emissions by 80 percent below 1990 levels by 2050.

In 2006, Governor Schwarzenegger signed Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006.¹ AB 32 codified the 2020 reduction goal, requiring California to reduce statewide GHG emissions to 1990 levels by 2020.

EXECUTIVE ORDER B-30-15 AND SENATE BILL 32

In 2015, former Governor Jerry Brown signed Executive Order (EO) B-30-15, which directed State agencies to take several steps to reduce statewide GHG emissions and adapt to changing climate conditions. One section of this executive order set a GHG emissions reduction goal for the State of 40 percent below 1990 levels by 2030. In 2016, the legislature passed, and the governor signed Senate Bill (SB) 32, which codified the 2030 GHG emissions reduction goal into law.

EXECUTIVE ORDER B-55-18

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

Net carbon neutrality

A net carbon neutral goal means that any GHG emissions produced by the community are balanced out through carbon sequestration, offsets, or other activities that remove GHG emissions from the atmosphere, so that the community's net GHG emissions are zero. Ideally, the community will reduce its own emissions as much as possible, and then balance out the remainder. The scenario in the State's 2022 Scoping Plan would reduce emissions to approximately 85 percent below 1990 levels and then offset the remaining emissions, as required by AB 1279.

⁶ According to an assessment of GHG emissions trends conducted by the Air Resources Board in 2022, statewide GHG emissions dropped below the 2020 GHG emissions limit in 2014 and have remained below the limit since that time.

ASSEMBLY BILL 1279

In 2022, Governor Newsom signed AB 1279, the California Climate Crisis Act, which requires the State to achieve net zero GHG emissions as soon as possible, but no later than 2045, and achieve and maintain net negative GHG emissions thereafter. The bill also requires California to reduce statewide GHG emissions by 85 percent compared to 1990 levels and directs the California Air Resources Board (CARB) to work with relevant State agencies to achieve these goals.

CLIMATE CHANGE SCOPING PLAN

The Climate Change Scoping Plan² (Scoping Plan) was first adopted in 2008 and was updated in 2014, 2017, and 2022. The Scoping Plan describes the strategies that California will implement to reduce the State's emissions to achieve the emission reduction goals required by statute. It identifies GHG emissions reduction strategies to achieve the State's goals, including direct regulations, alternate compliance mechanisms, incentives, voluntary actions, and market-based approaches like a cap-and-trade program.

While the Scoping Plan has a statewide focus, it identifies local governments as strategic partners to achieving the State goals. Each version of the Scoping Plan has provided guidance for local government actions to reduce GHGs. The 2008 Scoping Plan noted that the statewide goal of reducing emissions to 1990 levels by 2020 was comparable to reducing emissions 15 percent below "existing" emissions by 2020 for local governments. Although "existing emission levels" was not formally defined by the Scoping Plan, agencies throughout California have interpreted it as referring to emissions between 2005 and 2008. As a result, Contra Costa County's GHG emissions reduction strategies used 2005 emissions as the "existing" or baseline level to inform the 2020 goal in the 2015 CAP, which in turn informs the 2030 and 2045 goals in the 2024 CAAP. The 2022 update to the Scoping Plan recommends that local governments support statewide efforts to achieve net carbon neutrality.

The 2022 Scoping Plan employs a variety of GHG emissions reduction strategies that include direct regulations, alternative compliance mechanisms, incentives, voluntary actions, and market-based approaches like a cap-and-trade program. Carbon neutrality takes it one step further by expanding actions to capture and store carbon, including through natural and working lands and mechanical technologies, while drastically reducing



anthropogenic sources of carbon pollution at the same time.⁷ The 2022 Scoping Plan focuses on the outcomes needed to achieve carbon neutrality statewide by assessing paths for clean technology, energy deployment, natural and working lands, and others. It is designed to meet the State’s long-term climate objectives and support a range of economic, environmental, energy security, environmental justice, and public health priorities.

The 2022 Scoping Plan identifies strategies that would be most impactful at the local level for ensuring substantial progress towards the State’s carbon neutrality goals. The 2022 Scoping Plan notes, “These areas and strategies are designated as ‘priority’ because they are the GHG emissions reduction opportunities over which local governments have the most authority and that have the highest GHG emissions reduction potential”. This CAP integrates feasible GHG emissions reductions from the 2022 Scoping Plan.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA)³ requires many proposed development projects to conduct an environmental review that identifies how the project may impact the environment, including changes to GHG emissions. The State CEQA Guidelines include provisions for local governments to use adopted plans for reducing GHG emissions to address the cumulative impacts of individual future projects on GHG emissions (see State CEQA Guidelines Section 15183.5(b)(1)).

Consistent with the State CEQA Guidelines, lead agencies may use adopted GHG emissions reduction plans, such as a CAAP, to assess the cumulative impacts of projects on climate change at a programmatic level. If the adopted plan is consistent with State CEQA Guidelines Section 15183.5, the analysis and GHG emissions reduction efforts in the plan may be applied to individual projects, meaning that the projects would not have to conduct separate GHG analyses and project-specific environmental documents may tier from and/or incorporate by reference the existing programmatic review.

A future project-specific environmental review that relies on this 2024 CAAP for its cumulative impact analysis must show consistency with the plan by preparing a Consistency Checklist, identify specific GHG emissions reduction strategies from the 2024 CAAP that are applicable to the project, and demonstrate how the project will implement

⁷ The County’s 2023 *Healthy Lands, Healthy People* study identifies strategies for using natural and working lands to capture and store carbon. A Sustainable Agricultural Lands Conservation Grant from the State of California funded the study.

these strategies. Project applicants and County staff will identify which specific strategies are applicable to each project during project review. If applicable strategies are not otherwise binding and enforceable, they must be incorporated as mitigation strategies for the project. Projects that have cumulative impacts on GHG emissions may still need to prepare a separate GHG analysis and environmental review.

This 2024 CAAP meets the requirements in the State CEQA Guidelines that allow it to be applied to individual projects by:

- Quantifying emissions, both existing and projected over a specified period, resulting from activities within a defined geographic area, as discussed in [Chapter 3](#).
- Establishing a level, based on substantial evidence, below which the contribution of emissions from activities covered by the plan would not be cumulatively considerable. [Chapter 3](#) of this 2024 CAAP identifies the County's GHG emissions reduction goals, consistent with the State's regulatory goals, which are:
 - Reduce emissions to 40 percent below 1990 levels by 2030.
 - Reduce emissions to 85 percent below 1990 levels by 2045.
 - Support statewide net carbon neutrality by 2045.
- Identifying and analyzing the emissions resulting from specific actions or categories of actions anticipated within the geographic area, as discussed in [Chapter 4](#).
- Specifying strategies or a group of strategies, including performance standards that, if implemented on a project-by-project basis, substantial evidence demonstrates they would collectively achieve the specified emissions level, as discussed in [Chapters 4](#) and [5](#) and [Appendix B](#).
- Establishing a mechanism to monitor the plan's progress toward achieving specific levels and to require amendment if the plan is not achieving those levels, as discussed in [Chapter 6](#).
- Including an environmental review of the 2024 CAAP. The 2024 CAAP is evaluated by the Contra Costa 2045 General Plan Environmental Impact Report.



Regional Climate Action

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

The Bay Area Air Quality Management District (BAAQMD) regulates stationary sources of air pollution in the nine counties that surround San Francisco Bay: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma counties. The 24-member Board of Directors that governs BAAQMD includes four representatives from Contra Costa

County, including two members of the County Board of Supervisors. BAAQMD's Clean Air Plan (2017) provides a regional strategy to protect public health and the climate via continued progress toward all State and federal air quality standards, and to eliminate health risk disparities from exposure to air pollution among Bay Area communities. It includes a wide range of control measures designed to decrease emissions of the air pollutants that are most harmful to Bay Area residents, such as particulate matter, ozone, and toxic air contaminants; to reduce emissions of methane and other GHGs that are potent climate pollutants in the near-term; and to decrease emissions of carbon dioxide by reducing fossil fuel combustion. BAAQMD's Clean Air Plan defines a vision for transitioning the region to the post-carbon economy needed to achieve ambitious GHG emissions reduction goals for 2030 and 2050 and provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG emissions reduction goals.

In addition to fulfilling its role as a regulatory agency, BAAQMD plays a vital role in supporting climate action across the Bay Area. In 2018, BAAQMD provided a Climate Protection Grant Program grant to Contra Costa County that allowed the County, in partnership with the Cities of Antioch, San Pablo, and Walnut Creek, and the community organization Sustainable Contra Costa, to launch the Cleaner Contra Costa Challenge. The Cleaner Contra Costa Challenge is an online platform that allows county residents to take actions in their everyday lives that reduce GHG emissions.

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BAAQMD has offered funding for public agencies for trip reduction; bicycle parking and bikeways; and clean vehicle projects including electric vehicle charging stations, green fleets, and replacement of off-road and heavy-duty vehicles and equipment. BAAQMD's Climate Tech Finance program provides loans for public agencies looking to invest in green technology and pilot projects.

On April 20, 2022, the BAAQMD Board of Directors adopted *CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans* (2022 CEQA Guidelines).⁴ Appendix B of the 2022 CEQA Guidelines, *CEQA Thresholds for Evaluating the Significance of Climate Impacts*, presents BAAQMD's thresholds of significance for use in determining whether a proposed project will have a significant impact on climate change and provides the substantial evidence that lead agencies will need to support their use of these thresholds. The thresholds require that long-range plans, such as the General Plan and 2024 CAAP, must either meet the State's goals to reduce emissions to 40 percent of 1990 levels by 2030 and carbon neutrality by 2045 or must be consistent with a local GHG strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b). BAAQMD's 2022 CEQA Guidelines also include Appendix C, *Guidance for Greenhouse Gas Reduction Strategies*, which Contra Costa County followed during preparation of this CAAP.

In March 2023, BAAQMD adopted amendments to Regulation 9, Rules 4 and 6. These revisions require that, when existing natural-gas-powered space heaters and water heaters reach the end of their operational life, they be replaced with electric-powered models. These requirements are scheduled to take effect in 2027 to 2031 for water heaters (depending on the capacity of the unit) and in 2029 for space heaters.

The 2024 CAAP supports BAAQMD's Clean Air Plan, *CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*, and revisions to Regulation 9 as well as many other BAAQMD programs and initiatives aimed to reduce regional GHG emissions.

In 2023, BAAQMD received funding from the U.S. Environmental Protection Agency's (USEPA's) Climate Pollution Reduction Grant program, to lead the Bay Area Regional Climate Action Planning (BARCAP) initiative, an eight-county climate action planning process to position the region to compete for \$4.3 billion in implementation funding. This planning effort identifies specific, implementation-ready climate measures in high-priority sectors that provide significant GHG reductions and benefit frontline communities. Contra Costa County is a participating agency in the BARCAP initiative and assisted in the development of the Priority Climate Action Plan for the Northern and Central Bay Area Region.



CONTRA COSTA TRANSPORTATION AUTHORITY

The Contra Costa Transportation Authority (CCTA) maintains the Countywide Transportation Plan (CTP).⁵ The CTP is updated approximately every five years. CCTA conducts extensive outreach to the public, cities, and the County during the update process.

The CTP provides the overall direction for achieving and maintaining a balanced and functional transportation system within Contra Costa County while

strengthening links between land use decisions and transportation. It outlines CCTA's vision for future transportation and establishes goals, policies, strategies, projects, and actions for achieving that vision. The CTP is also the detailed plan which helps inform and direct transportation funding allocated throughout Contra Costa County. The CTP helps support the County's climate action planning vision by advancing goals to reduce vehicle miles traveled (VMT), increase the use of active transportation modes, promote transit-oriented development, promote advances in vehicle technology, increase transit capacity, and ensure that the transportation system is resilient in the face of climate change.

Implementing these policies will help the County meet its GHG emissions reductions and climate resiliency goals in a way that is consistent with other regional planning efforts.

CCTA also oversaw the creation of Contra Costa County's Electric Vehicle Readiness Blueprint. This document prepares Contra Costa County for the electric vehicle (EV) future by identifying the best locations for charging infrastructure; helping cities to adopt development standards and ordinances that encourage EV adoption; preparing the workforce of the future to maintain EVs and charging infrastructure; and identifying where improvements to the electricity distribution infrastructure are necessary to support electric-ready mobility hubs and zero-emission bus fleets. The Electric Vehicle Readiness Blueprint was adopted in July 2019.

The CCTA's INNOVATE 680 seeks to implement a suite of projects that, when operating together, will address corridor-wide congestion, travel delays, and long-standing operational challenges along Interstate 680 (I-680). INNOVATE 680 projects address part-time transit lanes, express lane completion, shared mobility hubs, mobility on demand, and

The Countywide Transportation Plan helps support the County's climate action planning vision by advancing goals to reduce vehicle miles traveled (VMT), increase the use of active transportation modes, promote transit-oriented development, promote advances in vehicle technology, increase transit capacity, and ensure that the transportation system is resilient in the face of climate change.

automated driving systems. For additional detail on the projects implemented as part of INNOVATE 680, see: <https://ccta.net/projects/innovate-680/>.

Climate Action in Contra Costa County

Since the early 2000s, Contra Costa County has initiated several efforts to address climate change, including efforts to measure and reduce GHG emissions, prioritize climate change mitigation in local government, and employ natural ecosystems for GHG mitigation. The 2024 CAAP, with its emphasis on mitigation, measurement, and resilience and adaptation, is the most recent chapter of the County's climate change response and mitigation journey. Highlights of the County's initiatives are shown in **Figure 5** and further described in this section.

Over the years, county voters have supported many strategies that improve the quality of life and the environment. In 1990, Contra Costa County voters approved an Urban Limit Line (ULL) for a period of 20 years. The ULL restricts urban development to certain areas of the county and helps to preserve farmland and open space. In 2006 it was adopted for another 20 years from that date. About 47 percent of the land in the county is inside the urban limit lines and urban growth boundaries adopted by the County and the 19 cities in the county.

The East Contra Costa County Habitat Conservancy is a joint exercise of powers authority formed by Contra Costa County and the Cities of Brentwood, Clayton, Oakley, and Pittsburg to implement the East Contra Costa County Habitat Conservation Plan / Natural Community Conservation Plan (HCP/NCCP). Formed over a ten-year planning and permitting process, the HCP/NCCP began implementation in 2007. The HCP/NCCP provides a framework to protect natural resources in eastern Contra Costa County while improving and streamlining the environmental permitting process for impacts on endangered species. The HCP/NCCP avoids project-by-project permitting that is generally costly and time consuming for applicants and often results in uncoordinated and biologically ineffective mitigation. The conservation strategy of the HCP/NCCP provides for comprehensive species, wetlands, and ecosystem conservation and contributes to the recovery of listed species in northern California.

FIGURE 5. TIMELINE OF CLIMATE ACTION PLANNING IN CONTRA COSTA COUNTY



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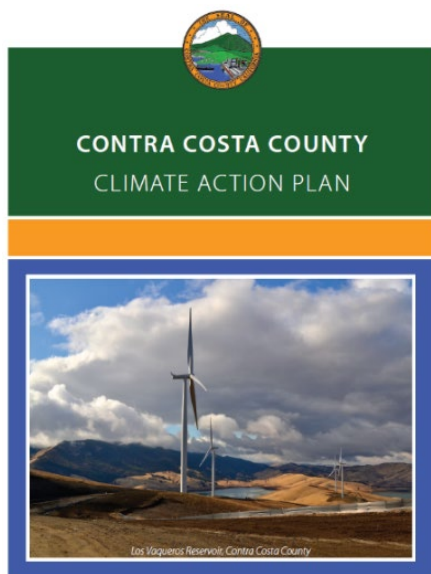
Over the years, voters have approved funding for the East Bay Regional Park District to maintain and expand its network of regional parks and other facilities in Contra Costa County. This includes Measure FF, a \$12/year parcel tax extension of Measure C, which was approved in 2004.

The County partners closely with the Contra Costa Resource Conservation District on a range of conservation programs and projects, including habitat preservation, strategies for supporting agriculture, and related topics.

Contra Costa County began taking significant steps to address climate change in 2005 with the publication of its first Climate Protection Report, which provided an estimate of the County's GHG emissions, reported existing County efforts to reduce GHG emissions, and listed potential actions that could reduce GHG emissions in the future. In February 2007, the Board of Supervisors directed County staff to prepare a GHG emissions inventory of community-wide and County government operations GHG emissions. In October 2007, the Board of Supervisors adopted a resolution to complete a climate action plan for the County's municipal facilities and operations funded by the BAAQMD.

In December 2008, the Board of Supervisors adopted a Municipal Climate Action Plan, which established formal GHG emissions reduction goals, GHG emissions reduction strategies, and methods for analysis and monitoring of GHG emissions reduction strategies for emissions from the County's operations. The County conducted an interim GHG inventory in 2013 to direct priorities toward achieving a goal of reducing the GHG emissions of government operations to 15 percent below 2005 levels by 2020.

2015 CLIMATE ACTION PLAN



The cover of the County's 2015 Climate Action Plan.

On December 15, 2015, the Board of Supervisors adopted a Climate Action Plan (2015 CAP) to reduce community-wide GHG emissions in the unincorporated areas of Contra Costa County. The 2015 CAP included sections covering the scientific and regulatory environment, an updated GHG inventory and forecast, and a climate change health risk assessment. Strategies in the 2015 CAP addressed GHG emissions reductions, promoting healthy communities, and facilitating CAP implementation. The County created its first full-time sustainability staff position, the Sustainability Coordinator, to oversee implementation of the 2015 CAP. The County Board of Supervisors' Sustainability Committee and the County Sustainability Commission were created to support implementation of the strategies in the 2015 CAP.

Since 2015, the County has implemented a variety of actions to help meet the goals set forth in the 2015 CAP. **Appendix D** provides more detail on progress made in meeting 2015 CAP goals. The County has reduced community-wide emissions associated with electricity use by joining the community choice energy program MCE and promoting the use of MCE's Deep Green and Local Sol products, which allow residents and businesses to purchase 100 percent renewable electricity and 100 percent locally produced solar, respectively. This also includes promoting energy efficiency incentive programs offered within the County by MCE, the Bay Area Regional Energy Network, and others. County facilities that do not have solar panels subscribe to MCE's Deep Green product.

In 2018, through a grant from the Strategic Growth Council, the County developed a Renewable Resource Potential Study that identifies the potential to generate clean energy in Contra Costa County. Among other things, the study found significant opportunity for solar energy, both on existing rooftops and parking lots in developed areas, and on undeveloped “greenfield” parcels in rural areas. In 2020, the County adopted a solar overlay zone to allow commercial solar energy facilities in certain areas, including commercial, industrial, and some agriculturally zoned parcels that are not prime agricultural land.

As described later in this chapter, in 2023, the County completed *Healthy Lands, Healthy People*⁶ through a Sustainable Agricultural Lands Conservation grant from the California Department of Conservation. This study identifies strategies for storing carbon in the diverse land uses in Contra Costa County.

Since 2015, the County has adopted and implemented policies for complete streets and Vision Zero and adopted an Active Transportation Plan. The County is constantly seeking funding to implement these policies.

BOARD SUSTAINABILITY COMMITTEE

The County Board of Supervisors’ Sustainability Committee oversees implementation of the CAP. The Sustainability Committee has played a role in several sustainability initiatives, including promoting the installation of EV charging stations in County facilities and converting the County fleet to all-electric, tracking the development of environmental justice goals and initiatives, promoting energy use management and efficiency programs, reviewing environmental justice and sustainability themes in the ongoing update to the General Plan, and raising awareness about climate change among residents and County officials.

COUNTY SUSTAINABILITY COMMISSION

In 2017, the County Board of Supervisors established the Sustainability Commission, a citizen advisory body, that advises County staff and the Board of Supervisors on

The Sustainability Commission has addressed topics in the sectors of energy use and green buildings; transportation; water conservation; solid waste; and climate adaptation, resilience, and environmental justice.



the successful implementation of the CAP, including suggestions on how the work can be performed more efficiently and effectively; opportunities to realize equity and fairness across the diverse communities of Contra Costa County in sustainability programs that support the CAP; and provide suggestions on how to better engage residents and businesses on sustainability issues and implementation of the CAP.

The Sustainability Commission, which reports to the Board Sustainability Committee, has addressed topics in the sectors of energy use and green buildings; transportation; water conservation; solid waste; and climate adaptation, resilience, and justice. In addition to supporting preparation of the 2024 CAAP, the Sustainability Commission has advised on implementation of the 2015 CAP, Climate Emergency Resolution, and Electric Vehicle Readiness Blueprint, which promote climate resilience, plan for a Just Transition of oil refineries on the Contra Costa County shoreline, examine how to transition to all-electric and carbon-neutral buildings materials, and provide outreach and education on sustainability to Contra Costa County residents and businesses.

East Bay Energy Watch

The East Bay Energy Watch (EBEW) was a partnership between the Pacific Gas and Electric Company (PG&E) and local governments in the East Bay region, including Contra Costa County. EBEW provided support for member agencies to conduct energy efficiency outreach to residents and businesses, retrofit existing government facilities to improve energy efficiency, and provide training to agency staff. EBEW also prepared a series of GHG inventories and provided GHG emission tracking for all member jurisdictions. The GHG inventories presented in Chapter 3 of the 2024 CAAP are based on the inventories EBEW prepared. EBEW ceased operations in 2020 when PG&E elected not to renew the organization's funding, although similar partnerships remain active in other parts of California.

TRANSPORTATION ANALYSIS GUIDELINES

In June 2020, the County adopted the Contra Costa Transportation Guidelines. These guidelines are intended to establish a uniform approach, methodology, and tool set to evaluate the impacts of land use decisions and related transportation projects on the County transportation system. The guidelines use VMT to assess impacts to the transportation system and require the development of mitigation measures to offset traffic impacts that are found to have exceeded CEQA's identified threshold(s) of significance.

COUNTY REACH CODES

The County has adopted building and energy provisions that go beyond the State’s building and energy codes. These amendments to the State codes are commonly called “reach codes”.

Section 74-4.006 of the Contra Costa County Code of Ordinances, adopted in 2015, amends the California Green Building Standards Code by setting requirements for installation of EV charging stations at new multifamily and nonresidential construction. For most new multifamily dwellings, if residential parking is provided, 10 percent of the total number of parking spaces at the dwelling site are required to be EV spaces. Half of the EV spaces, but not less than one, must be equipped with fully operational electric vehicle supply equipment (EVSE). The remaining EV spaces are required to be capable of supporting future EVSE. New nonresidential construction is required to provide EV spaces in accordance with the amount of available parking.

On January 18, 2022, the County Board of Supervisors adopted Ordinance 2022-02, an All-Electric (New Construction) Ordinance, to amend the 2019 California Energy Code to require the following building types to be all-electric: residential (including single-family and multifamily buildings), detached accessory dwelling units, hotel, office, and retail. On February 27, 2024, the County Board of Supervisors suspended its enforcement of Ordinance 2022-02, because of a decision on January 2, 2024, by the U.S. Court of Appeals 9th Circuit that invalidated a City of Berkeley ordinance that prohibited natural gas infrastructure in new buildings, precluding cities and counties from adopting ordinances that prohibit the installation of gas plumbing in buildings. On June 4, 2024, the County Board of Supervisors authorized staff to prepare an ordinance amending the County building code to replace its All-Electric (New Construction) Ordinance with a new ordinance to increase energy-efficiency standards for newly constructed residential buildings, hotels, offices, and retail buildings. The ordinance (Ordinance No. 2024-17) was introduced on September 10, 2024 and adopted by the Board of Supervisors on October 1, 2024. This action is reflected in this CAAP’s discussion of future GHG emissions.

In November 2022, the County Board of Supervisors adopted Ordinance 2022-35, which adopts and amends, among others, the 2022 California Building Code. Amendments include revisions to Section 420.14 to expand requirements for the installation of EV charging infrastructure at newly constructed nonresidential and multifamily residential buildings.

CLIMATE EMERGENCY RESOLUTION

On September 22, 2020, the Board of Supervisors adopted Resolution No. 2020/256,⁷ declaring that climate change “threatens the long-term economic and social well-being, health, safety, and security of the County, and that urgent action by all levels of government is needed to immediately address this climate emergency”. The resolution prioritizes the urgent implementation of the County’s 2024 CAAP to achieve GHG emissions reductions and to consider equity and social justice issues in the implementation of the plan, and directs that health, socioeconomic, and racial equity considerations be included in policymaking and climate solutions at all levels. The Climate Emergency Resolution also calls for establishing an ongoing task force of County department heads to focus on implementing the 2024 CAAP, planning for a Just Transition away from an economy based on fossil fuels, and adopting an all-electric ordinance for new construction.

INTERDEPARTMENTAL CLIMATE ACTION TASK FORCE

When the Board of Supervisors declared a climate emergency in 2020, one of the actions identified to address the emergency was the creation of an Interdepartmental Climate Action Task Force that includes all department heads or their senior deputies. The task force is directed to focus on urgently implementing the CAP and to identify additional actions, policies, and programs the County can undertake to reduce and adapt to the impacts of a changing climate.

The Task Force is directed to focus on urgently implementing the County's Climate Action and Adaptation Plan and to identify additional actions, policies, and programs the County can undertake to reduce and adapt to the impacts of a changing climate.

The Task Force is directed to report to the Board of Supervisors twice a year. The first of these reports, released in March 2021, recommended that the Board establish a Sustainability Fund to support improvements to County facilities and operations that reduce GHG emissions. The Board of Supervisors has directed the Department of Public Works to manage the fund, including the identification and implementation of projects and tracking savings, with the task force serving as an advisory committee to the



The Green Government Group (G3) Champions logo.

fund. The Sustainability Committee recommended that the initial focus of the fund be used to install the first tranche of electric vehicle charging stations, an ongoing priority.

The Task Force has also worked on scaling and implementing Green Business Program best practices in each of the County departments. Most County departments have nominated volunteers for the Green Government Group (G3) Champions program. The G3 Champions form a network of over 75 County employees across 18 departments who are focused on making Contra Costa County a cleaner, healthier place to live and work. The G3 Champions meet regularly to discuss climate action work happening in their departments and develop strategies and activities to educate and engage their colleagues in sustainability.

ENVISION CONTRA COSTA

Every county and incorporated community in California is required to adopt and occasionally update a document called a general plan, which is a comprehensive and long-range plan for the jurisdiction's land use policies and related matters for how communities will grow and develop. State law requires that each general plan includes the following topics:

- Land use
- Circulation
- Housing
- Conservation
- Open space
- Noise
- Safety
- Environmental justice (for communities that meet criteria)

The County's process of updating its current General Plan, referred to as Envision Contra Costa, included the 2045 General Plan, a zoning code update, and this 2024 CAAP. The 2045 General Plan and the 2024 CAAP are organized around four specific topics: environmental justice, sustainability, community health, and economic development.

HEALTHY LANDS, HEALTHY PEOPLE CARBON SEQUESTRATION STUDY

In 2023, the County completed a feasibility study—*Healthy Lands, Healthy People*—to identify strategies for storing carbon in the diverse land uses in Contra Costa County. The County received a Sustainable Agricultural Lands Conservation grant from the State that funded the project. The County partnered with the Contra Costa Resource Conservation District, the University of California Cooperative Extension, and a consultant team to develop *Healthy Lands, Healthy People*. The study informs the next steps to increase investments in trees, gardens, agricultural practices, and other activities that can use natural and working lands to address climate change.

COMMUNITY LEVEL ACTION

Just as climate change touches on all aspects of community life in Contra Costa County, all community members can take personal and collective action to reduce GHG emissions and advance resilience. Many community organizations, businesses, and individuals have already acted. The 2024 CAAP builds on these initiatives while engaging all members of the Contra Costa County community in climate action.

As described previously, in 2018, the County partnered with the cities of Antioch, San Pablo, and Walnut Creek and Sustainable Contra Costa to launch the Cleaner Contra Costa Challenge. A Climate Protection grant from the Bay Area Air Quality Management District provided funds to build an online platform tailored to Contra Costa communities that allows residents to take actions to create a cleaner, healthier place to live, work, and play. The two-year grant provided an opportunity to pilot the program before launching it more widely. Sustainable Contra Costa now operates the program across the county.



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3. CLIMATE CHANGES AND GHGS



Photo credit: Envision Contra Costa picture gallery.

Climate Science

WHAT IS CLIMATE CHANGE?

Climate is the long-term average of weather conditions, such as temperature and precipitation. It is normal for Earth’s climate system to experience long-term shifts, but human activity is causing global climate change at a much more rapid pace than in the past.

Human-caused climate change is largely attributable to the burning of fossil fuels, which causes greenhouse gases (GHGs) to build up in the atmosphere and trap heat close to the Earth’s surface, a phenomenon known as the greenhouse effect. Most GHGs are naturally occurring gases, such as water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), that absorb heat radiated from the Earth’s surface. Some GHGs can persist in the atmosphere and trap heat for thousands of years once they are emitted.

Human-caused climate change is largely attributable to the burning of fossil fuels.

As the levels of GHGs in the atmosphere increase because of human activity, more heat is trapped, increasing the temperature of the Earth's surface at an unprecedented rate. Because Earth's climate system is driven by the movement of heat in the atmosphere and in the oceans, more heat creates shifts in the global climate system, causing climate change. The effects of climate change vary in different geographic locations, and often include significant changes to temperatures, precipitation patterns, and storm activity.

EFFECTS OF CLIMATE CHANGE

Globally, the effects of human-caused climate change have been observed as:

- Increases in global surface temperatures.
- Increases in precipitation over land and increases in storm intensity.
- Retreat of glaciers.
- Ocean acidification.
- Warming of the global upper ocean.
- Increase in global mean sea level.⁸

Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. According to the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report, global warming of 1.5°C and 2°C will be exceeded during the 21st century unless we make great reductions in CO₂ and other GHG emissions in the coming decades.

Extreme heat days have become more frequent and more intense across most land regions since the 1950s, and extreme cold events have become less frequent. The frequency and intensity of heavy precipitation events have increased since the 1950s over most land areas, and drought has become more frequent in some areas due to increased evapotranspiration (water evaporation from land to sky).

CLIMATE CHANGE IN CALIFORNIA

In California and western North America, observations of the climate have shown: (1) a trend toward warmer temperatures with an increase in extremely hot days and nights; (2) an increase in the area burned by wildfires; (3) a smaller fraction of precipitation falling as snow; (4) an increase in frequency of drought and an increase in consecutive dry years; and (5) sea level rise is expected to continue to increase flooding and erosion on beaches, bluffs, and cliffs.⁹ Research suggests that California will continue to experience hotter and

drier conditions, reductions in winter snow and increases in winter rains, sea level rise, significant changes to the water cycle, and an increase in extreme weather events.

These changes in climate will affect economic systems throughout California, including Contra Costa County. To refrain from action is costly and risky; the California Fourth Climate Change Assessment estimates that taking no action to address the potential impacts of climate change will lead to economic losses of “tens of billions of dollars per year in direct costs” and “expose trillions of dollars of assets to collateral risk”. **Table 2** summarizes potential impacts in California due to climate change.

TABLE 2. CLIMATE CHANGE IMPACTS IN CALIFORNIA

CLIMATE IMPACT	HISTORICAL TRENDS	FUTURE DIRECTION OF CHANGE	CONFIDENCE FOR FUTURE CHANGE
Temperature	Warming	Warming	Very High
Sea Level Rise	Rising	Rising	Very High
Snowpack	Declining	Declining	Very High
Annual Precipitation	No significant trends	Unknown	Low
Intensity of Heavy Precipitation Events	No significant trends	Increasing	Medium-High
Frequency of Droughts	No significant trends	Increasing	Medium-High
Marine Layer Clouds	Some downward trends	Unknown	Low
Acres Burned by Wildfire	Increasing	Increasing	Medium-High

Source: Louise Bedsworth et al. 2018, “Statewide Summary Report,” in *California’s Fourth Climate Change Assessment*, publication no. SUMCCCA4-2018-013.

CLIMATE CHANGE IN CONTRA COSTA COUNTY

Climate change is expected to alter many aspects of the county’s climate, including temperature, precipitation patterns, and sea levels, potentially exacerbating both the severity and geographic scope of climate hazards. Contra Costa County is most vulnerable to hazards associated with pests and diseases, changes in air quality, drought, extreme heat, flooding, fog, human health hazards, landslides and debris flows, severe storms, sea level rise, shoreline flooding, and wildfire. These climate stressors are described in the following paragraphs.

Agricultural pests and diseases



The farms and ranches of Contra Costa County face risks from assorted pests and diseases that may affect crop plants, trees, and livestock. These pests and diseases can reduce or delay plant and animal growth, inflict such damage that agricultural products are less appealing and harder to sell, or cause plant or animal death. To manage greater pest and disease pressure, farmers may also need to increase pesticide applications.

Many pests and organisms that carry diseases are most active during warmer months, so the threat of infection or infestation is usually higher during these months. As the climate changes, temperatures are expected to get warmer earlier in the year and remain warmer until later in the year, creating a wider window for agricultural and urban pests and diseases to be active.

Both evergreen and oak woodlands in the county can be damaged by forestry pests and diseases, such as Sudden Oak Death and redwood bark beetles. These diseases severely harm ecosystems, including both woodlands and the animals that depend on them to provide habitat and foraging, such as coyote, gray fox, barn owl, red-tailed hawk, and Cooper's hawk.

Air quality



The primary determinants of air quality in Contra Costa County are ozone pollution from vehicle exhaust, particulate matter from industrial centers and diesel trucks, and allergen distribution. Higher temperatures can increase surface ozone concentrations, and increased water vapor can trap ozone in already-polluted areas. Ground-level ozone is associated with a variety of negative health outcomes, including reduced lung function, pneumonia, asthma, cardiovascular diseases, and premature death.



Nunn Vineyard. Photo credit: Stan Muraoka.

Ozone concentrations are projected to increase in most places that already experience high ozone levels, such as eastern Contra Costa County.

Drought



A drought happens when conditions are drier than normal for an extended period, making less water available for people (especially if local water supply depends on surface water), agricultural uses, and ecosystems. Communities in Contra Costa County may experience water shortages during drought conditions and mandatory water restrictions for domestic and agricultural uses. Farmers may need to cut back on irrigation, and ranchers may need to reduce the number of their livestock. Farmers may also be forced to plant varieties that are more drought tolerant or alter the timing and location of fields to ensure that irrigation water is available at critical times. Land may be left fallow if irrigation water is not available, which may increase the pressure to develop prime agricultural land.

Less precipitation could lower water levels, decrease water quality, and raise water temperatures at streams and lakes. These conditions can cause algal blooms in Delta areas and harm salmonid populations and other aquatic species, such as the California red-legged frog and western pond turtle. Droughts are a regular occurrence in California; however, scientists expect that climate change will lead to more frequent and more intense droughts statewide.

Extreme heat

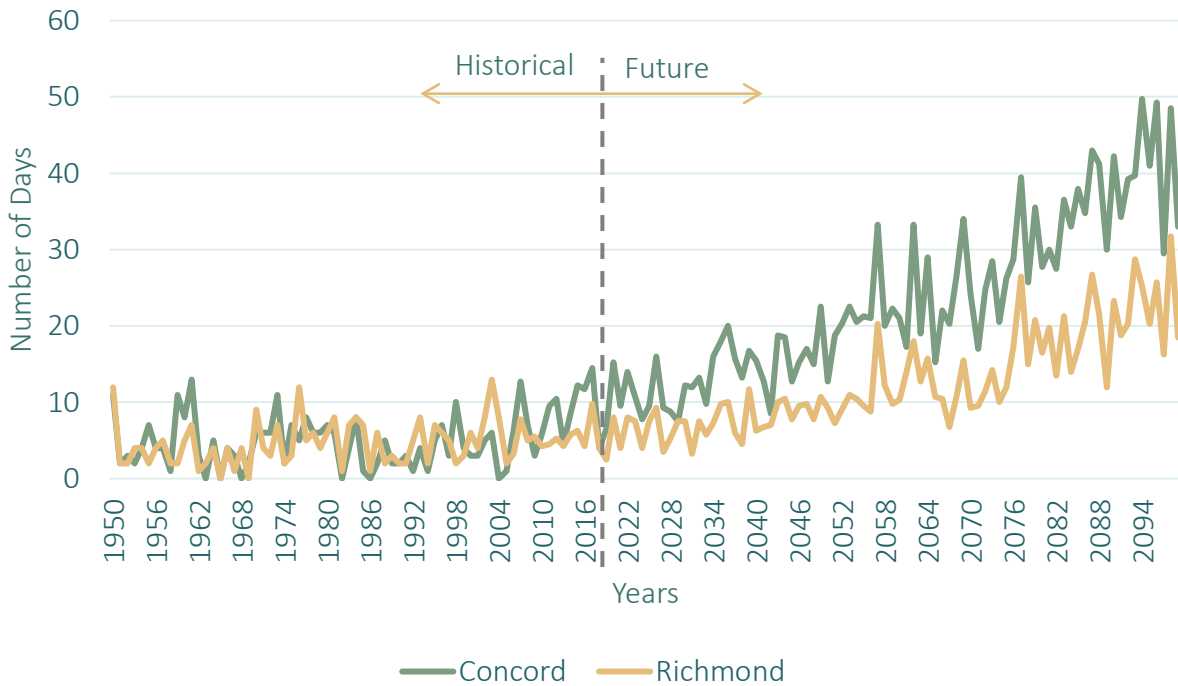


Contra Costa County has different thresholds for extreme heat in different parts of the county. An extreme heat day is where temperatures reach 94 degrees Fahrenheit in Rodeo, 99 degrees Fahrenheit in Alamo, and 102 degrees Fahrenheit in Knightsen.¹⁰ Extreme heat temperatures for the western part of the county are lower, but any higher-than-usual temperature can be harmful to people and assets that are not accustomed to it.

Historically, Contra Costa County has experienced an average of four extreme heat days a year. This number is expected to increase dramatically because of climate change, as illustrated in **Figure 6**.

By the middle of the 21st century (2040 to 2070), Contra Costa County is likely to have an average of 15 to 20 extreme heat days per year. By the end of the century, the county is projected to experience an average of 21 to 37 extreme heat days per year.

FIGURE 6. FREQUENCY AND PROJECTION OF EXTREME HEAT DAYS IN CONCORD AND RICHMOND



Source: Cal-Adapt. <https://cal-adapt.org/>. Historical data is available through 2020.

Extreme heat can cause heat-related illnesses, such as heat cramps, heat exhaustion, and heat stroke. High temperatures can harm animals and plants that are not adapted to them. Some types of infrastructure, including power lines and roadways, experience greater stresses during high temperatures, making failure more likely. People are less likely to venture outside in very high temperatures, hurting economic sectors that depend on outdoor activities. Extreme heat can also increase the risk of wildfires by drying out plant material, and prolonged high temperatures contribute to drought conditions.

An example of health inequity tied to climate change is that Black Americans have been found to be at a higher risk of illness and death from heat. However, there is no biological basis for this. Instead, this finding has been linked to social factors such as poverty, neighborhood conditions, access to air conditioning, and vehicle ownership. These factors are also associated with higher rates of chronic health conditions among the Black community, including cardiovascular disease and hypertension. Long-standing patterns of racial residential segregation and institutional racism mean that Black individuals disproportionately live in high-poverty, disinvested neighborhoods, regardless of income. The Contra Costa County communities with the highest proportions of Black residents are

the unincorporated community of North Richmond and the cities of Antioch, Pittsburg, and Richmond.

These conditions exist in Contra Costa County for other low-income residents of impacted communities. Extreme heat also can create vulnerability for workers whose jobs are outdoors, such as those in agriculture or construction, and those who work in poorly ventilated buildings and/or buildings that lack air conditioning.

Analysis conducted as part of the 2015 Contra Costa County Extreme Heat Vulnerability Assessment determined that the neighborhoods most vulnerable to heat are Bethel Island, East County, the Monument Corridor in Concord, the Rossmoor Area in Walnut Creek, and West County. These results are found in a summary of the assessment, *2015 Climate Change Vulnerability in Contra Costa County: A Focus on Heat*.¹¹

Air Conditioning

Air conditioner ownership helps protect against extreme heat events. However, while air conditioners allow households to adapt to extreme heat, increased household air conditioning could strain energy capacity and counter mitigation goals by leading to GHG emissions. Identifying areas where few households have air conditioners is important to ensure that these communities are adequately served by cooling centers. Low-income households are less likely to have or use air conditioning, and a lack of air conditioning may be one of the drivers of racial inequalities in morbidity and mortality during heat waves. In Contra Costa County, households in historically cooler areas and areas with older housing stock are less likely to have home air conditioning. All-electric heat pumps can provide both air conditioning and heating services, reducing the need for natural gas service, and helping to address this inequity.

Extreme weather may also lower water quality and cause water temperatures to rise, which can lead to algal blooms and declines in aquatic populations. Native fish species may have a more difficult time surviving in warmer waters and non-native species may out-compete native species.

Flooding



Flooding happens when there is too much water in inland areas to be held in local bodies, carried away by drains or creeks, or soaked into the soil. This water can build up and wash into normally dry areas and significantly harm buildings, people, and habitats. Floodwaters can be deep enough to drown people and may move fast enough to carry away people, cars, or even homes. Floodwaters

can carry contaminants into communities, impacting public health, ecosystem health, and water quality. Floods can be caused by heavy rainfall, extended periods of moderate rainfall, or clogged drains during periods of rainfall. Flash floods can be especially dangerous because they happen so fast that they give little or no warning.

Although climate change is expected to increase the frequency and intensity of droughts, scientists also project that it will increase the frequency and intensity of heavy rain and associated floods in Contra Costa County.

Fog



Fog is a very low cloud, usually low enough to touch the ground. It forms when air near the surface reaches the right temperature to form water vapor, which condenses into a cloud. In Contra Costa County, fog usually forms in two areas—western Contra Costa County along the bayfront and eastern Contra Costa County as part of the Central Valley. Western Contra Costa County experiences coastal fog that flows in from the Pacific Ocean. Eastern Contra Costa experiences tule fog, which usually forms after heavy rain between late autumn and early spring in the Central Valley. The cool air brought in by fog is necessary for the productivity of agriculture in the region and the growth of many tree-dominated habitats on the hillsides of Contra Costa County.

The cool air brought in by fog is necessary for the productivity of agriculture in the region and the growth of many tree-dominated habitats on the hillsides of Contra Costa County.

The impacts of climate change on fog are less clear. There has been close to a 50 percent reduction in tule fog in California’s Central Valley since the 1980s. Coastal fog is projected to decline by 12 to 20 percent between 1900 and 2070. Climate scientists believe that the warmer temperatures created by climate change make it harder for the air to become cool enough to create fog, and warmer temperatures are more likely to evaporate any fog that does form.

In agriculture, many varieties of fruit and nut trees require winter chill (measured as a number of chill hours) for high fruit and nut quality and yield. Research has shown that the warmer air that is replacing seasonal fog decreases the number of these important chill hours. This reduces the yield and quality of the cherries, almonds, walnuts, and other stone fruit that are grown in Contra Costa County.

Redwoods depend on the coastal fog for water in the summer months. The absence of coastal fog may cause higher evapotranspiration rates and increase the demand for water in woodland ecosystems during the drier summer months.

Human health hazards



There are several diseases that are linked to climate change and can be harmful to the health of Contra Costa County community members. Examples of these diseases include hantavirus pulmonary syndrome, Lyme disease, and West Nile virus, which can be debilitating or fatal for some of the population.

These diseases are carried by animals such as mice and rats, ticks, and mosquitos. Climate change can increase the rate of infection because, with warmer temperatures earlier in the spring and later in the winter, these animals can be active for longer, widening the window for disease transmission. Warmer temperatures and more intense rainfall can lead to larger populations of animals such as mosquitos, rodents, and ticks, increasing the risk of contracting diseases carried by these animals.

As described previously in the section on Agriculture, as the climate changes, temperatures are expected to get warmer earlier in the year and remain warmer until later in the year, creating a wider window for agricultural and urban pests and diseases to be active.

Landslides and debris flows



Landslides occur when a slope, such as the side of a hill or mountain, becomes unstable, causing soil and rocks to slide down the slope. Landslides are most common on steep slopes made up of loose soil and other materials and are often triggered by precipitation. The types of landslides caused by precipitation are typically debris flows (a landslide made of a wet mix of rock, soil, and other materials) and mudflows (or mudslides, which are primarily made of wet soil). Because they are so fluid, debris flows and mudflows can flow for long distances past the base of the slope and affect large areas. Landslides can damage or destroy buildings and infrastructure, block roadways, disrupt sensitive ecosystems, and injure or kill people in their path.

Climate change does not directly cause more frequent or intense landslides. However, it is expected to increase the conditions that can lead to landslides, such as an increase in heavy storms that saturate the ground and make a landslide more likely. These events can cause significant damage to important infrastructure in Contra Costa County, as happened during the Morgan Territory landslide in 2017. After large storm events in January and February of that year, the resulting landslide snapped a water main and collapsed a section

of Morgan Territory Road, leaving homes without water for a week and closing the road for months. Wildfires also increase the likelihood of a landslide by removing vegetation that supports slopes and slows down water. Wildfires can alter soil conditions, increasing erosion and water runoff, further exacerbating slope instability. Because climate change is projected to increase wildfire activity, it is possible that this could also increase the size and/or intensity of future landslides.

Severe storms



Severe storms include strong winds, hail, and lightning. Severe weather is usually caused by intense storm systems, although some types of strong winds can occur without a storm. Hail can damage buildings and plants (and in extreme cases, injure people), and lightning can spark fires, injure people, or cause fatalities. There have been no reported damage or injuries from lightning in Contra Costa County, although hail up to 0.75 inches in diameter fell in portions of Contra Costa County in April of 1983. Severe winds, such as the Diablo Winds that blow in northern California in the spring and fall, can damage or destroy buildings, knock over trees, and damage power lines and electrical equipment (potentially causing wildfires). In some cases, strong winds can reach between 40 and 80 miles per hour, causing trees to fall and damage power lines. Strong winds are the most common type of severe weather in Contra Costa County. In winter 2023, a series of severe storms triggered high wind, flooding, and freeze warnings across the county. Felled trees and debris caused power outages, the cold temperatures caused delays on BART, and slick roads made driving more dangerous.¹²

The connection between climate change and severe storms is not as well established as other weather events, but new evidence suggests that severe storms may happen more often and more intensely than in the past. Climate change may affect strong winds that are not associated with intense storms, but scientists are not clear on how these wind patterns might change.

Sea level rise



As global temperatures rise, glaciers and other land ice near the north and south poles melts. The water flows into the ocean, increasing sea levels across the globe. Higher temperatures also cause water to expand in oceans, further raising sea levels.

Eventually, sea levels may increase enough to permanently flood low-lying areas near the Bay shoreline and Delta areas. Sea level rise threatens buildings, infrastructure, and ecosystems that may be temporarily or permanently flooded by water in the shoreline areas and Delta of Contra Costa County. Structures built above the increased sea level can still be harmed if the higher level of the water erodes away the rock or soil supporting the structure, potentially making it unsafe and at risk of collapse. Sea level rise can also promote saltwater intrusion into the Delta aquatic systems and groundwater basins, which would negatively affect water quality and aquatic habitats. Aquatic habitats may be harmed if industrial or oil facilities are inundated, as hazardous materials could be released into the soils and water.

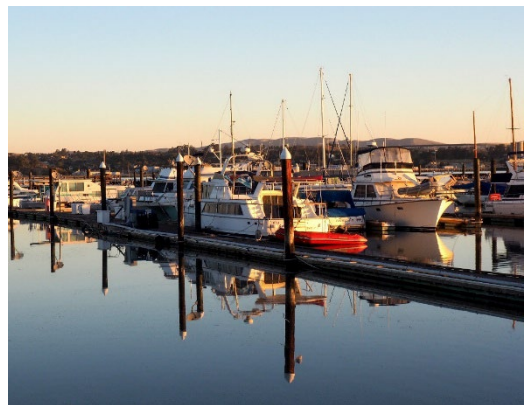
In California, sea levels may increase in most places by 6 to 10 inches by 2030, 13 to 23 inches by 2050, and 41 to 83 inches by 2100, relative to the average sea levels between 1991 and 2009. However, it is possible that sea level may increase faster than these projections.

Shoreline flooding



Rising sea levels mean that shoreline floods can become more severe and more frequent along shoreline communities and areas in the Delta. Because the ocean is at a higher level during new normal conditions, shoreline floods such as king tides can reach further onto land. Higher sea levels can also give a “boost” to smaller floods that would not have been large enough to flood dry land during past normal conditions, making shoreline flooding more frequent.

During strong storms and king tides, shoreline flooding can damage or destroy buildings in low-lying areas, disrupt transportation routes, and harm important economic assets such as the oil refineries and the Delta. The communities facing



*Shoreline facilities, such as this marina, are at particular risk from shoreline flooding.
Photo credit: Lisa Gorrell.*

the greatest risk in the unincorporated areas of the county are North Richmond, Rodeo, Crockett, Bay Point, Bethel Island, and Discovery Bay. Shoreline flooding could also damage water infrastructure and interrupt regional and statewide water services.

Wildfire



Wildfires are a regular feature of the landscape in much of California. Winter rains support plant growth, and the summer dry season dries out vegetation, increasing the potential for ignition during the late summer and fall when temperatures are high. Wildfires are defined as fires burning in natural areas, but they can easily spread into the developed areas between urban and wildland zones, known as the wildland-urban interface. Large sections of Contra Costa County are considered to be high or very high fire hazard severity zones by CAL FIRE. This exposes people and property to the flames, increasing the risk of injury, death, and property damage or destruction. The smoke and ash from wildfires can increase air and water pollution levels and create a significant health risk in the region, particularly under weather conditions that prevent smoke from clearing, as happened during the Camp Fire in Butte County in Northern California (2018) and LNU Lightning Complex Fire in Northern California wine country areas (2020).

Local ecosystems can be harmed by wildfire. Chaparral and scrub ecosystems are in high fire hazard severity zone areas. Although wildfires naturally occur in chaparral ecosystems, fires more than every 20 years can reduce the biodiversity of chaparral habitat and cause the ecosystem to convert to a grassland or scrub habitat. Riparian ecosystems can be harmed by wildfires due to loss of canopy and changes in soil structure, erosion, and shifts in specific composition due to changes in habitat structure. Large fires can cause widespread devastation throughout woodland areas in Contra Costa, particularly if trees have been weakened or killed by drought, extreme heat, or pest infestation.

Climate change is expected to lead to an increase in wildfires throughout California. Warmer temperatures, an increase in drought conditions, and forestry pests and diseases are likely to create more fuel in State and federal wildlands and a greater chance that a spark will grow into a potentially dangerous blaze. Excessive heat and dry conditions have already contributed to the rapid spread of wildfires in Contra Costa County during events

Fire activity is projected to increase where development expands in the wildland-urban interface, in addition to the dry hills around the Mount Diablo region in Contra Costa County.

such as the 3,700-acre Morgan Fire on Mount Diablo (2013); the 396,624-acre SCU Lightning Complex fires (2020), which impacted six counties; and the Franklin Fire (2022). Climate change is also expected to extend the fire season throughout much (or even all) of the year. Because wildfires burn the trees and other vegetation that help stabilize a hillside and absorb water, increases in fire activity may also lead to an increase in landslides and floods.

GHG Inventory and Forecast

INTRODUCTION

A GHG inventory is an estimate of the GHG emissions attributable to a particular community over the course of a specific year. A GHG forecast takes information from the GHG inventory as well as predictions of future demographic trends and the projected impacts of climate-related legislation to predict future levels of GHG emissions.

GHG emissions are generated by various activities that are commonplace in daily life, such as driving, electricity use, and water use. Some daily activities release GHG emissions in the location of the activity, such as gases released any time an internal combustion engine is operated. Other activities cause GHG emissions to be released elsewhere, such as using nonrenewable or non-carbon-free electricity to power a home, which generates GHG emissions in the location of the power plant that supplies the power, not in the home itself. Contra Costa County must consider GHG emissions resulting from activities attributed to residents, business, workers, and visitors of the unincorporated community, including GHG emissions generated both inside and outside the County's jurisdictional boundaries.

Determining the annual level of GHG emissions for specific years on a recurring basis will aid the County in establishing an attainable goal for continually reducing emissions. Furthermore, knowing which activities release GHG emissions allows the County to develop policies and programs that facilitate a decrease in emissions for each activity.

The County develops two types of GHG inventories: (1) community-wide inventories and (2) County operations inventories.

- A community-wide GHG inventory identifies GHG emissions that result from activities of unincorporated Contra Costa County residents, employees, visitors, and other community members. Examples include GHG emissions from residents driving cars, homes using water, and businesses using electricity. The community-wide GHG inventory presented for the unincorporated county is a production-based inventory, which means that it assesses the GHG emissions produced by activities occurring in the community.
- A County operations GHG inventory summarizes emissions that are a direct result of Contra Costa County's government operations. Examples include GHG emissions from electricity and water used in County buildings or the fuel used for County vehicles.

The project team prepared the new GHG inventories and updates to past GHG inventories consistent with the guidance in widely adopted, standard protocol documents. These protocols provide guidance on what activities should be evaluated in the GHG inventories and how emissions from those activities should be assessed. Using standard methods also allows for an easy comparison of GHG emission levels across multiple years and communities. The methods used to create these inventories are described in **Appendix B**.

Determining the annual level of GHG emissions will aid the County in establishing an attainable goal for continually reducing emissions. Furthermore, knowing which activities release GHG emissions allows the County to develop policies and programs that facilitate a decrease in emissions for each activity. Details about implementing these GHG reduction activities are included in the Enacting the Climate Action and Adaptation Plan section in [Chapter 6](#).

GHG Inventory

The following sections present the results of the community-wide and County operations GHG inventories for the years 2005, 2013, 2017, and 2019.

Total community-wide emissions declined 24 percent from 2005 to 2019.

COMMUNITY INVENTORY

The community-wide GHG inventory assessed GHG emissions from the following 11 categories of activities, known as sectors.

- **Transportation** is GHG emissions created by driving on-road vehicles in the unincorporated county, including passenger and freight vehicles.
- **Residential energy** is GHG emissions attributed to the use of electricity, natural gas, and other home heating fuels in residential buildings.
- **Nonresidential energy** is GHG emissions attributed to the use of electricity and natural gas in nonresidential buildings.
- **Solid waste** is the GHG emissions released from trash collected in the unincorporated areas of Contra Costa County, as well as collective annual emissions from waste already in place at the Acme, Keller Canyon, and West Contra Costa Landfills.
- **Agriculture** is GHG emissions from various agricultural activities in the unincorporated county, including agricultural equipment, crop cultivation and harvesting, fertilizer application, and livestock operations.



- **Off-road equipment** is GHG emissions from equipment that does not provide on-road transportation (excluding agricultural equipment), such as tractors for construction, equipment used for landscape maintenance, commercial and industrial equipment, and outdoor recreational equipment.
- **Water and wastewater** accounts for the electricity used to transport and process water and wastewater used or generated by unincorporated county residents and businesses, as well as direct emissions resulting from wastewater treatment activities.
- **Bay Area Rapid Transit (BART)** is GHG emissions associated with the operation of BART for unincorporated county residents.
- **Land use and sequestration** is GHG emissions absorbed and stored in trees and soils on locally controlled lands as part of healthy ecosystems and released into the atmosphere from development of previously undeveloped land.
- **Stationary sources** are emissions from fuel use at major industrial facilities, permitted by State and regional air quality authorities. These emissions are informational and are not counted as part of the community total.
- **Wildfire** includes emissions released as a result of wildfires. These emissions are informational and are not counted as part of the community total.
- **Direct access electricity** is electricity purchased directly from an Electric Service Provider (ESP) rather than an investor-owned utility company or Community Choice Energy provider such as MCE, generally to power large industrial, commercial, and institutional facilities.



Emissions from stationary sources, wildfire, and direct access electricity are reported for informational purposes but are not formally counted as part of the unincorporated county's GHG emissions.

Contra Costa County is home to large industrial facilities whose operations have generated significant GHG emissions and/or products that create GHGs, such as gasoline for internal combustion engines. Most of those facilities were constructed before land use permits from the County were required. If these facilities apply for new land use permits, the County can impose new operational requirements in some circumstances. An example of this is applications the County received in 2020 from two refineries to process renewable fuels.

There are several factors outside of the County's control that influence the operations and related emissions and energy use at these facilities. The County has therefore elected to exclude the direct emissions and energy use at these facilities from consideration of the County's GHG reduction goals for the following reasons:

- These facilities are regulated primarily through the Federal Energy Regulatory Commission and the California Energy Commission (CEC) and are subject to air quality and emissions standards set forth by the USEPA, CARB, and BAAQMD.
- The energy used at some of these facilities fluctuates from year to year, depending on the demand for resources and the availability of other electricity-generating sources, such as hydropower or renewable resources. This makes it difficult to accurately forecast the energy use at these facilities.
- The County has limited jurisdictional authority to reduce GHG emissions from these sources because they are subject to cap-and-trade regulations set forth by CARB.
- The approach to excluding energy from sources that are outside of the County's jurisdictional control is consistent with the *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*.
- The resultant jurisdictional inventory more accurately reflects the energy use from nonresidential customers in unincorporated Contra Costa County and allows the County to focus on actions that are within its control.

Large industrial customers frequently purchase direct access electricity. Direct access customers can purchase electricity from any Electric Service Provider (ESP) operating in the state. Different EPSs will rely on different power sources with different proportions of fossil and renewable energy to produce electricity. The California Public Utilities Commission (CPUC) regulates the sale of direct access electricity in California, and the identities of direct access customers and the specific ESPs from which they purchase electricity are not made

available to the public. Given the County's limited ability to monitor and regulate the sale and use of direct access electricity, as well as historical inconsistencies in how direct access electricity use is reported, direct access emissions are reported for informational purposes only.

Table 3 and **Figure 7** show the community-wide GHG emissions for the unincorporated county during the four inventory years. Total community-wide emissions declined 18 percent from 2005 to 2019. **Table 4** shows the proportion of GHG emissions from each sector for the unincorporated county for the four inventory years.

TABLE 3. ABSOLUTE ANNUAL GHG EMISSIONS, 2005 TO 2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Transportation (excluding BART)	628,200	651,130	571,650	464,040	-26%
Energy - Residential	294,930	280,870	212,420	191,780	-35%
Energy - Nonresidential	118,740	125,350	98,850 ¹	85,390	-28%
Solid waste	243,940	224,570	223,100	220,760	-10%
Agriculture	33,350	39,300	44,880	36,130	8%
Off-road equipment	34,160	36,290	42,840	54,010	58%
Water and wastewater	8,080	7,400	4,400	4,870	-40%
BART	1,040	1,320	1,440	190	-82%
Land use and sequestration	-70,860	-70,860	-70,860	-70,860	0%
Total Annual MTCO_{2e}	1,291,580	1,295,370	1,128,720	986,310	-24%
<i>Informational Items</i>					
Stationary sources	13,983,030	11,956,000	11,232,290	10,867,670	-22%
Wildfire	14,270	66,080	0 ²	10,100	N/A ³
Direct access electricity	0 ⁴	0 ⁴	0 ⁴	74,130	N/A
<p>Note: All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.</p> <p>¹ Estimates of nonresidential electricity use in 2013 are used in 2017 to account for a lack of available data in 2017.</p> <p>² No wildfires were recorded in the unincorporated county in 2017.</p> <p>³ Overall change between 2005 and 2019 for wildfire is not calculated because of the high degree of year-to-year variability.</p> <p>⁴ PG&E did not provide direct access electricity use data in these years.</p>					

FIGURE 7. ABSOLUTE ANNUAL GHG EMISSIONS BY SECTOR, 2005 TO 2019

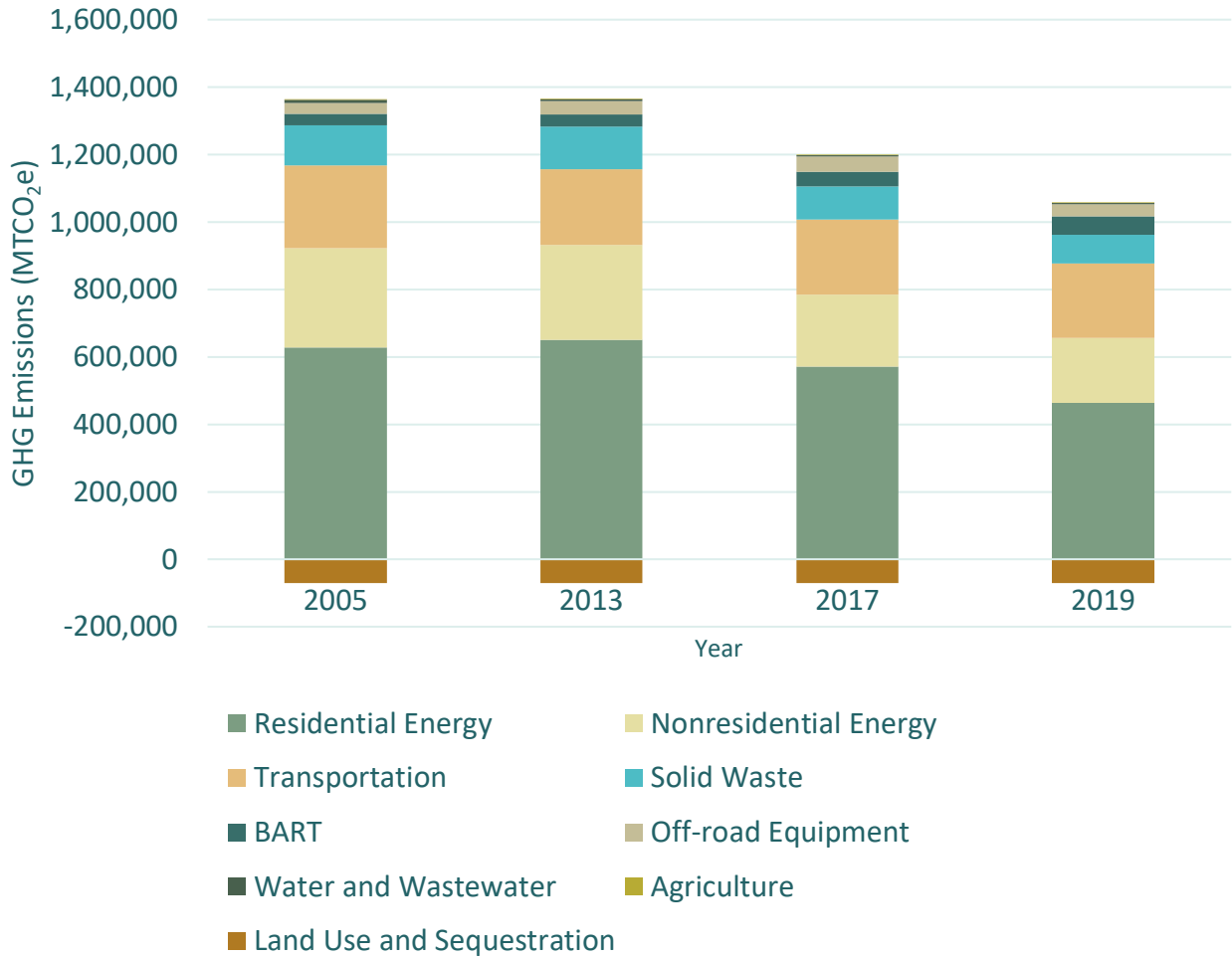


TABLE 4. PROPORTION OF GHG EMISSIONS, 2005 TO 2019

SECTOR	2005	2013	2017	2019
Transportation	49%	50%	51%	47%
Energy - Residential	23%	22%	19%	19%
Energy - Nonresidential	9%	10%	9%	9%
Solid waste	19%	17%	20%	22%
Agriculture	3%	3%	4%	4%
Off-road equipment	3%	3%	4%	5%
Water and wastewater	1%	1%	Less than 1%	Less than 1%
BART	Less than 1%	Less than 1%	Less than 1%	Less than 1%
Land use and sequestration	-5%	-5%	-6%	-7%
Total Annual MTCO₂e	100%	100%	100%	100%

Note: Totals may not equal the sum of individual rows due to rounding.

The transportation sector has consistently been the largest source of GHG emissions in the unincorporated county, accounting for between 47 and 51 percent of total community-wide GHG emissions (excluding informational items). Residential and nonresidential energy combined are the second-largest source of emissions, comprising 28 to 32 percent of community-wide emissions. Of the energy-related emissions, approximately 70 percent come from residential buildings and 30 from nonresidential buildings. In both building types, most emissions are associated with natural gas use. Solid waste is the third-largest source of emissions, accounting for between 17 and 22 percent of the community-wide total. Agriculture GHG emissions account for between 3 and 4 percent, and off-road equipment accounts for between 3 and 5 percent. GHG emissions from the water and wastewater and BART sectors are each 1 percent or less.

The sectors that experienced the largest decrease in annual GHG emissions between 2005 and 2019 were BART (82 percent), water and wastewater (40 percent), residential energy (35 percent), nonresidential energy (28 percent), and transportation (26 percent). Collectively, emissions from energy use declined 33 percent over this time period. These changes are primarily due to an increase in renewable and carbon-free electricity, the County joining MCE in 2017 (which provides more electricity from renewable and

The transportation sector has consistently been the largest source of GHG emissions in unincorporated Contra Costa County. The sectors that experienced the largest decrease in annual GHG emissions between 2005 and 2019 were BART, water and wastewater, residential energy, and transportation.

carbon-free sources than PG&E), and better resource-efficiency practices by community members. Emissions reductions also occurred in the solid waste sector (10 percent). Three sectors, nonresidential energy, off-road equipment, and agriculture saw increases in their emissions from 2005 to 2019.

Between 2005 and 2019, offroad emissions increased by 58 percent. Increases in offroad emissions are due to increased emissions from agricultural and other types of commercial and industrial equipment. Agricultural emissions increased due to changes in crop activity and livestock population. Detailed summaries of changes in GHG emissions by sector appear in **Appendix B**.

Per-person GHG emissions

Along with the “absolute” GHG emission levels discussed previously, the project team assessed the per-person GHG emissions from the unincorporated county. The team calculates per-person GHG emissions by taking the absolute GHG emissions in **Table 3** and dividing them by the number of residents in the unincorporated county for that inventory year. **Table 5** and **Figure 8** show the per-person emissions for the inventory years for the unincorporated county. Overall, per-person emissions declined 32 percent from 2005 to 2019. Because the population of the unincorporated county grew during this time, most sectors saw their per-person emissions decline. Even for sectors that had increases in their absolute emissions, such as Agriculture, population growth resulted in a decline in per-person emissions. Only per-capita off-road equipment emissions increased between 2005 and 2019.

TABLE 5. PER-PERSON GHG EMISSIONS, 2005 TO 2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Population					
Residents	154,270	165,700	174,110	174,150	13%
Emissions (MTCO₂e per-person)					
Transportation	4.07	3.93	3.28	2.66	-35%
Energy - Residential	1.91	1.70	1.22	1.10	-42%
Energy - Nonresidential	0.77	0.76	0.57	0.49	-36%
Solid waste	1.58	1.36	1.28	1.27	-20%
Agriculture	0.22	0.24	0.26	0.21	-4%
Off-road equipment	0.22	0.22	0.25	0.31	53%
Water and wastewater	0.05	0.04	0.03	0.03	-47%

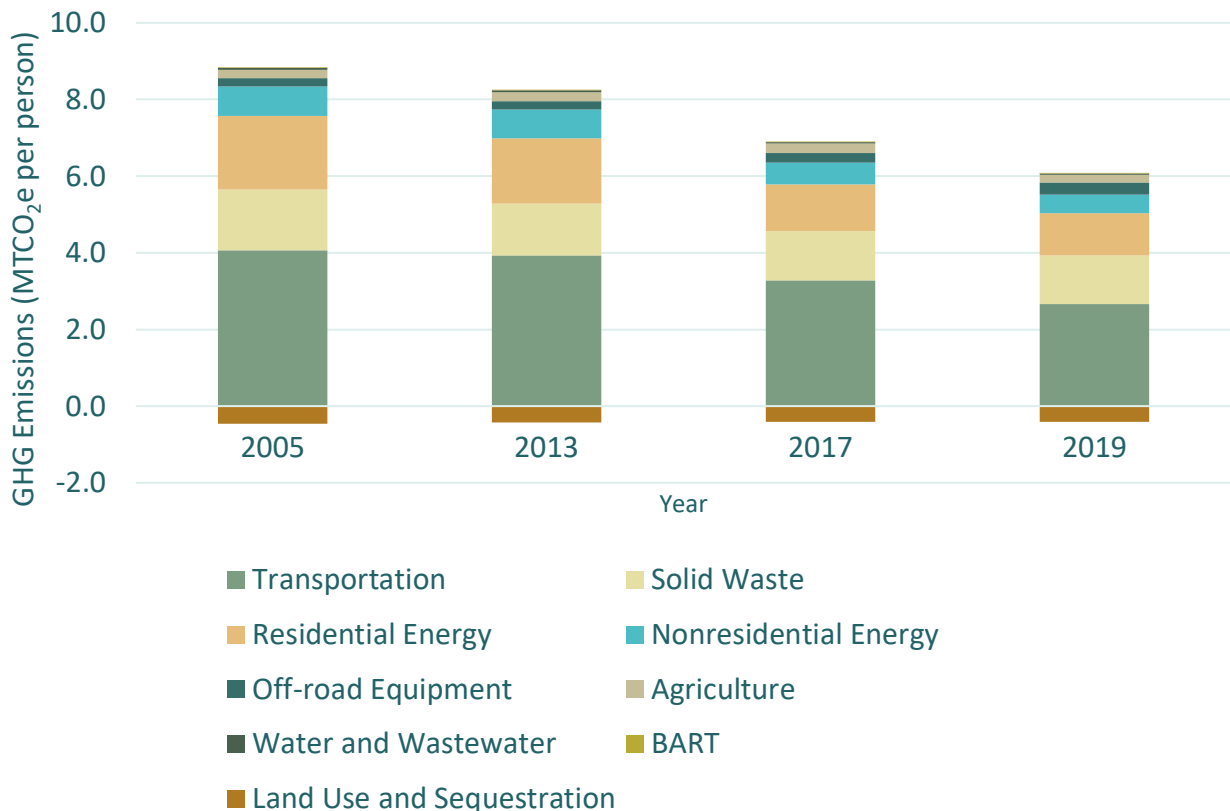
SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
BART	0.01	0.01	0.01	Less than 0.01	-84%
Land use and sequestration	-0.46	-0.43	-0.41	-0.41	-11%
Total Annual Emissions	8.37	7.82	6.48	5.66	-32%
<i>Informational Items</i>					
Stationary Sources	90.64	72.15	64.51	62.40	-31%
Wildfire	0.09	0.40	0.00	0.06	N/A ¹
Direct access electricity	0.00	0.00	0.00	0.44	N/A ²

Note: All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.

¹ Overall change between 2005 and 2019 is not calculated because of the high degree of year-to-year variability.

² Overall change between 2005 and 2019 is not calculated because of limited availability of direct access electricity use data between 2005 and 2017.

FIGURE 8. PER-PERSON ANNUAL GHG EMISSIONS BY SECTOR, 2005 TO 2019





COUNTY GOVERNMENT OPERATIONS EMISSIONS INVENTORY

Contra Costa County conducted government operations emissions inventories in 2006 and 2017.⁸ In 2006, Contra Costa County government operations emissions totaled 54,130 MTCO₂e for the sectors reported in this inventory (see **Table 6**). In 2017, County government operations GHG emissions were 43,380 MTCO₂e, a 20 percent decrease from 2006. This decrease is primarily the result of reductions in energy use, reductions in County Fleet emissions, and reductions in government-generated solid waste. The 2017 inventory also includes emissions from Wastewater Treatment and Refrigerants, which were not included in the 2006 inventory. In summary:

In 2017, GHG emissions from County government operations were 43,380 MTCO₂e, a 20 percent decrease from 2006. This decrease is primarily the result of reductions in energy use, reductions in County fleet emissions, and reductions in government-generated solid waste.

⁸ The budget for the 2024 CAAP included one County operations inventory. The County operations inventory will be updated on a regular basis, along with the community-wide inventory.

- The largest source of emissions in 2017 is from the Employee Commute sector (25,800 MTCO₂e). In the 2006 inventory, Employee Commute is also the largest contributor of GHG emissions (23,530 MTCO₂e).
- Significant emissions also originate from the Buildings and Facilities sector (12,500 MTCO₂e in 2017) and Government (County) Fleet (3,430 MTCO₂e in 2017).
- Emissions from every sector except for Employee Commute decreased between 2006 and 2017. There was a 10 percent increase in GHG emissions related to Employee Commute over this time.
- The greatest reduction in the amount of emissions was in the Buildings and Facilities sector (-6,760 MTCO₂e), followed by Government (County) Fleet sector (-5,070 MTCO₂e), and Solid Waste (-1,070 MTCO₂e).
- The number of County employees increased by 19 percent from 2006, accounting for 1,335 new positions in 2017.
- County employee transportation VMT increased, although this increase was slightly offset by improvements in vehicle efficiency. As a result, overall employee commute emissions increased 10 percent from 2006 to 2017.
- Energy usage in Buildings and Facilities as well as the Public Lighting sector emissions decreased overall due in large part to lower utility electricity emissions factors and energy efficiency.
- Annual solid waste volumes decreased.

Figure 9 compares 2017 GHG emissions to the 2006 baseline GHG emissions for the County operations inventory.

Local Energy Providers

As of January 2024, approximately 88.7 percent of customers in unincorporated Contra Costa County are buying electricity from MCE, a not-for-profit clean energy provider. Approximately 7.1 percent of these accounts, equating to 4,422 accounts, are enrolled in MCE's Deep Green electricity service, which provides electricity from 100 percent renewable energy. As a result of MCE's generation services, an estimated 3,485.73 metric tons of carbon dioxide equivalent were reduced in the unincorporated areas of the county in 2023. PG&E provides electricity to most of the remaining customers, as well as providing natural gas to all customers. Some large industrial facilities receive electricity from third-party providers. Some residents heat their homes using propane, kerosene, or wood.

FIGURE 9. 2006 BASELINE AND 2017 COUNTY OPERATIONS GHG EMISSIONS SUMMARY

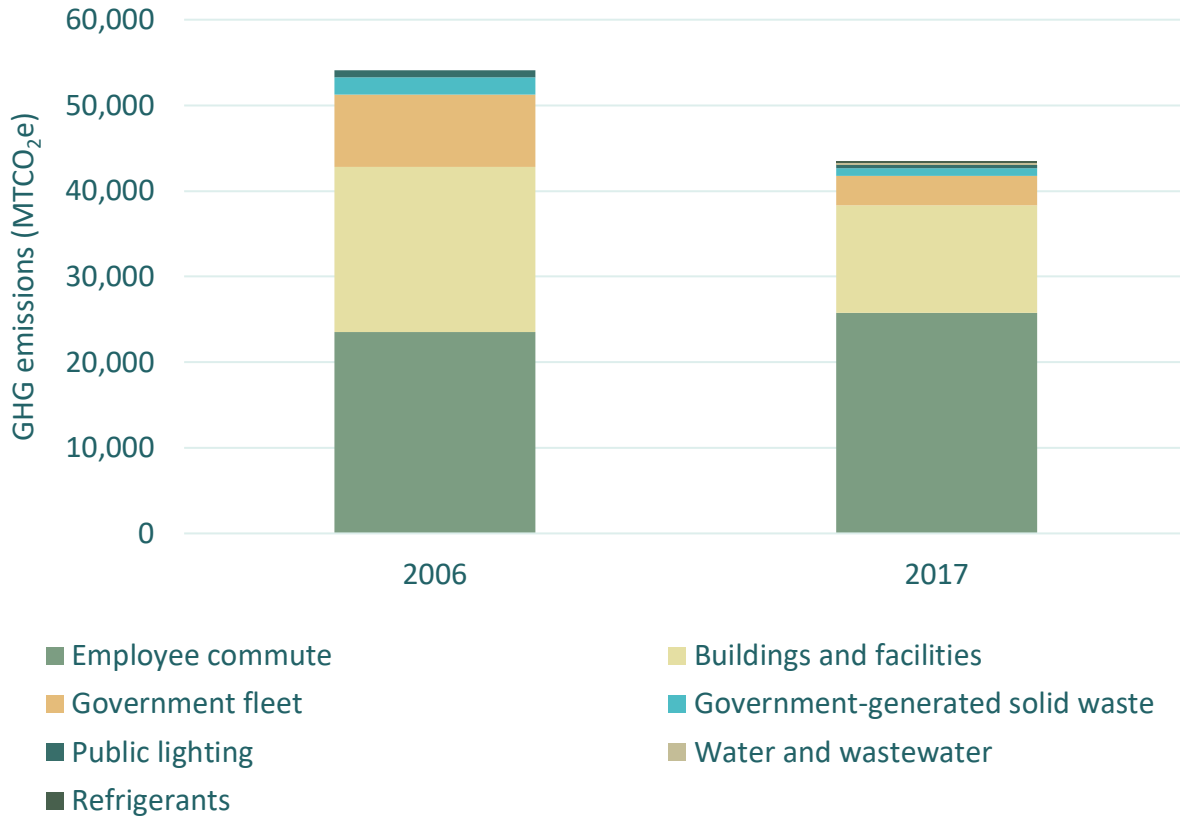


TABLE 6. 2006 BASELINE AND 2017 COUNTY OPERATIONS GHG EMISSIONS SUMMARY

SECTOR	2006 GHG EMISSIONS (MTCO ₂ E)	2017 GHG EMISSIONS (MTCO ₂ E)	PERCENTAGE CHANGE
Employee commute	23,530	25,800	10%
Buildings and facilities	19,260	12,500	-35%
Government fleet	8,500	3,430	-60%
Government-generated solid waste	1,980	900	-54%
Public lighting	830	440	-47%
Water and wastewater	Not included	220	—
Refrigerants	Not included	90	—
Total	54,090	43,380	-20%

Notes: These inventories assume 8,420 County employees in 2006 and 10,030 employees in 2017, a 19% increase.
 All numbers are rounded to the nearest 10. Totals may not add up to the sum of individual rows due to rounding.

Many factors contribute to changes in GHG emissions. Key factors may include changes in electricity and natural gas use, the proportion of electricity obtained from carbon-free sources, VMT, vehicle fuel efficiency, landfilled waste tonnage, temperature (affecting heating and cooling demand), and demographic changes (e.g., changes in population, household, and job numbers). Sector-specific descriptions of sources of and changes in GHG emissions are provided in **Appendix B**.

CONSUMPTION-BASED INVENTORY EMISSIONS

The community-wide GHG inventory presented for the unincorporated county is a protocol-compliant, production-based inventory, which means that it assesses the GHG emissions produced by activities occurring in the community. However, the inventory does not account for most of the emissions created by the consumption of food or material goods or use of services in the unincorporated county, including emissions from the

A consumption-based inventory assesses emissions associated with the manufacture, transportation, and disposal of these goods and services regardless of where they occur.

manufacture and transportation of goods purchased in the community, food grown and processed in other locations, air travel by unincorporated Contra Costa County community members, and the disposal or reprocessing of certain materials and products. For example, if someone who lives or works in an

unincorporated county community purchases new clothes, the production-based inventory will include vehicle emissions for the trip to and from the store, energy use at the store and home, and any landfilled waste generated. It would not include emissions from the growing and processing of the raw materials in the clothes, the manufacturing of the clothes, transportation of the clothes to the store, or the reprocessing of any waste materials that do not end up in a landfill, unless these activities occur within the unincorporated county.

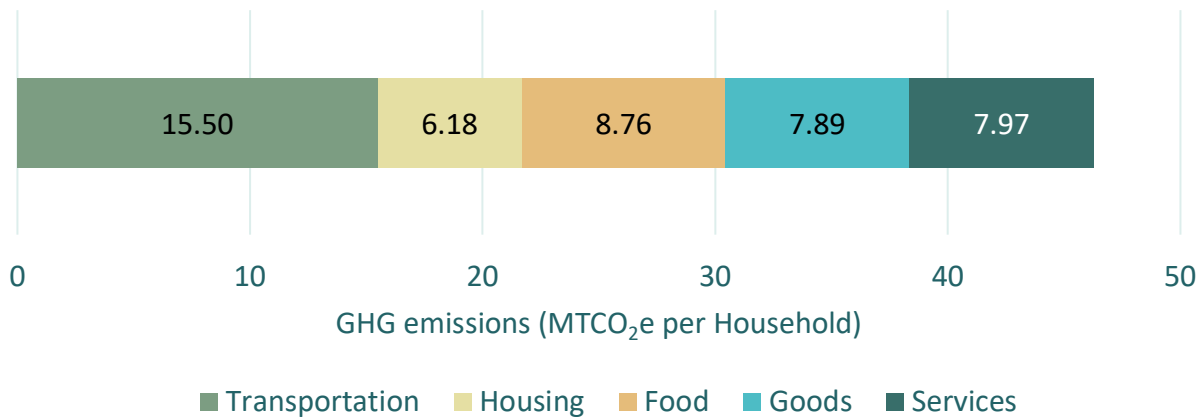
In contrast to a production-based inventory, a second type of GHG inventory, known as a consumption-based inventory, looks at a wider array of GHG emissions created by the goods and services used by unincorporated county community members, including residents, businesses, and employees. A consumption-based inventory assesses emissions associated with the manufacture, transportation, and disposal of these goods and services regardless of where they occur. Such inventories can provide a more complete picture of the GHG emissions associated with the lifestyle and consumer behavior of unincorporated county community members.

A consumption-based inventory is more complex to prepare than a production-based inventory. There are not established protocols and methods for consumption-based inventories, and California does not yet have a statewide consumption-based inventory or any guidance for preparing one. Due to these limitations, the project team did not prepare one as part of this 2024 CAAP. In 2015, BAAQMD worked with the Cool Climate Network at the University of California, Berkeley, to prepare a consumption-based inventory for all Bay Area jurisdictions. This inventory includes GHG emissions from the following sources:

- **Travel:** GHG emissions from fuel use by on-road vehicles, vehicle manufacturing and repairs, public transportation, and air travel.
- **Housing:** GHG emissions from electricity and natural gas use in homes as well as other fuels associated with home heating (such as kerosene or fuel oil), electricity emissions from water and wastewater activities, and waste emissions. This category also includes emissions from the manufacture, transportation, and construction and demolition of materials used to construct houses.
- **Food:** GHG emissions from the growth, processing/manufacturing, and transportation of food products.
- **Goods:** GHG emissions from the manufacture, transportation, and disposal of consumer products, such as home furnishings, appliances and electronics, clothing, and healthcare and personal items.
- **Services:** GHG emissions from personal and business services, including entertainment and recreation, communication, education, healthcare, and maintenance and repair activities.

Some of these GHG emission sources are also included in the production-based inventory prepared as part of the 2024 CAAP, and others are covered by either the production-based or consumption-based inventory but not both. According to the consumption-based inventory, transportation is responsible for 15.5 MTCO₂e per household, or 34 percent of emissions produced by activities conducted and goods consumed within Contra Costa County. Food is responsible for 8.79 MTCO₂e per household (19 percent), goods and services for 7.89 MTCO₂e per household and 7.97 MTCO₂e per household, respectively (17 percent each), and housing for 6.18 MTCO₂e per household, or 13 percent (see **Figure 10**).

FIGURE 10. CONSUMPTION-BASED GHG EMISSIONS INVENTORY RESULTS



While the 2024 CAAP does not directly speak to the goods and services used and offered by residents, business, and industry, the Contra Costa County community should recognize the role that consumption patterns play in achieving the County’s sustainability and climate goals.

GHG Emissions and Food Consumption

Food production, transport, storage, cooking, and waste are substantial contributors to GHG emissions, accounting for approximately 30 percent of emissions globally. These emissions include carbon dioxide, from fossil fuels used to power farm machinery and to transport, store, and cook foods; methane, released by animals as part of their digestive process; and nitrous oxide, released from tilled and fertilized soils. The majority of the emissions associated with food consumption occur outside of Contra Costa County.

Different food groups are associated with different levels of GHG emissions. Animal-based products are generally responsible for significantly greater emissions than plant-based products per unit weight. Emissions are released during multiple stages of the meat-producing process, including the cultivation of cereal crops to use as animal feed, which may require the conversion of existing forestland; during the animal digestive process; and during the decomposition of animal wastes. Emissions are also generated during the meat storage, processing, and transportation process. Plant-based foods, such as fruits, vegetables, whole grains, beans, and lentils, typically require fewer resources to cultivate. According to the consumption-based inventory, meat is responsible for approximately 30 percent of diet-related GHG emissions within unincorporated Contra Costa County. Research has also found that healthier diets tend to be associated with lower GHG emissions. Fostering awareness of the connection between food choices and the environment can therefore be an effective way of lowering GHG emissions and promoting healthy lifestyles.

The 2024 CAAP and General Plan help reduce emissions associated with food consumption by including policies to support local food production and equitable access to healthy food.

Sources:

Clune S, Crossin E, Verghese K (2017). Systematic review of greenhouse gas emissions for different fresh food categories. *Journal of Cleaner Production* 140(2): <https://www.sciencedirect.com/science/article/abs/pii/S0959652616303584>.

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Scarborough P, Appleby PN, Mizdrak A, Briggs ADM, Travis RC, Bradbury KE, Key TJ (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians, and vegans in the UK. *Climate Change* 125(2): 179-192. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4372775/>

GHG Forecast

The following sections present the results of the community-wide and County operations GHG emissions forecasts for the years 2030 and 2045. For a detailed description of GHG forecast methods and assumptions, see **Appendix B**.

ABSOLUTE BUSINESS-AS-USUAL GHG EMISSIONS FORECAST

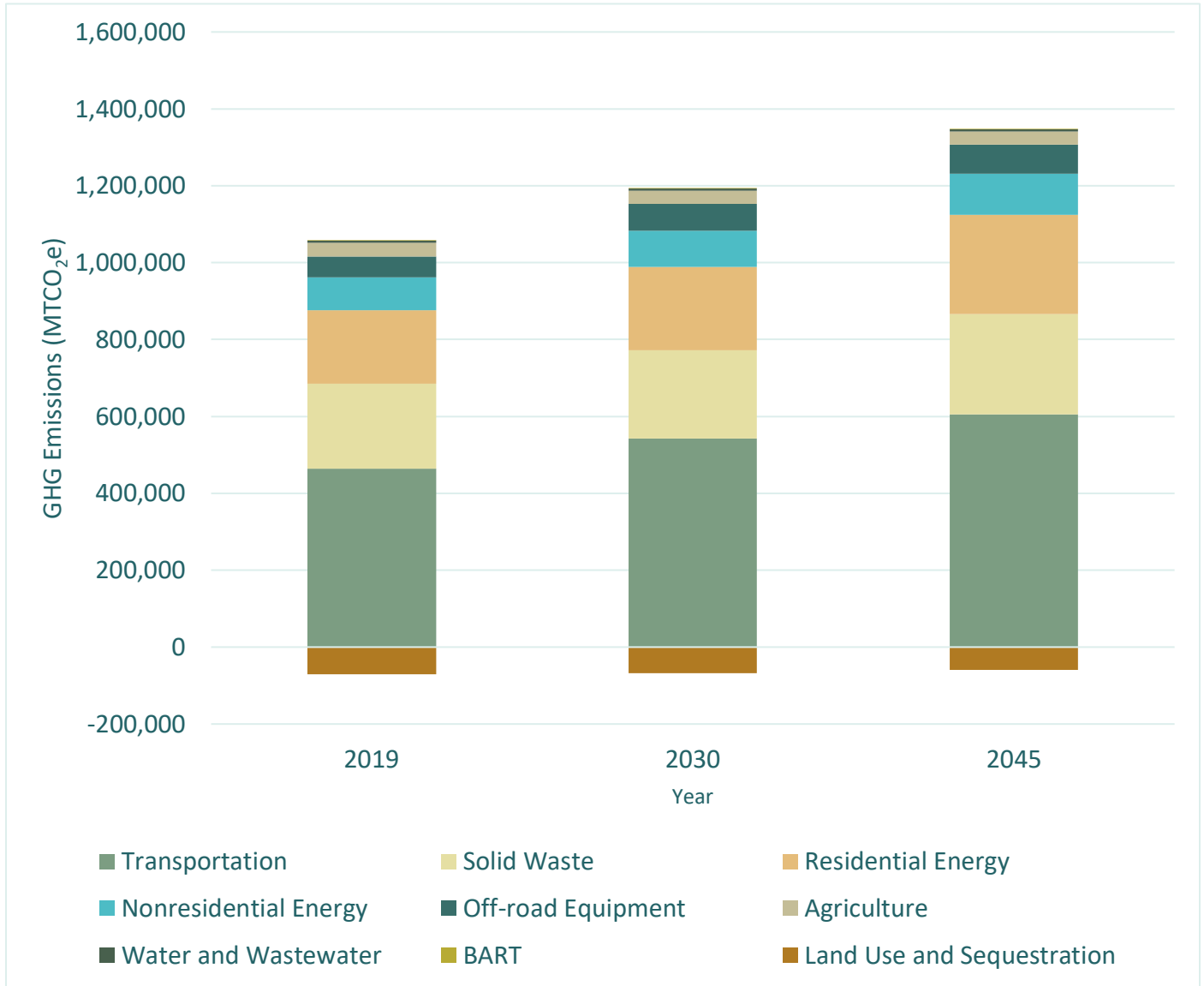
Table 7 and **Figure 11** show an estimate of unincorporated Contra Costa County's projected future GHG emissions if no further action is taken at the state, regional, or local level to reduce emissions, relative to the 2019 inventory. These projections are obtained by applying projected changes in community population to resource use and transportation behavior recorded in 2019. As such, these projections do not account for any potential changes in transportation or resource use directly resulting from the COVID-19 pandemic, the long-term effects of which are not currently known.

Most sectors show an increase in GHG emissions due to the growing population. Agricultural emissions decrease because the amount of land used for agricultural purposes is projected to decline. Although the land use and sequestration sector is expected to remain a net carbon sink (negative emissions), the amount of emissions sequestered (removed from the atmosphere) by the activities in this sector are projected to decline. This is due to the anticipated development of currently undeveloped land, removing the potential for this land to sequester, or store, carbon. Sequestration in forested and urbanized areas is projected to increase slightly.

TABLE 7. ABSOLUTE BUSINESS-AS-USUAL GHG EMISSIONS FORECAST, 2019 TO 2045

SECTOR	2019	2030	2045	PERCENTAGE CHANGE, 2019–2045
Transportation	464,040	542,020	605,080	30%
Energy - Residential	191,780	217,710	259,380	35%
Energy - Nonresidential	85,590	93,590	106,070	24%
Solid waste	220,760	229,450	260,490	18%
Agriculture	36,130	34,770	33,410	-8%
Off-road equipment	54,010	69,520	76,100	41%
Water and wastewater	4,870	5,530	6,590	35%
BART	190	220	260	37%
Land use and sequestration	-70,860	-67,580	-58,890	-17%
Total Annual MTCO_{2e}	986,310	1,125,230	1,288,490	31%

FIGURE 11. ABSOLUTE BUSINESS-AS-USUAL GHG EMISSIONS FORECAST, 2019 TO 2045





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4. GREENHOUSE GAS EMISSION REDUCTION STRATEGY



Briones Valley. Photo credit: Stephen Joseph.

GHG Emissions Reduction Goals

A key part of any CAAP is one or more goals for future GHG emissions levels. These goals may be “firm” levels of GHG emission reductions supported by State regulations and local commitments (also called regulatory goals) or aspirations that go beyond adopted minimums and represent a higher level of GHG emission reductions that communities can strive toward. The 2024 CAAP includes GHG emission reduction goals for 2030 and 2045.

As discussed in [Chapter 2](#), California has two statewide regulatory goals for reduction of GHGs:

- Reduce GHG emissions to 40 percent below 1990 levels by 2030. This goal was codified into law by SB 32.
- Reduce emissions to 85 percent below 1990 levels and achieve net carbon neutrality by 2045. This is the goal codified by AB 1279.

The 2022 Scoping Plan recommends that local governments support statewide efforts to achieve net carbon neutrality by achieving an 85 percent reduction in GHG emissions compared to 1990 by 2045. The 2022 Scoping Plan also removes specific goals for per-person emissions reductions that appeared in previous versions. The BAAQMD 2020 CEQA Guidelines,¹³ *CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*, require that local climate action plans such as the 2024 CAAP be consistent with these State-level goals.

CONTRA COSTA COUNTY'S GHG EMISSION REDUCTION GOALS

Local GHG emissions reduction efforts, such as this 2024 CAAP, may select any GHG emissions reduction goals that are appropriate for unincorporated Contra Costa County. However, to comply with State and regional guidelines for CEQA, the GHG emission reduction goals in the 2024 CAAP should be broadly consistent with the State-level goals. Additionally, the 2045 General Plan informs the County's land use decisions and related policies out to 2045; therefore, consistency with the State's 2045 goal also aligns with the General Plan's horizon year. Given these considerations, the GHG emissions reduction goals for Contra Costa County are:

- Reduce GHG emissions to 658,700 MTCO_{2e} by 2030.
- Reduce GHG emissions to 164,680 MTCO_{2e} by 2045.

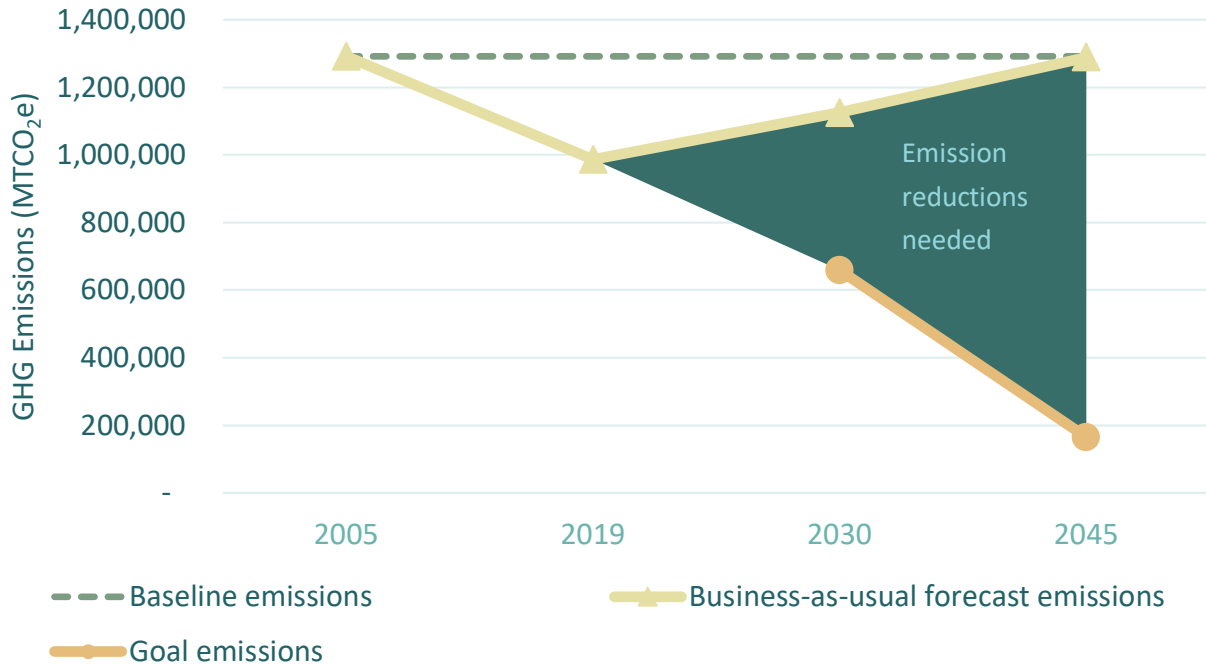
Table 8 and **Figure 12** show these emission goals and how they compare to the County's projected business-as-usual GHG emissions in [Chapter 3](#).

TABLE 8. CONTRA COSTA COUNTY BUSINESS-AS-USUAL GHG EMISSIONS FORECAST AND EMISSION GOALS, 2019 TO 2045

	2019	2030	2045
Business-as-usual forecast GHG emissions	986,310 MTCO _{2e}	1,125,230 MTCO _{2e}	1,288,490 MTCO _{2e}
Goal	N/A	658,700 MTCO _{2e}	164,680 MTCO _{2e}
GHG emissions to be reduced	N/A	466,530 MTCO _{2e}	1,123,810 MTCO _{2e}



FIGURE 12. BUSINESS-AS-USUAL FORECAST GHG EMISSIONS AND REDUCTION GOALS



Existing and Planned GHG Emissions Reduction Efforts

The County must substantially reduce its GHG emissions to achieve its goals. Fortunately, the State of California and regional and local agencies already have several efforts in place or planned that are expected to reduce GHG emissions in the unincorporated areas of Contra Costa County without the County taking additional action. The County can receive “credit” for the level of GHG emissions reduced locally by these existing and planned efforts.

STATE REDUCTION EFFORTS

California has adopted and committed to implementing policies to decrease GHG emission levels statewide, including from several of the major GHG emission sources in the unincorporated areas of Contra Costa County. Many of these policies are identified in the 2008 Scoping Plan and have been revised and expanded by successive updates.

The CARB Scoping Plan and related documents lay out several State-led policies to reduce GHG emissions, but six policies have a direct and apparent GHG emission reduction benefit to unincorporated Contra Costa County: the Renewables Portfolio Standard (RPS), Clean Car Standards, Title 24 building energy efficiency standards, the Low Carbon Fuel Standard (LCFS), the Short-Lived Climate Pollutant Reduction Strategy, and Renewable Natural Gas. An in-depth description of these initiatives and their projected GHG emission savings are provided in **Appendix B**. Because these are State-led programs, Contra Costa County will not be involved in their implementation or regulation.

1. **The Renewables Portfolio Standard** requires increases in renewable and carbon-free electricity supplies.
2. **The Clean Car Standards** require increased fuel efficiency of on-road vehicles and decreased carbon intensity of vehicle fuels.
3. The updated **Title 24 building energy efficiency standards** require new buildings to achieve increased energy-efficiency goals, and in some cases to install rooftop solar panels. The latest version of these standards went into effect January 1, 2023.
4. **The Low Carbon Fuel Standard** mandates reduced carbon intensity of fuels used in off-road equipment.
5. **The Short-Lived Climate Pollutant Reduction Strategy**, also known as SB 1383, requires that jurisdictions provide organic waste collection services, recover edible food, and keep most organic waste out of landfills.
6. **Renewable Natural Gas** assumes that biomethane and renewable hydrogen fuels will be blended into the fossil gas pipeline and that, in the 2030s, dedicated hydrogen pipelines will be constructed to serve certain industrial clusters.

The project team estimated GHG savings from the Clean Car Standards using State modeling tools released in 2021. These models do not consider newer State regulations to accelerate the transition to zero-emission vehicles, and so they do not reflect all the expected GHG reductions from zero-emission vehicles in Contra Costa County. The remaining savings are covered in Strategy TR-2, which is discussed later in this chapter.



REGIONAL AND LOCAL REDUCTION EFFORTS

In addition to State actions, the County’s default electricity provider, MCE, has also taken action to reduce the GHG emissions from the electricity it supplies to unincorporated Contra Costa County community members, beyond the minimum required by the RPS. In 2019, MCE electricity was approximately 60 percent renewable and 90 percent carbon-free. In future years, MCE will work to source 95 percent of its electricity from carbon-free sources. When quantifying the emissions impacts from electricity procurement policies, GHG emissions reductions from RPS are considered first. The County also enacted an all-electric reach code in 2022 (suspended in February 2024, as discussed in [Chapter 1](#)), which required many types of new buildings to not use natural gas. The reductions from MCE clean energy procurement and the 2022 all-electric reach code shown in **Table 9** represent savings obtained after the effects of the RPS have been considered. **Table 9** shows the GHG emissions reduction potential from the State-level efforts, MCE’s energy procurement plans and projected levels of adoption of MCE Deep Green, and the 2022 all-electric reach code. This table also shows how unincorporated Contra Costa County’s GHG emission levels with these reductions compares to the goals discussed previously.

TABLE 9. GHG EMISSION REDUCTIONS FROM EXISTING AND PLANNED STATE, REGIONAL, AND LOCAL ACTIONS, 2019 TO 2045

	2019 MTCO ₂ E	2030 MTCO ₂ E	2045 MTCO ₂ E
Forecast emissions without existing and planned actions	986,310	1,125,230	1,288,490
Reductions from RPS	-	-3,640	-41,270
Reductions from Clean Car standards	-	-110,250	-214,120
Reductions from Title 24	-	-9,880	-31,600
Reductions from LCFS (off-road only) *	-	740	7,430
Reductions from SB 1383	-	-21,880	-53,870
Reductions from renewable natural gas	-	-18,460	-78,050
Reductions from MCE clean energy procurement	-	-1,240	-
Reductions from 2022 all-electric reach code (suspended February 2024)	-	-3,150	-2,590
Reductions from all existing and planned state, regional, and local actions		-188,740	-488,200
Remaining emissions with existing and planned state, regional, and local actions	986,310	957,470	874,420
*Due to how the off-road equipment emissions from LCFS are calculated, the results show a minor increase in emissions from this sector.			

New Reduction Strategies To Achieve Our Goals

The 2024 CAAP uses a process called quantification to determine the amount of GHG emissions reduced by each strategy. The foundation for the quantification calculations is the baseline GHG inventory and forecast. Activity data from the inventory, such as VMT or kilowatt-hours, are combined with participation rates and data about the reduction in activity data from each action to calculate the GHG emissions reduction benefit of each strategy. This approach ensures that the GHG emissions reductions from the 2024 CAAP strategies are tied to current and future community activities. See **Appendix B** for additional quantification details for each strategy, including key assumptions and performance targets.

With the 2024 CAAP in place, the following are projected to occur before 2045:

- Average natural gas use per household will decline by 92 percent.
- The average resident will drive 15 percent fewer miles per year.
- The average resident will generate 18 percent less solid waste.

Calculations for reduction in activity data come from tools and reports provided by government agencies; these agencies include the USEPA, CEC, CARB, California Air Pollution Control Officers Association, US Department of Energy, and local air districts. If accurate data are not available through these sources, quantification uses case studies from comparable communities and applicable scholarly research.

This 2024 CAAP identifies GHG emissions reductions for most of the strategies. However, there are a few that do not have a specific reduction level due to missing data or the lack of reliable methodology. These efforts are still expected to reduce GHG emissions, but by how much cannot be accurately determined. These strategies are labeled “supportive”.

Strategies that only reduce electricity use or increase renewable electricity supplies will show zero GHG emissions reductions in 2045. This is because the State’s RPS requires all electricity sold in California to be carbon-free by 2045. Because there will already be no emissions from electricity use in 2045, Contra Costa County cannot count additional reductions associated with electricity in this year. This 2024 CAAP already credits reductions from the RPS as an existing State program. Strategy BE-3 is not expected to result in any GHG savings in 2045 due to the State’s RPS requirements.



4. Greenhouse Gas Emission Reduction Strategy

Local renewable energy systems and energy efficiency strategies will continue to provide several co-benefits to communities, including lower electricity bills and increased resiliency against power disruptions, even if there are no measurable additional GHG emissions reductions. The County recognizes the opportunity for microgrids, if they are found to be technically and economically feasible, both by the private sector and for County facilities.

GHG EMISSIONS REDUCTION STRATEGIES

This section presents the 11 climate action strategies that make up the County's GHG emissions reduction approach. These strategies include a mix of education and outreach programs to encourage GHG emissions reduction activities, financial subsidies, and other enticements to incentivize GHG emissions reductions and mandates to require GHG emissions reductions. In addition to the 11 climate action strategies presented in this section, an additional 17 strategies make up the 2024 CAAP's adaptation and resilience approach (discussed in [Chapter 5](#)) and the implementation approach (discussed in [Chapter 6](#)). More information on how these strategies were developed is provided in **Appendix B**.

The 11 GHG emissions reduction strategies are organized into five categories, each with a goal:



Clean and Efficient Built Environment (BE)



No Waste Contra Costa (NW)



Reduce Water Use and Increase Drought Resilience (DR)



Clean Transportation Network (CT)



Climate Equity (CE)

Each strategy presented in this 2024 CAAP includes a description of the strategy, an estimate of the absolute 2030 and 2045 GHG emissions reductions anticipated from the strategy at the projected performance level, the recommended actions necessary to implement it, and community co-benefits. For additional implementation details for each strategy, see [Table 12](#).

Recommended actions represent the County’s current understanding of best practices in achieving GHG emissions reductions and community equity, availability of technology, and local regulations as well as the current State and federal regulatory environment. County staff will revisit these recommended actions as conditions change and new opportunities become available. **Figure 13** provides definitions of goals, strategies, and actions, as used in this CAAP.

During the time the CAAP was under development, some of the actions were completed. These actions are included below to facilitate tracking of the ongoing progress Contra Costa County is making in achieving its climate action goals.

FIGURE 13. DEFINING A CAAP GOAL, STRATEGY, AND ACTION

CAAP Goal: An end statement describing the general result sought by the community. Each goal has associated strategies and actions. Goals are given abbreviations based on their topic (for example, TR for Transportation).

CAAP Strategy: A specific statement to guide decision making as the County works to achieve the GHG reduction targets and climate action goals. Strategies are statements of policy and intent. Each strategy is supported by a series of actions. Strategies are numbered based on the goal they fall under (for example, BE-2 is the second strategy under the Built Environment goal).

CAAP Action: A recommended measure, program, procedure, or technique to implement the associated strategy. Actions are concrete steps for the County to take, in collaboration with community members and key partners. They are not a comprehensive list of everything the County can do to implement the strategy.



4. Greenhouse Gas Emission Reduction Strategy

Community co-benefits are additional advantages of the strategy to communities beyond GHG emissions reduction. The 2024 CAAP highlights 12 co-benefits that a GHG emissions reduction strategy can provide, although strategies may provide additional benefits beyond those identified here:



Cost savings



Enhanced recreation opportunities



Greater community resilience



Greater energy independence



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



Increased resilience to pests



Reduced disaster effects



Reduced landfill waste



Reduced resource use

General Plan Alignment

The goals, strategies, and recommended implementation actions in this CAAP are in sync with the approach to reduce GHG emissions and address climate adaptation contained in the County's 2045 General Plan, which is discussed in greater detail in [Chapter 1](#). Where appropriate, the strategy language in the 2024 CAAP is identical to policy or action language in the General Plan. In other instances, the General Plan language provides a high-level framework for the more specific strategy wording in the 2024 CAAP. There are also cross-references in the 2024 CAAP at the end of relevant actions, indicating where the General Plan addresses the same topic.

Each cross-reference is made up of three parts: (1) a General Plan abbreviation, (2) a designation of a policy or action, and (3) the number of the referred policy or action. The cross-references use the following abbreviations for General Plan elements. Note that not all General Plan elements are cross-referenced in the 2024 CAAP, and so are not listed here:

- COS: Conservation, Open Space, and Working Lands
- HS: Health and Safety
- SC: Stronger Communities
- PFS: Public Facilities and Services
- GM: Growth Management

A cross-reference containing an element abbreviation followed by "P" refers to a policy, while a cross-reference containing an element abbreviation "A" refers to an action. This designation is then followed by two numbers. The first number is the goal under which the policy or action may be found. The second number is the number of the policy or action under that goal.

For example, a cross-reference to HS-P8.3 refers to the Health and Safety Element, Goal 8, and the third policy under that goal. Similarly, COS-A14.4 refers to the Conservation, Open Space, and Working Lands Element, Goal 14, and the fourth action under that goal.

This approach is intended to help ensure consistency between the General Plan and the 2024 CAAP, making it clear that both documents work together to address GHG reductions and improve resilience to climate change.

In addition to policies in the General Plan that provide direction on specific topics that are relevant to the 2024 CAAP, there are three policies that address overarching issues in the 2024 CAAP. These three policies are contained in the Health and Safety Element of the General Plan. All three fall under Goal HS-3.



General Plan Goal HS-3

Communities that reduce existing and anticipated greenhouse gas (GHG) emissions in support of statewide carbon neutrality goals and other GHG reduction targets.

General Plan Policy HS-P3.1

Prioritize implementation of the Contra Costa County Climate Action and Adaptation Plan to reduce GHG emissions from community-wide sources and adapt to changing climate conditions.

General Plan Policy HS-P3.2

Facilitate carbon-neutral development projects and communities that support a circular economy, zero-emission modes of transportation, reliable and renewable energy resources, energy-efficient buildings, zero waste, water efficiency and conservation, green infrastructure, soil conservation, and a system of natural and working lands that support natural carbon sequestration and climate resilience.

General Plan Policy HS-P3.3

Require new development projects using the Contra Costa County Climate Action and Adaptation Plan to streamline their environmental review of GHG emissions, as permitted by CEQA Guidelines Section 15183.5, to demonstrate consistency with the Climate Action and Adaptation Plan and incorporate applicable GHG reduction and climate change adaptation measures.

These three policies, along with the more specific General Plan policies cross-referenced in the following sections, support the development and implementation of the 2024 CAAP.

CLEAN AND EFFICIENT BUILT ENVIRONMENT (BE)

HOMES, WORKPLACES, AND BUSINESSES IN UNINCORPORATED CONTRA COSTA COUNTY RUN EFFICIENTLY ON CLEAN ENERGY.



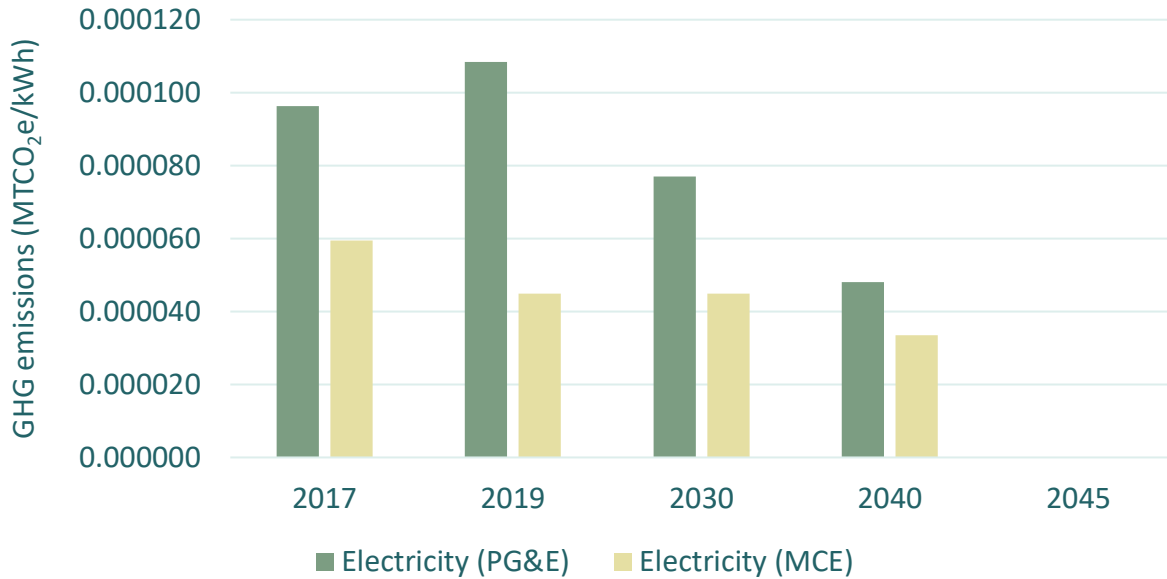
Homes and commercial buildings in Contra Costa County.



The structure of the built environment plays a significant role in how members of the Contra Costa County community work, play, live, and allocate personal resources. Community decisions about the structure, form, and function of homes, businesses, and other vital community structures represent a significant, long-term investment in a particular way of living life and conducting business.

The built environment uses a significant amount of energy and is responsible for a large share of Contra Costa County's GHG emissions. However, as shown in **Figure 14**, increasing the proportion of communities' energy mix that comes from carbon-free and renewable sources can dramatically reduce emissions resulting from electricity use within buildings. These strategies, combined with investing in energy-efficient buildings and retrofits, and reducing the resource intensity of building materials will reduce GHG emissions and energy use. These efforts can also reduce utility costs, improve local air quality, and make the neighborhoods of Contra Costa County more resilient, comfortable, and habitable in the face of the effects of climate change.

FIGURE 14. EMISSIONS PRODUCED PER KWH OF ELECTRICITY, MCE AND PG&E



BE-1: Require and incentivize new buildings and additions built in unincorporated Contra Costa County to be low-carbon or carbon neutral.

Under this strategy, there will be more new carbon-neutral and low-carbon buildings in unincorporated Contra Costa County through efforts to build all-electric new construction and use carbon-neutral/low-carbon building materials.

This strategy builds on the County’s previously adopted All-Electric Building Ordinance, which was suspended in February 2024 because of a federal court ruling in January 2024 that precludes cities and counties from adopting ordinances that prohibit the installation of gas plumbing in buildings. To replace its suspended all-electric ordinance, the County adopted Ordinance No. 2024-17, adopting and amending the 2022 California Energy Code to require increased energy efficiency standards for newly constructed residential buildings, hotels, offices, and retail buildings. The more stringent energy efficiency standards support low

Contra Costa County’s Administration Building and Jail Demolition and Redevelopment Project is the County’s first True Resource Use and Efficiency (TRUE) pre-certified project. The project incorporated used furniture and office supplies and other salvaged materials; over 90 percent of building materials were diverted materials. The project is the first government construction project in the world to achieve TRUE precertification.

levels of GHG emissions for new construction. This ordinance is expected to take effect on January 1, 2025, and will be considered for updates during future revisions to the Building Standards Code.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	4,340	10,970

Strategy BE-1 Co-benefits:



Cost savings



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



Increased resilience to pests



Reduced resource use

Strategy BE-1 Actions:

- Adopt new or modified reach codes that exceed the California Building Standards Code as the State updates the Building Code every three years, to require the use of low-carbon intensive energy sources, achieve higher levels of energy performance, and achieve lower levels of GHG emissions. (COS-A14.4)
- Maintain, update, and publicize County ordinances and programs requiring new residential buildings, hotels, offices, and retail to be more energy efficient, with low levels of GHG emissions. Evaluate the feasibility of including other building types as appropriate. (COS-A14.5)
- Design and construct new County facilities to be zero-net energy to the extent feasible. (COS-P14.8)
- Study the feasibility of establishing a low-carbon concrete requirement for all new construction and retrofit activities and consider additional strategies to reduce embedded carbon in construction materials. The intent is to determine what the County can and should do to support or exceed State requirements for net-zero emissions for cement use by 2045. (HS-A3.2)

4. Greenhouse Gas Emission Reduction Strategy

- Provide educational materials to encourage project applicants to incorporate passive solar design features into new developments and significant alterations and additions.
- Promote sustainable building strategies and designs, including small and “tiny” homes, to project applicants as site appropriate.
- Consider requiring sustainable features as a condition of approval, including reuse of materials to minimize embedded carbon.
- Provide educational and technical resources to advance the adoption of heat pump water heater and heat pump space heating in buildings in support of BAAQMD Regulation 9, Rule 4, and Regulation 9, Rule 6, which will mandate that replacement and new water heaters (2027 and 2031), and space heaters (2029) are zero NOx. (COS-A14.10)



The new Contra Costa County Administration Building, part of the first government project in the world to receive TRUE pre-certification. Photo credit: Contra Costa County staff.



BE-2: Retrofit existing buildings and facilities in the unincorporated county, and County infrastructure, to reduce energy use and convert to low-carbon or carbon-free fuels.

With implementation of this strategy, the existing built environment in unincorporated Contra Costa County will include more carbon-neutral and low-carbon buildings through all-electric upgrades, energy efficiency, and weatherization retrofits, and upgrades to existing buildings, including County-owned and operated buildings and facilities.

Approximately 56 percent of the county’s housing stock was constructed prior to 1980, around the time when modern building codes were first adopted (this includes the 19 cities). Within the unincorporated county, approximately 74 percent of housing stock was constructed prior to 1980.

In March 2023, BAAQMD adopted a regulation to require existing natural-gas-powered space heaters and water heaters be replaced with electrical models when the natural-gas-powered units reach the end of their operational life. This regulation will take effect in 2027 to 2031 for water heaters (depending on the capacity of the unit) and in 2029 for space heaters. This regulation accelerates the transition of natural gas appliances to electric appliances in existing homes and nonresidential buildings, resulting in a higher adoption rate of these technologies. Depending on the specific type of equipment, 70 to 90 percent of space heaters and water heaters should be electric by 2045 due to the BAAQMD regulations and local efforts.

	2030	2045
GHG emissions reduction (Absolute MTCO _{2e})	55,990	156,150



4. Greenhouse Gas Emission Reduction Strategy

Strategy BE-2 Co-benefits:



Cost savings



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



Reduced resource use

Strategy BE-2 Actions:

- Create a County policy or program to facilitate making existing residential and nonresidential buildings more energy-efficient and powered by carbon-free energy. (COS-A14.6)
- Create a detailed County roadmap to convert existing homes and businesses to use low-carbon or carbon-free appliances. The roadmap should include steps to support converting buildings to rely on low-carbon or carbon-free energy using an equitable framework that minimizes the risk of displacement or significant disruptions to existing tenants. (COS-A14.7)
- Provide educational and technical resources to advance the adoption of heat pump water heater and heat pump space heating in new buildings.
- Evaluate options for incentivizing and requiring additions and alterations to be energy efficient and to achieve the lowest feasible levels of GHG emissions, including upgrades to the building electric panel as needed. (COS-A14.8)
- Ensure County-led and supported retrofit programs incentivize and prioritize conversion of buildings built before 1980 and emphasize assistance to owners of properties that are home to very low-, low-, and moderate- income residents or located in Impacted Communities, as permitted by available funding. (COS-A14.9)

CookSmart

In 2024, the County implemented the BayREN CookSmart pilot program, in partnership with Sustainable Contra Costa. This program provides electric induction cooktops and up to three pieces of induction-compatible cookware to up to 100 County residents, with an emphasis on residents living in Impacted Communities.

- Explore opportunities, in collaboration with partner agencies, to create new incentives or publicize existing ones to support updating existing buildings to achieve the lowest feasible levels of GHG emissions.
- Partner with community groups and MCE to establish an induction cooktop education program for county residents. (Initiated in 2024.)
- Work to continue to obtain funding with partners such as BayREN and MCE to implement a program or programs to provide reduced-cost or free energy-efficiency and zero-carbon retrofits to local small businesses and households earning less than the area median income, in support of the Contra Costa County Asthma Initiative, Contra Costa County Weatherization Program, similar County programs, other nonprofit partners, and other health equity efforts for Impacted Communities. Support the use of low-emitting materials, including paints and carpeting, in retrofits to improve indoor air quality.
- In partnership with MCE and BayREN, continue to support voluntary home and business energy efficiency retrofits, including all-electric measures.
- Facilitate participation by homes and businesses in demand response programs.
- Continue to conduct energy and water tracking activities, audits, and upgrades of County facilities, including conversion of feasible County facilities to all-electric space and water heating.
- Advocate for modifications to the federal Weatherization Assistance Program that expand eligible measures to include whole building clean energy improvements, such as wall insulation, duct sealing, electric panel upgrades, electric heat pumps, and related

BayREN

The Bay Area Regional Energy Network (BayREN) is a partnership between communities in the nine-county Bay Area region, including Contra Costa County, which supports energy efficiency, water efficiency, and GHG emissions reduction. BayREN provides financial and technical assistance to property owners, businesses, and local governments to reduce their resource use and GHG emissions. This work includes providing rebates and other incentives for energy efficiency retrofits and the installation of energy-efficient appliances.

Cool roofs and pavement

Cool roofs and pavements help to reduce the amount of sunlight absorbed by these materials, helping to bring down the temperature in buildings and developed areas. Both cool roofs and pavements reflect most sunlight, rather than absorbing it, and efficiently emit the solar energy that they do absorb. In the California Building Standards Code, these materials are formally defined by their level of thermal emittance and solar reflectance.



4. Greenhouse Gas Emission Reduction Strategy

measures. Advocate for an increase in the income eligibility limits for the Weatherization Assistance Program.

- Implement requirements for cool roofs and light-colored, non-reflective, permeable paving materials as part of retrofit, repair, and replacement activities, using recycled materials or other materials with low embedded carbon as feasible and as established by the Building Standards Code.

BE-3: Increase the amount of electricity used and generated from renewable sources in the county.

This strategy seeks to accelerate the replacement of electricity from fossil fuels with electricity from renewable and other carbon-free sources. Actions include increased local renewable energy generation, support for MCE clean energy programs, including Deep Green and Local Sol tiers, and improved energy independence and resilience through battery storage systems⁹ for renewable electricity. This builds on the 2018 *Renewable Resource Potential Study*, which describes the opportunities to generate renewable energy in Contra Costa County, on rooftops, parking lots, and other spaces within the urban limit line, and in certain areas outside the urban limit line.



Examples of ground-mounted and rooftop solar arrays. Multifamily buildings can be constructed with solar energy and battery storage systems. This reduces the amount of GHGs from the electricity needed to power the building and increases resilience to power outages. Photo credit: Contra Costa County staff

⁹ The County recommends the installation of small battery energy storage systems because of their energy resilience benefits. Although these systems can help to increase use of carbon-free energy, reputable methods for quantifying energy use and GHG reduction benefits at the building level from use of battery storage are not available at this time.

As all electricity sources in California are expected to be carbon-free by 2045, reducing electricity use or increasing renewable energy supplies in 2045 do not result in GHG reductions beyond those quantified under the State’s RPS program (discussed earlier in this chapter), although they continue to provide cost-saving and resilience benefits.

MCE Levels of Service

MCE provides three tiers of electricity service: Light Green 60% Renewable Energy, Deep Green 100% Renewable Energy, and 100% Locally Produced Solar Energy.

Approximately 93 percent of MCE accounts participate in the Light Green tier, 7 percent participate in Deep Green, and less than 1 percent participate in Local Solar. On March 24, 2020, the County Board of Supervisors voted to go Deep Green 100% renewable with MCE for most the County’s accounts.

	2030	2045
GHG emissions reduction (Absolute MTCO _{2e})	10,830	0

Strategy BE-3 Co-benefits:



Greater energy independence



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



4. Greenhouse Gas Emission Reduction Strategy

Strategy BE-3 Actions:

- Require new commercial parking lots with 50 or more spaces to mitigate heat gain through installation of shade trees, solar arrays, or other emerging cooling technologies. Prioritize the use of solar arrays where feasible and appropriate. (HS-P8.3)
- Encourage property owners to pursue financial incentives for solar energy installations and energy storage technologies, such as battery storage systems, on new and existing buildings.
- Work with MCE to increase enrollment, especially in the Deep Green tier.
- Continue to enroll all eligible, non-solar-equipped County facility electricity accounts in MCE territory in the Deep Green tier.
- Work with the Contra Costa County Fire Protection District and other organizations that provide fire protection services to provide education and promote incentives for battery storage systems that can increase the resilience of homes and businesses to power outages.
- Encourage installation of battery storage systems in new and existing buildings, especially buildings with solar energy systems and buildings that provide essential community services. (COS-P14.7)
- Provide information about battery storage systems with all applications for new home construction and solar panel installations.
- Pursue implementation of recommendations of the 2018 Renewable Resource Potential Study.
- Evaluate the least-conflict feasible locations for stand-alone battery storage systems and modify land use regulations to enable such use in these locations.
- Explore the technical and economic feasibility of developing and operating microgrids in Contra Costa County and for County facilities. (Supported by COS-P14.3 and COS-A14.2)
- Explore opportunities to install community solar projects with battery backup to provide clean energy to Impacted Communities.

Renewable energy in Contra Costa County

In 2023, the County issued 1,700 permits for residential and commercial solar projects, totaling approximately 68,500 kilowatts (kW) of capacity, capable of generating enough electricity to meet the needs of over 23,000 houses. The County has installed 7,300 kW of rooftop and parking lot solar projects. The County also issued 110 permits for residential battery energy storage projects.

NO WASTE CONTRA COSTA (NW)

CONTRA COSTA COUNTY DISPOSES OF NO MORE SOLID WASTE THAN 2.2 POUNDS PER PERSON PER DAY (PPD).¹⁰



Waste reduction, reuse, recycling, and composting strategies reduce emissions by reducing the amount of material that decomposes in a landfill. These actions also encourage community-wide creativity, collaboration, and conservation as residents and business owners are inspired to share skills and develop innovative ways to reduce resource use.

Communities across California are already reducing their use of single-use plastics and expanding community compost efforts in

accordance with AB 1276 and SB 1383. Contra Costa County is poised to make further strides in waste management by increasing composting of organic waste, expanding recycling efforts, encouraging the reuse of materials, and reducing the amount of waste arising through County operations.

Efforts to divert waste away from landfills and into composting and recycling programs reduce emissions and help make valuable recycled materials available to the broader community. Expansion of the County's recycling and composting programs helps ensure that residents not only know how to properly manage their waste, but also have a convenient and affordable way to do so. The 2024 CAAP also looks upstream, identifying strategies for reducing emissions from waste by reducing the amount of waste that results from the purchase of goods used in County operations.

AB 1276

Assembly Bill (AB) 1276, signed into law by Governor Gavin Newsom, changes the Public Resource Code related to single-use food accessories and standard condiments. AB 1276 prohibits restaurants and other food providers from providing single-use utensils and standard condiments unless requested by the customer. Local jurisdictions are required to authorize an enforcement agency to enforce these requirements.

¹⁰ The pounds per person per day (PPD) metric refers to the average amount of solid waste that each person that lives in the unincorporated county disposes in landfills each day. This does not include material that is recycled or composted.



4. Greenhouse Gas Emission Reduction Strategy

Most of the emissions associated with the solid waste sector are not from waste that community members in the unincorporated county are throwing out annually. Instead, 80 to 90 percent of emissions from solid waste are coming from three landfills in the unincorporated county. These landfills accept waste from communities across Northern California. As the waste decomposes over decades, it releases GHG emissions. The County is responsible for permitting activities at these landfills and may affect operations at these activities through its agreements with landfill operators. These landfills are the Acme Landfill outside of Martinez, the Keller Canyon Landfill outside of Pittsburg, and the West Contra Costa Landfill outside of Richmond. Although the West Contra Costa Landfill closed in 2006, the waste that had already been deposited in the landfill continues to decompose and create GHG emissions.

The presence of three landfills within the unincorporated county means that, even if the volume of solid waste generated in the unincorporated county declines significantly, GHGs will be released for decades as waste that is already in landfills continues to decompose. The 2024 CAAP addresses this source of emissions by including strategies and actions to promote landfill gas capture, expanded use of landfill gases, and decreases in flaring activity.

NW-1: Increase composting of organic waste.

With this strategy in place, organic waste will be diverted from landfills to composting or other opportunities for reuse in accordance with SB 1383 and other applicable requirements. This includes establishing organic waste collection programs for all franchise waste customers in the unincorporated areas of the county, encouraging and supporting wastewater agencies to accept food waste or other acceptable organic materials for processing in on-site anaerobic digesters, and allowing for creative opportunities to reuse or reprocess organic waste material.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	2,240	4,000

Strategy NW-1 Co-benefits:



Increased economic opportunities



Increased resilience to pests



Reduced landfill waste



Reduced resource use

Strategy NW-1 Actions:

- Ensure, through franchise agreements and other relationships with waste haulers, a source-separated organics collection service for all residential and commercial customers in County-controlled collection franchise areas.
- Require that new and expanded landfill operations significantly reduce GHG emissions to meet or exceed State targets to the extent feasible, and work toward carbon-neutral landfills. (PFS-P7.12)
- Work with wastewater providers to explore the use of organic waste as feedstock for anaerobic digesters to produce biogas that can generate electricity or fuel.
- Require local restaurants, grocery stores, and other edible food generators that handle large quantities of food to partner with food rescue organizations to divert edible food that would be otherwise disposed in landfills for distribution to those in need, in accordance with SB 1383.
- Collaborate with edible food recovery programs and the Community Wellness & Prevention Program to decrease food waste and address hunger.



4. Greenhouse Gas Emission Reduction Strategy

- Procure compost or other products made from recovered organic waste in accordance with the County's Recovered Organic Waste Product and Recycled Paper Procurement Policy.

NW-2: Reduce waste from County operations.

This strategy reduces waste generated through County operations and the activities of outside organizations with which the County contracts for specific goods and services. Efforts to achieve waste reductions include updating and implementing the County's environmentally preferable purchasing policy, ensuring all County facilities have and use organic waste and recycling collection services, and requiring the use of low-carbon content building and paving materials for all County projects as feasible.

Environmentally Preferable Purchasing

The County's Environmentally Preferable Purchasing (EPP) Policy was updated and approved by the Board of Supervisors in September 2023. The new policy updates the County's 2008 EPP and includes purchasing requirements to minimize environmental impacts, reduce GHG emissions, and advance the goals of the CAAP.

	2030	2045
GHG emissions reduction (Absolute MTCO _{2e})	1,090	1,620

Strategy NW-2 Co-Benefits:



Increased economic opportunities



Increased resilience to pests



Reduced resource use

Strategy NW-2 Actions:

- Continue source-separated organics collection service at all County-owned facilities that includes recovering food waste (scraps) and food-soiled paper.
- Implement three-stream recycling (trash, recycling, and organic waste) at all County-owned facilities.

- Establish requirements for source-separated organics collection and three-stream recycling as conditions in lease agreements for County offices.
- Conduct waste audits of County facilities, including assessing the volume and composition of all waste streams, to identify challenges with waste activities and develop educational or operational changes to address issues and reduce waste generation.
- Obtain material for capital projects from local and low-carbon sources to the greatest extent feasible, including allocating additional funds to allow for such materials, and integrate appropriate standards into the County's Environmentally Preferable Purchasing (EPP) policy.
- Continue to reduce paper use in County operations. Procure recycled paper and janitorial supplies in accordance with the Recovered Organic Waste Product and Recycled Paper Procurement Policy.
- Continue engagement with TRUE zero waste certification for County projects.
- Enact Bay-friendly landscaping practices at County facilities. Develop County policies and practices for Bay-friendly landscaping.
- Explore opportunities to reuse wood from County tree maintenance activities as an alternative to chipping.
- Encourage medical facilities and medical waste recycling companies to upgrade facilities to increase the amount of medical waste recycled or reprocessed.
- Explore the feasibility of transitioning to reusable products in the health sector, where appropriate, and procuring products certified as green or low carbon.

TRUE Certification

TRUE certification is a certification program for facilities and their operations that assesses how well the facility is reducing the amount of waste it produces. The certification requirements include at least a 90 percent diversion rate, compliance with applicable laws and permits, and regular reporting on waste statistics. The new County Administration Building B at 1026 Escobar Street, Martinez, was the first project in the world to receive TRUE certification.

Bay Friendly Landscaping

Bay Friendly Landscaping is a set of best practices for landscaping to minimize impacts to the San Francisco Bay and its watershed. These practices include reducing stormwater runoff, providing wildlife habitat, and reducing fertilizer use.



4. Greenhouse Gas Emission Reduction Strategy

NW-3: Increase community-wide recycling and waste minimization programs.

Under this strategy, the amount of waste sent to landfills from community members is reduced through extensive diversion and waste minimization programs. The County explores and implements all feasible opportunities to minimize landfill waste, including through recycling of additional materials, prohibitions or limitations on materials that cannot be recycled/composted, education around conscious consumption, and opportunities to divert waste materials for reuse.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	520	2,530

Strategy NW-3 Co-benefits:



Increased economic opportunities



Increased resilience to pests



Reduced resource use

Strategy NW-3 Actions:

- Create a source-reduction program in partnership with regional agencies to promote rethinking, refusing, reducing, reusing, and regenerating of materials.
- Improve educational efforts to promote better waste sorting among community members.
- Work with waste haulers to expand the types of materials accepted by recycling programs as economic conditions allow.

The Five Rs

Recycling and composting are critical steps to decreasing the amount of waste that the County sends to a landfill. However, recycling and composting still should be treated as a last resort. Prior to sending something to a recycling or composting center (or landfill if no alternative exists), community members should try to reduce the amount of waste produced in the first place, by following the five Rs:

Rethink whether it is necessary to buy something.

Refuse to buy something that produces excess waste.

Reduce the amount of waste generated.

Reuse items that would otherwise be treated as waste.

Regenerate waste products into something useful often through recycling.

- Work with waste haulers to continue availability of curbside pickup recycling services.
- Evaluate the feasibility of banning single-use plastics or establishing additional restrictions beyond those created by SB 54.
- Encourage the use of reusable items over disposable materials.
- Promote the Contra Costa County Recycling Market Development Zone low-interest loan program to create incentives for the development of businesses that use recycled materials.



Three-stream waste management systems with clear instructions about what materials go in each bin, like this, ensure that people are able to properly sort items into the correct bin and divert compostable and recyclable materials from the landfill. Photo credit: Contra Costa County staff.

NW-4: Reduce emissions from landfill gas.

After it is deposited in landfills, waste gradually decomposes and releases landfill gas. Landfill gas contains both carbon dioxide and methane, making this gas a potent contributor to GHG emissions and regional air pollutants. Most, but not all, of this gas is captured and used to generate energy, produce fuels, or flared. The gas that is not captured escapes into the atmosphere, adding to the county’s GHG emissions. Increasing the percentage of captured landfill gas both helps the County meet its GHG emissions reduction goals and improve local air quality. Strategy NW-4 improves the landfill gas capture rate, increases opportunities to use landfill gas as an alternative energy source, and reduces the rate of flaring of landfill gas.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	57,460	61,410

Strategy NW-4 Co-benefits:



Greater energy independence



Improved air quality

Strategy NW-4 Actions:

- Encourage efforts at Acme, Keller Canyon, and West Contra Costa landfills to install or enhance existing methane capture technology and associated monitoring systems with a goal of increasing the methane capture rate to the greatest extent feasible. (Supported by COS-P14.5)
- Explore opportunities for partnering with agricultural and industrial operations to generate energy from methane gas generated by their ongoing activities.
- Support landfill operators in efforts to transition away from landfill gas flaring.

REDUCE WATER USE AND INCREASE DROUGHT RESILIENCE (DR)

CONTRA COSTA COUNTY USES LESS WATER AND COMMUNITIES ARE PREPARED FOR DROUGHT.



Communities can reduce water use and protect themselves from the effects of drought through implementation of strategies to increase indoor water use efficiency and reduce outdoor water use. Increasing water use efficiency and decreasing outdoor water use reduce GHGs by reducing the amount of energy needed to process, heat, and deliver water. In addition to saving energy, water conservation and efficiency helps protect one of California's most precious resources and helps the county become more resilient to drought and water shortage. In addition, reducing water use in individual homes and businesses can reduce utility costs.

Contra Costa County possesses both surface and groundwater resources. In California, groundwater quality and sustainability are ensured through the Sustainable Groundwater Management Act (SGMA). The SGMA establishes a local management structure for groundwater, led by Groundwater Sustainability Agencies (GSAs). GSAs are responsible for authoring and implementing the local Groundwater Sustainability Plan. GSAs active in Contra Costa County include the City of Antioch GSA, City of Brentwood GSA, Byron-Bethany Irrigation District GSA, Contra Costa County GSA, Diablo Water District GSA, Discovery Bay GSA, East Contra Costa Irrigation District GSA, East Bay Municipal Utilities District GSA, and Zone 7 GSA. The California Department of Water Resources approved the East Contra Costa Subbasin Groundwater Sustainability Plan in July 2023. The Groundwater Sustainability Plan goals are consistent and complementary with the County's CAAP and focus on groundwater management strategies that protect and maintain safe and reliable groundwater sources in the face of climate change.



4. Greenhouse Gas Emission Reduction Strategy

DR-1: Reduce indoor and outdoor water use.

This strategy reduces water use in communities and at County facilities. This includes efforts to promote water conservation; increase the acreage of native and drought-tolerant plants; encourage graywater/rainwater catchment systems and supportive infrastructure; and provide incentives to reduce water use as appropriate.

The average Contra Costa resident uses 126 gallons of water per day.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	970	1,440

Strategy DR-1 Co-benefits:



Cost savings



Increased resilience to pests



Reduced resource use

Strategy DR-1 Actions:

- Require new development to reduce water consumption through use of water-efficient devices and technology, drought-tolerant landscaping strategies, and treated recycled water where available. (COS-P7.6)
- Require homes and businesses to install water-efficient fixtures at time of retrofit activities, in accordance with the California Building Standards Code.
- Continue to enforce the Model Water Efficient Landscaping Ordinance and encourage the use of native and drought-tolerant landscaping for exempt residential and commercial landscapes through partnership with local and regional water agencies and other organizations.
- Partner with water and wastewater service providers, Groundwater Sustainability Agencies, irrigation districts, and private well owners to increase participation in water conservation programs countywide. (COS-P7.1)
- Facilitate offering of BayREN water bill savings programs through eligible community water providers.

- Encourage the installation of graywater and rainwater catchment systems, particularly for new construction, as feasible for wastewater infrastructure. Reduce regulatory barriers for these systems and explore creating incentives for installing these systems in new and existing buildings.
- Evaluate opportunities for graywater use in public spaces and implement them as feasible.
- Promote the installation of composting toilets at appropriate County facilities in locations without wastewater service.



*Drought-tolerant landscapes and native plants have lower water demands than other plant species.
Photo credit: Envision Contra Costa picture gallery.*

DR-2: Ensure sustainable and diverse water supplies.

This strategy supports efforts to diversify the sources of Contra Costa County's water supplies and ensure that water supplies are viable for the long-term.

This is a supportive policy that does not create its own GHG emission reductions.

Strategy DR-2 Co-benefits:



Greater community resilience



Reduced resource use

Strategy DR-2 Actions:

- Encourage Contra Costa Health to work with Groundwater Sustainability Agencies to ensure that new well permit applications are in accordance with County ordinances and State construction standards and require a hydrogeological evaluation in areas with known water shortages to ensure that the sustainable yield goals can be met.
- Require new development to demonstrate the availability of safe, sanitary, and environmentally sound water delivery and wastewater treatment systems with adequate capacity. (PFS-P4.5, PFS-P4.6)
- Discourage new development that may reasonably lead to groundwater overdraft, subsidence, or other negative impacts, or which may reasonably depend on the import of unsustainable quantities of water from outside the county.
- Require the use of permeable surfaces for new or reconstructed hardscaped areas where feasible.
- In coordination with Groundwater Sustainability Agencies, expand opportunities for groundwater recharge.
- Work with water suppliers to expand recycled water systems as feasible, including considering additional treatment to allow for additional recycled water uses.

CLEAN TRANSPORTATION NETWORK (TR)

CONTRA COSTA COUNTY'S TRANSPORTATION NETWORK PROVIDES SAFE AND ACCESSIBLE OPTIONS FOR WALKING, BIKING, AND TRANSIT. IF RESIDENTS AND WORKERS ARE DRIVING, THEY ARE IN ZERO-EMISSION VEHICLES.



Transportation is an integral part of living life and conducting business for nearly all members of the Contra Costa County community. The range of transportation options that the County invests in and that are useful for the public has profound impacts on GHG emissions, local environmental quality, public safety, and overall quality of life.

Private vehicle travel is convenient, but releases significant volumes of GHGs, increases the maintenance demand on roads, creates toxic particulates through tire wear and brake dust, increases congestion, requires significant personal investment, hinders active modes of transportation, and is a significant source of death and injury. Increasing the safe, affordable, accessible, active, and reliable transportation options available to communities makes it easier for all residents to participate in public life and gives all community members the freedom to choose transportation modes that promote health, reduce fuel costs and time lost in traffic, and help the County meet its GHG emissions reduction goals. The 2024 CAAP diversifies the County's transportation landscape by recommending investments in active transportation, micromobility, public transit, complete streets, and roadway safety and ensuring that employers offer alternative commuting options for their employees.

Micromobility is a category of affordable, lightweight transportation ideal for trips of five miles or less and designed for individual use. Micromobility devices can be personally owned bicycles, e-bikes, electric scooters and electric skateboards, or shared bikes, e-bikes, and e-scooters. - [Contra Costa 511.org](https://www.contracosta511.org)

The County is committed to enhancing active transportation by promoting access and connectivity for all modes of travel besides automobile travel. Active transportation encompasses any self-propelled, human-powered travel, such as walking and bicycling. The County's Active Transportation Plan¹⁴ serves as a roadmap to enhance active transportation safety and mode share for unincorporated areas in Contra Costa County by providing a comprehensive look at the County's active transportation needs and



4. Greenhouse Gas Emission Reduction Strategy

opportunities. The plan outlines investments in new bicycle facilities, upgraded crossings, enhanced trail connections, and improved walkways.

While the County works to have a wide suite of transportation options available, passenger and commercial automobile use will continue to be a large part of Contra Costa County's transportation mix. However, different fuels have different levels of carbon intensity. Gasoline and diesel-fueled vehicles, in particular, release more carbon dioxide into the atmosphere than vehicles that use electricity or hydrogen fuels, even when accounting for how the electricity or hydrogen is generated. Increasing use of cleaner transportation fuels will be a key to help reduce the County's transportation emissions. Ensuring that cleaner fuels are affordable, accessible, and easy to use means helping communities address the up-front costs of acquiring an electric or other clean-fuel vehicle and ensuring that refueling infrastructure, such as EV charging stations, is equitably distributed throughout and across communities. Additionally, the County aims to increase the use of clean fuels in its own vehicle fleet and promote the use of clean fuels among transportation providers such as taxis and ridesharing programs.



*County Employees on Bike to Work Day: Karin Deas (left), John Steere and Joe Lawlor (right).
Photo credit: Contra Costa County staff.*

TR-1: Improve the viability of walking, biking, zero-emission commuting, and using public transit for travel within, to, and from the county.

This strategy, in coordination with the General Plan's policies and actions, reduces vehicle miles traveled (VMT) in Contra Costa County by making it easier for people to bike, walk, roll, and take public transit. This strategy incorporates the County's commitments to implement the Contra Costa Active Transportation Plan, Complete Streets Policy, Vision Zero Action Plan, and other County policies to facilitate location of new development to minimize car dependency.

Contra Costa County's Complete Streets Policy was adopted in 2016. This policy promotes rethinking street design to ensure that streets adequately serve all users and are sensitive to local traffic conditions. All departments and agencies of Contra Costa County are required to work towards making Complete Streets practices a routine part of everyday operations and are considered for all development projects.

Adopted in March 2022, the County's Active Transportation Plan serves as a roadmap to enhance active transportation safety and mode share for unincorporated Contra Costa County by providing a comprehensive look at the county's active transportation needs and opportunities. The plan outlines investments in new bicycle facilities, upgraded crossings, enhanced trail connections, and improved walkways.

In March 2022, the County also adopted the Action Plan from the Vision Zero Final Report.¹⁵ Created by the Public Works Department, this plan commits the County to the Vision Zero goal of reducing vehicle collisions by promoting safe vehicles, safe speeds, safe roads, and post-crash care.

Active Transportation Plan

The Active Transportation Plan aims to:

- Prioritize active transportation investments based on factors such as collision history or systemic risk, location in an impacted community, location near key destinations, and funding opportunities.
- Shift trip modes by Contra Costa County residents and visitors from motor vehicles to active modes such as walking and biking.
- Provide a vision for arterials and collector streets within the unincorporated county roadway network to assist County departments in planning for private development, capital projects, and maintenance efforts.



4. Greenhouse Gas Emission Reduction Strategy

The County also supports legislation that enhances accessibility to quality transit, protects vulnerable road users, increases transit service, ensures transit is safe and affordable, and identifies strategies and funding to implement recommendations in the 2019 Employee Commute Survey for County employees.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	17,050	40,370

Strategy TR-1 Co-benefits:



Cost savings



Greater community resilience



Improved air quality



Improved community equity



Improved public health



Reduced resource use

Strategy TR-1 Actions:

- Prioritize expansion of bicycle, micromobility, and pedestrian infrastructure (e.g., Class IV separated bikeways) to address the significant latent demand for these active transportation modes. (TR-P2.2)
- Develop and promote mobility alternatives to single-occupancy vehicles, including but not limited to public transit, micromobility, carbon-free rideshare strategies, and nonmotorized modes. (TR-A2.1)
- Implement programs to encourage transit use, bicycling, walking, telecommuting, and use of alternative vehicle fuels by County employees. (TR-A2.4)
- Reduce single-occupant vehicle usage and VMT by significantly enhancing the availability and safety of other travel modes through infrastructure investment, policy support (Vision Zero, Transportation Demand Management Ordinance, and other best practices), and support for public transit. (TR-P2.4)
- Plan, design, construct, and maintain facilities for walking, bicycling, and rolling to serve people of all ages, abilities, and income levels, including children, seniors, families, and people with limited mobility. (TR-P5.1)

- Partner with CCTA and neighboring jurisdictions to build out the countywide bicycle and pedestrian network, prioritizing completion of the Low-Stress Countywide Bicycle Network and pedestrian safety improvement projects in the County's Pedestrian Priority Areas, as described in the Countywide Bicycle and Pedestrian Plan. (TR-A5.1)
- Construct innovative bicycle and pedestrian facilities, including Class IV separated and protected bikeways, bicycle superhighways, and other low-stress facility types, as described in the Countywide Bicycle and Pedestrian Plan and in contemporary, best-practice transportation planning and engineering guidance. Use contextually appropriate green infrastructure and landscaping to separate vehicular lanes from bicycle and pedestrian facilities whenever feasible. (TR-A5.2)
- Require transportation infrastructure serving new development to be designed using best practices, contemplating existing and planned land uses, roadways, bicycle and pedestrian facilities, transit facilities, and connections to adjoining areas. (TR-P4.2)
- Create connections between unincorporated communities and neighborhoods in unincorporated areas and adjacent jurisdictions to improve multimodal access to local destinations, such as schools, parks, shopping, health services, and workplaces. (TR-P4.3)
- Promote carpools, vanpools, other ridesharing, and park-and-ride lots by maintaining in place and enforcing a Transportation Demand Management (TDM) Ordinance that reflects best practices and, at a minimum, conforms to Contra Costa Transportation Authority's adopted model TDM ordinance or resolution. (GM-P3.5)
- Track over time projects that add pedestrian and bicycle facilities to document the County's implementation of the County Road Improvement and Preservation Program (CRIPP); Complete Streets checklist; Vision Zero Report and Action Plan; Active Transportation Plan; and equity-focused plans, programs, and policies.
- Improve the safety and comfort of bicycle, pedestrian, and public transit facilities using best practices to encourage more people to use such facilities.

Healthy Building, Healthy Communities Program

In 2023, the Contra Costa Healthy Building Healthy Communities Program won two grants totaling over \$1.7 million to promote active transportation and advance equity in bicycle and pedestrian roadway safety. These grants included a four-year \$1.5 million grant to provide Safe Routes to School programming at up to 90 schools countywide; and a one-year \$200,000 grant to advance Vision Zero, build community capacity to promote bicycle and pedestrian safety, and disseminate bicycle and pedestrian safety campaigns.



4. Greenhouse Gas Emission Reduction Strategy

- Coordinate with Caltrans, CCTA, the Regional Transportation Planning Committees, and neighboring jurisdictions to plan, design, and implement Complete Streets concepts on Routes of Regional Significance.
- In collaboration with key partners, support efforts to establish or join a shared mobility program that provides access to conventional bicycles, e-bikes, and other micromobility modes, prioritizing access for low-income residents who do not have bicycles. Support efforts to establish and/or maintain bike repair programs.
- Support efforts to expand the service area and frequency of regional transit agencies, and reduced fares for students, seniors, and low-income residents on systems, including AC Transit, BART, Capitol Corridor, County Connection, Tri Delta Transit, the San Francisco Bay Ferry, and WestCAT. Encourage programs that support “last mile” transportation connection and options.
- Maximize development of jobs and affordable housing near high-quality transit service to support a jobs-housing balance.
- Market the county’s Northern Waterfront to attract innovative companies with jobs for residents.
- Improve county-wide safety for cyclists by advocating for the passage of Vulnerable Road User Laws.
- Secure additional funding for the maintenance and expansion of bicycle and pedestrian infrastructure improvements. Support efforts to obtain additional funding to maintain and expand public transit operations and infrastructure improvements.
- Support CCTA to develop and implement methods for tracking EV and e-bike charging and availability across jurisdictions.
- Support CCTA and regional transit agencies in providing “last mile” transportation connections and options.
- Encourage and support increased regional integration of transit systems to promote more equitable fare structures, fare integration, easier transfers, including coordinated transfers between different transit systems and reduced wait times, improved information sharing, and generally a more seamless and modern system.



*Contra Costa Centre Overcrossing.
Photo credit: Contra Costa County*

- Ensure emerging transportation technologies and travel options, such as autonomous and ZEVs and transportation network companies, support the County’s goals for reducing emissions, adapting to climate change, improving public safety, and increasing equitable mobility. (TR-P2.3)

TR-2: Increase the use of zero-emission vehicles. Transition to a zero-emission County fleet by 2035 and a community fleet that is at least 50 percent zero-emission by 2030.

Implementation of this strategy will help increase the share of zero-emission vehicles on the road. The County will encourage all residents and businesses (including heavy-duty vehicle operators) to transition to zero-emission vehicles, enforce the County vehicle purchasing policy, promote electric vehicle sharing services, and ensure adequate electric vehicle charging and other zero-emission fueling infrastructure in new and existing development. The State projects that 86 percent of light-duty vehicles and over 70 percent of heavy-duty vehicles will be zero emission by 2045, based on modeling in the State’s 2022 Scoping Plan.

There are approximately 33,850 zero-emission or plug-in hybrid vehicles registered in Contra Costa County, or about 3.9 percent of all light-duty vehicles, as of the end of 2021. Statewide, about 2.9 percent of light-duty vehicles are zero-emission or plug-in hybrid. However, this number is growing rapidly. In the first half of 2022, approximately 22.7 percent of light-duty vehicle sales in Contra Costa County were zero-emission or plug-in hybrid, higher than all but five counties in California. Approximately 84 percent of vehicles in Contra Costa County are projected to be electric by 2045.

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	148,000	343,890



4. Greenhouse Gas Emission Reduction Strategy

Strategy TR-2 Co-benefits:



Cost savings



Improved air quality



Improved community equity



Improved public health



Reduced resource use

Advanced Clean Car Standards

California has a set of regulations adopted in recent years to encourage the transition to zero-emission vehicles.

The Innovative Clean Transit regulation, first adopted in 2018, requires that all new buses purchased by transit agencies in California must be zero-emission by 2029. There are earlier milestones for zero-emission bus purchases depending on the size of the agency. The regulation also requires that transit agencies plan to fully transition to zero-emission buses by 2040.

The Advanced Clean Trucks regulation, adopted in 2020, requires an increase in the number of new zero-emission medium- and heavy-duty vehicles sold in California. This regulation covers freight trucks, delivery vans, large pickup trucks, and other large vehicles. The targets vary by vehicle type, but the State expects that 63 percent of new trucks will be zero-emission by 2035.

The Advanced Clean Car II standards, adopted in 2022, requires that all new passenger cars, trucks, and SUVs sold in California be zero-emission by 2035. Beginning in 2026, 35 percent of new passenger vehicles sold in the state must be zero-emission.

The Advanced Clean Fleets regulation, adopted in 2023, applies to government and large private vehicle fleets. It requires that most vehicle types sold to fleet operators be zero-emission. For local governments such as Contra Costa County, at least 50 percent of new vehicle purchases must be zero-emission starting in 2024, increasing to 100 percent in 2027. There are exemptions for some types of vehicles, including emergency vehicles.

Strategy TR-2 Actions:

- Require new County vehicles to be zero-emission to the extent a viable vehicle is available on the market, that charging or zero-emission fueling equipment is conveniently located where the vehicle will be stored, and as required by the Advanced Clean Fleet regulations, with the goal that all County vehicles will be zero-emission by 2035.
- Continue adopting new or modified reach codes and consider future updates that exceed the California Building Standards Code as the State updates the Building Code, including the Green Building Code, to require zero-emission charging infrastructure in new multifamily and nonresidential buildings. Explore expanding it to include new single-family homes. (Supported by TR-P2.12 and TR-A2.12)
- Install electric vehicle charging equipment and other infrastructure needed to support the transition to a zero-emission County fleet at County facilities. Consider the appropriate locations, number, and capacity of infrastructure to facilitate the transition of the County fleet to zero-emission vehicles.
- Provide incentives for zero-emission vehicles in partnership with MCE, BAAQMD, and other agencies.
- Work with property owners and other potential partners to pursue installation of zero-emission vehicle charging stations in and near multifamily dwelling units.
- Update off-street parking ordinance to include a requirement for zero-emission vehicle charging infrastructure. Consider including incentives for developers to exceed minimum requirements (i.e., density bonus).
- Increase installation of electric vehicle charging stations for all vehicle types, including bicycles and scooters, at public facilities, emphasizing increased installation in Impacted Communities.
- In partnership with regional agencies, explore providing subsidies for households making less than the area median income to purchase or lease zero-emission vehicles and associated infrastructure.
- Pursue fees and regulatory efforts to convert transportation network company (TNC), taxi, and similar car-hire services to zero-emission vehicles.
- Explore opportunities for implementing electric vehicle sharing programs.

On June 1, 2023, the County hosted its first electric vehicle (EV) and E-bike show to educate and empower employees to use EV technology as the County fleet transitions to zero-emission vehicles. Approximately 200 staff from County departments and other public agencies attended to learn about EVs and E-bikes through a showcase that featured a wide range of EVs from public fleets and staff's personal vehicles.

4. Greenhouse Gas Emission Reduction Strategy

- Work with BAAQMD and other regional agencies to convert off-road equipment to zero-emission clean fuels.
- Work with contractors, fleet operations, logistics companies, and other operators of heavy-duty vehicles to accelerate the transition to zero-emission heavy-duty vehicles.
- In cases where battery-electric, hybrid-electric, and sustainably sourced hydrogen fuel-cell sources are not available, work with Public Works to pursue the use of renewable natural gas (sourced from recovered organic waste) for transportation fuel, electricity, or heating applications.
- Encourage efforts to maximize EV charging during solar peak hours.
- Continue to host events such as the Electric Vehicle and E-Bike Show to educate and empower County staff and community members about zero-emission vehicles.
- Coordinate with CCTA and other local and regional agencies to implement the Contra Costa County Electric Vehicle Readiness Blueprint and related policies and apply best practices in ZEV charging/fueling infrastructure requirements. (TR-A2.11)



Electric vehicles like this one in the County's fleet help to significantly reduce GHG emissions associated with transportation. Photo credit: Contra Costa County.

RESILIENT COMMUNITIES AND NATURAL INFRASTRUCTURE (NI)

CONTRA COSTA COUNTY WILL INCREASE RESILIENCE TO CLIMATE HAZARDS AND FOSTER COMMUNITY HEALTH.



Most of the strategies for Resilient Communities and Natural Infrastructure are not associated with GHG emissions savings. NI-4 is included here because it both contributes significantly to the County’s resilience efforts and results in measurable GHG emissions reductions. See Chapter 5 for a detailed description of other strategies that fall under this goal.

NI-4: Sequester carbon on natural and working lands in Contra Costa County.

This strategy increases opportunities to store carbon through natural carbon sequestration on public and private lands, increased tree planting by the County and public and private partners, and installation of green infrastructure. Additional actions pertaining to tree planting are in strategy NI-5 in [Chapter 5](#).

	2030	2045
GHG emissions reduction (Absolute MTCO ₂ e)	22,630	88,910

Strategy NI-4 Co-benefits:



Enhanced recreation opportunities



Greater community resilience



Improved air quality



Improved public health



Increased economic opportunities



Increased resilience to pests



4. Greenhouse Gas Emission Reduction Strategy

Strategy NI-4 Actions:

- Pursue implementation of recommendations from the carbon sequestration feasibility study, *Healthy Lands, Healthy People*.
- Continue to support and work with key partners to maintain existing and establish new pilot programs for carbon sequestration on agricultural land.
- Promote regenerative agricultural and landscaping techniques that incorporate cover crops, mulching, compost application, field borders, alley cropping, conservation crop rotation, prescribed grazing, and reduced tillage to promote healthy soil and soil conservation. (Supported by COS-P2.12)
- Support soil conservation and restoration programs. Encourage agricultural landowners to work with agencies such as the USDA's NRCS and Contra Costa RCD to reduce erosion and soil loss. (COS-P2.11)
- Coordinate with farming groups, ranchers, the Contra Costa Resource Conservation District, and the University of California Cooperative Extension to identify and promote varieties of feedstock, livestock, and crops that are resilient to rising temperatures and changing precipitation patterns and that increase carbon sequestration.
- Explore ways to increase carbon sequestration on County-owned properties.
- Partner with regional landowners and agencies to establish local carbon sequestration programs and incentives.
- Consider the development of carbon offset protocols and guidance to provide technical support to applicants and County permitting staff to promote appropriate natural sequestration on natural and developed lands.
- Ensure that any local or regional carbon sequestration program that the County establishes, promotes, supports, or joins demonstrates benefits to unincorporated communities that face environmental justice issues.
- Explore the potential for the public to support tree planting and maintenance of existing trees. (Supported by COS-P6.2)

Healthy Lands, Healthy People

Contra Costa County completed a feasibility study in 2023 to explore how agriculture, parks, gardens, and open space in the county could be used to sequester carbon and support carbon neutrality efforts. The study is funded by a grant from the California Department of Conservation. Its findings have informed quantification assumptions for Strategy NI-4. Implementation of the recommendations in this study will inform future updates of this 2024 CAAP.

- Establish a mechanism to support expanded tree planting and maintenance activities, particularly in areas with few trees.
- Support protection, restoration, and enhancement of creeks, wetlands, marshes, sloughs, and tidelands, and emphasize the role of these features in climate change resilience, air and water quality, and wildlife habitat. (COS-P5.1)
- Inventory wetlands, floodplains, marshlands, natural watercourses, riparian corridors, and adjacent lands that could potentially support climate adaptation (through flood management, filtration, or other beneficial ecosystem services) and mitigation (e.g., carbon sequestration). (COS-A5.1)
- Encourage and support conservation of natural lands outside the urban limit line in the unincorporated county.
- Explore new funding and financing opportunities for climate adaptation and resilience projects, including the creation of a Climate Resilience District, issuance of bonds—including bonds that can be marketed as “green bonds” -- as a potential financing mechanism, and similar opportunities.
- Require that any mitigation of air quality impacts occur on-site to the extent feasible to provide the greatest benefit to residents in unincorporated communities. For mitigation that relies on offsets, require that the offsets be obtained from sources as near to the project site as possible or from sources that would improve air quality in an Impacted Community. If the project site is within or adjacent to an Impacted Community, require offsets or mitigation within that community unless determined infeasible by the County. (HS-P1.6)

Climate Resilience Districts

Climate resilience districts are special districts that can raise and allocate money to fund projects and operations that address climate change adaptation efforts, such as those to help protect against sea level rise, wildfire, and drought. They have the authority to establish special taxes, assessments, or other charges. Local governments may establish climate resilience districts under Assembly Bill 852, adopted in 2022.



Achieving Our Goals

With the reductions currently projected from the 2024 CAAP strategies, GHG emissions for the unincorporated areas of Contra Costa County are expected to fall to 1.47 MTCO₂e per person. This is 55 percent below GHG emissions without the 2024 CAP.

County staff developed a set of 11 GHG emission reduction strategies and assessed the GHG emission reduction potential of these strategies, given the project team’s reasonable understanding of available resources and what seemed appropriate for the unincorporated area. **Appendix B** provides detailed information about the

GHG emission reduction potential of these strategies.

These GHG emission reduction potentials are intended to be a starting point. They are based on the best available information, the experience and expertise of County staff, and known resources and capabilities. It is possible to achieve greater reductions if there is more confidence in higher levels of participation or development of additional programs.

Table 10 shows the expected GHG emission levels with these strategies enacted.

TABLE 10. GHG EMISSIONS WITH 2024 CAAP DRAFT REDUCTION STRATEGIES, 2019 TO 2045

SECTOR	2019	2030	2045	PERCENTAGE CHANGE, 2019–2045
Transportation	464,040	277,450	60,970	-87%
Energy - Residential	191,780	141,720	24,180	-87%
Energy - Nonresidential	85,390	71,500	24,540	-71%
Solid Waste	220,760	146,270	137,070	-38%
Agriculture	36,130	34,770	33,410	-8%
Off-road Equipment	54,010	54,150	29,270	-46%
Water and Wastewater	4,870	3,610	1,470	-70%
BART	190	150	50	-74%
Land Use and Sequestration	-70,860	-90,210	-147,800	-109%
Total Annual MTCO₂e	986,310	639,460	163,130	-83% *

Note: Due to rounding, totals may not equal the sum of the individual values

* Reductions of 83 percent below 2019 levels are comparable to reductions of 85 percent below 1990 levels.

All the strategies discussed in this chapter help Contra Costa County reduce its GHG emissions and allow the County to achieve its GHG reduction goals. Different strategies, along with existing and planned efforts, contribute to the GHG reductions in each of the different sectors as projected in 2045:

- **Transportation:** The largest share of GHG reductions from transportation-related emissions comes from a significant increase in the adoption of electric vehicle and other zero-emission vehicle (ZEV) technologies, as discussed in Strategy TR-2. The State's Clean Car Standards, establishing stricter vehicle fuel efficiency standards and ZEV adoption requirements, accounts for approximately 39 percent of these reductions. Strategy TR-1, which reduces VMT through increases in transit use, active transportation, and micromobility, accounts for the remaining 7 percent of GHG reductions in transportation energy use.
- **Residential energy:** More than half of GHG reductions in residential energy use comes from energy efficiency and electrification of existing homes, as discussed in Strategy BE-2, and another 24 percent comes from the State's program to partially meet natural gas needs from renewable sources. The State's increase in the Title 24 energy efficiency standards for new buildings and RPS program to convert all electricity to renewable or carbon-free sources each contribute about 10 percent of the GHG reductions in this sector. Smaller but still significant GHG reductions to residential energy use come from the high energy performance standards discussed in Strategy BE-1 and the effects of the County's earlier all-electric reach code.
- **Nonresidential energy:** Similar to the residential energy sector, the largest share of GHG reductions in nonresidential energy use (44 percent) comes from energy efficiency and electrification of existing building in Strategy BE-2, followed by the State's plan for increased natural gas from renewable sources (28 percent). The State's RPS and Title 24 programs create the next-largest sources of reductions. The County's energy performance standards in BE-1 and the County's earlier all-electric reach code also play a role in reducing emissions from this sector.
- **Solid waste:** The largest contributor to solid waste GHG emission reductions in the CAAP is the increased capture rate of methane from landfills in Strategy NW-4, which is responsible for about 50 percent of these reductions. The State's organics recycling requirements, as codified by SB 1383, are responsible for another 44 percent of GHG emission reductions from solid waste. Local efforts to increase recycling and minimize waste generation, as discussed in Strategies NW-1, NW-2, and NW-3, collectively achieve the remaining GHG emission reductions.



4. Greenhouse Gas Emission Reduction Strategy

- Agriculture: The State and CAAP strategies do not directly reduce agricultural emissions in a measurable manner, although Strategy TR-2 reduces emissions from agricultural equipment (part of the off-road equipment sector) and Strategy NI-4 may affect agricultural emissions by supporting increased carbon farming and sequestration on the County's natural and working lands.
- Off-road equipment: The CAAP achieves reductions in off-road equipment GHG emissions by promoting replacing gasoline and diesel-fueled equipment with electric models, as discussed in Strategy TR-2.
- Water and wastewater: The primary contributor to GHG emission reductions from water and wastewater is the State's RPS program. Water-efficiency standards in Strategy DR-1 account for the remaining GHG emission reductions.
- BART: The State's RPS program reduces GHG emissions from BART operations.
- Land use and sequestration: Strategy NI-4 in the CAAP, which increases carbon farming and sequestration on the County's natural and working lands, drives the GHG reductions in the land use and sequestration sector.

With the reductions currently projected from the 2024 GHG emissions reduction strategies, GHG emissions for the unincorporated county are expected to be reduced to 85 percent below 1990 levels, equal to 87 percent below baseline 2005 levels and 83 percent below 2019 levels. These reductions are predicted to occur across most GHG emission sectors, though emissions within the Solid Waste sector will continue to be affected by previously deposited waste continuing to decompose in landfills. As noted previously, there is the potential for these strategies to yield additional GHG emission reductions as County staff and decision makers develop and institute implementation actions and monitor the results.

With these reductions as currently assessed, unincorporated Contra Costa County achieves the GHG emissions reduction goals for 2030 and 2045, as shown in **Table 11**. The County may reduce emissions faster than expected as it implements the CAAP, and it will report on this progress as part of the CAAP monitoring activities.

TABLE 11. 2024 GHG EMISSION REDUCTIONS AND REGULATORY GOALS

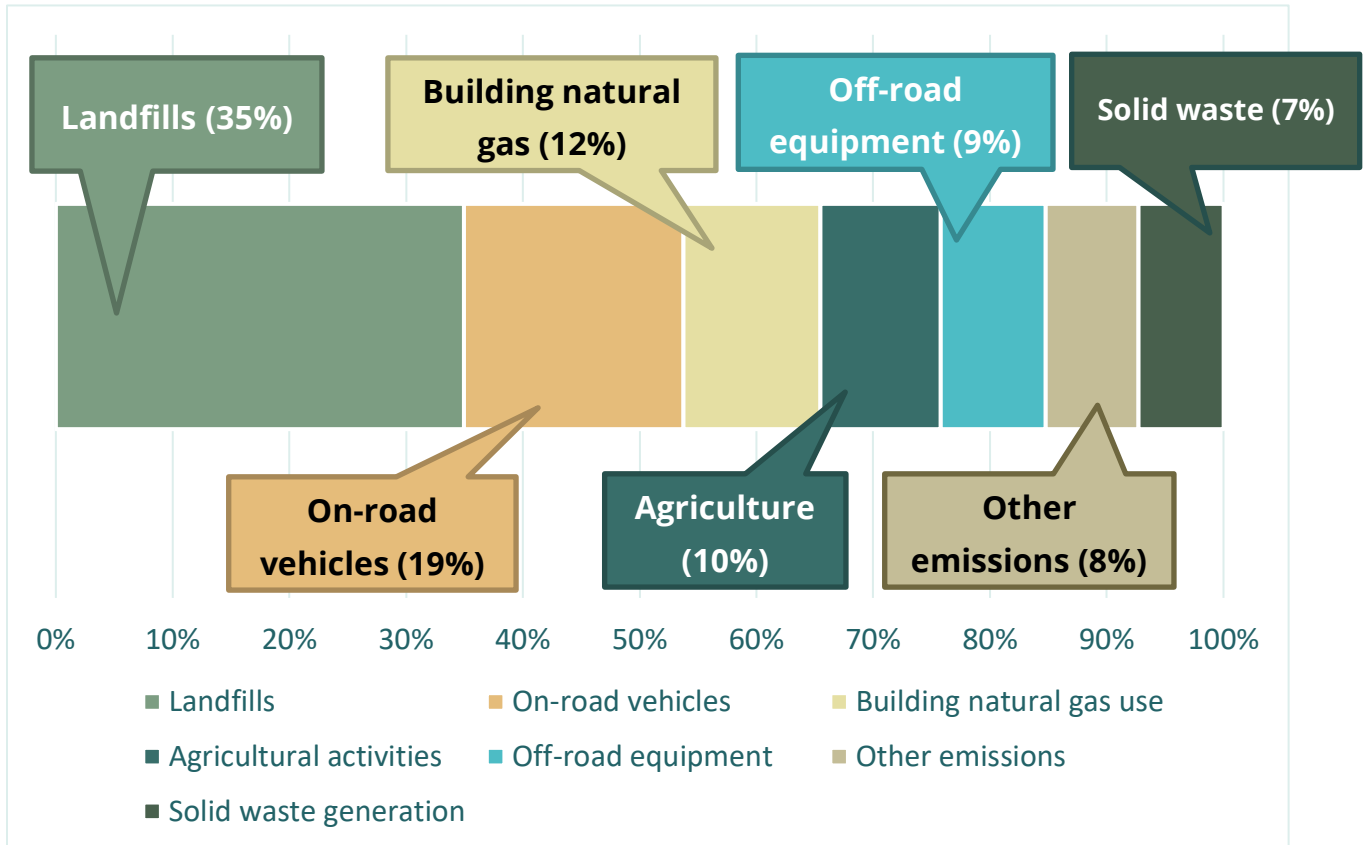
	2030 MTCO ₂ E	2045 MTCO ₂ E
GHG emissions goals	658,700	164,680
GHG emissions with CAAP strategies	639,460	163,130
Gap to GHG emission reduction goal*	-19,240	-1,550
Note: Due to rounding, totals may not equal the sum of the individual values. * Negative values mean that the strategies reduce GHG emissions to below the goal.		

THE 2024 CAAP AND NET CARBON NEUTRALITY

Achieving net carbon neutrality in Contra Costa County will require implementation of GHG reduction efforts that meet the County's regulatory goals, in combination with carbon sequestration and potentially other methods to "zero out" the remaining emissions. The 2024 CAAP achieves significant reductions in GHG emissions, consistent with the County's emission reduction goals, and places Contra Costa County on a path to support statewide net carbon neutrality by 2045. Currently, there is insufficient guidance and certainty around local carbon sequestration, storage, and potential carbon offset strategies to mathematically demonstrate with certainty that the 2024 CAAP will achieve carbon neutrality by 2045. However, the County believes that such guidance and certainty will emerge in future years as the County, regional agencies, and the State further explore the opportunities, develop guidance and methods, and validate new technology. When available, guidance on quantifying how to achieve carbon neutrality will be integrated into future updates of this 2024 CAAP.

For the foreseeable future, achieving net carbon neutrality will likely not be feasible without the use of local carbon sequestration on natural and working lands. Although GHG emissions can be eliminated from many of the County's GHG emissions sources, this is not practical for every source given technical, economic, or political considerations. Assuming implementation of the strategies in this 2024 CAAP, **Figure 15** shows the major sources of Contra Costa County's remaining GHG emissions in 2045.

FIGURE 15. CONTRA COSTA COUNTY 2045 GHG EMISSIONS WITH IMPLEMENTATION OF 2024 CAAP



Note: Percentage totals in this chart do not account for emissions in the land use and sequestration sector (natural and working lands, urban trees, and developed land). With implementation of the 2024 CAAP, the land use and sequestration sector is projected to sequester 147,800 MTCO₂e in 2045. The “Other emissions” category is composed of emissions from BART; water and wastewater sectors; land development activities; and propane, kerosene, and wood used as heating fuels.

The County should take advantage of future opportunities to reduce the GHG emissions from these sources as much as possible, ideally to zero. However, for GHG emissions that cannot be feasibly reduced in the short and near term, carbon sequestration on natural and working lands is the preferred strategy to “cancel out” these emissions so that the County’s net GHG emissions from remaining sources are zero. Should the County find that there continue to be GHG emissions, the County may want to consider related strategies to remove carbon from the atmosphere if equity and GHG emissions and other potential pollution concerns can be addressed.



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5. CLIMATE ADAPTATION STRATEGY



Photo credit: Envision Contra Costa picture gallery.

Vulnerability Assessment Summary

Contra Costa County prepared a vulnerability assessment that examines how people and assets in the county may be affected by the hazards related to climate change discussed in Chapter 3. This vulnerability assessment considers how severe the effects of these hazards are likely to be and identifies the groups of people and assets who face the greatest potential for harm. It considers both the current and future climate conditions in the unincorporated area of the county following the methods recommended by the *California Adaptation Planning Guide* prepared by the California Governor’s Office of Emergency Services. An abridged version of the key vulnerability assessment results is presented here. **Appendix C** provides detailed information on the vulnerability assessment methods and results.

Some hazards can occur virtually anywhere in Contra Costa County or may affect the entire county. This includes drought, human health hazards, and air quality impacts. Other hazards are much more likely in specific locations, such as landslides and flooding. However, people and assets outside of affected areas may still be harmed if the hazard creates a series of cascading impacts that ripple beyond the immediate hazard zone. For example, a fire near Orinda may close Highway 24 and the BART tracks in that area, interrupting BART service in the central and east parts of Contra Costa County and causing traffic congestion on alternate routes. The vulnerability assessment considers these indirect impacts and reflects them in its scores.



EFFECTS ON POPULATIONS

Although climate change will affect everyone, some populations in the unincorporated county are likely to be affected more than others. This can include the risk of injury, death, or property damage or destruction, and can also include economic impacts and loss of income, behavioral and mental health impacts, and an overall decrease in quality of life. Impacted Communities, who have been historically under-resourced and are already more likely to face constraints such as limited financial resources, reduced access to education and job opportunities, and increased exposure to environmental hazards, are likely to be further affected as climate change-related hazards increase in frequency and severity. Other groups of people are also likely to be disproportionately affected, including senior citizens, renters, and persons with chronic health conditions.

People with limited financial means, such as low-income persons and cost-burdened households (those who must spend more than 30 percent of their income on housing) are often vulnerable because they may lack the resources to retrofit their home against hazardous conditions or to move to an area with less risk. For example, low-income persons are less likely to live in homes that have reliable air

Due to the high cost of living in Contra Costa County, “low-income households” include some households who might be considered financially well off in other places. In 2022, a family of four in Contra Costa County is considered “low-income” if its annual income is lower than \$109,600.

conditioning and may not be able to afford to install these systems themselves, which puts them at greater risk of harm from extreme temperatures. They also face greater vulnerabilities because they may be less able to withstand a temporary loss of income if their work is affected by climate change-related hazards. People who work in outdoor activities, such as construction, agriculture, and recreation, are usually more susceptible.

Lack of access to resources not only includes financial resources, but also communication, transportation, education, and other community services. Even people who are relatively well-off financially can be disproportionately affected by climate change-related hazards if they are physically or socially isolated. For example, persons with limited English proficiency may not be able to interact with officials, and persons without lifelines such as transportation, or broadband internet or other forms of reliable communication, may not be able to get accurate information about hazardous situations. This often makes it harder for them to get the resources needed to prepare for or respond to an emergency. Renters

face similar threats because even if they have the financial resources to adapt to changing conditions, they have limited control over their home.

Physical constraints can also make people more susceptible to climate change. Persons with disabilities may find it harder to prepare for hazardous events, and some hazards can exacerbate chronic health conditions and create a greater threat for persons with these conditions. Young children and senior citizens are disproportionately affected by some hazards, such as extreme heat and air pollution, even if they are entirely healthy. Senior citizens living alone are often at greater risk since they are more likely to be socially isolated. Persons with physical constraints are also more likely to need assistance during evacuations.

The health equity of populations is also closely associated with racism, historic discrimination, and a wide range of socioeconomic conditions. The 2024 CAAP includes “place-based strategies”, such as efforts to enhance availability and access to resources and physical infrastructure. These strategies advance the County’s efforts to address GHG emissions as well as offer enhanced resilience in Impacted Communities.

EFFECTS ON BUILDINGS AND INFRASTRUCTURE

The vulnerability assessment considers the effects of climate change–related hazards on buildings and infrastructure, including private homes and businesses, public facilities such as government offices and libraries, and important institutions such as schools and hospitals. This category also includes infrastructure networks such as the electrical grid, roadways, rail lines, and water and wastewater systems. Buildings and infrastructure in hazard-prone areas are naturally vulnerable to damage or destruction from hazards that occur in those areas, such as floods, landslides, sea level rise, and wildfires. Designing new structures to be more resilient against these hazards or hardening existing ones to better resist them can help reduce the threat.

The loss of key buildings and infrastructure systems can create potentially severe effects throughout the county. The loss of homes in a natural disaster means that a potentially large group of people must be temporarily housed while their homes go through the lengthy reconstruction process. Some people may choose not to return to their former community. Damages to businesses can cause economic harm to business owners and employees as well as members of various communities. For example, sea level rise and coastal flooding can interrupt many of the industrial and manufacturing centers located along the Contra Costa County shoreline, creating temporary or permanent loss of income for their employees, with possible cascading impacts such as harming the tax base and well-being of various communities.

Infrastructure networks, despite their county-spanning size, are also vulnerable to disruption from hazards related to climate change. Damage to just one or a few key nodes or components of an infrastructure system can cause a chain reaction that restricts or shuts down the network across a much wider area. For example, 26 bridges in Contra Costa County are in areas at risk of a 100-year flood or dam inundation. Even though these bridges make up a very small portion of the overall roadway network in the county, damage to them can force travelers to take potentially long and congested detours or may render some areas completely inaccessible.

Loss of key buildings or parts of infrastructure networks can also harm important community services that rely on these networks. This is particularly true for transportation infrastructure, such as roads and railways. If these systems are damaged or blocked, this can also block access by emergency response and public transit services vehicles. Even if alternate buildings and infrastructure networks are available, the alternatives may not be able to accommodate the change in demand. For example, 10 schools in Contra Costa County are in high and very high fire hazard severity zones. Although this is a relatively small proportion of the overall number of schools in the county, if some of these schools are damaged by wildfires, there may not be capacity at other, unharmed schools to take in all the displaced students.

Contra Costa County's infrastructure networks are connected to much larger regional, State, and national systems. These systems are vulnerable to disruption from outside of Contra Costa County, resulting in a loss of service to community members. For example, most of the water used in the unincorporated areas of the county is imported from the Sierra Nevada through a complex system of pumps, aqueducts, and reservoirs. Damage at any point along this system can affect Contra Costa County's water supply, causing restricted water service. Many components of this system pass through eastern Contra Costa County and other low-lying areas of the Delta region, where they are particularly vulnerable to sea level rise.

Buildings and infrastructure do not need to be physically damaged to trigger a loss of service. For example, extreme heat makes the machinery of the power grid run less efficiently and simultaneously increases demand to meet greater cooling needs. This combination raises the risk of the grid overloading and causing brownouts or blackouts. Similarly, drought conditions harm water delivery services but do not cause physical damage to pipes or water treatment plants. Economic drivers can also be affected without experiencing physical damage, such as when businesses are forced to close because of a public health emergency.

EFFECTS ON ECOSYSTEMS AND NATURAL RESOURCES

Many of the ecosystems and other natural resources in California are unique to the state and have evolved under local conditions, including climate patterns. However, the unprecedented rate of change in the climate system can rapidly create local conditions unfavorable to ecosystems, killing them or forcing them out of the area before they have the chance to adapt. Damage or loss of local ecosystems and natural resources is harmful for its own sake, but it also affects the people and



Meadow environments such as this are highly susceptible to several climate change-related hazards. Photo credit: Deidra Dingman.

economy of Contra Costa County. Many ecosystems provide important services for communities, such as protection against floods and high winds, groundwater recharge and filtration, and home for pollinators and beneficial species. The natural environment provides recreational and tourism opportunities, contributes to the valued character of Contra Costa County, and helps maintain a high quality of life.

Climate change often results in species and even entire ecosystems being forced out of their historical range and moving to areas that provide their preferred living conditions. In some cases, there may no longer be places in Contra Costa County that can support these ecosystems, and they disappear from the area. For example, the conifer forests in the hills of west county depend on fog and its cooling benefit in summer temperatures. As temperatures increase and coastal fog is expected to decrease, these trees may not survive. Habitat loss can also exacerbate this problem. For example, in a natural system, wetlands will migrate inland as sea levels rise. However, if the inland areas are blocked by development or other barriers, the wetlands cannot migrate and could disappear.

Even if overall temperature and precipitation patterns remain favorable to key ecosystems and natural resources, the increased frequency and severity of some climate change-related hazards can harm these important community assets. Wildfires are a prime example of this. Many ecosystems in California, especially forests, rely on naturally

occurring wildfires to remove dead vegetation and return nutrients to the soil, and some species rely on fires for reproduction. However, increases in the intensity of wildfires mean that trees that could survive relatively low-level fires may not be able to survive much more severe blazes. Similarly, though occasional fires may be beneficial, too-frequent fires can kill young trees before they establish themselves, creating a risk that trees will be replaced by more rapidly growing grasses and brushlands.

In some cases, climate change leads to cumulative impacts that can weaken or kill ecosystems. Species that have adapted to be relatively resistant to one or a small number of hazards may still be vulnerable to multiple hazards that happen at the same time or one after another in close succession. For example, forestry pests have long been a presence in California, and though they may kill individual trees or stands of trees, forests and woodlands are generally not significantly affected. However, drought and extreme temperatures weaken trees, making them more vulnerable to pests that could not do serious damage under normal conditions. At the same time, warmer temperatures can increase pest numbers and keep them active for more of the year, so they can do more damage than they could previously. These and similar cumulative effects mean that species and ecosystems that could resist hazardous events under normal conditions may be much more susceptible to them because of climate change.

Adaptation Strategies

A key goal of the 2024 CAAP is to reduce Contra Costa County's GHG emissions. Combined with other global GHG emissions reduction efforts, the 2024 CAAP will help to prevent more severe effects of climate change. However, some degree of climate change is inevitable. Climate conditions in recent years in Contra Costa County are already different from historical conditions, and community members have already observed more frequent and intense climate change-related hazards. Contra Costa County will have to adapt to future climate conditions; acting now or in the short term will help communities be more resilient to climate change-related hazards expected decades in the future.

This 2024 CAAP includes a set of adaptation strategies. These strategies respond to the key vulnerabilities identified by the vulnerability assessment; concerns about current and future conditions raised by community members and County officials; and best practices in the region and across California to help promote a more unified climate adaptation response. While these climate adaptation strategies do not directly result in measurable GHG emissions reductions, they do support the GHG emissions reduction strategies and contribute to a comprehensive climate change response.

The adaptation strategies are organized into two categories, each with its own goal:



Climate Equity (CE)



Resilient Communities and Natural Infrastructure (NI)

As with the GHG emissions reduction strategies, the adaptation strategies support co-benefits, that is, benefits that the strategy provides to communities beyond increased resilience.



Cost savings



Enhanced recreation opportunities



Greater community resilience



Greater energy independence



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



Increased resilience to pests



Reduced disaster effects



Reduced landfill waste



Reduced resource use

General Plan alignment

As with the GHG reduction efforts in [Chapter 4](#), the adaptation goals, strategies, and recommended implementation actions discussed in this chapter align with climate adaptation goals, policies, and actions in the County's General Plan, as discussed in [Chapter 1](#). When the 2024 CAAP and General Plan address similar topics, the language used in both documents is identical or at least consistent, ensuring that both are in sync and provide a unified approach to addressing climate adaptation.

RESILIENT COMMUNITIES AND NATURAL INFRASTRUCTURE (NI)

CONTRA COSTA COUNTY WILL INCREASE RESILIENCE TO CLIMATE HAZARDS AND FOSTER COMMUNITY HEALTH.



The 2024 CAAP takes steps to improve the resilience of Contra Costa County's unincorporated communities by ensuring that structures and infrastructure are responsive to flooding, sea level rise, fire, heat, and other climate change hazards. Natural features such as trees, soils, and water can help make the county more resilient by absorbing carbon and modulating the effects of heat, sea level rise, and flooding. Community resilience hubs can serve as centralized locations for electricity access, cooling and clean air centers, and emergency preparedness and response resources.

In addition to the General Plan, the strategies and actions in this goal integrate with the Contra Costa County Local Hazard Mitigation Plan and the Community Wildfire Protection Plan. The Local Hazard Mitigation Plan assesses the risk to people and facilities from hazardous conditions and includes mitigation actions to reduce or eliminate risks, particularly in the short term. The Community Wildfire Protection Plan provides a snapshot of current wildfire protection challenges and capabilities, identifies and prioritizes areas for hazardous fuel reduction, and recommends types and methods of vegetation management that may help protect the affiliated communities from wildfire losses.



Hercules waterfront. Photo credit: Emily Groth.

The Contra Costa County Emergency Operations Plan describes the structures and processes the County follows to respond to and recover from emergency events. The County's Extreme Weather Working Group collaborated in 2024 to create a series of hazard-specific plans or annexes that support the Emergency Operations Plan. These annexes identify County departments' roles and responsibilities and create a framework for cities to follow during extreme heat, extreme cold, or poor air quality events. These annexes guide emergency planning and response to these events and bolster the County's "whole community" approach to improve resilience today.

NI-1: Protect against and adapt to changes in sea levels and other shoreline flooding conditions.

This strategy aims to protect communities against permanent and temporary inundation from rising sea levels and shoreline flooding through green infrastructure, effective building siting and retrofits, and informed land use decisions.



Sea level rise and other coastal flooding hazards threaten structures built near the shoreline.

Strategy NI-1 Co-benefits:



Enhanced recreation opportunities



Greater community resilience



Reduced disaster impacts

Strategy NI-1 Actions:

- Require new development to locate habitable areas of buildings above the highest water level expected, accounting for sea level rise and other changes in flood conditions, or construct natural and nature-based features, or a levee, if necessary, adequately designed to protect the project for its expected life. (HS-P6.1)
- Support the use of natural infrastructure, including ecosystem restoration and green infrastructure, to protect against sea level rise and associated shoreline flooding.
- Coordinate with State and regional agencies, neighboring jurisdictions, property owners, utilities, and others to prepare a sea level rise adaptation plan. (Supported by HS-A6.3)

As of December 2023, 28.3 acres of County right-of-way had been converted to green infrastructure, with another 11.1 acres planned. The County continues to incorporate pervious paving in some projects, including projects at the El Sobrante Library and Rio Vista Elementary School in Bay Point.

- Seek funding and pursue implementation of wetland restoration and other adaptation efforts for sea level rise. (Supported by HS-P6.2)
- Convene a working group that includes local jurisdictions, local shoreline communities, community-based organizations, property owners, businesses, and other stakeholders to collaborate on shoreline flooding adaptation strategies.
- Identify opportunities for employing natural areas as buffers against rising sea levels.

Contra Costa Resilient Shoreline Ad Hoc Committee

The Board of Supervisors established the Contra Costa Resilient Shoreline Ad Hoc Committee at the May 16, 2023, Board of Supervisors meeting. The committee makes recommendations to the Board on work the County can do to plan for sea level rise and improve shoreline resiliency. The committee also provides a dedicated space for Contra Costa County to consider how local sea level rise resilience and adaptation efforts can complement regional efforts happening across the San Francisco Bay Area. The committee has been meeting regularly since October 12, 2023.

NI-2: Protect against and adapt to increases in the frequency and intensity of wildfire events.

This strategy aims to increase community resilience to the direct and indirect effects of wildfires, both locally and regionally. Public and private property shall be designed and maintained to minimize the risk of damage from wildfires; infrastructure systems will be hardened and designed to include redundancy; and emergency management plans and practices for wildfires will be responsive to the needs of Impacted Communities.

Strategy NI-2 Co-benefits:



Greater community resilience



Improved community equity



Improved public health



Reduced disaster impacts

Strategy NI-2 Actions:

- Deny entitlements for projects creating additional residential units (i.e., units not allowed by-right) in Very High Fire Hazard Severity Zones in the LRA or SRA. Discourage such projects in High Fire Hazard Severity Zones in the SRA and discourage them in such zones in the LRA unless adequate fire protection services are provided.¹¹ (HS-P7.1)
- Require any construction of buildings or infrastructure within a High or Very High Fire Hazard Severity Zone in the Local or State Responsibility Areas, or in areas that may be designated as the Wildland-Urban Interface, to incorporate fire-safe design features that meet the applicable State Fire Safe Regulations and Fire Hazard Reduction Around Buildings and Structures Regulation for road ingress and egress, fire equipment access, and adequate water supply. (HS-P7.2)
- Require subdivisions in the High Fire Hazard Severity Zone in the Local or State Responsibility Areas, or projects requiring a land use permit in the High or Very High Fire Hazard Severity Zone in the Local or State Responsibility Areas, to complete a site-

¹¹ High and Very High Fire Hazard Severity Zones are mapped by CAL FIRE. Designations are based on factors that influence fire likelihood and fire behavior. Many factors are considered, such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area.

specific fire protection plan. Work with the appropriate fire protection district to review and revise the fire protection plans. (HS-P7.4)

- Work with property owners in High or Very High Fire Hazard Severity Zones or in areas that may be designated as the Wildland-Urban Interface, to establish and maintain fire breaks and defensible space, vegetation clearance, emergency access roads, water supply and fire flow, signage, and firefighting infrastructure that meet adopted State, County, or community fire safety standards. (HS-P7.5)
- Coordinate with energy service providers to underground power lines, especially in the Wildland-Urban Interface and Fire Hazard Severity Zones. (HS-P7.10)
- Review indoor air filtration standards and consider whether filtration requirements can and should be strengthened for projects permitted by the County.
- Work with community organizations to help Impacted Communities have access to financing and other resources to reduce the fire risk on their property, prepare for wildfire events, and allow for a safe and speedy recovery.

Fire Protection Plans

According to General Plan Policy HS-P7.4, a fire protection plan shall include measures for fire-resistant construction materials and modifying fuel loading, as well as a plan to maintain that protection over time. The fire protection plan shall include:

- a) A risk analysis
- b) Fire response capabilities
- c) Defensible space requirements
- d) Fire safety requirements for infrastructure
- e) Building ignition resistance
- f) Mitigation measures and design for non-conforming fuel modification
- g) Wildfire education
- h) Maintenance and limitations
- i) A plan for emergency preparedness, response, and evacuation

NI-3: Establish and maintain community resilience hubs.

The intent of this strategy is to establish and maintain community resilience hubs with microgrids, education, training opportunities, and other community-focused resources. Under this strategy, the County develops a feasibility analysis and implementation plan for siting community resilience hubs across the county, with attention to Impacted Communities, and identifies opportunities for battery storage projects at County facilities. County emergency planners help enact this strategy by ensuring emergency response plans include climate change disasters such as wildfires, sea level rise, flooding, extreme heat, and drought. These efforts emphasize equitable recovery for Impacted Communities and those affected by environmental justice issues.

Strategy NI-3 Co-benefits:



Greater community
resilience



Improved community
equity



Increased resilience to
pests

Strategy NI-3 Actions:

- Pursue funding to develop a resilience hub master plan that identifies existing community facilities that can serve as resilience hubs and support affected populations during hazard events. This process should start with an assessment of community needs. Such facilities should be distributed equitably throughout the county, with an emphasis on easy access for Impacted Communities. Where appropriate facilities do not exist, develop plans to create new resilience hubs. (Supported by HS-P8.1)
- Pursue funding to implement the resilience hub master plan, including retrofitting selected facilities to function as resilience hubs. These retrofits should involve adding solar panels, battery backup systems, water resources, air filtration, supplies to meet basic community and emergency medical needs, and other needs as identified by the resilience hub master plan.
- Create a virtual resilience hub that connects County resources to communities through virtual community networks to provide detailed, up-to-date information about preparing for natural disasters, public safety notifications and alerts, space for virtual gathering and information-sharing, and other appropriate uses. Materials shall be accessible in multiple languages.

- Coordinate resilience hub activities with planning efforts around public safety power shutoffs and wildfire smoke resiliency.

NI-4: Sequester carbon on natural and working lands in Contra Costa County.

NI-4 contributes significantly to the County’s resilience efforts, but because it results in measurable GHG emissions reductions, it is part of the County’s GHG emissions reduction approach and is included in [Chapter 4](#).

NI-5: Minimize heat island effects through the use of cool roofs, green infrastructure, tree canopy, cool paint and pavement, and other emerging strategies.

With this strategy, impacts of heat islands are addressed and minimized through construction practices for buildings and structures, including through ample shading opportunity and other green infrastructure improvements, including green stormwater infrastructure.

Strategy NI-5 Co-benefits:



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



Reduced disaster impacts



Reduced resource use

Strategy NI-5 Actions:

- Require landscaping for new development to filter and retain runoff and support flood management and groundwater recharge. (COS-P-7.7)
- Promote installation of drought-tolerant green infrastructure, including street trees, in landscaped public areas. (COS-P7.8)
- Increase tree planting in urbanized areas and open spaces, where ecologically appropriate, emphasizing areas with limited existing tree cover, using low-maintenance native tree species that are low fire risk, and ensuring water supply resources are not compromised. (Supported by COS-P6.2)
- Consider preparing and implementing an Urban Forest Management Plan, or Tree Plan for the unincorporated county.
- Provide shade trees or shade structures at parks, plazas, and other outdoor spaces where feasible. (HS-P8.5)

- When updating the County ordinances that relate to trees and green infrastructure, consider whether tree removal and/or replanting requirements adequately promote expansion of the tree canopy and green infrastructure in Impacted Communities. (Supported by TR-A2.2, HS-P2.2, and HS-A2.5)
- Support efforts to develop incentive programs for home and business owners, school districts, and other local and regional property owners to increase the adoption of cool roofs, green infrastructure, and other cooling strategies on private property.

Urban Heat Islands: Tree Cover and Impervious Surfaces

The urban heat island effect is one of the most important aspects of how neighborhood conditions can exacerbate extreme heat. Urban heat islands are areas with little tree cover and significant portions of land covered by impervious surfaces or artificial structures covered with impenetrable materials, such as pavement and rooftops. Temperatures in these areas may be significantly hotter than in surrounding areas, especially at night, because impervious surfaces retain heat absorbed throughout the day. Addressing heat islands may also be an important lever for health equity, as researchers have found that low-income people and people of color are more likely to live in areas with land cover characteristics conducive to urban heat islands. Additionally, research has identified a correlation between home values and tree cover, meaning that addressing urban heat islands carries implications for financial equity. Actions to reduce the heat island effect also offer mitigation co-benefits, as increased tree cover can store carbon dioxide, as well as provide shade that reduces energy consumption needed for cooling buildings.

Many cities in Contra Costa County contain areas with very little contiguous tree cover, including most of the cities in East and West County, along with significant parts of Martinez, Concord, Danville, and San Ramon. Areas with very high percentages of impervious surfaces exist in many of the same urban areas with little tree cover. Areas with a high percentage of impervious surfaces are concentrated in North Richmond, San Pablo, Richmond, and El Cerrito, and in some tracts in cities in Central and East County.

NI-6: Protect communities against additional hazards created or exacerbated by climate change.

The goal of this strategy is to reduce impacts from other climate-related hazards, including drought, flooding, landslides, and severe weather. In accordance with this strategy, development projects are sited and designed to reduce exposure to hazardous conditions, and community members receive the support and assistance needed to prepare for and recover from natural disasters.

Strategy NI-6 Co-benefits:



Cost savings



Greater community resilience



Greater energy independence



Improved community equity



Improved public health



Increased resilience to pests



Reduced disaster impacts

Strategy NI-6 Actions:

- Discourage new below-market-rate housing in High and Very High Wildfire Hazard Severity Zones, the Wildland-Urban Interface, and Alquist-Priolo Fault Zones. If below-market-rate housing must be constructed within these zones, require it to be hardened or make use of nature-based solutions to remain habitable to the greatest extent possible. (HS-P4.2)
- Treat susceptibility to hazards and threats to human health and life as primary considerations when reviewing all development proposals and changes to land uses.
- Partner with community-based organizations to provide information to community members about how to prepare for projected climate change hazards.
- Promote, and develop as necessary, available funding sources to create incentives for residents and businesses to prepare for natural disasters, particularly members of Impacted Communities.

- Consider projected impacts of climate change when siting, designing, and identifying the construction and maintenance costs of capital projects.
- Actively promote and expand participation in local and regional community emergency preparedness and response programs.
- Support and fund efforts to enhance ongoing community and cross-sector engagement in community-level resilience and cohesion. Support non-governmental organizations to actively engage in developing a network of community-level actions that enhance resiliency.
- Work with energy service providers to promote programs encouraging reduced energy use during extreme heat events. (HS-P8.2)
- Support efforts by East Bay Regional Park District and other local recreation agencies to provide outdoor recreation facilities with adequate shading and refillable water stations where appropriate. (HS-P8.4)

CLIMATE EQUITY (CE)

CONTRA COSTA COUNTY WILL ADDRESS ENVIRONMENTAL FACTORS LEADING TO HEALTH DISPARITIES, PROMOTE SAFE AND LIVABLE COMMUNITIES, AND PROMOTE INVESTMENTS THAT IMPROVE NEIGHBORHOOD ACCESSIBILITY.



Ensuring that Contra Costa County's unincorporated communities are a welcoming and resilient home to diverse families, individuals, and businesses as the effects of climate change intensify around the world means ensuring that the County's climate action strategies are built on a foundation of justice and equity. Equity, justice, and the climate resilience they engender can take many forms across different sectors and include such strategies as supporting family-sustaining jobs in sustainable industries, providing equitably distributed green space, facilitating access to fresh and healthy food, and ensuring that all Contra Costa County departments and citizens are actively engaged in climate action planning. An important aspect of Climate Equity will be using culturally and linguistically appropriate methods. Climate action planning entails mobilizing the entire community to adopt a way of life and way of doing business that will not only weather the disruptions caused by climate change but will continue to thrive far into the future.

CE-1: Provide access to affordable, clean, safe, and healthy housing and jobs.

Strategy CE-1 aims to ensure that all residents live in clean, healthy homes and neighborhoods; have access to parks, open space, and fresh food; have easy access to safe and affordable mobility options; and are trained for and have access to living wage jobs. The County commits to implementing the 2024 CAAP strategies for equitable benefits to Impacted Communities, ensures every County department integrates climate issues and climate-related effects in services to residents, and meaningfully and continuously engages the communities most affected by climate change with developing and implementing appropriate solutions.

Strategy CE-1 Co-benefits:



Enhanced recreation opportunities



Greater community resilience



Improved community equity



Increased economic opportunities



Increased resilience to pests

Strategy CE-1 Actions:

- In partnership with community-based organizations, reverse community deterioration and blight and improve personal and property safety in neighborhoods throughout Contra Costa County.
- Ensure that new housing for households making less than the area median income and housing for other Impacted Communities are outside of hazard-prone areas, including for wildfires, landslides, floods, and sea level rise, or that they are hardened or make use of nature-based solutions to remain habitable to the greatest extent possible.
- In partnership with community-based organizations, secure funding to create a program to provide low-cost or free air conditioning and filtration, improved insulation, low-emitting materials, energy solar and storage systems, energy efficiency, and indoor ventilation in homes, emphasizing buildings that are home to Impacted Community members. (Supported by SC-A6.2 and SC-A6.3)
- Track development of local micro-grid battery storage policies and systems in other jurisdictions and identify potential opportunities for Contra Costa County.
- Encourage companies and entrepreneurs from local universities and national labs to create jobs in such industries as renewable energy, transportation technology, diverse forms of manufacturing, biotech/biomedical, and clean tech.
- In partnership with residents of Impacted Communities, affected workers, business/industry, environmental and environmental justice advocates, community colleges, workforce development and training entities, local government, and other involved agencies, support transition from highly polluting industries to a net-zero emission economy based on renewable and sustainable industries that provide living-wage jobs. (SC-P1.1)



5. Climate Adaptation Strategy

- Provide support for State and federal programs that support family-sustaining jobs in sustainable industries, efforts to support organized labor, and living wage labor standards.
- Adopt an ordinance at least as stringent as the State’s maximum idling law, and coordinate with CARB and law enforcement to achieve compliance. (HS-A1.5)

CE-2: Invest in solutions to support climate equity.

With this strategy in place, County investments support climate equity. The County implements best practices in environmental, social, and governance considerations as the 2024 CAAP is implemented.

Strategy CE-2 Co-benefits:



Improved community equity



Increased economic opportunities

Strategy CE-2 Actions:

- Evaluate and adjust County planning and expenditures for infrastructure and services as needed to ensure equitable investment in Impacted Communities, consistent with SB 1000.
- Work with County departments to incorporate addressing climate change, providing climate solutions, and enhancing community equity more fully into County operations and the broad range of services the County provides.
- As part of the 2024 CAAP and General Plan implementation, consider whether the strategy being implemented provides equitable benefits for Impacted Communities as a criterion for prioritization.
- Continually engage communities most affected by climate change in developing and implementing climate solutions and ensure that such solutions provide benefits to Impacted Communities. (Supported by HS-P4.3)
- Advocate for the Contra Costa Employees Retirement Association to include use of Environmental, Social, and Governance criteria in its investment policies.
- Require that the County's Deferred Compensation Plan provider make available Environmental, Social, and Governance investment options for employees participating in the County's 457 deferred compensation program. (In Progress)
- Amend the County investment policy to consider the use of Environmental, Social, and Governance criteria and to continue and improve efforts to divest from fossil fuels. (Completed)

- Work with schools, the Contra Costa County Library, business groups, and community-based organizations to educate and inform community members about climate change and related sustainability topics, and the County’s climate goals and the actions the County is taking to achieve them.
- Evaluate the issuance of Labeled Bonds, such as “Green”, “Sustainable”, or “Social” bonds, during the planning stage of a bond issuance by the County. It is the County’s preference to issue Labeled Bonds if the evaluation demonstrates a financial or policy benefit to the County. (Completed)

The County submitted a signed Agreement with the U.S. Department of Housing and Urban Development in July 2023 for a \$750,000 Community Project Funding grant to fund the development of a Just Transition Economic Revitalization Plan (JTERP). The JTERP is a plan for transitioning away from an economy that is dependent on fossil fuels to a zero-emission and clean and green economy and for improving the health, safety, infrastructure, and job opportunities of residents in communities most impacted by the environmental burdens of the climate crisis.

On June 13, 2023, the Board of Supervisors approved the County’s Investment Policy for Fiscal Year 2023-2024. The policy includes a new provision regarding the prohibition of investment in securities issued by fossil fuel companies and the consideration of Environmental, Social, and Governance (ESG) criteria.

CE-3: Increase access to parks and open space.

All County residents have easy access to parks and open space under this strategy. The County has an easily accessible and integrated system of high-quality, safe, and well-maintained parks and trails for all residents of the unincorporated county, including Impacted Communities.

Strategy CE-3 Co-benefits:



Enhanced recreation opportunities



Greater community resilience



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities



Reduced disaster effects

Strategy CE-3 Actions:

- Establish a goal for all residents to live within a half mile of a park or other green space.
- Support land acquisition for new parks and open space areas and protect such lands through fee title acquisition or through deed restrictions like conservation easements.
- Continue to construct and develop opportunities for new trails.
- Support investment in existing park facilities, in partnership with regional agencies.
- Increase the tree canopy on public property, especially in Impacted Communities and areas with a high heat index, by prioritizing funding for new street tree planting and maintenance. (HS-P2.2)



*El Cerrito playground.
Photo credit: Amalia Cunningham.*

CE-4: Ensure residents have equitable, year-round access to affordable, local fresh food.

With this strategy in place, county residents will have increased access to local fresh food. The County facilitates the creation of more Certified Farmers' Markets, supports urban gardens, and ensures that healthy food is affordable and accessible to Impacted Communities and those in food desert areas.

Strategy CE-4 Co-benefits:



Improved community equity



Improved public health



Increased economic opportunities

Strategy CE-4 Actions:

- Support establishment of year-round Certified Farmers' Markets in all communities, prioritizing Impacted Communities.
- Work with community groups to establish and maintain urban gardens, particularly on vacant lots and park land in Impacted Communities. (Supported by SC-P5.3)
- Encourage major supermarkets to locate in Impacted Communities. (Supported by SC-P5.1 and SC-A5.3)
- Support co-operative grocery markets in Impacted Communities.



Little Sprouts Farm in Bay Point.

CE-5: Ensure that large industrial facilities act as good neighbors.

This strategy helps to make sure that large industrial facilities are good neighbors. The County makes recommendations to responsible permitting agencies regarding permits for fossil-fuel based industries and/or point sources, tracks data on fossil fuel products produced and/or transported in and through Contra Costa County and allows for a Just Transition away from polluting and extractive industries.

Strategy CE-5 Co-benefits:



Improved air quality



Improved community equity



Improved public health



Increased economic opportunities

Strategy CE-5 Actions:

- Provide comments to responsible permit agencies on permit applications for large industrial facilities with significant emissions on potential measures to reduce impacts on and provide benefits to neighboring unincorporated communities.
- Regularly track data on fossil fuel production and transportation in Contra Costa County.
- Encourage the economic development of industries and supply chains that emphasize a reduction in GHG emissions.
- Encourage economic development and job creation in industries that advance the County's sustainability goals, using the County's policy on enhanced infrastructure financing districts.
- As economic conditions change, support efforts to phase out heavily polluting and extractive industries and replace them with businesses that contribute to a regenerative and circular economy.
- Require new or expanded commercial and industrial projects resulting in 25,000 square feet or more of gross habitable floor area, such as warehouses and other large, enclosed buildings, to be near zero-emission operations, including the facilities themselves and the associated fleets, except for uses with fewer than five vehicles domiciled on-site. Require all necessary measures to achieve near -zero-emissions. (HS-P1.8)

Near-Zero Operations for Large Commercial or Industrial Facilities

According to General Plan Policy HS-P1.8, measures to achieve near-zero emissions for large commercial or industrial projects may include:

- a) Reduce on-site energy consumption and increase on-site energy generation and energy storage.
- b) Provide adequate on-site zero-emission vehicle-capable parking for all anticipated truck traffic to prevent idling and off-site queuing.
- c) Provide electrified loading docks with receptacles allowing plug-in of refrigerated trailers.
- d) Use heavy-duty trucks that are model year 2014 or later and expedite a transition to zero-emission trucks by establishing a clear timeline for electrification of trucks as they become commercially available. Ensure contracts with motor carriers include air quality incentives or requirements, such as providing incentives to fleets that meet United States Environmental Protection Agency SmartWay standards or requiring use of zero-emission or near zero-emission trucks.
- e) Use a “clean fleet” of delivery vehicles as they become commercially available, but no later than 2025.
- f) Use zero-emission yard equipment, such as forklifts, pallet trucks and jacks, and stackers.
- g) Implement practices to control and remove fugitive dust and other contaminants from paved areas.

Collectively, the strategies in this section will help community members and assets adapt to changing climate conditions and improve resilience to climate change–related hazards as well as confer many relevant co-benefits. Unlike the GHG emissions reduction strategies in [Chapter 4](#), adaptation strategies do not have quantitative goals. However, these strategies can contribute to quantified benefits, including reductions in property damage, decreases in the number or severity of hazard events, and preservation of key community standards. These quantified benefits also support performance standards discussed in the General Plan elements.



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6. REALIZING THE 2024 CAAP



Photo credit: Envision Contra Costa photo gallery.

Enacting the Climate Action and Adaptation Plan

To ensure the success of the 2024 CAAP, Contra Costa County will integrate the goals and strategies of this plan into other local and regional plans and prioritize and implement the programs and activities identified herein. As the County updates other planning documents, such as the Municipal and Zoning Codes, or Specific Plans, staff will ensure that these documents support and are consistent with the 2024 CAAP.

Implementing the 2024 CAAP will require County staff and leadership to enact these strategies and report progress. This CAAP identifies a work plan that includes responsible departments/divisions, time frames, and relative costs associated with each strategy. Staff will monitor progress using an implementation and monitoring tool on an annual basis and will provide an annual update to County decision-makers. The Contra Costa County Sustainability Group, part of the County's Department of Conservation and Development, is responsible for leading overall implementation of the CAAP, and working with other County departments and community partners to implement specific CAAP strategies and actions.

The following strategies and associated actions are designed to guide Contra Costa County in successfully implementing the 2024 CAAP.

LEADERSHIP STRATEGIES (L)

CONTRA COSTA COUNTY IS A MODEL FOR HOW LOCAL GOVERNMENT CAN TAKE ACTION ON CLIMATE ISSUES.



Advancing meaningful action on climate change requires sustained commitment and active involvement from Contra Costa County government officials, community members, local community-based organizations, regional agencies, and business owners, among other interested public and private partners. The 2024 CAAP's leadership strategies are designed to facilitate the long-range and creative planning that will ensure that Contra Costa County is at the forefront of climate change mitigation and adaptation. These efforts include ensuring that climate action is a priority across County departments, equipping County staff to address climate change as part of their work, supporting the development of climate action funding mechanisms, and incorporating analysis of climate change and equity in budgeting decisions. While GHG emissions from County operations are a very small percentage of emissions countywide, it is important for the County to demonstrate in its day-to-day business its commitment to climate action. New programs being introduced by BayREN should provide additional resources for County operations to reduce GHG emissions.

L-1: Establish Contra Costa County as a leader among local governments for addressing climate issues.

Strategy L-1 Actions:

- Continue to publicize and support the operations of the County's Interdepartmental Climate Action Task Force and Green Government Group (G3) Champions.
- Work with all County departments to encourage adoption of best practices from the County's Green Business Program and other practices that support the County's climate goals.
- Encourage development of new policies and initiatives that support the County's climate goals.

- Explore the creation of funding mechanisms, including a carbon impact fee, to support the County's Sustainability Fund for investments in County facilities if additional financial resources are needed.
- Support legislative efforts to establish a green bank able to equitably finance sustainability projects, including renewable energy, energy efficiency, and green infrastructure, for residential and commercial customers. (COS-A14.11)
- Ensure that funding mechanisms to address climate change minimize or avoid disproportionate financial impacts to Impacted Communities and do not exacerbate economic inequities, to the extent feasible.
- Facilitate trainings for County staff on climate change (including the results of the Vulnerability Assessment and 2024 CAAP technical work) and how they can support climate action through their work with the County and at home.
- Encourage County employees to explore innovative technologies and programs that address climate change.
- Incorporate integrated pest management into new construction and retrofit programs on County properties.
- Ensure County departments follow the County's Environmentally Preferable Purchasing Policy and policy requirements are included in the contracting process.
- Regularly review and revise the County's purchasing and contracting programs as necessary to ensure consistency with the County's sustainability and GHG reduction goals. (HS-A3.3)



County Green Government Group Champions at a planting day with Friends of Alhambra Creek.

Photo credit: Jody London.

L-2: Continue to recognize the climate crisis as an emergency for Contra Costa County and make addressing climate change a top County priority.

Strategy L-2 Actions:

- Continue to implement the 2020 Climate Emergency Resolution approved by the Board of Supervisors, including conducting periodic reviews and updates to the Resolution.
- Consider climate vulnerabilities and associated equity effects as factors in the County's planning and expenditures for infrastructure and services to increase resilience and reduce GHG emissions countywide.
- Consider developing standards for the disclosure of climate and equity effects and vulnerabilities in staff reports for all decisions by the Board of Supervisors when such disclosures are helpful and necessary. Explore modifying County processes and forms to include questions to ensure the proposed action is consistent with the 2024 CAAP and equity goals.
- Assess County programs, policies, operations, and projects (excluding stationary sources) for their contribution to achieving the County's GHG emissions reduction goals and consistency with the 2024 CAAP.
- Disclose GHG emissions to a registry such as the Carbon Disclosure Project (CDP).



Climate change is a priority for Contra Costa County residents, who support continued County leadership on this topic.

IMPLEMENTATION STRATEGIES (IS)

CONTRA COSTA COUNTY WILL ENSURE IT FOLLOWS THROUGH TO ACHIEVE THE GOALS AND ACTIONS IN THIS CLIMATE ACTION AND ADAPTATION PLAN.



Successfully reducing GHG emissions, addressing climate change vulnerabilities, and building community resilience requires active, organized, and ongoing collaboration between County government and local businesses, community-based organizations, regional governments, and the public. Implementation strategies in this 2024 CAAP are intended to ensure the continued provision of resources for the implementation, revision, and monitoring of the 2024 CAAP as well as the continued cultivation of government and community partnerships.

IS-1: Monitor and report progress toward achieving Climate Action and Adaptation Plan goals on an annual basis.

Strategy IS-1 Actions:

- Assign responsibility for facilitating and supporting 2024 CAAP implementation to the County's Department of Conservation and Development.
- Identify key staff from each department responsible for supporting 2024 CAAP implementation and updates for annual reporting and monitoring.
- Continue to involve community-based organizations and other key stakeholders in reviewing and recommending 2024 CAAP action items.
- Continue to prepare an annual progress report on implementation of the recommended GHG emissions reduction strategies and progress toward the 2024 CAAP goals. When information is available, provide updates on estimated GHG emissions reductions and current GHG emissions levels.
- Monitor implementation of the Sustainability Fund for projects in County facilities.
- Use the 2024 CAAP implementation and monitoring tool to track GHG benefits from 2024 CAAP implementation and identify progress toward the 2024 CAAP reduction goals.
- Pursue refinements to the County permitting system and other systems as needed to support collection of 2024 CAAP implementation data.

- Work with Contra Costa Health on exploring and, if appropriate, developing health indicators related to climate change to help inform progress on current actions and effectiveness of adaptation strategies.

IS-2: Continue collaborative partnerships with public agencies, private partners, and community groups that support Climate Action and Adaptation Plan implementation, with an emphasis on residents and community-based organizations from Impacted Communities.

Strategy IS-2 Actions:

- Participate in local and regional organizations that provide tools and support for energy efficiency, energy conservation, GHG emissions reductions, sustainable infrastructure development, adaptation, public information, and implementation of this 2024 CAAP.
- Enable effective partnerships to implement high-priority strategies from the 2024 CAAP by working through established interagency collaborations and joint exercise of powers authorities and forming new arrangements of various types where necessary to be effective.
- Provide input to partner agencies on policy barriers that need to be addressed at the State level.
- Continue collaboration with other local governments in Contra Costa County on climate action and related subjects, including an annual Sustainability Exchange meeting of all local government staff in Contra Costa County that focus on climate action and adaptation planning and implementation.
- Explore opportunities to form public-private partnerships that expand resources, including funding, in support of CAAP implementation.

The Sustainability Exchange is a regular gathering for local government staff in Contra Costa County who work on sustainability issues to network and learn from one another. The Sustainability Exchange launched in January 2017. Every meeting includes time for networking and learning about the work of others in Contra Costa County, as well as a topical presentation and opportunity to reflect in small groups.



Members of the Sustainability Exchange tour the Antioch Dunes National Wildlife Refuge. Photo credit: Contra Costa County staff

IS-3: Secure necessary funding to implement the Climate Action and Adaptation Plan.

Strategy IS-3 Actions:

- Develop a comprehensive funding strategy for the 2024 CAAP, including funding sources and levels for reduction strategies as part of annual reporting.
- Include GHG emissions reduction strategies in the capital improvement programs for County-owned and managed facilities and infrastructure, and other plans as appropriate.
- Pursue local, regional, state, and federal grants to support implementation.
- Explore dedicated funding sources for 2024 CAAP implementation, including from the Sustainability Fund or other revenue sources as needed.
- Explore opportunities to allocate a portion of revenues from revenue-generating strategies in the 2024 CAAP to its implementation.

CAAP Updates

Per HS-A3.1 in the County's General Plan, future updates to the 2023 CAAP must include:

- a) Inventories of GHG emissions in the unincorporated county.
- b) GHG reduction goals for 2030 and 2045 at a minimum.
- c) Forecasts of GHG emissions for the unincorporated county consistent with the growth assumptions of the General Plan.
- d) GHG reduction measures and strategies with quantifiable outcomes.
- e) Climate adaptation and resilience strategies to ensure the county's communities can respond to changing climate conditions.
- f) An implementation and monitoring program to track the County's progress toward achievement of the GHG reduction targets.
- g) A community and stakeholder engagement program for CAP preparation and implementation.

IS-4: Continue to update the baseline emissions inventory and Climate Action and Adaptation Plan every five years.

Strategy IS-4 Actions:

- Update the community-wide GHG emissions inventory every five years at a minimum and more frequently as resources are available. Prepare an inventory for the 2024 calendar year within a year of adoption of the 2024 CAAP.
- Update the 2024 CAAP to incorporate new technologies, practices, and other options to further reduce emissions. (Supported by HS-A3.1)

IS-5: Maintain and update the Climate Action and Adaptation Plan to allow for greater resilience.

Strategy IS-5 Actions:

- Coordinate, where possible, updates of the Climate Action and Adaptation Plan, General Plan Safety Element, and Local Hazard Mitigation Plan cycles to ensure plan alignment and coordination of climate mitigation and adaptation efforts.
- Assess the implementation status and effectiveness of adaptation strategies.

Work Plan

Table 12 contains information to support staff and community implementation of the strategies and to effectively integrate them into budgets, the capital improvement program, and other programs and projects. These implementation details are:

CAAP Strategy and Implementation Actions: The strategy language and the specific actions needed for reductions and increased resilience.

Potential Strategies of Effectiveness: Metrics that County staff and others could use to track the success of the strategy.

Lead Department(s): The lead County department(s) tasked with implementing the strategy.

Potential Partners: Example local organizations that the County will partner with to implement the given strategy. Additional community partners will be welcome.

Although significant GHG emissions reduction policies and initiatives are already in place, the actions proposed in this plan, by necessity, far surpass the scale of existing efforts. Implementing the plan and ensuring that it results in real, additional GHG emissions reductions will require increased coordination across sectors and institutionalized climate protection efforts across communities. The number of actions recommended in this plan will take many years to implement, given limitations in both staff time and funding.

Time Frame: The year by which a strategy should be effective by fiscal year's end. The exact status of a strategy will vary based on its actions, and many strategies will be ongoing through and beyond 2030. An effective strategy will be one that is actively on track to achieve its GHG emissions reductions, support adaptation to climate change effects, or achieve long-term resilience. For a strategy to be effective, the necessary programs and efforts should be active, and any infrastructure or other capital improvements should be in place. The effective year is not the end year, many of the strategies are intended to remain in effect for the foreseeable future, so they do not have end dates. Time frames for effectively setting up the strategies are:

- Near Term (by 2026)
- Mid-term (by 2028)
- Long Term (by 2030)

Applicability: The people, development, land uses, activities, and other aspects of communities that the strategy applies to.

Though near term priorities are identified, please note that priorities can and do shift based on funding availability, advances in technology, new and better ideas, etc. The 2024 CAAP and this implementation section should be considered a living document.

TABLE 12. 2024 CAAP IMPLEMENTATION MATRIX

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>Clean and Efficient Built Environment: Homes, workplaces, and businesses in unincorporated Contra Costa County run efficiently on clean energy.</p>		
<p>BE-1: Require and incentivize new buildings and additions built in unincorporated Contra Costa County to be low-carbon or carbon neutral.</p> <ul style="list-style-type: none"> - Adopt new or modified reach codes that exceed the California Building Standards Code, as the State updates the Building Code every three years, to require the use of low-carbon intensive energy sources, to achieve higher levels of energy performance, and to achieve lower levels of GHG emissions. (COS-A14.4) - Maintain, update, and publicize County ordinances and programs requiring new residential buildings, hotels, offices, and retail to be more energy efficient, with low levels of greenhouse gas emissions. Evaluate the feasibility of including other building types as appropriate. (COS-A14.5) - Design and construct new County facilities to be zero-net energy to the extent feasible. (COS-P14.8) - Study the feasibility of establishing a low-carbon concrete requirement for all new construction and retrofit activities and consider additional strategies to reduce embedded carbon in construction materials. The intent is to determine what the County can and should do to support or exceed State requirements for net-zero emissions for cement use by 2045. (HS-A3.2) - Provide educational materials to encourage project applicants to incorporate passive solar design features into new developments and significant alterations and additions. - Promote sustainable building strategies and designs, including small and “tiny” homes, to project applicants as site appropriate. Consider requiring sustainable features as a condition of approval, including reuse of materials to minimize embedded carbon. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> - Implement the reach code. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> - Participation in energy efficiency and weatherization programs by new residential and commercial buildings (including County facilities), with attention to participation in Impacted Communities. (Conservation and Development – community; Public Works – County facilities) - Energy efficient lighting and other appliances and mechanical systems in new County buildings. (Public Works) - Completed report exploring requirements for low-carbon concrete in new construction. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> - BayREN - Local contractors, developers, architects, and Contra Costa County Building Trades Council - MCE - PG&E - Building Industry Association - BAAQMD <p>Applicability</p> <ul style="list-style-type: none"> - County operations - New development - Residents in unincorporated areas. <p>Time Frame</p> <p>Near term (by 2026)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Provide educational and technical resources to advance the adoption of heat pump water heater and heat pump space heating in buildings in support of BAAQMD Regulation 9, Rule 4, and Regulation 9, Rule 6, which will mandate that replacement and new water heaters (2027 and 2031), and space heaters (2029) are zero NOx. (COS-A14.10) 		
<p>BE-2: Retrofit existing buildings and facilities in the unincorporated county, and County infrastructure, to reduce energy use and convert to low-carbon or carbon-free fuels.</p> <ul style="list-style-type: none"> – Create a County policy or program to facilitate making existing residential and nonresidential buildings more energy-efficient and powered by carbon-free energy. (COS-A14.6) – Create a detailed County roadmap to convert existing homes and businesses to use low-carbon or carbon-free appliances. The roadmap should include steps to support converting buildings to rely on low-carbon or carbon-free energy using an equitable framework that minimizes the risk of displacement or significant disruptions to existing tenants. (COS-A14.7) – Provide educational and technical resources to advance the adoption of heat pump water heater and heat pump space heating in new buildings. – Evaluate options for incentivizing and requiring additions and alterations to be energy efficient and to achieve the lowest feasible levels of GHG emissions, including upgrades to the building electric panel, as needed. (COS-A14.8) – Ensure County-led and supported retrofit programs incentivize and prioritize conversion of buildings built before 1980 and emphasize assistance to owners of properties that are home to very low-, low-, and moderate- income residents and/or located in Impacted Communities, as permitted by available funding. (COS-A14.9) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Participation in energy efficiency and weatherization programs, including retrofits and site rehabilitation, by existing residential and commercial buildings (including County facilities), with attention to participation in Impacted Communities. (Conservation and Development) – Roadmap to convert existing buildings to all-electric (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Energy efficient lighting and other appliances and mechanical systems. (Conservation and Development) – Expanded or created retrofit programs to complement weatherization programs that serve low-income county residents. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – BayREN – Local contractors, architects, and Contra Costa County Buildings Trades Council – MCE – Neighborhood Preservation Program – Contra Costa County Asthma Initiative <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Near term (by 2026)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Explore opportunities, in collaboration with partner agencies, to create new incentives or publicize existing ones to support updating existing buildings to achieve the lowest feasible levels of GHG emissions. – Work to continue to obtain funding with partners such as BayREN and MCE to implement a program or programs to provide reduced-cost or free energy-efficiency and zero-carbon retrofits to local small businesses and households earning less than the area median income, in support of the Contra Costa County Asthma Initiative, Contra Costa County Weatherization Program, similar County programs, other nonprofit partners, and other health equity efforts for Impacted Communities. Support the use of low-emitting materials, including paints and carpeting, in retrofits to improve indoor air quality. – In partnership with MCE and BayREN, continue to support voluntary home and business energy efficiency retrofits, including all-electric measures. – Partner with community groups and MCE to establish an induction cooktop education program for county residents. (Initiated in 2024.) – Facilitate participation by homes and businesses in demand response programs. – Continue to conduct energy and water tracking activities, audits, and upgrades of County facilities, including conversion of feasible County facilities to all-electric space and water heating. – Advocate for modifications to the federal Weatherization Assistance Program that expand eligible measures to include whole building clean energy improvements, such as wall insulation, duct sealing, electric panel upgrades, electric heat pumps, and related measures. Advocate for an increase in the income eligibility limits for the Weatherization Assistance Program. – Implement requirements for cool roofs and light-colored, nonreflective permeable paving materials as part of retrofit, repair, 		

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>and replacement activities, using recycled materials or other materials with low embedded carbon as feasible and as established by the Building Standards Code.</p>		
<p>BE-3: Increase the amount of electricity used and generated from renewable sources in the county.</p> <ul style="list-style-type: none"> – Require new commercial parking lots with 50 or more spaces to mitigate heat gain through installation of shade trees, solar arrays, or other emerging cooling technologies. Prioritize the use of solar arrays where feasible and appropriate. (HS-P8.3) – Encourage property owners to pursue financial incentives for solar installations and energy storage technologies, such as battery storage systems, on new and existing buildings. – Work with MCE to increase enrollment, especially in the Deep Green tier. – Continue to enroll all eligible, non-solar-equipped County facility electricity accounts in MCE territory in the Deep Green tier. – Work with the Contra Costa County Fire Protection District and other organizations that provide fire protection services to provide education and promote incentives for battery storage systems that can increase the resilience of homes and businesses to power outages. – Encourage installation of battery storage systems in new and existing buildings, especially buildings with solar energy systems and buildings that provide essential community services. (COS-P14.7) – Provide information about battery storage systems with all applications for new home construction and solar panel installations. – Pursue implementation of recommendations of the 2018 Renewable Resource Potential Study. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Number and percent of County and community accounts enrolled in MCE Deep Green (Conservation and Development) – Total megawatts of installed renewable energy capacity, by type, in the unincorporated county. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Megawatts of rooftop and parking lot solar installed in unincorporated county, including County facilities and Impacted Communities. (Conservation and Development – community; Public Works – County facilities) – Megawatt-hours of installed battery storage capacity at public and private buildings. (Conservation and Development – community; Public Works – County facilities) – Percent of electricity supplied by PG&E and MCE from renewable sources. (Conservation and Development) – Number of new and existing buildings with energy storage systems, including County facilities. (Conservation and Development – community; Public Works – County facilities) – Progress in meeting recommendations from the 2018 Renewable Resource Potential Study. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – BayREN – Fire protection districts in Contra Costa County – Local contractors, architects, and Contra Costa County Building Trades Council – MCE – PG&E – BAAQMD <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – New development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Mid-term (by 2028)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Evaluate the least-conflict feasible locations for stand-alone battery storage systems and modify land use regulations to enable such use in these locations. – Explore the technical and economic feasibility of developing and operating microgrids in Contra Costa County, and for County facilities. (Supported by COS-P14.3 and COS-A14.2) – Explore opportunities to install community solar projects with battery backup to provide clean energy to Impacted Communities. 		
<p>No Waste Contra Costa: Contra Costa County disposes no more solid waste than 2.2 pounds per person per day.</p>		
<p>NW-1: Increase composting of organic waste.</p> <ul style="list-style-type: none"> – Ensure, through franchise agreements and other relationships with waste haulers, a source-separated organics collection service for all residential and commercial customers in County-controlled collection franchise areas. – Require that new and expanded landfill operations significantly reduce GHG emissions to meet or exceed State targets to the extent feasible, and work toward carbon-neutral landfills. (PFS-7.12) – Work with wastewater providers to explore the use of organic waste as feedstock for anaerobic digesters to produce biogas that can generate electricity or fuel. – Require local restaurants, grocery stores, and other edible food generators that handle large quantities of food to partner with food rescue organizations to divert edible food that would be otherwise disposed in landfills for distribution to those in need, in accordance with SB 1383. – Collaborate with edible food recovery programs and the Community Wellness & Prevention Program to decrease food waste and address hunger. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Percentage of County-controlled franchise areas with source separated organics collection for residential customers. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of commercial edible food generators in County-controlled franchise areas participating in edible food recovery program. (Conservation and Development) – Number of projects complying with the Model Water Efficient Landscaping Ordinance (MWELO) required to use compost. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Applicability</p> <ul style="list-style-type: none"> – Environmental justice organizations – Food rescue organizations – Major generators of organic waste (schools, restaurants, event spaces, grocery stores, etc.) – Waste haulers – Wastewater service providers – Contra Costa Health, CWPP – County Jail meal service – Schools – Hospitals

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Procure compost or other products made from recovered organic waste in accordance with the County’s Recovered Organic Waste Product and Recycled Paper Procurement Policy. 		<p>Time Frame Mid-term (by 2028)</p>
<p>NW-2: Reduce waste from County operations.</p> <ul style="list-style-type: none"> – Continue source-separated organics collection service at all County-owned facilities that includes recovering food waste (scraps) and food-soiled paper. – Implement three-stream recycling (trash, recycling, and organic waste) at all County-owned facilities. – Establish requirements for source-separated organics collection and three-stream recycling as conditions in lease agreements for County offices. – Conduct waste audits of County facilities, including assessing the volume and composition of all waste streams, to identify challenges with waste activities and develop educational or operational changes to address issues and reduce waste generation. – Obtain material for capital projects from local and low-carbon sources to the greatest extent feasible, including allocating additional funds to allow for such materials, and integrate appropriate standards into the County’s Environmentally Preferable Purchasing (EPP) policy. – Continue to reduce paper use in County operations. Procure recycled paper and janitorial supplies in accordance with the Recovered Organic Waste Product and Recycled Paper Procurement Policy. – Continue engagement with TRUE zero-waste certification for County projects. – Enact Bay-friendly landscaping practices at County facilities. Develop County policies and practices for Bay-friendly landscaping. – Explore opportunities to reuse wood from County tree maintenance activities as an alternative to chipping. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Recycling, composting at County facilities. (Public Works) – Volume of waste disposed at County facilities. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Recycled content of County purchases consistent with applicable requirements of SB 1383. (Public Works) – Enforcement of requirements for County vendors and contractors to adopt and implement the Environmentally Preferable Purchasing Policy. (Public Works) – Number of County facilities with Bay-friendly landscaping practices. (Public Works) – Tonnage of recycled and composted materials, by type, collected at County facilities. (Public Works) – Number of County facilities with three-stream recycling. (Public Works) 	<p>Potential Partners – County operations</p> <p>Applicability – Waste haulers</p> <p>Time Frame Mid-term (by 2028)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Encourage medical facilities and medical waste recycling companies to upgrade facilities to increase the amount of medical waste recycled or reprocessed. – Explore the feasibility of transitioning to reusable products in the health sector, where appropriate, and procuring products certified as green or low carbon. 		
<p>NW-3: Increase community-wide recycling and waste minimization programs.</p> <ul style="list-style-type: none"> – Create a source-reduction program in partnership with regional agencies to promote rethinking, refusing, reducing, reusing, and regenerating of materials. – Improve educational efforts to promote better waste sorting among community members. – Work with waste haulers to expand the types of materials accepted by recycling programs as economic conditions allow. – Work with waste haulers to continue the availability of curbside pickup recycling services. – Evaluate the feasibility of banning single-use plastics or establishing additional restrictions beyond those created by SB 54. – Encourage the use of reusable items over disposable materials. – Promote the Contra Costa County Recycling Market Development Zone low-interest loan program to create incentives for the development of businesses that use recycled materials. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Actual disposed pounds per person per day (PPD) numbers year over year. (Conservation and Development) – Number of households and businesses subscribing to recycling and organics service. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of businesses participating in Recycling Market Development Zone program (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – New development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Applicability</p> <ul style="list-style-type: none"> – Major waste generators – Waste haulers – Recycling centers <p>Time Frame</p> <p>Mid-term (by 2028)</p>
<p>NW-4: Reduce emissions from landfill gas.</p> <ul style="list-style-type: none"> – Encourage efforts at Acme, Keller Canyon, and West Contra Costa landfills to install or enhance existing methane capture technology and associated monitoring systems with a goal of increasing the methane capture rate to the greatest extent feasible. (Supported by COS-P14.5) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Methane capture rate <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Tons of flared landfill gas 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Landfill operators <p>Applicability</p> <ul style="list-style-type: none"> – Landfill operators <p>Time Frame</p> <p>Mid-term (by 2028)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Explore opportunities for partnering with agricultural and industrial operations to generate energy from methane gas generated by their ongoing activities. – Support landfill operators in efforts to transition away from landfill gas flaring. (COS-P14.5) 		
<p>Reduce Water Use and Increase Drought Resilience: Contra Costa County uses less water, and communities are prepared for drought.</p>		
<p>DR-1: Reduce indoor and outdoor water use.</p> <ul style="list-style-type: none"> – Require new development to reduce potable water consumption through use of water-efficient devices and technology, drought-tolerant landscaping strategies, and treated recycled water, where available. (COS-P7.6) – Require homes and businesses to install water-efficient fixtures at time of retrofit activities, in accordance with the California Building Standards Code. – Continue to enforce the Model Water Efficient Landscaping Ordinance and encourage the use of native and drought-tolerant landscaping for exempt residential and commercial landscapes through partnership with local and regional water agencies and other organizations. – Partner with water and wastewater service providers, Groundwater Sustainability Agencies, irrigation districts, and private well owners to increase participation in water conservation programs countywide. (COS-P7.1) – Facilitate the offering of BayREN water bill savings programs through eligible community water providers. – Encourage the installation of graywater and rainwater catchment systems, particularly for new construction, as feasible for wastewater infrastructure. Reduce regulatory barriers for these systems and explore creating incentives for installing these systems in new and existing buildings. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Water use, specifically reduction in overall water use in the unincorporated county as reported by water companies. (Conservation and Development) – Water use, specifically reduction in water use at County facilities. (Public Works) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Square footage of native and drought-tolerant landscaping projects at County facilities. (Public Works) – Number of participants in Contra Costa Water District Lawn to Garden program. (Conservation and Development) – Number of participants in East Bay Municipal Utility District Lawn Conversion program. (Conservation and Development) – Number of water districts participating in BayREN water savings program. (Conservation and Development) – Number of customers participating in water conservation programs sponsored by water companies. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Water providers – Green Business Program <p>Applicability</p> <ul style="list-style-type: none"> – Central Contra Costa Sanitary District – Contra Costa Water District – East Bay Municipal Utility District – West County Wastewater District – Other water and wastewater service providers – Contra Costa Health – UC Master Gardeners – Nurseries – Property managers <p>Time Frame</p> <p>Near term (by 2026)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Evaluate opportunities for graywater use in public spaces and implement them as feasible. – Promote the installation of composting toilets at appropriate County facilities in locations without wastewater service. 		
<p>DR-2: Ensure sustainable and diverse water supplies.</p> <ul style="list-style-type: none"> – Encourage Contra Costa Health to work with Groundwater Sustainability Agencies to ensure that new well permit applications are in accordance with County ordinances and State construction standards and require a hydrogeological evaluation in areas with known water shortages to ensure that the sustainable yield goals can be met. – Require new development to demonstrate the availability of safe, sanitary, and environmentally sound water delivery and wastewater treatment systems with adequate capacity. (PFS-P4.5, PFS-P4.6) – Discourage new development that may reasonably lead to groundwater overdraft, subsidence, or other negative impacts, or which may reasonably depend on the import of unsustainable quantities of water from outside the county. – Require the use of permeable surfaces for new or reconstructed hardscaped areas where feasible. – In coordination with Groundwater Sustainability Agencies, expand opportunities for groundwater recharge. – Work with water suppliers to expand recycled water systems as feasible, including considering additional treatment to allow for additional recycled water uses. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Amount of recycled water used. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Groundwater sustainability indicators: chronic lowering of groundwater levels; reduction in storage; seawater intrusion; degraded quality; land subsidence; surface water depletion. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Existing development – New development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Applicability</p> <ul style="list-style-type: none"> – Contra Costa Health – Central Contra Costa Sanitary District – Contra Costa Water District – East Bay Municipal Utility District – Groundwater Sustainability Agencies (GSAs): <ul style="list-style-type: none"> – City of Antioch GSA – City of Brentwood GSA – Byron-Bethany Irrigation District GSA – Contra Costa County GSA – Diablo Water District GSA – Discovery Bay GSA – East Contra Costa Irrigation District GSA – EBMUD GSA – Zone 7 GSA

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
		<ul style="list-style-type: none"> – West County Wastewater District – Other water and wastewater service providers <p>Time Frame Mid-term (by 2028)</p>
<p>Clean Transportation Network: Contra Costa County’s transportation network provides safe and accessible options for walking, biking, and transit. If residents and workers are driving, they are in zero-emission vehicles.</p>		
<p>TR-1: Improve the viability of walking, biking, zero-emission commuting, and using public transit for travel within, to, and from the county.</p> <ul style="list-style-type: none"> – Prioritize expansion of bicycle, micromobility, and pedestrian infrastructure (e.g., Class IV separated bikeways) to address the significant latent demand for these active transportation modes. (TR-P2.2) – Develop and promote mobility alternatives to single-occupancy vehicles, including but not limited to public transit, micromobility, carbon-free rideshare strategies, and nonmotorized modes. (TR-A2.1) – Implement programs to encourage transit use, bicycling, walking, telecommuting, and use of alternative vehicle fuels by County employees. (TR-A2.4) – Reduce single-occupant vehicle usage and VMT, by significantly enhancing the availability and safety of other travel modes through infrastructure investment, policy support (Vision Zero, and other best practices), and support for public transit. (TR-P2.4) – Plan, design, construct, and maintain facilities for walking, bicycling, and rolling to serve people of all ages, abilities, and income levels, 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Percentage complete and under construction of unincorporated bicycle network. (Public Works) – Linear feet of pedestrian facilities constructed. (Public Works) – Number of bicycle and pedestrian network gaps closed. (Public Works) – Measure progress on the County Road Improvement and Preservation Program (CRIPP); Complete Streets; Vision Zero; Active Transportation; and equity-focused plans, programs, and policies. (Public Works) – Number of new units (residential and commercial) located in transit priority areas. (Conservation and Development) – Number of new units of affordable housing, particularly in areas with high-quality transit. (Conservation and Development) – Transit ridership in County service areas. (Conservation and Development) – Number of employers operating transportation demand programs. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – 511 Contra Costa – BAAQMD – CCTA – Environmental justice groups – MTC/ABAG – Transit providers – Local communities – California State Association of Counties – Advocacy organizations – East Bay Leadership Council – Safe Routes to School programs <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – New development – Residents in unincorporated areas. – Businesses in unincorporated areas.

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>including children, seniors, families, and people with limited mobility. (TR-P5.1)</p> <ul style="list-style-type: none"> – Partner with CCTA and neighboring jurisdictions to build out the countywide bicycle and pedestrian network, prioritizing completion of the Low-Stress Countywide Bicycle Network and pedestrian safety improvement projects in the County's Pedestrian Priority Areas, as described in the Countywide Bicycle and Pedestrian Plan. (TR-A5.1) – Construct innovative bicycle and pedestrian facilities, including Class IV separated and protected bikeways, bicycle superhighways, and other low-stress facility types, as described in the Countywide Bicycle and Pedestrian Plan and in contemporary, best-practice transportation planning and engineering guidance. Use contextually appropriate green infrastructure and landscaping to separate vehicular lanes from bicycle and pedestrian facilities whenever feasible. (TR-A5.2) – Require transportation infrastructure serving new development to be designed using best practices, contemplating existing and planned land uses, roadways, bicycle and pedestrian facilities, transit facilities, and connections to adjoining areas. (TR-P4.2) – Create connections between unincorporated communities and neighborhoods in unincorporated areas and adjacent jurisdictions to improve multimodal access to local destinations, such as schools, parks, shopping, health services, and workplaces. (TR-P4.3) – Track over time projects that add pedestrian and bicycle facilities to document the County's implementation of the County Road Improvement and Preservation Program (CRIPP); Complete Streets checklist; Vision Zero Report and Action Plan; Active Transportation Plan; and equity-focused plans, programs, and policies. – Improve the safety and comfort of bicycle, pedestrian, and public transit facilities using best practices to encourage more people to use such facilities. 	<p>Supportive Performance Metric(s): <u>For County Operations:</u></p> <ul style="list-style-type: none"> – Number of employees participating in the County remote work policy. (Human Resources) – Number and percentage of County employees using the pre-tax commute benefit. (Human Resources) – Administrative Bulletin supporting videoconference and conference calls, where appropriate. (County Administrator) – Updated CRIPP Project list. (Public Works) – Grant awards for transportation projects that support 2024 CAAP goals (number and amount). (Public Works, Conservation and Development) 	<p>Time Frame Long term (by 2030)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Coordinate with Caltrans, CCTA, the Regional Transportation Planning Committees, and neighboring jurisdictions to plan, design, and implement Complete Street concepts on Routes of Regional Significance. – In collaboration with key partners, support efforts to establish or join a shared mobility program that provides access to conventional bicycle, e-bikes, and other micromobility modes, prioritizing access for low-income residents who do not have bicycles. Support efforts to establish and/or maintain bike repair programs. – Support efforts to expand the service area and frequency of regional transit agencies, and reduced fares for students, seniors, and low-income residents on systems, including AC Transit, BART, Capitol Corridor, County Connection, Tri Delta Transit, the San Francisco Bay Ferry, and WestCAT. Encourage programs that support "last mile" transportation connection and options. – Maximize development of jobs and affordable housing near high-quality transit service to support a jobs-housing balance. – Market the county's Northern Waterfront to attract innovative companies with jobs for residents. – Promote carpools, vanpools, other ridesharing, and park-and-ride lots by maintaining in place and enforcing a Transportation Demand Management (TDM) Ordinance that reflects best practices, and, at a minimum, conforms to Contra Costa Transportation Authority's adopted model TDM ordinance or resolution. (GM-P3.5) – Improve county-wide safety for bicyclists by advocating for the passage of Vulnerable Road User Laws. – Secure additional funding for the maintenance and expansion of bicycle and pedestrian infrastructure improvements. Support efforts to obtain additional funding to maintain and expand public transit operations and infrastructure improvements. 		

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<ul style="list-style-type: none"> – Support CCTA to develop and implement methods for tracking EV and e-bike charging and availability across jurisdictions. – Support CCTA and regional transit agencies in providing “last mile” transportation connections and options. – Encourage and support increased regional integration of transit systems to promote more equitable fare structures, fare integration, easier transfers, including coordinated transfers between different transit systems and reduced wait times, improved information sharing, and generally a more seamless and modern system. – Ensure emerging transportation technologies and travel options, such as autonomous and ZEVs and transportation network companies, support the County's goals for reducing emissions, adapting to climate change, improving public safety, and increasing equitable mobility. (TR-P2.3) 		
<p>TR-2: Increase the use of zero-emissions vehicles. Transition to a zero-emission County fleet by 2035 and a community fleet that is at least 50 percent zero-emission by 2030.</p> <ul style="list-style-type: none"> – Require new County vehicles to be zero emission to the extent a viable vehicle is available on the market, that charging or zero-emission fueling equipment is conveniently located where the vehicle will be stored, and as required by the Advanced Clean Fleet regulations, with the goal that all County vehicles will be zero-emission by 2035. – Continue adopting new or modified reach codes and consider future updates that exceed the California Building Code as the State updates the Building Code, including the Green Building Code, to require zero-emission charging infrastructure in new multifamily and nonresidential buildings. Explore expanding it to 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of zero-emission vehicles registered in unincorporated county. (Conservation and Development) – Percentage of County fleet that is zero-emission. (Public Works) – Implementation of an EV sharing program (Conservation and Development) – Number of electric vehicle charging ports installed at County facilities for County fleet and public use. (Public Works) – Number of EV ready parking spaces and EV charging stations installed with new development. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – BAAQMD – Contra Costa Transportation Authority – Environmental justice groups – MCE – Multifamily and rental property owners – TNC and taxi providers – BART – Caltrans – East Bay Leadership Council <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – New development

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>include new single-family homes (Supported by TR-P2.12 and TR-A2.12).</p> <ul style="list-style-type: none"> – Install electric vehicle charging equipment and other infrastructure needed to support the transition to a zero-emission County fleet at County facilities. Consider the appropriate locations, number, and capacity of infrastructure to facilitate the transition of the County fleet to zero-emission vehicles. – Provide incentives for zero-emission vehicles in partnership with MCE, BAAQMD, and other agencies. – Work with property owners and other potential partners to pursue installation of zero-emission vehicle charging stations in and near multifamily dwelling units. – Update off-street parking ordinance to include a requirement for zero-emission vehicle charging infrastructure. Consider including incentives for developers to exceed minimum requirements (i.e., density bonus). – Increase installation of electric vehicle charging stations for all vehicle types, including bicycles and scooters, at public facilities, emphasizing increased installation in Impacted Communities. – In partnership with regional agencies, explore providing subsidies for households making less than the area median income to purchase or lease zero-emission vehicles and associated infrastructure. – Pursue fees and regulatory efforts to convert transportation network company (TNC), taxi, and similar car-hire services to zero-emission vehicles. – Explore opportunities for implementing electric vehicle sharing programs. – Work with BAAQMD and other regional agencies to convert off-road equipment to zero-emission clean fuels. – Work with contractors, fleet operations, logistics companies, and other operators of heavy-duty vehicles to accelerate the transition to zero-emission heavy-duty vehicles. 	<p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of zero-emission vehicles purchased annually for County fleet. (Public Works) – Number of publicly accessible EV chargers installed throughout the unincorporated county. (Conservation and Development) 	<ul style="list-style-type: none"> – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame Ongoing</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – In cases where battery electric, hybrid, electric, and sustainable sourced hydrogen fuel cells are not available, work with Public Works to pursue the use of renewable natural gas (sourced from recovered organic waste) for transportation fuel, electricity, or heating applications i. – Encourage efforts to maximize EV charging during solar peak hours. – Continue to host events such as the Electric Vehicle and E-Bike Show to educate and empower County staff and community members about zero-emission vehicles. – Coordinate with CCTA and other local and regional agencies to support implementation of the Contra Costa County Electric Vehicle Readiness Blueprint and related policies and apply best practices in ZEV charging/fueling infrastructure requirements. (TR-A2.11). 		
<p>Resilient Communities and Natural Infrastructure: Contra Costa County will increase resilience to climate hazards and foster community health.</p>		
<p>NI-1: Protect against and adapt to changes in sea levels and other shoreline flooding conditions.</p> <ul style="list-style-type: none"> – Require new development to locate habitable areas of buildings above the highest water level expected accounting for sea level rise and other changes in flood conditions, or construct natural and nature-based features, or a levee, if necessary, adequately designed to protect the project for its expected life. (HS-P6.1) – Support the use of natural infrastructure, including ecosystem restoration and green infrastructure, to protect against sea level rise and associated shoreline flooding. – Coordinate with State and regional agencies, neighboring jurisdictions, property owners, utilities, and others to prepare a sea level rise adaptation plan. (Supported by HS-A6.3) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Establish a shoreline flooding working group. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Develop effective tracking metrics. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Existing development – New development <p>Applicability</p> <ul style="list-style-type: none"> – San Francisco Bay Conservation and Development Commission – Delta Stewardship Council – Shoreline communities – Irrigation districts – Community-based organizations – Land Trusts

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Seek funding and pursue implementation of wetland restoration and other adaptation efforts for sea level rise. (Supported by HS-P6.2) – Convene a working group that includes local jurisdictions, local shoreline communities, community-based organizations, property owners, businesses, and other stakeholders to collaborate on shoreline flooding adaptation strategies. – Identify opportunities for employing natural areas as buffers against rising sea levels. 		<p>Time Frame</p> <p>Long term (by 2030)</p>
<p>NI-2: Protect against and adapt to increases in the frequency and intensity of wildfire events.</p> <ul style="list-style-type: none"> – Deny applications for subdivisions creating additional residential units (i.e., units not allowed by-right) in Very High Fire Hazard Severity Zones. Discourage such subdivisions in High Fire Hazard Severity Zones unless adequate fire protection services are provided. (HS-P7.1) – Require any construction of buildings or infrastructure within a High or Very High Fire Hazard Severity Zone in the Local or State Responsibility Areas, or in areas that may be designated as the Wildland-Urban Interface, to incorporate fire-safe design features that meet the applicable State Fire Safe Regulations and Fire Hazard Reduction Around Buildings and Structures Regulations for road ingress and egress, fire equipment access, and adequate water supply. (HS-P7.2) – Require subdivisions in the High Fire Hazard Severity Zones in the Local or State Responsibility Areas, or projects requiring a land use permit in the High or Very High Fire Hazard Severity Zones in the Local or State Responsibility Areas, to complete a site-specific fire protection plan. Work with the appropriate fire protection district to review and revise the fire protection plans. (HS-P7.4) 	<p>Key Performance Measure(s):</p> <ul style="list-style-type: none"> – Amount of funds distributed for wildfire mitigation efforts. (Contra Costa Fire Protection District and other fire protection entities) – Miles of power lines undergrounded. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Residents in unincorporated areas. – Businesses in unincorporated areas. – County operations – Existing development – New development – Sheriff's Office of Emergency Services <p>Applicability</p> <ul style="list-style-type: none"> – Community-based organizations – Contra Costa County Fire Protection District – Facility operators (school districts, libraries, community centers, etc.) – Kensington Fire Protection District – Rodeo-Hercules Fire Protection District – Moraga-Orinda Fire District

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Work with property owners in High or Very High Fire Hazard Severity Zones or in areas that may be designated as the Wildland-Urban Interface, to establish and maintain fire breaks and defensible space, vegetation clearance, emergency access roads, water supply and fire flow, signage, and firefighting infrastructure that meet adopted State, County, or community fire safety standards. (HS-P7.5) – Coordinate with energy service providers to underground power lines, especially in the WUI and High and Very High Fire Hazard Severity Zones. (HS-P7.10) – Review indoor air filtration standards and consider whether filtration requirements can and should be strengthened for projects permitted by the County. – Work with community organizations to help Impacted Communities have access to financing and other resources to reduce the fire risk on their property, prepare for wildfire events, and allow for a safe and speedy recovery. 		<ul style="list-style-type: none"> – San Ramon Valley Fire Protection District – Medical service providers – 211 – Red Cross <p>Time Frame Long term (by 2030)</p>
<p>NI-3: Establish and maintain community resilience hubs.</p> <ul style="list-style-type: none"> – Pursue funding to develop a resilience hub master plan that identifies existing community facilities that can serve as resilience hubs and support affected populations during hazard events. This process should start with an assessment of community needs. Such facilities should be distributed equitably throughout the county, with an emphasis on easy access for Impacted Communities. Where appropriate facilities do not exist, develop plans to create new resilience hubs. (Supported by HS-P8.1) – Pursue funding to implement the resilience hub master plan, including retrofitting selected facilities to function as resilience hubs. These retrofits should involve adding solar panels, battery backup systems, water resources, air filtration, supplies to meet 	<p>Key Performance Measure(s):</p> <ul style="list-style-type: none"> – Adopted plan for community resilience hubs. (Conservation and Development) – Number of community resilience hubs. (Conservation and Development) – Number of permits issued for battery storage projects. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Community-based organizations – Contra Costa County Fire Protection District – Contra Costa County Sheriff’s Office of Emergency Services – Employment and Human Services – Environmental justice organizations – Facility operators (school districts, libraries, community centers, childcare facilities, etc.)

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>basic community and emergency medical needs, and other needs as identified by the resilience hub master plan.</p> <ul style="list-style-type: none"> – Create a virtual resilience hub that connects County resources to communities through virtual community networks to provide detailed, up-to-date information about preparing for natural disasters, public safety notifications and alerts, space for virtual gathering and information-sharing, and other appropriate uses. Materials shall be accessible in multiple languages. – Coordinate resilience hub activities with planning efforts around public safety power shutoffs and wildfire smoke resiliency. 		<ul style="list-style-type: none"> – Jurisdictional fire departments – Homeless service providers – Medical service providers – 211 – Contra Costa County Office of Education – Local school districts – Red Cross <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Residents in unincorporated areas. <p>Time Frame</p> <p>Mid-term (by 2028)</p>
<p>NI-4: Sequester carbon on natural and working lands in Contra Costa County.</p> <ul style="list-style-type: none"> – Pursue implementation of recommendations from carbon sequestration feasibility study, <i>Healthy Lands, Healthy People</i>. – Continue to support and work with key partners to maintain existing and establish new pilot programs for carbon sequestration on agricultural land. – Promote regenerative agricultural and landscaping techniques that incorporate cover crops, mulching, compost application, field borders, alley cropping, conservation crop rotation, prescribed grazing, and reduced tillage to promote healthy soil and soil conservation. (Supported by COS-P2.11) – Support soil conservation and restoration programs. Encourage agricultural landowners to work with agencies such as the USDA’s 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Completed feasibility study for carbon sequestration in Contra Costa County. (Conservation and Development) Completed 2023 <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of completed pilot carbon farming project(s). – Progress report on implementation of County’s Green Infrastructure Plan for County facilities. (Public Works) – Quantity of SB 1383-compliant compost procured and utilized by the County directly or on the County’s behalf. (Public Works, Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Contra Costa County Integrated Pest Management Advisory Committee – Agricultural groups – Community gardening groups – Community-based organizations – Contra Costa Resource Conservation District – East Bay Regional Park District – Save Mount Diablo, John Muir Land Trust, and other

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<p>NRCS and Contra Costa RCD to reduce erosion and soil loss. (COS-P2.10)</p> <ul style="list-style-type: none"> – Coordinate with farming groups, ranchers, the Contra Costa Resource Conservation District, and the University of California Cooperative Extension to identify and promote varieties of feedstock, livestock, and crops that are resilient to rising temperatures and changing precipitation patterns and that increase carbon sequestration. – Explore ways to increase carbon sequestration on County-owned properties. – Partner with regional landowners and agencies to establish carbon sequestration programs and incentives. – Consider the development of carbon offset protocols and guidance to provide technical support to applicants and County permitting staff to promote appropriate natural sequestration on natural and developed lands. – Ensure that any local or regional carbon sequestration program that the County establishes, promotes, supports, or joins must provide benefits to unincorporated communities that face environmental justice issues. – Explore the potential for the public to support tree planting and maintenance of existing trees. (Supported by COS-P6.2) – Establish a mechanism to support expanded tree planting and maintenance activities, particularly in areas with few trees. – Support protection, restoration, and enhancement of creeks, wetlands, marshes, sloughs, and tidelands, and emphasize the role of these features in climate change resilience, air and water quality, and wildlife habitat. (COS-P5.1) – Inventory wetlands, floodplains, marshlands, natural watercourses, riparian corridors, and adjacent lands that could potentially support climate adaptation (e.g., through flood management, filtration, or other beneficial ecosystem services) and mitigation (e.g., carbon sequestration). (COS-A5.1) 	<ul style="list-style-type: none"> – Progress in meeting recommendations from the 2023 Healthy Lands, Healthy People carbon sequestration feasibility study. (Conservation and Development) 	<p>land conservation organizations.</p> <ul style="list-style-type: none"> – Environmental justice organizations – Organizations that support regenerative landscaping and agriculture. – Regional landowners – UC Cooperative Extension – Contra Costa Health <p>Applicability</p> <ul style="list-style-type: none"> – County operations – East Contra Costa County Habitat Conservancy – Natural and working lands – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Long term (by 2030)</p>

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<ul style="list-style-type: none"> – Encourage and support conservation of natural lands outside the urban limit line in the unincorporated county. – Explore the new funding and financing opportunities for climate adaptation and resilience projects, including the creation of a Climate Resilience District, issuance of green bonds as a potential financing mechanism, and similar opportunities. – Require that any mitigation of air quality impacts occur on-site to the extent feasible to provide the greatest benefit to residents in unincorporated communities. For mitigation that relies on offsets, require that the offsets be obtained from sources as near to the project site as possible or from sources that would improve air quality in an Impacted Community. If the project site is within or adjacent to an Impacted Community, require offsets or mitigation within that community unless determined infeasible by the County (HS-P1.6). 		
<p>NI-5: Minimize heat island effects through the use of cool roofs, green infrastructure, tree canopy, cool paint and pavement, and other emerging strategies.</p> <ul style="list-style-type: none"> – Require landscaping for new development to filter and retain runoff and support flood management and groundwater recharge. (COS-P7.7) – Promote installation of drought-tolerant green infrastructure, including street trees, in landscaped public areas. (COS-P7.8) – Increase tree planting in urbanized areas, and open spaces where ecologically appropriate, emphasizing areas with limited existing tree cover, using low-maintenance native tree species that are low fire risk and ensuring water supply resources are not compromised. (Supported by COS-P6.2) – Consider preparing and implementing an Urban Forest Management Plan, or Tree Plan for the unincorporated county. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of permits for cool roofs, both private and County facilities. (Conservation and Development) – Adoption of an Urban Forest Management Plan, or Tree Plan. (Conservation and Development, Public Works) – Percent of heat-vulnerable communities with tree cover / number of new tree plantings. (Public Works) – Square feet of pervious pavers installed. (Public Works) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of ER visits, deaths, and associated clinical care related to extreme heat events. (Health) – Equity measure rankings on the Healthy Places Index. (Health) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Community-based organizations – Community gardening groups – Environmental justice organizations – Organizations that support regenerative landscaping and agriculture. – Water and wastewater service providers – Contra Costa Health and related partners – East Bay Regional Park District

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<ul style="list-style-type: none"> – Provide shade trees or shade structures at parks, plazas, and other outdoor spaces. (HS-P8.5) – When updating the County ordinances that relate to trees and green infrastructure, consider whether tree removal, planting, and/or replanting requirements adequately promote expansion of the tree canopy and green infrastructure in Impacted Communities. (Supported by TR-A2.2, HS-P2.2, and HS-A2.5) – Support efforts to develop incentive programs for home and business owners, school districts, and other local and regional property owners to increase the adoption of cool roofs, green infrastructure, and other cooling strategies on private property. 	<ul style="list-style-type: none"> – Acres treated by green stormwater infrastructure. (Public Works) 	<p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – New development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Midterm (by 2028)</p>
<p>NI-6: Protect communities against additional hazards created or exacerbated by climate change.</p> <ul style="list-style-type: none"> – Discourage new below-market-rate housing in High and Very High Wildfire Hazard Severity zones, the Wildland-Urban Interface, and Alquist-Priolo Fault Zones. If below-market-rate housing must be constructed within these zones, require it to be hardened or make use of nature-based solutions to remain habitable to the greatest extent possible. (HS-P4.2) – Treat susceptibility to hazards and threats to human health and life as primary considerations when reviewing all development proposals and changes to land uses. (Supported by HS-P4.1) – Partner with community-based organizations to provide information to community members about how to prepare for projected climate change hazards. – Promote, and develop as necessary, available funding sources to create incentives for residents and businesses to prepare for natural disasters, particularly members of Impacted Communities. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Health outcomes of residents in Impacted Communities relative to the prior performance review. (Health) – Number of substandard homes that pose a health risk to residents in Impacted Communities relative to the prior performance review. (Conservation and Development) – Amount of support provided to businesses in Impacted Communities through the County's small business assistance programs relative to the prior performance review. (Conservation and Development) – The rate of poverty in Impacted Communities relative to the prior performance review. (Conservation and Development) – Development and use of climate change vulnerability and resilience screening criteria for County capital investment projects. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Community-based organizations – Contra Costa County Fire Protection District – Facility operators (school districts, libraries, community centers, etc.) – Kensington Fire Protection District – Rodeo-Hercules Fire Protection District – Moraga-Orinda Fire District – San Ramon Valley Fire Protection District – Medical service providers – Contra Costa Health and related partners – 211 – Red Cross

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<ul style="list-style-type: none"> – Consider projected impacts of climate change when siting, designing, and identifying the construction and maintenance costs of capital projects. (Supported by HS-A4.1) – Actively promote and expand participation in local and regional community emergency preparedness and response programs. – Support and fund efforts to enhance ongoing community and cross-sector engagement in community-level resilience and cohesion. Support non-government organizations to actively engage in developing a network of community-level actions that enhance resiliency. – Work with energy service providers to promote programs encouraging reduced energy use during extreme heat events. (HS-P8.2) – Support efforts by East Bay Regional Park District and other local recreation agencies to provide outdoor recreation facilities with adequate shading and refillable water stations where appropriate. (HS-P8.4) 	<p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of County-led or -supported outreach and engagement activities in support of emergency preparedness and hazard mitigation. 	<ul style="list-style-type: none"> – Sheriff's Office of Emergency Services <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – New development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Near term (by 2026)</p>
<p>Climate Equity: Contra Costa County will address environmental factors leading to health disparities, promote safe and livable communities, and promote investments that improve neighborhood accessibility.</p>		
<p>CE-1: Provide access to affordable, clean, safe, and healthy housing and jobs.</p> <ul style="list-style-type: none"> – In partnership with community-based organizations, reverse community deterioration and blight and improve personal and property safety in neighborhoods throughout Contra Costa County. – Ensure that new housing for households making less than the area median income and housing for other Impacted Communities are outside of hazard-prone areas, including for wildfires, landslides, floods, and sea level rise, or that they are hardened or make use of nature-based solutions to remain habitable to the greatest extent possible. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Funds spent by County departments on energy efficiency and other services that support the Climate Action and Adaptation Plan goals in Impacted Communities compared to non-Impacted Communities. (Conservation and Development, Public Works) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Measures of health and social impacts of climate change that can reveal significant disparities and inequities across groups. (Health) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Community-based organizations – Environmental justice groups – Local grocery stores and food banks – Housing developers and contractors – Community colleges, schools, labor unions, and local career skills training programs – Workforce development programs

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<ul style="list-style-type: none"> – In partnership with community-based organizations, secure funding to establish a program to provide low-cost or free air conditioning and filtration, improved insulation, low-emitting materials, energy solar and storage systems, energy efficiency, and indoor ventilation in homes, emphasizing buildings that are home to Impacted Community members. (Supported by SC-A6.2 and SC-A6.3) – Track development of local micro-grid battery storage policies and systems in other jurisdictions and identify potential opportunities for Contra Costa County. – Encourage companies and entrepreneurs from local universities and national labs to create jobs in such industries as renewable energy, transportation technology, diverse forms of manufacturing, biotech/biomedical, and clean tech. – In partnership with residents of Impacted Communities, affected workers, business/industry, environmental and environmental justice advocates, community colleges, workforce development and training entities, local government, and other involved agencies, support transition from highly polluting industries to a net-zero emission economy based on renewable and sustainable industries that provide living-wage jobs. (SC-P1.1) – Provide support for State and federal programs that support family-sustaining jobs in sustainable industries, efforts to support organized labor, and living wage labor standards. – Adopt an ordinance at least as stringent as the State’s maximum idling laws, and coordinate with CARB and law enforcement to achieve compliance. (HS-A1.5) 		<ul style="list-style-type: none"> – Workforce Development Boards <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Existing development – New development – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Mid-term (by 2028)</p>
<p>CE-2: Invest in solutions to support climate equity.</p> <ul style="list-style-type: none"> – Evaluate and adjust County planning and expenditures for infrastructure and services as needed to ensure equitable investment in Impacted Communities, consistent with SB 1000. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Modified County investment policy to use ESG and to continue to prohibit investment in all securities issued by fossil fuel companies. (County Administrator, Treasurer/Tax Collector) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Community-based organizations – Contra Costa Employees Retirement Association

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<ul style="list-style-type: none"> – Work with County departments to incorporate addressing climate change, providing climate solutions, and enhancing community equity more fully into County operations and the broad range of services the County provides. – As part of the 2024 CAAP and General Plan implementation, consider whether the strategy being implemented provides equitable benefits for Impacted Communities as a criterion for prioritization. – Continually engage communities most affected by climate change in developing and implementing climate solutions and ensure that such solutions provide benefits to Impacted Communities. (Supported by HS-P4.3) – Advocate for the Contra Costa Employees Retirement Association to include use of Environmental, Social, and Governance criteria in its investment policies. – Require that the County's Deferred Compensation Plan provider make available Environmental, Social, and Governance investment options for employees participating in the County's 457 deferred compensation plan. – Amend the County investment policy to consider the use of Environmental, Social, and Governance criteria and to continue and improve efforts to divest from fossil fuels. – Work with schools, Contra Costa County Library, business groups, and community-based organizations to educate and inform community members about climate change and related sustainability topics, and the County's climate goals and the actions the County is taking to achieve them. – Evaluate the issuance of Labeled Bonds, such as "Green", "Sustainable", or "Social" bonds, during the planning stage of a bond issuance by the County. It is the County's preference to issue Labeled Bonds if the evaluation demonstrates a financial or policy benefit to the County. 	<p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of community engagement opportunities in which County staff participate, including presentations to community groups. – Advocacy for Contra Costa Employees Retirement Association to use ESG in its investment priorities and to offer environmentally and socially responsible investment choices for members. (Board of Supervisors) 	<ul style="list-style-type: none"> – Environmental justice groups – School and community college districts – Contra Costa County Library – Business groups – Youth groups <p>Applicability</p> <ul style="list-style-type: none"> – Impacted Communities – Residents in unincorporated areas. <p>Time Frame</p> <p>Mid-term (by 2028)</p>

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<p>CE-3: Increase access to parks and open space.</p> <ul style="list-style-type: none"> – Establish a goal for all residents to live within a half mile of a park or other green space. – Support land acquisition for new parks and open space areas and protect such lands through fee title acquisition or through deed restrictions like conservation easements. – Continue to construct and develop opportunities for new trails. – Support investment in existing park facilities, in partnership with regional agencies. – Increase the tree canopy on public property, especially in Impacted Communities and areas with a high heat index, by prioritizing funding for new street tree planting and maintenance. (HS-P2.2) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of residents in unincorporated county, including those in Impacted Communities, within a half mile of a park or other green space. (Conservation and Development) – Total acres of parks and green space by type. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Agricultural groups – Contra Costa Resource Conservation District – East Bay Regional Park District – Environmental justice groups – Local land trusts and land conservation groups – Housing developers <p>Applicability</p> <ul style="list-style-type: none"> – New development – Residents in unincorporated areas. <p>Time Frame</p> <p>Near term (by 2026)</p>
<p>CE-4: Ensure residents have equitable, year-round access to affordable, local fresh food.</p> <ul style="list-style-type: none"> – Support establishment of year-round Certified Farmers' Markets in all communities, prioritizing Impacted Communities. – Work with community groups to establish and maintain urban gardens, particularly on vacant lots and park land in Impacted Communities. (Supported by SC-P5.3) – Encourage major supermarkets to locate in Impacted Communities. (Supported by SC-P5.1 and SC-A5.3) – Support co-operative grocery markets in Impacted Communities. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of regular Certified Farmers' Markets in all communities and in Impacted Communities. (Agriculture) – Number of permits issued for urban gardens in all communities (if permits are required by policy). (Agriculture) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Number of residents participating in In Lieu of Services (ILOS) food benefits. (Health) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – Agricultural groups – Community gardening groups – Environmental justice groups – Farmers markets – Local grocery stores and food banks <p>Applicability</p> <ul style="list-style-type: none"> – Residents in unincorporated areas. – Businesses in unincorporated areas.

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<p>CE-5: Ensure that large industrial facilities act as good neighbors.</p> <ul style="list-style-type: none"> – Provide comments to responsible permit agencies on permit applications for large industrial facilities with significant emissions on potential measures to reduce impacts on and provide benefits to neighboring unincorporated communities. – Regularly track data on fossil fuel production and transportation in Contra Costa County. – Encourage the economic development of industries and supply chains that emphasize a reduction in GHG emissions. – Encourage economic development and job creation in industries that advance the County's sustainability goals, using the County's policy on enhanced infrastructure financing districts. – As economic conditions change, support efforts to phase out heavily polluting and extractive industries and replace them with businesses that contribute to a regenerative and circular economy. – Require new or expanded commercial and industrial projects resulting in 25,000 square feet or more of gross habitable floor area to be near zero-emission operations, including the facilities themselves and the associated fleets, except for uses with fewer than five vehicles domiciled on-site. Require all necessary measures to achieve near-zero emissions. (HS-P1.8) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Quantity and type of fossil fuels produced, refined, stored in, and distributed in the unincorporated county, to the extent data are available. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> – Information on specific fossil fuel facilities in Contra Costa County, including changes of ownership, mergers and acquisitions, investor presentations and reports, or any other public information that may indicate a facility's interest or intent to expand in the future, considering broader market trends in oil and gas refining and export in the Bay Area. (Conservation and Development) – Local air quality metrics. (Conservation and Development) 	<p>Time Frame Long term (by 2030)</p> <p>Potential Partners</p> <ul style="list-style-type: none"> – BAAQMD – CARB – Chambers of Commerce – East Bay Leadership Council – Community-based organizations – Environmental justice groups – Industry groups – Labor unions <p>Applicability</p> <ul style="list-style-type: none"> – Industrial operations – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame Ongoing and near term (by 2026)</p>

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<p>Leadership Strategies: Contra Costa County is a model for how local government can take action on climate issues.</p>		
<p>L-1: Establish Contra Costa County as a leader among local governments for addressing climate issues.</p> <ul style="list-style-type: none"> - Continue to publicize and support the operations of the County's Interdepartmental Climate Action Task Force and Green Government Group (G3) Champions. - Work with all County departments to encourage the adoption of best practices from the County's Green Business Program and other practices that support the County's climate goals. - Encourage development of new policies and initiatives that support the County's climate goals. - Explore the creation of funding mechanisms, including a carbon impact fee, to support the County's Sustainability Fund for investments in County facilities if additional financial resources are needed. - Support legislative efforts to establish a green bank able to equitably finance sustainability projects, including renewable energy, energy efficiency, and green infrastructure, for residential and commercial customers. (COS-A14.11) - Ensure that funding mechanisms to address climate change minimize or avoid disproportionate financial impacts to Impacted Communities and do not exacerbate economic inequities to the extent feasible. - Facilitate trainings for County staff on climate change (including the results of the Vulnerability Assessment and the 2024 CAAP) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> - Ongoing work products and semi-annual reports from Interdepartmental Climate Action Task Force. (Conservation and Development) - Annual report on conditions placed on discretionary projects to ensure support for Climate Action and Adaptation Plan goals. (Conservation and Development) - Number of County departments that have adopted their own Climate Action Plan or adopted practices that support the CAAP. (Conservation and Development) <p>Supportive Performance Metric(s):</p> <ul style="list-style-type: none"> - Number of County departments adopting best practices of the Green Business Program. (Conservation and Development) - Trainings and other information for County staff on climate change. (Conservation and Development) - Amount of pesticides applied to County properties. (Public Works, Health (IPM)) - Number of County facilities with an active integrated pest management plan. (Public Works, Health (IPM)) 	<p>Potential Partners</p> <ul style="list-style-type: none"> - All County departments - Interdepartmental Climate Action Task Force - Community-based organizations - Green Business Program - Contra Costa County Library <p>Applicability</p> <ul style="list-style-type: none"> - County operations - Businesses in unincorporated areas. <p>Time Frame</p> <p>Ongoing and midterm (by 2028)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>technical work) and how they can support climate action through their work with the County and at home.</p> <ul style="list-style-type: none"> – Encourage County employees to explore innovative technologies and programs that address climate change. – Incorporate integrated pest management into new construction and retrofit programs on County properties. – Ensure County departments follow the County's Environmentally Preferable Purchasing Policy and policy requirements are included in the contracting process. – Regularly review and revise the County's purchasing and contracting programs as necessary to ensure consistency with the County's sustainability and GHG reduction goals. (HS-A3.3) 		
<p>L-2: Continue to recognize the climate crisis as an emergency for Contra Costa County and make addressing climate change a top County priority.</p> <ul style="list-style-type: none"> – Continue to implement the 2020 Climate Emergency Resolution approved by the Board of Supervisors, including conducting periodic reviews and updates to the Resolution. – Consider climate vulnerabilities and associated equity effects as factors in the County's planning and expenditures for infrastructure and services to increase resilience and reduce GHG emissions countywide. – Consider development standards for the disclosure of climate and equity effects and vulnerabilities in staff reports for all decisions by the Board of Supervisors when such disclosures are helpful and necessary. Explore modifying County processes and forms to include questions to ensure the proposed action is consistent with the 2024 CAAP and equity goals. – Assess County programs, policies, operations, and projects (excluding stationary sources) for their contribution to achieving the County's GHG emissions reduction goals and consistency with the 2024 CAAP. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Actions taken to implement Climate Emergency Resolution. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – All County departments – Interdepartmental Climate Action Task Force – Community-based organizations – Local environmental groups <p>Applicability</p> <ul style="list-style-type: none"> – County operations <p>Time Frame</p> <p>Mid-term (by 2028)</p>



CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<ul style="list-style-type: none"> – Disclose GHG emissions to a registry such as the Carbon Disclosure Project (CDP). 		
<p>Implementation Strategies: Contra Costa County will ensure it follows through to achieve the goals and actions in this Climate Action and Adaptation Plan.</p>		
<p>IS-1: Monitor and report progress toward achieving Climate Action and Adaptation Plan goals on an annual basis.</p> <ul style="list-style-type: none"> – Assign responsibility for facilitating and supporting 2024 CAAP implementation to the County's Department of Conservation and Development. – Identify key staff from each department responsible for supporting 2024 CAAP implementation and updates for annual reporting and monitoring. – Continue to involve community-based organizations and other key stakeholders in reviewing and recommending 2024 CAAP action items. – Continue to prepare an annual progress report on implementation of the recommended GHG emissions reduction strategies and progress toward the 2024 CAAP goals. When information is available, provide updates on estimated GHG emissions reductions and current GHG emissions levels. – Monitor implementation of the Sustainability Fund for projects in County facilities – Use the 2024 CAAP implementation and monitoring tool to track GHG benefits from 2024 CAAP implementation and identify progress toward the 2024 CAAP reduction goals. – Pursue refinements to improve the County permitting system and other systems as needed to support collection of 2024 CAAP implementation data. – Work with Contra Costa Health on exploring, and if appropriate, developing health indicators related to climate change to help 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Preparation of Annual Report and presentation to Sustainability Commission and Board of Supervisors. (Conservation and Development) – Dedicated funding in annual budget for implementation of the 2024 CAAP. (County Administrator) – Regularly maintained 2024 CAAP tracking tool. (Conservation and Development) – Updates to County permitting system to support tracking of 2024 CAAP implementation. (Conservation and Development) – Sustainability Fund progress report. (Public Works) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – All County departments – Interdepartmental Climate Action Task Force – Sustainability Commission <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Ongoing and near term (by 2026)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>inform progress on current actions and effectiveness of adaptation strategies.</p>		
<p>IS-2: Continue collaborative partnerships with public agencies, private partners, and community groups that support Climate Action and Adaptation Plan implementation, with an emphasis on residents and community-based organizations from Impacted Communities.</p> <ul style="list-style-type: none"> – Participate in local and regional organizations that provide tools and support for energy efficiency, energy conservation, GHG emissions reductions, sustainable infrastructure development, adaptation, public information, and implementation of this 2024 CAAP. – Enable effective partnerships to implement high-priority strategies from the 2024 CAAP by working through established interagency collaborations and joint exercise of powers authorities and forming new arrangements of various types where necessary to be effective. – Provide input to partner agencies on policy barriers that need to be addressed at the State level. – Continue collaboration with other local governments in Contra Costa County on climate action and related subjects, including an annual Sustainability Exchange meeting of all local government staff in Contra Costa County that focus on climate action and adaptation planning and implementation. – Explore opportunities to form public-private partnerships that expand resources, including funding, in support of CAAP implementation. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Partnerships developed and maintained. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – All County departments – Interdepartmental Climate Action Task Force – Sustainability Commission – Agency partners – Community-based organizations <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Near term (by 2026)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>IS-3: Secure necessary funding to implement the Climate Action and Adaptation Plan.</p> <ul style="list-style-type: none"> – Develop a comprehensive funding strategy for the 2024 CAAP, including funding sources and levels, for reduction strategies as part of annual reporting. – Include GHG emissions reduction strategies in the capital improvement programs for County-owned and managed facilities and infrastructure, and other plans as appropriate. – Pursue local, regional, state, and federal grants to support implementation. – Explore dedicated funding sources for 2024 CAAP implementation, including from the Sustainability Fund or other revenue sources as needed. – Explore opportunities to allocate a portion of revenues from revenue-generating strategies in the 2024 CAAP to its implementation. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Climate action integration into all department work plans and capital improvement program. (County Administrator, Public Works) – Number of grants and amount of funding being pursued, awarded, and managed. (Conservation and Development) – CAAP funding strategy. (Conservation and Development) – Funding provided for the Sustainability Fund. (County Administrator) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – All County departments – Interdepartmental Climate Action Task Force – Agency partners <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Ongoing and near term (by 2026)</p>
<p>IS-4: Continue to update the baseline emissions inventory and Climate Action and Adaptation Plan every five years.</p> <ul style="list-style-type: none"> – Update the community-wide GHG emissions inventory every five years at a minimum and more frequently as resources are available. Prepare an inventory for the 2024 calendar year within a year of adoption of the 2024 CAAP. – Update the 2024 CAAP to incorporate new technologies, practices, and other options to further reduce emissions. (Supported by HS-A3.1) 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Updated GHG inventories every five years. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – All County departments – Interdepartmental Climate Action Task Force <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Timeframe</p> <p>Mid-term (by 2028)</p>

CAP STRATEGY AND IMPLEMENTATION ACTIONS	POTENTIAL IMPLEMENTATION PERFORMANCE METRICS AND LEAD DEPARTMENTS	POTENTIAL PARTNERS, APPLICABILITY, AND TIME FRAME
<p>IS-5: Maintain and update the Climate Action and Adaptation Plan to allow for greater resilience.</p> <ul style="list-style-type: none"> – Coordinate, where possible, updates of the Climate Action and Adaptation Plan, General Plan Safety Element, and Local Hazard Mitigation Plan cycles to ensure plan alignment and coordination of climate mitigation and adaptation efforts. – Assess the implementation status and effectiveness of adaptation strategies. 	<p>Key Performance Metric(s):</p> <ul style="list-style-type: none"> – Progress on implementing GHG emissions reduction strategies, climate adaptation strategies, and general sustainability strategies. (Conservation and Development) 	<p>Potential Partners</p> <ul style="list-style-type: none"> – All County departments – Interdepartmental Climate Action Task Force <p>Applicability</p> <ul style="list-style-type: none"> – County operations – Residents in unincorporated areas. – Businesses in unincorporated areas. <p>Time Frame</p> <p>Near term (by 2026)</p>

7. GLOSSARY

Adaptation. Making changes in response to current or future conditions (such as the increased frequency and intensity of climate-related hazards), usually to reduce harm and to take advantage of new opportunities.^{16,17}

Adaptive capacity. The “combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities”.¹⁸

Assets. A valued feature of a community that may be harmed by climate change. Assets may include buildings, infrastructure, community services, ecosystems, and economic drivers.¹⁹

Bay-friendly landscaping. A holistic approach to landscaping that works with the natural conditions of the San Francisco Bay Watershed. Bay-friendly practices foster soil health and conserve water and other valuable resources while reducing waste and preventing pollution.

Carbon-free energy. Means that the energy supplied by a resource generates no carbon emissions.

Carbon neutral. Reducing GHG emissions released to the atmosphere to zero over a period of time, either by entirely eliminating all GHG emissions or by balancing out all remaining GHG emissions through carbon removal practices so that the "net" emissions are zero.

Carbon offsets. A reduction or removal of emissions of carbon dioxide or other GHGs made to compensate for emissions made elsewhere.

Carbon sequestration. The process of storing carbon dioxide in locations other than the atmosphere, where it cannot contribute to climate change or ocean acidification. For the purposes of this plan, carbon sequestration refers to nature-based carbon removal through the storage of atmospheric carbon in vegetation, soils, woody products, and aquatic environments.²⁰

Climate change. A change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. In the context of this plan, refers to changes brought on by human activities.^{21,22}

Climate justice. The concept that no group of people should disproportionately bear the burden of climate change impacts or the costs of mitigation and adaptation.²³

Climate Resilience Districts. Special districts that can raise and allocate money to fund projects and operations that address climate change adaptation efforts, such as those to help protect against sea level rise, wildfire, and drought. They have the authority to establish special taxes, assessments, or other charges. Local governments may establish climate resilience districts under Assembly Bill 852, adopted in 2022.

Community-wide. Operative throughout the whole community.

Complete streets. A transportation facility that is planned, designed, constructed, operated, and maintained to provide comfortable and convenient mobility, and improve accessibility and connectivity to essential community destinations for all users, regardless of whether they are travelling as pedestrians, bicyclists, public transportation riders, or drivers. Complete streets are especially attuned to the needs of people walking, using assistive mobility devices, rolling, biking, and riding transit.²⁴

Direct access: Electricity purchased directly from an Electric Service Provider (ESP) rather than an investor-owned utility company or Community Choice Energy provider, generally to power large industrial, commercial, and institutional facilities.

Electric Service Provider (ESP): An entity that is not a utility company but provides electricity service to specific customers (usually large industrial, commercial, or institutional sites) within a utility's service area. This service is often known as direct access electricity. ESPs are overseen by State regulators.

Electric vehicle. A zero-emission vehicle that uses electricity stored in a battery to power one or more electric motors and can be plugged in at home, work, fleet, or public charging stations.²⁵

Embedded carbon (also known as embodied carbon). The total GHGs emitted in the production and use of a good or service. For example, the lifecycle GHG emissions of building materials would include emissions resulting from the extraction, manufacturing, transportation, installation, maintenance, and disposal of the materials.

Environmental, Social, and Governance (ESG). The implementation of a governance structure and reporting system that evaluates a company's performance related to environmental and social factors that go beyond the company's duty to maximize profits. *Environmental metrics* may include how well a company performs related to conserving energy, water, and other natural resources, protecting ecosystems and biodiversity,

reducing carbon emissions, mitigating climate change, and promoting resilience. *Social metrics* include factors such as whether a company is union friendly, provides fair pay and leave, prioritizes worker health and safety, and proactively seeks a diverse workforce. *Governance* refers to how the company manages both the environmental and social aspects of its policies, programs, and reporting.²⁶

Equity. The state in which each individual or group is allocated the resources needed to reach an equal outcome.^{27,28}

Exposure. The presence of people, infrastructure, natural systems, and economic, cultural, and social resources in areas that are subject to harm.²⁹

Extreme event. When a weather or climate variable exceeds the upper or lower thresholds of its observed range.^{30,31}

Extreme heat. Temperatures that are hotter than 98 percent of the historical high temperatures for the area, as measured between April and October of 1961 to 1990. Across Contra Costa County, the extreme heat threshold is 96.6°F, although it varies from 87.1°F in Kensington to 102.4°F in Byron.

Fire hazard severity zone. An area of significant fire hazard based on fuels, terrain, weather, and other relevant hazards.³²

First mile, last mile. Refers to the first or final mile of a trip, typically between the origin/final destination of the trip and the nearest public transit access point.

Graywater. Untreated wastewater that has not been contaminated by toilet discharge; affected by infectious, contaminated, or unhealthy bodily wastes; and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes.³³

Green bond. A green bond is a bond intended to finance projects with environmental benefits, such as renewable energy, public transportation, and pollution prevention and remediation.

Green infrastructure. Infrastructure that filters and absorbs stormwater where it falls. The federal Water Infrastructure Improvement Act (2019) defines green infrastructure as "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspire stormwater and reduce flows to sewer systems or to surface waters".³⁴

Greenhouse gas(es). Greenhouse gases (GHGs) are gases that allow sunlight to pass through but reflect heat radiated from the Earth's surface, trapping heat in the lower atmosphere. Common GHGs include water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). They may be emitted by natural or human processes.

Greenhouse gas (GHG) emissions inventory. A quantified list of a community's GHG emissions and sources.³⁵

Hazard. An event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, or other types of harm or loss.³⁶

Hazard mitigation. Sustained action taken to reduce or eliminate the long-term risk to human life and property by means of efforts that reduce hazard, exposure, and vulnerability.³⁷

Impact (Climate impact). The effects (especially the negative effects) of a hazard or other conditions associated with climate change.³⁸

Impacted Communities. Low-income areas that are disproportionately affected by environmental pollution and other hazards that can lead to negative health effects, exposure, or environmental degradation. Senate Bill (SB) 1000 labels such communities "disadvantaged communities", but county residents found that this term was neither supportive nor reflective of their community and opted for the term Impacted Communities instead. SB 1000 defines Impacted Communities per Health and Safety Code Section 39711, specifying CalEnviroScreen as the primary screening method for identifying Impacted Communities. In general, census tracts in the highest quartile of scores (75 to 100) are considered Impacted Communities under SB 1000.

Just Transition. Refers to the transition away from the extractive, profit-driven economy and culture to one that is ecologically sustainable, just, and equitable for all members of society. A central theme of the Just Transition is moving away from fossil fuels to renewable energy and the need to create sustainable green jobs for workers, particularly those in the fossil fuel industry.

Low-carbon building. Buildings designed and constructed to release little to no carbon over their lifetimes.

Low-carbon construction materials. Low-carbon construction materials may refer to building materials that meet the State’s requirements under AB 2446, which requires the State to develop a strategy for the building sector to achieve a 40 percent net reduction in GHG emissions of building materials by 2035.

Low-carbon energy. Energy sources that release less carbon than fossil fuels. Examples of low-carbon energy sources are solar, biomethane, and low- to zero-carbon hydrogen.³⁹

Low-Stress Bike Network. Low-stress cycling refers to the idea that a network may be established to ensure that there are ways in which cyclists can easily access areas throughout a community without being an extremely confident rider.⁴⁰

MCE. Community Choice Energy provider for unincorporated county and most of the cities in Contra Costa County.

Microgrid. According to the U.S. Department of Energy, a microgrid is a group of interconnected loads and distributed energy resources in clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can operate in either grid-connected or in island mode, including entirely off-grid applications.

Natural carbon sequestration. Assembly Bill 1757 (2022) defines natural carbon sequestration as “actions that are undertaken on natural and working lands to remove and provide storage of atmospheric greenhouse gases in vegetation and soils. This shall include preservation, conservation, restoration, and sustainable management of these lands, which may include compost application, cover crops, hedgerows, planned grazing, urban forestry, riparian restoration, restoration of tidal flows to wetlands, and other forms of wetland restoration, among other relevant actions”.⁴¹

Natural infrastructure. An area or system that is either naturally occurring or naturalized and then intentionally managed to provide multiple benefits for the environment and human well-being.

Natural and working lands. Lands not covered by buildings or structures, including forests, grasslands, shrublands, woodlands, rangelands, farmland, wetlands, coastal areas, and the green spaces in urban and built environments. These lands serve important ecological purposes, including providing food and fiber, clean air, water, flood protection, species habitats, and other resources and benefits.⁴²

Near zero-emission. A building, vehicle, technology, or other type of operation that uses zero-emission technologies, enables technologies that provide a pathway to zero-emissions operations, or incorporates other technologies that significantly reduce criteria pollutants, toxic air contaminants, and GHG emissions.⁴³

Net-zero. Means that emissions of GHGs to the atmosphere are balanced by removals of GHG emissions over a period of time.⁴⁴

Open space. Land that is not intensively developed for residential, commercial, industrial, or institutional use.

Qualified climate action plan. A climate action plan that meets State requirements such that future development projects requiring environmental review under State law can streamline greenhouse gas impact analyses by demonstrating consistency with the plan.

Reach code. A local municipal code that exceeds the State building code. An energy reach code must be at least as stringent as the statewide code, cost-effective, approved by the California Energy Commission, and updated and re-approved with each State Energy Code update.

Resilience. The capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience. Community resilience is the ability of communities to withstand, recover, and learn from past disasters to strengthen future response and recovery efforts.^{45,46,47}

Resilience Hubs. Community-serving facilities augmented to support residents and coordinate resource distribution and services before, during, and after a natural hazard event.

Risk. The potential for damage or loss created by the interaction of hazards with assets such as buildings, infrastructure, or natural and cultural resources.⁴⁸

Sea level rise. The worldwide average rise in mean sea level, which may be due to a number of different causes, such as the thermal expansion of sea water and the addition of water to the oceans from the melting of glaciers, ice caps, and ice sheets.⁴⁹

Sensitivity. The level to which a species, natural system, or community, government, etc. would be affected by changing climate conditions.⁵⁰

Social vulnerability. The susceptibility of a given population to harm from exposure to a hazard, directly affecting its ability to prepare for, respond to, and recover from the hazard.^{51,52}

Solid waste. The federal Resource Conservation and Recovery Act defines solid waste as “any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities. Nearly everything we do leaves behind some kind of waste. It is important to note that the definition of solid waste is not limited to wastes that are physically solid. Many solid wastes are liquid, semi-solid, or contain gaseous material”.

State Responsibility Area. The area in the state where the State of California has primary financial responsibility for the prevention and suppression of wildland fires.

Susceptibility. A person or population’s potential for vulnerability due to demographic, socioeconomic, and geolocation characteristics.⁵³

Sustainability. Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Transportation network company (TNC). Companies that provide prearranged transportation services for compensation using an online-enabled application or platform to connect drivers using their personal vehicles with passengers.

Unincorporated Area. All land and water within a county that is outside the boundaries of incorporated cities and towns. Development in the unincorporated area is subject to County land use regulations.

Unincorporated communities: Communities in the unincorporated areas of Contra Costa County subject to County land use regulations.

Urban heat island. The phenomenon in which large urban areas experience higher temperatures, greater pollution, and more negative health impacts during hot months due to a combination of heat-absorptive surfaces, heat-generating activities, and the absence of vegetation.⁵⁴

Vulnerable road user law. Laws that prioritize the safety of road users who are not motor vehicle drivers. Provisions may include instituting strong penalties for motor vehicle drivers who seriously injure people using roadways who are not protected within a motor vehicle.

Vulnerability. Climate vulnerability describes the degree to which natural, built, and human systems are susceptible “to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt”.⁵⁵

Vulnerability assessment. An analysis of how a changing climate may harm a community and which elements—people, buildings and structures, resources, and other assets—are most vulnerable to its effects based on an assessment of exposure, sensitivity, the potential impact(s), and the community’s adaptive capacity.⁵⁶

Wildland-urban interface. An area where houses and wildland vegetation directly intermingle, creating a significant threat to human life or property from wildfires.

Zero-emission vehicle. A vehicle that does not produce emissions when in operation, including battery-electric vehicles and hydrogen fuel cell electric vehicles.⁵⁷

Zero-net-energy building. A building where the value of the energy produced on-site by renewable energy resources is equal to the value of the grid energy consumed annually, as measured using the California Energy Commission’s Time Dependent Valuation Metric.⁵⁸

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APPENDIX A: KEY STATE AND REGIONAL CLIMATE CHANGE POLICY AND LEGISLATION

Since 2005, the State of California and regional agencies have responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing emissions in the public and private sectors through legislation starting with the first Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32) and more recently with aggressive statewide targets on greenhouse gas (GHG) reduction (Senate Bill [SB] 32 and AB 1279), renewable energy portfolio standard (SB 100), and zero-emissions vehicles (SB 1275). The following table provides a summary of key State and regional climate change policy and legislation through mid-2023, beginning with the most recent actions.

POLICY OR LEGISLATION	DATE	DESCRIPTION
<p>Bay Area Air Quality Management District (BAAQMD) Rules 9-4 and 9-6</p>	<p>2023</p>	<p>Nitrogen Oxides from Natural Gas-Fired Furnaces, Boilers, and Water Heaters</p> <p>BAAQMD adopted amendments to Regulation 9, Inorganic Gaseous Pollutants, Rule 4, Nitrogen Oxides from Natural Gas-Fired Furnaces (Rule 9-4), and Rule 6, Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). Space- and water-heating appliances generate a large portion of nitrogen oxide (NO_x) emissions from sources in the Bay Area. NO_x are a key criteria pollutant as a precursor to ozone and secondary particulate matter (PM) formation. The amendments would require more stringent NO_x emission standards for space- and water-heating appliances within the BAAQMD's jurisdiction starting in year 2023 and would substantially reduce NO_x emissions from these appliances commonly found in single-family homes and commercial applications.</p> <p>The amendments to Rules 9-4 and 9-6 include the following elements:</p> <ul style="list-style-type: none"> • Sales and installation of smaller water heaters and boilers (below 75,000 BTU/hour) must be zero emission, starting in 2027. • Sales and installation of furnaces (heat input rate less than 175,000 BTU/hour) must be zero emission starting in 2029.



POLICY OR LEGISLATION	DATE	DESCRIPTION
		<ul style="list-style-type: none"> Sales of larger water heaters and boilers (between 75,000 and 2 million BTU/hour) must be zero emission starting in 2031. <p>Existing appliances can remain in operation but the rule would apply once they need replacement.</p> <p>Nitrogen Oxides from Natural Gas-Fired Furnaces BAAQMD adopted the amendment to Regulation 9, Inorganic Gaseous Pollutants, Rule 4, Nitrogen Oxides from Natural Gas-Fired Furnaces (Rule 9-4). Space- and water-heating appliances generate a large portion of nitrogen oxide (NO_x) emissions from sources in the Bay Area. NO_x are a key criteria pollutant as a precursor to ozone and secondary particulate matter (PM) formation. The amended rule introduces new NO_x standards for new, natural gas-fired furnaces, requiring reduced NO_x emissions for devices beginning in 2024 and zero NO_x emissions for furnaces beginning in 2029. This more stringent NO_x emission standards for space-heating appliances within the BAAQMD's jurisdiction would substantially reduce NO_x emissions from these appliances commonly found in single-family homes.</p> <p>Nitrogen Oxides from Natural Gas-Fired Boilers and Water Heaters BAAQMD adopted the amendment to Regulation 9, Inorganic Gaseous Pollutants, Rule 6, Nitrogen Oxides Emissions from Natural Gas-Fired Boilers and Water Heaters (Rule 9-6). As mentioned, space- and water-heating appliances generate a large portion of NO_x emissions from sources in the Bay Area. This amendment would require new zero-NO_x standards with compliance dates ranging from 2027 to 2031 to new, natural gas-fired devices. More stringent NO_x emission standards for-water-heating appliances within the BAAQMD's jurisdiction would substantially reduce NO_x emissions from these appliances commonly found in single-family homes and commercial applications.</p>
Advanced Clean Fleets	2023	<p>California Air Resources Board (CARB) adopted the Advanced Clean Fleet standards in August of 2023. This regulation requires California state and local government fleets, including city, county, special district, and State agency fleets, to ensure 50% of vehicle purchases are zero-emissions beginning in 2024</p>



Key Climate Change Policy and Legislation

POLICY OR LEGISLATION	DATE	DESCRIPTION
		<p>and 100% of vehicle purchases are zero-emissions by 2027. They must also initially submit a compliance report by April 1, 2024. Small government fleets of 10 or fewer vehicles and those in designated counties would start their ZEV purchases beginning in 2027. Alternatively, State and local government fleet owners may elect to use the ZEV Milestones Option. State and local government fleets may purchase either ZEVs or near-ZEVs, or a combination of ZEVs and near-ZEVs, until 2035. Starting in 2035, only ZEVs will meet the requirements.</p>
<p>Title 24, Part 6, Building Energy-Efficiency Standards</p>	<p>2022, updated every three years</p>	<p>The California Energy Resources Conservation and Development Commission (now the CEC) adopted energy conservation standards for new residential and nonresidential buildings in June 1977 and most recently revised in 2022. (Title 24, Part 6, of the California Code of Regulations [CCR]). Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. The 2022 Building Energy Efficiency Standards, which were adopted on August 11, 2022, went into effect January 1, 2023.</p>
<p>Title 24, Part 11, Green Building Standards Code (CALGreen)</p>	<p>2022, updated every three years</p>	<p>On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards, the California Green Building Standards Code (24 CCR, Part 11, known as "CALGreen") as part of the California Building Standards Code. CALGreen establishes planning and design standards for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The mandatory provisions of CALGreen became effective January 1, 2011. Like the other parts of Title 24, CALGreen is updated every three years. The current version of CALGreen was adopted in 2022 and became effective on January 1, 2023.</p>
<p>Title 20, Appliance Efficiency Regulations</p>	<p>2020, updated every three years</p>	<p>The CEC adopted the 2016 Appliance Efficiency Regulations (Title 20 CCR Sections 1601–1608), which include standards for both federally regulated appliances and non-federally regulated appliances. Though these regulations are now often viewed as</p>

POLICY OR LEGISLATION	DATE	DESCRIPTION
		"business as usual", they exceed the standards imposed by all other states, and they reduce GHG emissions by reducing energy demand. California introduced Title 20 requirements in two phases, with Tier I effective January 1, 2018, and Tier II effective July 1, 2019.
Advanced Clean Car II standards	2022	California Air Resources Board (CARB) adopted the Advanced Clean Car II standards in August of 2022. This regulation requires that all new light-duty vehicles (e.g., passenger cars, small trucks, and SUVs) sold in the state to be zero-emission by 2035, with interim targets for new light-duty vehicle sales beginning in 2026. There are some limited exceptions for plug-in hybrid vehicles.
Senate Bill 852	2022	Authorizes cities, counties, special districts, or a combination of any of the above to form a climate resilience district for the purposes of raising and allocating funding for eligible projects and the operating expenses of eligible projects.
Assembly Bill 1757	2022	Requires the California Natural Resources Agency (CNRA), by January 1, 2024, in collaboration with CARB, the California Environmental Protection Agency (CalEPA), the California Department of Food and Agriculture (CDFA), and an expert advisory committee, to set targets for natural carbon sequestration and nature-based climate solutions for 2030, 2038, and 2045, which must be integrated into the Scoping Plan and other State policies. CARB must ensure that double counting of emissions reductions is avoided and emissions reduction projects and actions that receive State funding will not be eligible to generate credits under any market-based compliance mechanism. CARB, by January 1, 2025, must develop standard methods for State agencies to track GHG emissions and reductions, carbon sequestration, and, where feasible, additional benefits from natural and working lands over time. CNRA, by January 1, 2025, in collaboration with CARB, CalEPA, and CDFA, must review and update the Climate Smart Strategy to achieve the targets and post data on its website on progress made toward targets, including on State expenditures made to implement the targets.
Assembly Bill 1279	2022	The California Climate Crisis Act codifies the statewide carbon neutrality goal. It directs the State to achieve



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POLICY OR LEGISLATION	DATE	DESCRIPTION
		net zero GHG emissions as soon as possible, but no later than 2045, and to achieve and maintain net negative GHG emissions thereafter, and to ensure that by 2045, statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 levels.
Senate Bill 596	2021	Requires CARB to establish a strategy to reduce GHG emissions in the concrete and cement sector by 40% from 2019 levels by 2030 and to achieve carbon neutrality as soon as possible, but no later than 2045.
Senate Bill 27	2021	Creates the California Carbon Sequestration and Climate Resilience Project Registry to maintain a list of eligible but unfunded projects, which then may be funded by public or private entities to mitigate California's GHG emissions and improve climate resilience. Also directs CARB to add carbon sequestration to the state's climate projection efforts.
Advanced Clean Trucks	2023	California Air Resources Board (CARB) adopted the Advanced Clean Trucks standards in August of 2022 accelerate a large-scale transition of zero-emission medium-and heavy-duty vehicles from Class 2b to Class 8.
N-82-20	2020	The order directs state agencies to deploy a number of strategies to store carbon in the state's natural and working lands and remove it from the atmosphere. The order also sets a first-in-the-nation goal to conserve 30% of the state's land and coastal water by 2030 (30x30) to fight species loss and ecosystem destruction. Directs state agencies to pursue innovative actions, strategies and partnerships to maximize the full climate benefits of natural and working land, through healthy soils management, including planting cover crops, hedgerows and compost applications; wetlands restoration to protect coastal areas; active forest management to reduce catastrophic risk and restore forest health; and boosting green infrastructure in urban areas like trees and parks.
N-79-20	2020	Identifies three zero-emissions goals: (1) 100% of in-state sales of new light-duty vehicles (i.e., passenger cars and trucks) will be zero-emission by 2035; (2) 100% of medium- and heavy-duty vehicles in the State be zero-emission by 2045 for all operations where feasible; and (3) the State will transition to 100% zero-emission off-road vehicles and equipment by 2035 where feasible. The order directs CARB to develop regulations

POLICY OR LEGISLATION	DATE	DESCRIPTION
		and strategies to achieve these goals. CARB adopted regulations for light-duty vehicles in August 2022 through the Advanced Clean Cars II rulemaking process.
Assembly Bill 2800	2020	Establishes Climate-Safe Infrastructure Working Group for the purpose of examining how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.
Senate Bill 743	2020	Amends the standards for determining negative environmental impacts from new development under the California Environmental Quality Act (CEQA) from level of service (traffic congestion levels) to vehicles miles traveled (VMT).
Senate Bill 1035	2018	Requires local planning agencies to review and, if necessary, revise the safety element upon each revision of the housing element or local hazard mitigation plan, not less than every 8 years, to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies. Allows cities and counties to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies that was not available during the previous revision of the safety element.
Senate Bill 100	2018	100 Percent Clean Energy Act of 2018. Requires the state to purchase 100% of total retail sales of electricity from eligible renewable energy resources and zero-carbon resources by 2045.
B-55-18	2018	Signed September 10, 2018, sets a goal “to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter”. Directs CARB to work with relevant state agencies to ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal. The goal of carbon neutrality by 2045 is in addition to other statewide goals, meaning not only should emissions be reduced to 80% below 1990 levels by 2050, but that, by no later than 2045, the remaining emissions should be offset by equivalent net removals of CO ₂ e from the atmosphere, including through sequestration in forests, soils, and other natural landscapes.
Assembly Bill 617	2017	Companion to Cap-and-Trade Extension. Establishes a groundbreaking program to measure and reduce air pollution from mobile and stationary sources at the



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		neighborhood level in the communities most impacted by air pollutants. Requires the Air Resources Board to work closely with local air districts and communities to establish neighborhood air quality monitoring networks and to develop and implement plans to reduce emissions. The focus on community-based air monitoring and emission reductions will provide a national model for enhanced community protection.
Assembly Bill 398	2017	Cap-and-Trade Extension. Extends and improves the Cap-and-Trade Program, which will enable the state to meet its 2030 emission reduction goals in the most cost-effective manner. Furthermore, extending the Cap-and-Trade Program will provide billions of dollars in auction proceeds to invest in communities across California.
Senate Bill 1	2017	Transportation funding legislation that increases the state's gasoline tax by \$0.12 per gallon, raising over \$5 billion per year for transportation projects including improvements in efficiency and emission reduction.
Senate Bill 1383	2016	Short-Lived Climate Pollutants Strategy. Establishes statewide reduction targets for short-lived climate pollutants, including black carbon and methane (CH ₄). Black carbon is the light-absorbing component of fine particulate matter produced during incomplete combustion of fuels. SB 1383 requires the state board, no later than January 1, 2018, to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants to achieve a reduction in methane by 40%, hydrofluorocarbon gases by 40%, and anthropogenic black carbon by 50% below 2013 levels by 2030. The bill also establishes targets for reducing organic waste in landfills. On March 14, 2017, CARB adopted the Short-Lived Climate Pollutant Reduction Strategy, which identifies the state's approach to reducing anthropogenic and biogenic sources of short-lived climate pollutants. Anthropogenic sources of black carbon include on- and off-road transportation, residential wood burning, fuel combustion (charbroiling), and industrial processes.
Assembly Bill 197	2016	Greenhouse gas regulations. Prioritizes direct emission reductions from large stationary sources and mobile sources.



POLICY OR LEGISLATION	DATE	DESCRIPTION
Senate Bill 32	2016	GHG emission reduction target for 2030. Establishes a statewide GHG emission reduction target of 40% below 1990 levels by 2030.
B-30-15	2015	Executive Order B-30-15, signed April 29, 2015, sets a goal of reducing GHG emissions within the State to 40% of 1990 levels by the year 2030. Executive Order B-30-15 also directs CARB to update the Scoping Plan to quantify the 2030 GHG reduction goal for the State and requires State agencies to implement measures to meet the interim 2030 goal as well as the long-term goal for 2050 in Executive Order S-03-05.
Assembly Bill 1482	2015	Requires Natural Resources Agency, beginning July 1, 2017, and every 3 years thereafter, to update the state's climate adaptation strategy. Requires state agencies to maximize specified objectives, including, among others, promoting the use of the climate adaptation strategy to inform planning decisions and ensure that state investments consider climate change impacts, as well as promote the use of natural systems and natural infrastructure, as defined, when developing physical infrastructure to address adaptation.
Senate Bill 379	2015	Climate Adaptation and Resiliency Strategies. Requires cities and counties to include climate adaptation and resiliency strategies in the safety elements of their general plans. Cities and counties with an adopted local hazard mitigation plan prior to 2017, are to address climate change in the safety element of the general plan upon the next revisions or update of the local hazard mitigation plan. Cities and counties that do not have an adopted local hazard mitigation plan must update the safety element of the general plan to address climate adaptation and resiliency by January 1, 2022. The bill requires the climate adaptation update to include a set of goals, policies, and objectives based on a vulnerability assessment, as well as implementation measures, including the conservation and implementation of natural infrastructure that may be used in adaptation projects.



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Senate Bill 350	2015	Clean Energy and Pollution Reduction Act of 2015. Establishes targets to increase retail sales of renewable electricity to 50% by 2030 and double the energy-efficiency savings in electricity and natural gas end uses by 2030.
Assembly Bill 246	2015	Establishes the Integrated Climate Adaptation and Resiliency Program to be administered by the Office of Planning and Research to coordinate regional and local efforts with state climate adaptation strategies to adapt to the impacts of climate change, as specified. Also requires within one year of an update to the Safeguarding California Plan, the Office of Emergency Services, in coordination with the Natural Resources Agency, the Office of Planning and Research, and relevant public and private entities, to review and update, as necessary, the Adaptation Planning Guide, as specified. The bill establishes an advisory council to support the goals of the Office of Planning and Research and a clearinghouse for climate adaptation information.
Senate Bill 605	2014	Short-lived climate pollutants. Requires CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants by January 1, 2016.
Senate Bill 1826	2014	Organic Waste Diversion. Requires businesses to recycle their organic waste on and after April 1, 2016, depending on the amount of waste they generate per week. This law also requires that on and after January 1, 2016, local jurisdictions across the state implement an organic waste recycling program to divert organic waste generated by businesses and multifamily residential dwellings with five or more units. Organic waste means food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed with food waste.
Senate Bill 1275	2014	Charge Ahead California Initiative. Establishes a state goal of 1 million zero-emission and near-zero-emission vehicles in service by 2020. Amends the enhanced fleet modernization program to provide a mobility option. Establishes the Charge Ahead California Initiative requiring planning and reporting on vehicle incentive programs and increasing access to and benefits from zero-emission vehicles for

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		disadvantaged, low-income, and moderate-income communities and consumers.
Senate Bill 1204	2014	California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program. Creates the California Clean Truck, Bus, and Off-Road Vehicle and Equipment Technology Program funded by the Greenhouse Gas Reduction Fund for development, demonstration, precommercial pilot, and early commercial deployment of zero- and near-zero emission truck, bus, and off-road vehicle and equipment technologies, with priority given to projects benefiting disadvantaged communities.
Assembly Bill 8	2013	Alternative fuel and vehicle technologies funding programs. Extends until January 1, 2024, extra fees on vehicle registrations, boat registrations, and tire sales to fund the AB 118, Carl Moyer, and AB 923 programs that support the production, distribution, and sale of alternative fuels and vehicle technologies and air emissions reduction efforts. The bill suspends until 2024 CARB's regulation requiring gasoline refiners to provide hydrogen fueling stations and appropriates up to \$220 million of AB 118 money to create hydrogen fueling infrastructure in the state.
Assembly Bill 1092	2013	Building standards for electric vehicle charging infrastructure. Requires the Building Standards Commission to adopt mandatory building standards for the installation of future electric vehicle charging infrastructure for parking spaces in multifamily dwellings and nonresidential development.
Senate Bill 535	2012	Greenhouse Gas Reduction Fund and Disadvantaged Communities. Requires the California Environmental Protection Agency to identify disadvantaged communities; requires that 25% of all funds allocated to the Greenhouse Gas Reduction Fund established by AB 32 go to projects that benefit disadvantaged communities, with at least 10% going to projects located within these communities. Requires the Department of Finance to include a description of how these requirements are fulfilled in an annual report.
Assembly Bill 1532	2012	Greenhouse Gas Reduction Fund in the Budget. Requires the Department of Finance to develop and submit to the Legislature an investment plan every three years for the use of the Greenhouse Gas



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		Reduction Fund; requires revenue collected pursuant to a market-based compliance mechanism to be appropriated in the Annual Budget Act; requires the department to report annually to the Legislature on the status of projects funded; and specifies that findings issued by the Governor related to “linkage” as part of a market-base compliance mechanism are not subject to judicial review.
Senate Bill X1-2	2011	Directs the California Public Utilities Commission's (CPUC's) Renewable Energy Resources Program to increase the amount of electricity generated from eligible renewable energy resources per year to an amount that equals at least 20% of the total electricity sold to retail customers in California per year by December 31, 2013, 25% by December 31, 2016 and 33% by December 31, 2020. In 2018, Senate Bill 100 was signed into law, which increases the RPS to 60% by 2030 and requires all the state's electricity to come from carbon-free resources by 2045 (see above). The new RPS goals apply to all electricity retailers in the state including publicly owned utilities (POUs), investor-owned utilities, electricity service providers, and community choice aggregators. This new RPS preempts the California Air Resources Board's 33% Renewable Electricity Standard.
Assembly Bill 1504	2011	Requires Department of Forestry and Fire Protection and Air Resources Board to assess the capacity of its forest and rangeland regulations to meet or exceed the state's greenhouse goals, pursuant to AB 32.
Assembly Bill 341	2011	AB 341 (Chapter 476, Statutes of 2011) increases the statewide goal for waste diversion to 75% by 2020 and requires recycling of waste from commercial and multifamily residential land uses. Section 5.408 of CALGreen also requires that at least 65% of the nonhazardous construction and demolition waste from nonresidential construction operations be recycled and/or salvaged for reuse.
Senate Bill X7-7	2010	20x20 Water Conservation Plan. Mandates urban water conservation and authorized the Department of Water Resources (DWR) to prepare a plan implementing urban water conservation requirements (20x2020 Water Conservation Plan). In addition, it requires agricultural water providers to prepare agricultural water management plans, measure water

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		deliveries to customers, and implement other efficiency measures. SBX7-7 requires urban water providers to adopt a water conservation target of 20% reduction in urban per capita water use by 2020 compared to 2005 baseline use.
Assembly Bill 2514	2010	Requires electric utilities to install minimum levels of grid-scale energy storage infrastructure.
Senate Bill 375	2008	Requires CARB to develop regional GHG emission reduction targets for passenger vehicles. CARB established targets for 2020 and 2035 for each region covered by one of the State's 18 metropolitan planning organizations (MPO). CARB is required to update the targets for the MPOs every eight years.
Assembly Bill 118	2007	Creates the Alternative and Renewable Fuel and Vehicle Technology Program, to be administered by the Energy Commission, to provide funding to public projects to develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies.
Senate Bill 97	2007	Directs Governor's Office of Planning and Research to develop CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions."
Assembly Bill 1881	2006	The Water Conservation in Landscaping Act of 2006 requires local agencies to adopt the updated DWR model ordinance or an equivalent. Requires the CEC to consult with the DWR to adopt, by regulation, performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.
Assembly Bill 1803	2006	GHG inventory transferred to Air Resources Board from the Energy Commission.
Senate Bill 1	2006	California's Million Solar Roofs plan is enhanced by the CPUC and CEC's adoption of the California Solar Initiative. SB 1 directs CPUC and CEC to expand this program to more customers and requires the state's municipal utilities to create their own solar rebate programs. This bill would require, beginning January 1, 2011, a seller of new homes to offer the option of a



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		solar energy system to all customers negotiating to purchase a new home constructed on land meeting certain criteria and to disclose certain information.
Senate Bill 107	2006	Directs CPUC's Renewable Energy Resources Program to increase the amount of renewable electricity (RPS) generated per year, from 17% to an amount that equals at least 20% of the total electricity sold to retail customers in California per year by December 31, 2010.
Assembly Bill 32	2006	California Global Warming Solutions Act of 2006. Requires CARB to adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990 to be achieved by 2020. CARB shall adopt regulations to require the reporting and verification of statewide GHG emissions and to monitor and enforce compliance with this program. AB 32 directs Climate Action Team established by the Governor to coordinate the efforts set forth under Executive Order S-3-05 to continue its role in coordinating overall climate policy.
Executive Order S-03-05	2005	Signed June 1, 2005, set the following GHG reduction targets for the state: 2000 levels by 2010, 1990 levels by 2020, and 80% below 1990 levels by 2050.
Senate Bill 1078	2002	Establishes the California RPS Program, which requires electric utilities and other entities under the jurisdiction of the CPUC to meet 20% of their renewable power by December 31, 2017, for the purposes of increasing the diversity, reliability, public health, and environmental benefits of the energy mix.
Senate Bill 812	2002	Adds forest management practices to the California Climate Action Registry members' reportable emissions actions and directed the Registry to adopt forestry procedures and protocols to monitor, estimate, calculate, report, and certify carbon stores and carbon dioxide emissions that resulted from the conservation-based management of forests in California.
Assembly Bill 1493	2002	State law requiring the first set of GHG emission standards for passenger vehicles. Requires the registry, in consultation with CARB, to adopt procedures and protocols for the reporting and certification of reductions in GHG emissions from mobile sources for use by the state board in granting the emission reduction credits. This bill requires the state board to

POLICY OR LEGISLATION	DATE	DESCRIPTION
		develop and adopt, by January 1, 2005, regulations that achieve the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks.
Senate Bill 527	2001	Revises the functions and duties of the California Climate Action Registry and requires the Registry, in coordination with CEC to adopt third-party verification metrics, developing GHG emissions protocols and qualifying third-party organizations to provide technical assistance and certification of emissions baselines and inventories. SB 527 amended SB 1771 to emphasize third-party verification.
Senate Bill 1771	2000	Establishes the creation of the non-profit organization, the California Climate Action Registry and specifies functions and responsibilities to develop a process to identify and qualify third-party organizations approved to provide technical assistance and advice in monitoring GHG emissions and setting GHG emissions baselines in coordination with CEC. Also, the bill directs the Registry to enable participating entities to voluntarily record their annual GHG emissions inventories. Also, SB 1771 directs CEC to update the state's GHG inventory from an existing 1998 report and continuing to update it every five years.
Assembly Bill 939	1989	California's Integrated Waste Management Act of 1989, AB 939 (Public Resources Code §§ 40050 et seq.) sets a requirement for cities and counties throughout the state to divert 50% of all solid waste from landfills by January 1, 2000, through source reduction, recycling, and composting. In 2008, the requirements were modified to reflect a per capita requirement rather than tonnage. To help achieve this, the act requires that each city and county prepare and submit a source reduction and recycling element. AB 939 also established the goal for all California counties to provide at least 15 years of ongoing landfill capacity.
Assembly Bill 4420	1988	Directs the CEC to prepare and maintain the inventory of GHG emissions and to study the effects of GHGs and climate change impacts on the state's energy supply and demand, economy, environment, agriculture, and water supplies. The study also required recommendations for avoiding, reducing, and addressing related impacts - and required the CEC to



Key Climate Change Policy and Legislation

POLICY OR LEGISLATION	DATE	DESCRIPTION
		coordinate the study and any research with federal, state, academic, and industry research projects.
Sources: Statewide Energy Efficiency Climate Collaborative Climate Action Plan 2.0 Template; University of California Berkeley Center for Law, Energy, and the Environment, California Climate Policy Dashboard.		



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APPENDIX B: TECHNICAL GHG APPENDIX

This appendix provides details for Contra Costa County's greenhouse gas (GHG) emissions inventory and forecast in **Chapter 3** of the 2024 Climate Action and Adaptation Plan (CAAP) and the GHG emission reduction pathway presented in **Chapter 4** of the 2024 CAAP. It summarizes the technical details and findings from these analyses as well as the data sources, assumptions, and performance metrics used to assess the potential for GHG savings from State and local existing and planned efforts and the reduction strategies associated with the CAAP.

Inventory and Forecast

As part of the preparation of the 2015 CAP, Contra Costa County and its regional partners and technical consultants prepared community-wide and County operations GHG inventories for the calendar years 2005 and 2013. The 2015 CAP identified the year 2005 as the baseline year for emission reductions, as this was considered a year with good data availability at the time, consistent with State guidance, and without any unusual factors that might affect GHG emissions.

As part of the 2024 CAAP update process, the project teams prepared inventories of community-wide emissions for the years 2017 and 2019. County staff made some updates to the 2005 and 2013 community-wide inventories in the 2015 CAP to ensure a consistent method and approach across all inventory years. County staff have also prepared a County operations GHG emissions inventory for the year 2017.

This document presents the full results of the Contra Costa County community-wide GHG inventory and the County operations inventory and is the most up-to-date summary of Contra Costa County's GHG emissions.

PROTOCOLS

A series of guidance documents, called protocols, provide recommendations on how to adequately assess GHG emissions. The project team prepared the new GHG inventories and updates to past GHG inventories consistent with the guidance in widely adopted, standard protocol documents. These protocols provide guidance on what activities should be evaluated in the GHG inventories and how emissions from those activities should be assessed. Using standard methods also allows for an easy comparison of GHG emission levels across multiple years and communities.

- The County operations GHG inventory relies on the Local Government Operations Protocol (LGOP), which was first developed in 2008 and was updated in 2010. The LGOP is a tool for accounting and reporting GHG emissions of local government (municipal) operations and is used throughout California and the United States. The LGOP includes guidance from several existing programs as well as the state's mandatory GHG reporting regulations.
- The community-wide GHG inventory uses the United States Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (U.S. Community Protocol), which was first developed in 2012 and updated most recently in 2019. The California Governor's Office of Planning and Research encourages cities and counties in California to follow the U.S. Community Protocol for community-wide GHG emissions.
- A third protocol, the Global Protocol for Community-Scale Greenhouse Gas Inventories (Global Protocol) was first developed in 2014 and is intended for use in preparing international community-scale GHG inventories. It is largely consistent with the U.S. Community Protocol, although it contains additional guidance and resources to support a wider range of activities that may be found in other countries. The project team has used the Global Protocol to assess GHG emissions from sources that are not covered in the U.S. Community Protocol.

GHG inventories are estimates of GHG emissions based on these standard methods and verified datasets. While they are not direct measurements of GHG emissions, the use of the standard methods identified in the protocols, in combination with accurate data from appropriate sources, allows GHG inventories to provide reliable estimates of local emission levels. Due to potential data limitations, some inconsistencies in methods may remain. Any concerns about inconsistent methods are noted in the appropriate sector discussion.

UNITS OF MEASUREMENT

GHG inventories and forecasts assess emissions in a unit called carbon dioxide equivalent (CO₂e), which is a combined unit of all GHGs analyzed in the inventory. As different GHGs have different effects on the processes that drive climate change, CO₂e is a weighted unit that reflects the relative potency of the different GHGs. These inventories report amounts of GHGs in metric tons of CO₂e (MTCO₂e), equal to 1,000 kilograms or approximately 2,205 pounds.

EMISSION FACTORS

An emission factor describes how many MTCO₂e are released per unit of an activity. For instance, an emission factor for electricity describes the MTCO₂e produced per kilowatt hours (kWh) of electricity used. Since different sources of electricity can have different emission factors, the emission factors in **Table B-1** represent a weighted average of emission factors across electricity sources and portfolios (e.g., MCE's Light Green and Deep Green products). The emission factor for on-road transportation describes the MTCO₂e produced per mile of driving. The project team calculated most of the GHG emissions using data on GHG-generating activities in combination with emission factors. Some sources of GHG emissions (known as sectors), including agriculture and off-road emissions, are calculated using formulae or models and do not have specific emission factors. **Table B-1** shows the emission factors for the inventory years for the unincorporated area.

TABLE B-1. GHG INVENTORY EMISSION FACTORS, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE	SOURCE
PG&E electricity (MTCO ₂ e/kWh)	0.000226	0.000195	0.000096	0.000108	-52%	PG&E
Direct access electricity (MTCO ₂ e/ kWh)	0.000388	0.000309	0.000208	0.000187	-52%	California Energy Commission
MCE electricity (MTCO ₂ e/ kWh)	N/A	N/A	0.000059	0.000045	-24% *	MCE
Natural gas (MTCO ₂ e/therm)	0.005311	0.005311	0.005311	0.005311	0%	US Community Protocol
Propane (MTCO ₂ e/gallon)	0.005844	0.005844	0.005844	0.005844	0%	US Community Protocol
Kerosene (MTCO ₂ e/gallon)	0.010569	0.010569	0.010569	0.010569	0%	US Community Protocol
Wood (MTCO ₂ e/MMBTU)	0.095624	0.095624	0.095624	0.095624	0%	US Community Protocol
On-road vehicles (MTCO ₂ e/VMT)	0.000486	0.000483	0.000421	0.000408	-16%	California Air Resources Board
BART (MTCO ₂ e/passenger mile)	0.000093	0.000093	0.000093	0.000013	-86%	BART
Municipal solid waste (MTCO ₂ e/ton)	0.293179	0.293184	0.286047	0.261659	-11%	CalRecycle
Alternative daily cover (MTCO ₂ e/ton)	0.191850	0.245890	0.245694	0.245693	28%	CalRecycle

* MCE's percentage change is from 2017 to 2019.

COMMUNITY-WIDE EMISSIONS

Sectors

The community-wide GHG inventory assessed GHG emissions from the following 11 categories of activities, known as sectors.

- **Transportation** includes GHG emissions created by driving on-road vehicles in the unincorporated county, including passenger and freight vehicles.
- **Residential energy** includes GHG emissions attributed to the use of electricity, natural gas, and other home heating fuels in residential buildings.
- **Solid waste** includes the GHG emissions released from trash collected in the unincorporated areas of Contra Costa County, as well as collective annual emissions from waste already in place at the Acme, Keller Canyon, and West Contra Costa Landfills.
- **Nonresidential energy** includes GHG emissions attributed to the use of electricity and natural gas in nonresidential buildings.
- **Agriculture** includes GHG emissions from various agricultural activities in the unincorporated county, including agricultural equipment, crop cultivation and harvesting, fertilizer application, and livestock operations.
- **Off-road equipment** includes GHG emissions from equipment that does not provide on-road transportation (excluding agricultural equipment), such as tractors for construction, equipment used for landscape maintenance, commercial and industrial equipment, and outdoor recreational equipment.
- **Water and wastewater** accounts for the electricity used to transport and process water and wastewater used or generated by unincorporated county residents and businesses, as well as direct emissions resulting from wastewater treatment activities.
- **Bay Area Rapid Transit (BART)** includes GHG emissions associated with the operation of BART for unincorporated county residents.



- **Land use and sequestration** includes GHG emissions absorbed and stored in trees and soils on locally controlled lands as part of healthy ecosystems and released into the atmosphere from development of previously undeveloped land.
- **Stationary sources** are emissions from fuel use at major industrial facilities, permitted by state and regional air quality authorities. These emissions are informational and are not counted as part of the community total.
- **Wildfire** includes emissions released as a result of wildfires. These emissions are informational and are not counted as part of the community total.
- **Direct access electricity** is electricity purchased directly from an Electric Service Provider (ESP) rather than a conventional utility company or Community Choice Energy provider such as MCE, generally to power large industrial, commercial, and institutional facilities.



Community-Wide Inventory Results

Table B-2 shows the community-wide GHG emissions for the unincorporated area associated for the four inventory years. Total community-wide emissions declined 22 percent from 2005 to 2019. The most significant decreases in emissions came from BART, water and wastewater, residential energy use, and transportation, which all saw their associated emissions decrease by more than 25 percent. Only off-road equipment saw a significant (58 percent) increase in associated GHG emissions.

TABLE B-2. ABSOLUTE ANNUAL GHG EMISSIONS, 2005–2019 (MTCO₂E)

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 - 2019
Transportation	628,200	651,130	571,650	464,040	-26%
Residential energy	294,930	280,870	212,420	191,780	-35%
Nonresidential energy	118,740	125,350	98,850 ¹	85,390	-28%
Solid waste	243,940	224,570	223,100	220,760	-10%
Agriculture	33,350	39,300	44,880	36,130	8%
Off-road equipment	34,160	36,290	42,840	54,010	58%
Water and wastewater	8,080	7,400	4,400	4,870	-40%
BART	1,040	1,320	1,440	190	-82%
Land use and sequestration	-70,860	-70,860	-70,860	-70,860	0%
Total Annual MTCO₂e	1,291,580	1,295,370	1,128,720	986,310	-24%
<i>Informational Items</i>					
Stationary sources	13,983,030	11,956,000	11,232,290	10,867,670	-22%
Wildfire	14,270	66,080	0 ²	10,100	N/A ³
Direct access electricity	0 ⁴	0 ⁴	0 ⁴	74,130	N/A
Note: All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows. 1 Estimates of nonresidential electricity use in 2013 are used in 2017 to account for a lack of available data in 2017. 2 No wildfires were recorded in the unincorporated county in 2017. 3 Overall change between 2005 and 2019 for wildfire is not calculated because of the high degree of year-to-year variability. 4 PG&E did not provide direct access electricity use data in these years.					

Regarding stationary sources, there are several factors outside of the County's control that influence the operations and related emissions and energy use at these facilities. The County has therefore elected to exclude the direct emissions and energy use at these facilities from consideration of the County's GHG reduction goals for the following reasons:

- These facilities are regulated primarily through the Federal Energy Regulatory Commission and the California Energy Commission (CEC) and are subject to air quality and emissions standards set forth by the United States Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD).

- The energy used at some of these facilities fluctuates from year to year depending on the demand for resources and the availability of other electricity-generating sources such as hydropower or renewable resources. This makes it difficult to accurately forecast the energy use at these facilities.
- The County has limited jurisdictional authority to reduce GHG emissions from these sources as they are subject to cap-and-trade regulations set forth by CARB.
- The approach to excluding energy from sources that are outside of the County's jurisdictional control is consistent with the *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*.

The resultant jurisdictional inventory more accurately reflects the energy use from nonresidential customers in unincorporated Contra Costa County and allows the County to focus on actions that are within its control.

Contra Costa County is developing a Just Transition Economic Revitalization Plan, a long-term strategic plan for transitioning to a net zero-emission economy.

COMMUNITY-WIDE GHG INVENTORY RESULTS BY SECTOR

Transportation

On-road transportation activity accounts for vehicle miles driven between two points in the unincorporated area, or between the unincorporated area or another community. It does not include miles for trips that begin and end in other communities but pass through the unincorporated area (e.g., from Sacramento to Oakland). Unincorporated Contra Costa County community members drove approximately 1.3 billion vehicle miles in 2005, decreasing 12 percent to approximately 1.1 billion vehicle miles in 2019. The VMT in 2005 resulted in GHG emissions of approximately 628,200 MTCO₂e, which dropped to approximately 464,040 in 2019, a 26-percent decrease. GHG emissions decreased due to this reduction in VMT, increasingly fuel-efficient vehicles, and a wider adoption of electric vehicles. The average vehicle on the road in unincorporated Contra Costa County generated 16 percent fewer GHG emissions per mile in 2019 than in 2005, as reported by Caltrans. **Table B-3** provides a breakdown of the activity data and emissions for on-road transportation for the unincorporated area by each individual year included in the updated community inventory.



TABLE B-3. TRANSPORTATION ACTIVITY DATA AND GHG EMISSIONS, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 - 2019
Activity Data (VMT)					
On-road transportation	1,291,819,230	1,349,279,980	1,357,121,160	1,136,911,090	-12%
Emissions (MTCO₂e)					
On-road transportation	628,200	651,130	571,650	464,040	-26%
All numbers are rounded to the nearest 10.					

Residential Energy

Contra Costa County's GHG emissions from residential energy totaled approximately 191,780 MTCO₂e in 2019, compared to 294,930 MTCO₂e in 2005, a decline of 35 percent. Residential electricity GHG emissions decreased due to a decrease in overall use and usage of cleaner sources of electricity. Residential electricity use fell 40 percent from 2005 to 2019, from 488,236,740 kWh to 293,561,300 kWh. Over this period, as seen in **Table B-1**, a unit of electricity supplied by Pacific Gas and Electricity Company (PG&E) emitted 52 percent less GHG in 2019 than in 2005. Electricity from MCE, which supplied electricity to community residents in 2017 and 2019, generated even fewer GHG emissions per unit of electricity than PG&E-supplied electricity, which has also contributed to the decline in this sector. Natural gas use and GHG emissions saw a small decrease from 2005 to 2019 of 3 percent despite a growing population. Propane and wood use and GHG emissions also declined over this period, although GHG emissions from these fuels are only a small proportion of those from the residential energy sector. **Table B-4** provides a breakdown of the activity data and GHG emissions for residential energy for the unincorporated area.

TABLE B-4. RESIDENTIAL ENERGY ACTIVITY DATA AND GHG EMISSIONS BY SUBSECTOR, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 - 2019
Activity Data					
Residential PG&E electricity (kWh)	488,236,740	478,219,710	461,970,670	46,158,330	-91%
Residential MCE electricity (kWh)	-	-	307,820	247,402,970	80,273%*
Residential natural gas (therms)	30,919,160	31,007,110	28,634,420	30,100,640	-3%
Residential propane (gallons)	1,525,330	1,106,900	1,043,270	1,021,340	-33%
Residential kerosene (gallons)	13,160	10,960	8,030	16,320	24%
Residential wood (MMBTU)	117,000	165,830	100,960	101,710	-13%
Emissions (MTCO₂e)					
Residential PG&E electricity	110,120	93,380	44,510	5,000	-95%
Residential MCE electricity	0	0	20	11,060	55,200%*
Residential natural gas	164,570	165,040	152,060	159,850	-3%
Residential propane	8,910	6,470	6,100	5,970	-33%
Residential kerosene	140	120	80	170	21%
Residential wood	11,190	15,860	9,650	9,730	-13%
Total Annual MTCO₂e	294,930	280,870	212,420	191,780	-35%
* MCE did not operate in the unincorporated County until 2017, and 2017 operations were very limited. MCE percentage changes are for changes from 2017 to 2019.					
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Solid Waste

Contra Costa County's community-wide GHG emissions associated with solid waste include four subsectors.

- Municipal solid waste (MSW) is the material that is discarded by community members and reflects the actual waste generated by the community.
- Alternative daily cover (ADC) is organic material applied at landfills by the landfill operator as a means of controlling debris and pests.
- Waste in place is the solid waste and associated GHG emissions deposited in the County's landfills in previous years.
- The flaring subsector accounts for GHG emissions from the combustion of gases generated by the decomposing waste.

Between 2005 and 2019, total solid waste GHG emissions decreased by 10 percent due to decreases in solid waste generated and ADC applied, likely as a result of increased community awareness about recycling and composting and the availability of curbside recycling programs. Although annual waste generation decreased, waste in place at the landfills increased as waste is added to the landfills each year. **Table B-5** presents solid waste emissions data for each year for the unincorporated area.

TABLE B-5. SOLID WASTE ACTIVITY DATA AND GHG EMISSIONS BY SUBSECTOR, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 – 2019
Activity Data (Tons)					
Solid waste	154,820	78,790	79,520	79,340	-49%
ADC	15,950	13,990	11,470	7,580	-52%
Waste in place	34,455,010	41,785,650	45,776,140	47,618,290	38%
Landfill flaring	5,270	5,260	5,250	5,270	Less than 1%
Emissions (MTCO_{2e})					
Solid waste	45,390	23,100	22,750	20,760	-54%
ADC	3,060	3,440	2,820	1,860	-39%
Waste in place	193,950	196,500	196,000	196,610	1%
Landfill flaring	1,540	1,530	13,550	13,590	-1%
Total Annual MTCO_{2e}	243,940	224,570	235,120	232,820	-10%
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Nonresidential Energy

Contra Costa County's GHG emissions from nonresidential energy totaled approximately 85,390 MTCO_{2e} in 2019, compared to 118,740 MTCO_{2e} in 2005, a decrease of 28 percent. Electricity emissions from retail electricity suppliers (PG&E and MCE) have fallen significantly, driven by a small decrease in electricity use and a large increase in the amount of electricity for renewable and carbon-free sources (see **Table B-1**). Between 2005 and 2019, nonresidential electricity obtained from PG&E decreased by 90 percent and nonresidential electricity obtained from MCE increased from virtually nothing in 2017 to approximately 200 million kWh in 2019. Natural gas use and associated emissions have reportedly increased, although this may be less of an actual increase and more so the result of data being omitted by PG&E as a way of complying with State privacy regulations. As a consequence of this, the project team has kept nonresidential natural gas use constant at 2013 levels, a conservative estimate that may not account for actual decreases in this subsector. **Table B-6** provides a breakdown of the activity data and GHG emissions for nonresidential energy for the unincorporated area.

TABLE B-6. NONRESIDENTIAL ENERGY ACTIVITY DATA AND GHG EMISSIONS BY SUBSECTOR, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Activity Data					
Nonresidential PG&E Electricity (kWh) ¹	284,558,070	266,216,660	266,216,660	29,062,250	-90%
Nonresidential MCE electricity (kWh) ²	0	0	28,730	200,181,720	696,669%
Nonresidential natural gas (therms) ⁴	10,251,360	13,784,410	13,784,410	13,784,410	-58%
Emissions (MTCO_{2e})					
Nonresidential PG&E electricity ¹	64,180	51,980	25,650	3,150	-95%
Nonresidential MCE electricity ²	0	0	Less than 10	9,040	451,900%
Nonresidential natural gas ³	54,560	73,370	73,200	73,200	34%



SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Total Annual MTCO_{2e}	118,740	125,350	98,850	85,390	34%
<p>1: Due to omissions in data reported by PG&E for the calendar year 2017, the project team assumed that electricity use remained constant from 2013 levels.</p> <p>2: MCE did not operate in the unincorporated County until 2017, and 2017 operations were very limited. MCE percentage changes are for changes from 2017 to 2019.</p> <p>3: Due to omissions in data reported by PG&E for the calendar years 2017 and 2019, the project team assumed that natural gas use remained constant from 2013 levels.</p> <p>All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.</p>					

Agricultural Emissions

GHG emissions associated with the agriculture sector for the unincorporated area increased by approximately 8 percent between 2005 and 2019, as shown in **Table B-7**. This increase is due primarily to a minor increase (5 percent) in the amount of cattle in the county. Although crop acreages declined from 2005 to 2019, more fertilizer was applied in 2019 than in 2005 due to a shift in the types of crops being grown that required slightly more fertilizer.

TABLE B-7. AGRICULTURE ACTIVITY DATA AND GHG EMISSIONS BY SUBSECTOR, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Activity Data					
Crops (acreage)	200,980	204,031	197,360	183,730	-9%
Nitrogen applied (pounds)	3,261,620	3,560,480	3,698,500	3,608,340	11%
Livestock (effective annual population)	16,500	19,110	22,060	17,340	5%
Emissions (MTCO_{2e})					
Crops	3,920	4,280	4,450	4,340	11%
Enteric fermentation	28,510	33,920	39,160	30,790	8%
Manure management	920	1,100	1,270	1,000	9%
Total Annual MTCO_{2e}	33,350	39,300	44,880	36,130	8%
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Off-Road Equipment Emissions

According to data shown in **Table B-8**, emissions from off-road equipment in unincorporated Contra Costa County increased approximately 73 percent between 2005 and 2019, although the sector overall remains a small proportion of the total community-wide emissions. This increase is primarily the result of a significant rise in diesel tractor and other agricultural equipment use over this period, along with increases in commercial and industrial/warehouse equipment use. Since this modeling is directly reported by State agencies, it is possible that changes in modeling methods may be affecting the results. Note that the State provides these GHG emission levels directly, so there is no activity data to display.



TABLE B-8. OFF-ROAD EQUIPMENT GHG EMISSIONS BY SUBSECTOR, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 – 2019
Agricultural equipment	1,200	1,190	1,180	10,170	748%
Cargo handling equipment	900	380	330	310	-66%
Commercial harbor equipment *	0	0	0	2,600	N/A
Construction and mining equipment	6,780	7,170	8,880	7,200	6%
Industrial equipment	8,320	8,840	9,470	9,780	18%
Lawn and garden equipment	3,580	3,280	3,760	3,880	8%
Light commercial equipment	2,230	2,780	3,060	3,270	47%
Locomotives	3,170	3,260	3,540	3,620	14%
Oil drilling equipment	20	20	20	20	0%
Pleasure craft	1,890	1,810	1,800	1,830	-3%
Portable equipment	4,830	6,240	6,700	6,970	44%
Recreational equipment	650	670	610	630	-3%
Transport Refrigeration Units	590	650	3,490	3,730	532%
Total Annual MTCO_{2e}	34,160	36,290	42,840	54,010	58%
<p>* State modeling only provided emissions for commercial harbor equipment for 2019. All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.</p>					

According to records maintained by the California Department of Conservation’s Geologic Energy Management Division, there are no active oil or gas extraction wells in the unincorporated area. There are 16 natural gas storage wells in the hills between Clyde and Bay Point, along with an observation well. As these sites are not being used for active extraction, there are no further emissions associated with fossil fuel production at well sites in this inventory.

Water and Wastewater Emissions

Emissions associated with the water and wastewater sector are counted as indirect or direct emissions. Indirect water emissions refer to emissions created by the electricity required to treat and move water to where it is used. Indirect wastewater emissions refer to electricity needed to move wastewater to water treatment facilities, and to process and discharge it. Direct wastewater emissions refer to emissions produced directly by decomposing materials in wastewater.

GHG emissions from Contra Costa County's water and wastewater activity decreased 40 percent between 2005 and 2019. Indirect water GHG emissions declined by 62 percent between 2005 and 2019 while indirect wastewater GHG emissions decreased by 66 percent. Community members used substantially less water (31 percent less) and generated less wastewater (30 percent less) in 2019 than in 2005 despite population growth. This is likely a result of increased water efficiency by community residents and businesses. Additionally, the electricity used in water and wastewater pumping and treatment has been increasingly supplied by renewable and carbon-free sources, decreasing GHG emissions. Direct wastewater emissions did rise by approximately 199 percent from 2005 to 2019 but given that the amount of wastewater generated declined by this period, this is likely due to changes in modeling approaches and available data. The emissions data for the unincorporated area in **Table B-9** shows that overall emissions increased slightly within the water and wastewater sector.

TABLE B-9. WATER AND WASTEWATER ACTIVITY DATA AND GHG EMISSIONS BY SUBSECTOR, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 – 2019
Activity Data					
Water use (million gallons)	11,530	11,650	7,380	8,010	-31%
Water electricity use (kWh)	26,443,770	28,004,290	19,137,620	20,783,930	-21%
Wastewater generation (million gallons)	4,560	4,610	3,150	3,170	-30%
Wastewater electricity use (kWh)	6,199,120	6,198,590	4,268,050	4,295,780	-31%
Emissions (MTCO₂e)					
Indirect water	5,960	5,470	1,840	2,250	-62%
Indirect wastewater	1,400	1,210	410	470	-66%
Direct wastewater	720	720	2,150	2,150	199%
Total Annual MTCO₂e	8,080	7,400	4,400	4,870	-40%
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

BART Emissions

Emissions associated with BART ridership decreased 82 percent between 2005 and 2019. This decline is attributable to changes in BART’s electricity portfolio, which in recent years has shifted to favor more renewable and carbon-free sources of energy. BART ridership from community members in unincorporated Contra Costa County increased 29 percent between 2005 and 2019, as shown in **Table B-10**. Ridership at all stations serving the unincorporated area increased by 10 to 35 percent over this period except for Pittsburg/Bay Point, which saw some of its ridership shift to Pittsburg Center and Antioch with the opening of the BART to Antioch extension in 2018.

TABLE B-10. BART ACTIVITY DATA AND GHG EMISSIONS, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Activity Data					
BART Ridership (passenger miles)	11,231,870	14,228,420	15,528,840	14,444,740	29%
Emissions (MTCO_{2e})					
Total Annual MTCO _{2e}	1,040	1,320	1,440	190	-82%
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Land Use and Sequestration

GHG emissions from land use and sequestration can be either positive (a source of emissions) or negative (removing emissions from the atmosphere, creating what is known as an emissions “sink”). Natural lands and trees in urban areas absorb carbon, storing it in wood, plants, and soil. As a result, when natural land is preserved or when more trees are planted, emissions from this sector are negative because GHGs are being removed from the atmosphere. However, developing natural lands or converting them to a different form (for example, replacing forests with crop land) or removing street trees causes carbon to be released, creating GHG emissions.

This sector includes emission sources and sinks from three types of activities: sequestration of GHG emissions in locally controlled forested lands, sequestration of GHG emissions in street trees in urbanized unincorporated areas, and emissions caused by permanently removing vegetation from natural lands or farmlands as a part of development.

Emissions and sequestered amounts remained constant in both years for all three activities. Locally controlled forests and urban trees have not had their sequestration capabilities changed by human activities during the inventory period. While there was some development activity that caused a loss of sequestered GHG emissions, records of when the development specifically occurred are not available, and so the GHG emissions have been assigned equally to both inventory years, hence the lack of changes. Forests sequestered 58,110 MTCO₂e annually, while urban trees sequestered 12,750 MTCO₂e, for a total carbon sink of 70,860 MTCO₂e for the unincorporated area, as shown in **Table B-11**.

TABLE B-11. LAND USE AND SEQUESTRATION ACTIVITY DATA AND GHG EMISSIONS, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005 – 2019
Activity Data					
Acres of forested land	60,050	60,050	60,050	60,050	0%
Acres of urban trees	32,780	32,780	32,780	32,780	0%
Acres of land use changes	0	0	0	0	0%
Emissions (MTCO₂e)					
Forest sequestration	-58,110	-58,110	-58,110	-58,110	0%
Street tree sequestration	-12,750	-12,750	-12,750	-12,750	0%
Land use changes	0	0	0	0	0%
Total Annual MTCO₂e	-70,860	-70,860	-70,860	-70,860	0%
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Wildfire

Wildfires create GHG emissions by burning organic materials such as trees and plants, releasing the carbon sequestered in these materials. Larger fires and those that burn through forested areas, as opposed to less densely vegetated ecosystems, release more GHG emissions. The County reported wildfires in the unincorporated area in 2005, 2013, and 2019, but not in 2017. The acreages and emissions of these fires for the unincorporated area are reported in **Table B-12**. Although wildfire emissions and acreages were lower in 2019 than in 2005, wildfire activity varies widely from year to year and is generally expected to increase in future years due to climate change. Wildfire emissions are not calculated in the totals presented in this appendix and are for informational purposes only.



TABLE B-12. WILDFIRE ACTIVITY DATA AND GHG EMISSIONS, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Activity Data					
Acres burned	2,070	6,320	0	1,830	-31%
Emissions (MTCO_{2e})					
Total Annual MTCO _{2e}	14,270	66,080	0	10,100	-29%
2005 wildfires: Bragdon Fire, BNSF Fire, Byron Fire, Vasco Airport Fire, and an unnamed fire south of Antioch.					
2013 wildfires: Kirker Fire and Morgan Fire.					
2019 wildfires: Marsh 3 Fire, Marsh 5 Fire, Marsh 6 Fire.					
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Stationary Source Emissions

Stationary source emissions result from fuel use, such as natural gas or propane, at large industrial facilities. These facilities include refineries, power plants, factories, and similar installations. Natural gas use at these facilities may be included as part of the nonresidential natural gas use reported by PG&E. Emissions from these facilities are regulated by the State and BAAQMD. Emissions from these facilities are therefore not counted toward the County’s total GHG emissions.

Table B-13 shows the emissions from stationary sources for the unincorporated area. This information is directly reported by CARB as total emissions. The Board does not report activity data for stationary sources, which would include amounts of fuel burned at these facilities. These emissions are not included in the totals presented in this memorandum and are for informational purposes only.

TABLE B-13. STATIONARY SOURCE GHG EMISSIONS, 2005–2019

SECTOR	2005	2013	2017	2019	PERCENTAGE CHANGE, 2005–2019
Emissions (MTCO_{2e})					
Total Annual MTCO _{2e}	13,983,030	11,956,000	11,232,290	10,867,670	-22%
All numbers are rounded to the nearest 10. Totals may not equal the sum of individual rows.					

Direct Access Electricity Emissions

PG&E provided direct access electricity data only for 2019. In 2019, Contra Costa County direct access electricity customers used 396, 805, and 940 kWh of electricity, producing 74,130 MTCO₂e of emissions. Direct access electricity, supplied by an ESP to large nonresidential customers, is regulated by the California Public Utilities Commission. The identities of direct access customers and the specific ESPs from which they purchase electricity are not made available to the public. Given the County's limited ability to monitor and regulate the sale and use of direct access electricity, as well as historical inconsistencies in how direct access electricity use is reported, direct access emissions are reported for informational purposes only.

COUNTY OPERATIONS EMISSIONS

Sectors

The County operations inventory looks at GHG emissions from the following sectors:

- **Employee commute** includes GHG emissions from County employees commuting to and from work, as well as emissions associated with business travel.
- **Buildings and facilities** includes the electricity and natural gas use at County-owned facilities.
- **Government fleet** includes the fuel-use from County-owned vehicles.
- **Government-generated solid waste** includes the waste materials generated at County facilities.
- **Public lighting** includes the electricity use for publicly owned lights, including streetlights and traffic signals.
- **Water and wastewater** includes emissions associated with water use and wastewater generation at County facilities.
- **Refrigerants** includes the leaks of GHGs from air conditioning systems in County-owned vehicles and buildings.

County Operations Inventory Results

In 2006, Contra Costa County government operations emissions totaled 54,090 MTCO₂e for the sectors reported in this inventory, as shown in **Table B-14**. In 2017, County government operations GHG emissions were 43,380 MTCO₂e, a 20 percent decrease from 2006 levels. This decrease is primarily the result of reductions in energy use, reductions in County fleet emissions, and reductions in employee waste disposal. The 2017 inventory also includes emissions from wastewater treatment and refrigerants, which were not included in the 2006 inventory.

TABLE B-14. 2006 BASELINE AND 2017 COUNTY-OPERATIONS GHG EMISSIONS SUMMARY

SECTOR	2006 GHG EMISSIONS (MTCO ₂ E)	2017 GHG EMISSIONS (MTCO ₂ E)	PERCENTAGE CHANGE
Employee commute	23,530	25,800	10%
Buildings and facilities	19,260	12,500	-35%
Government fleet	8,500	3,430	-60%
Government-generated solid waste	1,980	900	-54%
Public lighting	830	440	-47%
Water and wastewater	Not included	220	—
Refrigerants	Not included	90	—
Total	54,090	43,380	-20%

These inventories assume 8,420 County employees in 2006 and 10,030 employees in 2017, a 19% increase.
 Note: All numbers are rounded to the nearest 10. Totals may not add up to the sum of individual rows due to rounding.

COUNTY OPERATIONS GHG INVENTORY RESULTS BY SECTOR

Employee Commute and Travel

Tables B-15 and **B-16** summarize changes in 2006 and 2017 related to employee commute activities.

TABLE B-15. 2006 BASELINE AND 2017 EMPLOYEE COMMUTE AND TRAVEL EMISSIONS

ACTIVITY/SOURCE	2006 MTCO ₂ E	2017 MTCO ₂ E	PERCENTAGE CHANGE
Employee commute	23,530	25,800	10%

TABLE B-16. 2017 EMPLOYEE COMMUTE ACTIVITY DATA AND GHG EMISSIONS

ACTIVITY/SOURCE	ACTIVITY DATA	UNITS	GHG EMISSIONS (MTCO ₂ E)	PERCENTAGE
Driving alone (gas)	77,173,500	Vehicle miles	24,600	95%
Driving alone (electric)	4,494,570	Vehicle miles	0	0%
Carpool	1,155,500	Passenger miles	350	1%
Transit (BART, bus)	641,830	Passenger miles	100	Less than 1%
Motorcycle	425,050	Vehicle miles	749	3%
Active transportation (walk, bike)	66,590	Miles	0	0%
Telecommute	88,816	Miles	0	0%
Total	84,045,860	Miles	25,800	100%

Note: All numbers are rounded to the nearest 10. Totals may not add up to the sum of individual rows due to rounding.

Although employees' personal commute is not under the direct operational control of the County, there are a variety of tools and resources available to influence employees' commute patterns. For this reason, emissions are included in this inventory. Employee commute accounted for in the emissions inventory includes business travel; travel via personal vehicles; carpool; alternative transportation methods, including biking and walking; air travel; and public transit.

In 2017, County employees' commute to work contributed to 25,795 MTCO₂e. This is a 10 percent increase in GHG emissions from the 23,530 MTCO₂e reported in 2006. Over the years, there was an increase in the number of employees from 8,420 to 10,030 between 2006 and 2017. Commute emissions reflect increased vehicle fuel efficiency, although changes in the number of employees and increases in commute distance balance that out.

Buildings and Facilities

The buildings and facilities sector includes electricity and natural gas use at County-owned and operated buildings and facilities. Emissions from this sector totaled 19,210 MTCO₂e in 2006 and 12,500 MTCO₂e in 2017 (see **Table B-17**), a 35 percent decrease.

TABLE B-17. 2006 BASELINE AND 2017 BUILDINGS AND FACILITIES ENERGY USE EMISSIONS

SUBSECTOR	2006 MTCO ₂ E	2017 MTCO ₂ E	PERCENTAGE CHANGE
Buildings and facilities – natural gas	11,360	6,300	-44%
Buildings and facilities – electricity	7,670	6,200	-19%
Total	19,030	12,500	-35%

Note: All numbers are rounded to the nearest 10. Totals may not add up to the sum of individual rows due to rounding.

Government (County) Fleet

The vehicles and equipment used in the County's daily operations burn gasoline, diesel, propane, and compressed natural gas fuel, resulting in the emission of GHGs. Contra Costa's 2017 vehicle fleet emissions totaled 3,430 MTCO₂e (see **Table B-18**). This is a 59-percent decrease in GHG emissions from the 8,500 MTCO₂e in the 2006 inventory. This is primarily the result of a decrease in on-road vehicle miles traveled and an increase in fuel efficiency between inventory years.

TABLE B-18. 2006 BASELINE AND 2017 VEHICLE FLEET EMISSIONS

SECTOR	2006 MTCO ₂ E	2017 MTCO ₂ E	PERCENTAGE CHANGE
Government fleet	8,500	3,430	-59%

Solid Waste

County operations generate solid waste during normal activity, much of which is eventually landfilled. Emissions from this sector are estimates of methane generation that will result in future years from the waste that was sent to the landfill in the inventory year. Solid waste generated by County employees contributed to a total of 900 MTCO₂e in the year 2017 (see **Table B-19**). Solid waste collected from County operations saw a reduction of 54 percent in emissions since the 2006 baseline, where this sector contributed to 1,980 MTCO₂e.

TABLE B-19. 2006 BASELINE AND 2017 GOVERNMENT-GENERATED SOLID WASTE

SECTOR	2006 MTCO ₂ E	2017 MTCO ₂ E	PERCENTAGE CHANGE
Government-generated solid waste	1,980	900	-54%

Public Lighting

Emissions from public lighting owned by the County, such as streetlights, totaled 440 MTCO₂e in 2017 (see **Table B-20**). This is a 47-percent decrease from 2006.

TABLE B-20. 2006 BASELINE AND 2017 PUBLIC LIGHTING

SECTOR	2006 MTCO ₂ E	2017 MTCO ₂ E	PERCENTAGE CHANGE
Public lighting	830	440	-47%

Water and Wastewater

The water and wastewater treatment sector includes the emissions generated by the electricity needed to move and process the water used and the wastewater generated by County government facilities (indirect water and wastewater), along with direct emissions caused by the processing of County-generated wastewater. Water use and wastewater generation at County facilities generated a total of 220 MTCO₂e in 2017 (see **Table B-21**). The water and wastewater sector was not included in the 2006 baseline inventory.

TABLE B-21. 2006 BASELINE AND 2017 WASTEWATER TREATMENT

SECTOR	2006 MTCO ₂ E	2017 MTCO ₂ E
Indirect Water	Not included	180
Indirect Wastewater	Not included	20
Direct Wastewater	Not included	20
Total	Not included	240

Note: All numbers are rounded to the nearest 10. Totals may not add up to the sum of individual rows due to rounding.

Refrigerants

Vehicles and buildings with air conditioning use refrigerants that can leak from engines and appliances during normal operation and maintenance. These refrigerants are often GHGs that trap a very large amount of heat per unit of gas, known as gases with a very high global warming potential (GWP). Emissions from refrigerant leaks were accounted for in the 2017 GHG emissions inventory for County government operations. This sector was not included in the 2006 baseline inventory. Refrigerant emissions contributed to 90 MTCO₂e in 2017 (see **Table B-22**).

TABLE B-22. 2006 BASELINE AND 2017 REFRIGERANTS

SECTOR	2006 MTCO ₂ E	2017 MTCO ₂ E
Refrigerants	Not included	90

CONSUMPTION-BASED INVENTORY EMISSIONS

As discussed in Chapter 3, the consumption-based inventory accounts for GHG emissions created by the goods and services used by community members of the unincorporated county, including residents, businesses, and employees. A consumption-based inventory assesses emissions associated with the manufacture, transportation, and disposal of these goods and services, regardless of where they occur.

In 2015, BAAQMD worked with the Cool Climate Network at the University of California, Berkeley, to prepare a consumption-based inventory for all Bay Area jurisdictions. This inventory includes GHG emissions from the following sources:

- **Travel:** GHG emissions from fuel use by on-road vehicles, vehicle manufacturing and repairs, public transportation, and air travel.
- **Housing:** GHG emissions from electricity and natural gas use in homes as well as other fuels associated with home heating (such as kerosene or fuel oil), electricity emissions from water and wastewater activities, and waste emissions. This category also includes emissions from the manufacture, transportation, and construction and demolition of materials used to construct houses.
- **Food:** GHG emissions from the growth, processing/manufacturing, and transportation of food products.

- **Goods:** GHG emissions from the manufacture, transportation, and disposal of consumer products, such as home furnishings, appliances and electronics, clothing, and healthcare and personal items.
- **Services:** GHG emissions from personal and business services, including entertainment and recreation, communication, education, healthcare, and maintenance and repair activities.

Some of these GHG emission sources are also included in the production-based inventory prepared as part of the 2024 CAP, and others are covered by either the production-based or consumption-based inventory but not both.

According to the consumption-based inventory, transportation is responsible for 15.5 MTCO₂e per household, or 34 percent of emissions produced by activities conducted and goods consumed in Contra Costa County. Food is responsible for 8.79 MTCO₂e per household (19 percent), goods and services for 7.89 MTCO₂e per household and 7.97 MTCO₂e per household, respectively (17 percent each), and housing for 6.18 MTCO₂e per household or 13 percent (see **Figure B-1**).

Table B-23 compares the sources of GHG emissions in the 2024 CAAP production-based inventory and the BAAQMD/Cool Climate Network consumption-based inventory.

FIGURE B-1. CONSUMPTION-BASED INVENTORY RESULTS

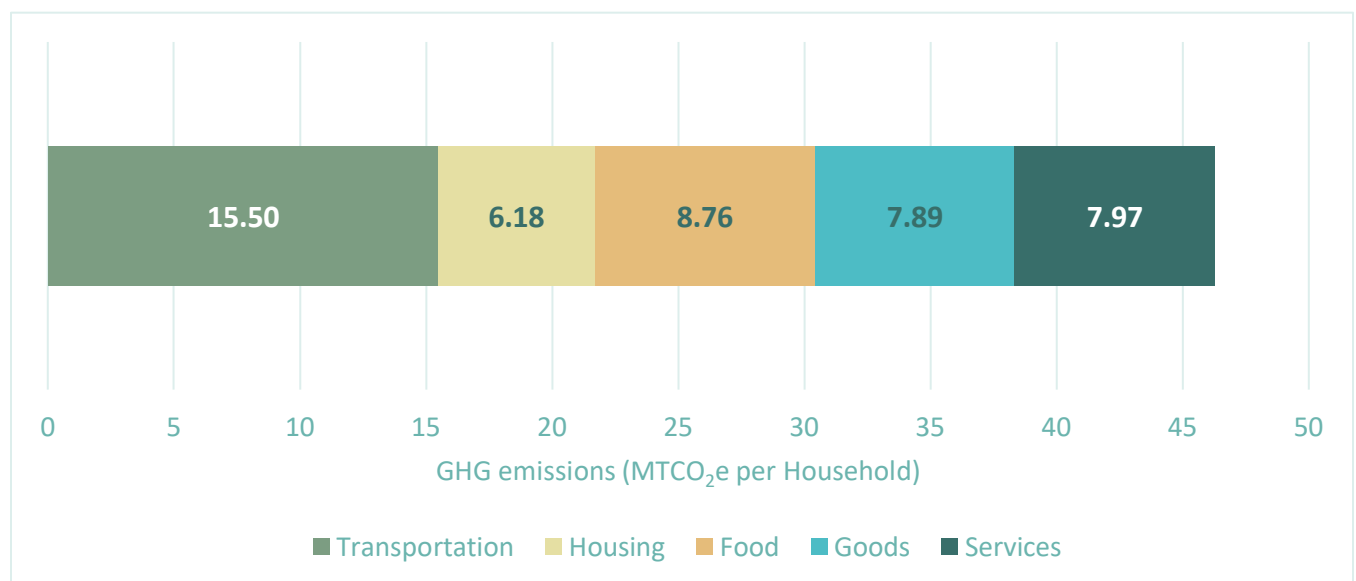




TABLE B-23. COMPARISON OF SOURCES IN PRODUCTION-BASED AND CONSUMPTION-BASED GHG EMISSION INVENTORIES

SOURCE OF EMISSIONS	PRODUCTION-BASED CAAP INVENTORY	BAAQMD/COOL CLIMATE NETWORK CONSUMPTION-BASED INVENTORY
Generation of electricity used	Included	Included
Combustion of natural gas used	Included	Included
Combustion of other home heating fuels used	Not included	Included
Fuel use from on-road vehicles	Included	Included
Fuel use from public transportation	Included	Included
Electricity use from BART	Included	Included
Vehicle manufacturing and repairs	Partially included*	Included
Air travel	Not included	Included
Fuel use from off-road equipment, including construction and landscaping equipment	Included	Not included
Generation of electricity used for water processing and transportation	Included	Included
Generation of electricity used for wastewater processing and transportation	Included	Unknown†
Direct wastewater process emissions	Included	Not included
Landfilling of solid waste	Included	Included
Reprocessing of recyclables	Partially included*	Included
Compost processing	Partially included*	Included
Manufacturing of home-construction materials	Partially included*	Included
Food growth, processing, production, and transportation	Partially included*	Included
Carbon sequestration in forests and street trees	Included	Not included
Other embedded emissions in goods and services	Not included	Included

Note: Due to differences in data sources and analysis methods, the same source of emissions in both inventories may produce different results.

* Emissions from energy use, water use, and waste generation associated with these activities are included in the 2024 CAAP Update inventory if these activities occur in Contra Costa County. Emissions from these activities outside of Contra Costa County and other emissions associated with these activities in Contra Costa County are not included in the 2024 CAAP inventory.

† Emissions from these activities are not explicitly called out in the BAAQMD/Cool Climate Network consumption-based inventory but may be included in the total electricity use category.

Due to differences in data sources and analysis methods, the same source of emissions in both inventories may produce different results.

Community-Wide Forecast

The forecast of community-wide GHG emissions for the unincorporated area is based on the results of the 2019 community GHG emissions inventory. The project team assumed growth in these emissions consistent with the anticipated growth in unincorporated Contra Costa County's future population, jobs, and development patterns, developed as part of the Envision Contra Costa buildout calculations. The project team forecasts GHG emissions for the calendar years 2030 and 2045. The forecast is a "worst case" scenario that does not assume any efforts are taken, at any level, to reduce GHG emissions beyond the policies that are already in effect in 2019.

For many sectors, the GHG forecast assumes that each person in the unincorporated area will continue to contribute the same amount of GHG emissions as they did in 2019, so that the amount of GHG emissions increases proportionally to demographic growth. There are some sectors that are not projected this way:

- Transportation, which is projected using a regional traffic demand model based partially on demographics and partially on the location of various land uses.
- Agriculture, which is forecast using future land use projections for the amount of agricultural land in the unincorporated area.
- Land use and sequestration, which is forecast using future land use projections for developed land, forested land, and any agricultural and open space land that is developed.
- Within the off-road equipment sector, emissions from construction and mining equipment are projected using the rate of population and job growth, emissions from industrial equipment are projected using future land use projections for industrial land, and emissions from Transportation Refrigeration Units are projected using the proportion of county-wide road miles in the unincorporated area.

The forecast does not project any change in activity or GHG emissions for alternative home heating fuels (propane, kerosene, and wood), direct access electricity, cargo-handling equipment, or oil drilling equipment. Additionally, emissions for the two informational sectors (stationary sources and wildfires) are not forecasted, owing to their informational and substantial uncertainty in projecting future activities for these sectors. These GHG emissions do not have a demographic indicator that staff can use to reasonably project the volume of these emissions in the future, particularly given that they are informational



items and not included in the total community-wide emissions. **Table B-23** shows the demographic projections and their sources for the unincorporated area.

TABLE B-23. DEMOGRAPHIC PROJECTIONS, 2019–2045

DEMOGRAPHIC	2019	2030	2045	PERCENTAGE CHANGE, 2019-2045	SOURCE
Population	174,150	199,360	239,720	38%	ABAG/MTC, Envision Contra Costa
Households	60,320	69,210	83,500	38%	ABAG/MTC, Envision Contra Costa
Jobs	38,760	42,480	48,150	24%	US Census Bureau, Envision Contra Costa
Service population*	212,910	241,840	287,870	35%	ABAG/MTC, US Census Bureau, Envision Contra Costa

* Service population is the sum of population and jobs
All numbers are rounded to the nearest 10.

Table B-24 shows unincorporated Contra Costa County’s projected future GHG emissions relative to the 2019 inventory. Most sectors show an increase in GHG emissions due to the growing population. Agricultural emissions decrease because the amount of land used for agricultural purposes is projected to decline. Although the land use and sequestration sector is expected to remain a net carbon sink (negative emissions), the amount of emissions sequestered (removed from the atmosphere) by the activities in this sector are projected to decline. This is due to anticipated development of currently undeveloped land, removing the potential for this land to sequester carbon. Sequestration in forested and urbanized areas is projected to increase slightly.

TABLE B-24. ABSOLUTE BUSINESS-AS-USUAL GHG EMISSIONS FORECAST, 2019–2045

SECTOR	2019 MTCO ₂ E	2030 MTCO ₂ E	2045 MTCO ₂ E	PERCENTAGE CHANGE, 2019–2045
Transportation	464,040	542,020	605,080	30%
Residential energy	191,780	217,710	259,380	35%
Nonresidential energy	85,590	93,590	106,070	24%
Solid waste	220,760	229,450	260,490	18%
Agriculture	36,130	34,770	33,410	-8%
Off-road equipment	54,010	69,520	76,100	41%
Water and wastewater	4,870	5,530	6,590	35%
BART	190	220	260	37%
Land use and sequestration	-70,860	-67,580	-58,890	-17%
Total Annual MTCO₂e	986,310	1,125,230	1,288,490	31%
All values rounded to the nearest 10. Due to rounding, totals may not equal the sum of the individual values.				

Strategy Quantification

STATE AND REGIONAL GHG EMISSION REDUCTIONS FROM EXISTING ACTIONS

California has adopted and is committed to implementing policies that reduce statewide GHG emissions, including those in Contra Costa County. Many of these policies are laid out in the Climate Change Scoping Plan (Scoping Plan), a state document that outlines regulatory and market-based solutions to achieving California's GHG emission reduction goals. The Scoping Plan was first prepared in 2008, with successive updates in 2014, 2017, and 2022. These updates revised the state-level actions and identified additional opportunities for GHG emission reductions.

The Scoping Plan and related documents lay out several policies to reduce California's GHG emissions, although not all are directly applicable to Contra Costa County. The project team has assessed Contra Costa County's GHG emissions and identified five State policies that are directly relevant to the community. This allows the 2024 CAAP to provide "credit" to Contra Costa County for these policies. These State efforts are:

- **The Renewables Portfolio Standard (RPS)**, which requires increases in renewable and carbon-free electricity supplies. RPS was first established in 2002 and has been amended multiple times, most recently by SB 100 in 2018. It requires all electricity providers in the state to obtain at least 33 percent of their electricity from eligible renewable resources by the end of 2020, 60 percent of their electricity from eligible renewable resources by the end of 2030, and all their electricity from carbon-free (although not necessarily eligible renewable) resources by the end of 2045. This policy reduces GHG emission from electricity use, including electricity used to transport and process water and wastewater, and electricity used for electric vehicles.
- **The Clean Car Standards**, which require increased fuel efficiency of on-road vehicles and decreased carbon intensity of vehicle fuels. In 2002, California adopted AB 1493, the New Passenger Motor Vehicle Greenhouse Gas Emission Standards or Pavley standard. It required a reduction in tailpipe GHG emissions from new vehicles produced from 2009 to 2015. In 2012 CARB adopted an extension of this policy, the Advanced Clean Car Standards, which requires more stringent reductions in tailpipe GHG emissions from vehicles produced from 2016 to 2025. The Clean Car Standards reduce GHG emissions from on-road transportation. In August 2022, CARB adopted another expansion of these standards, known as the Advanced Clean Cars II standards.

This regulation requires that all new light-duty vehicles (e.g., passenger cars, small trucks, and SUVs) sold in the state to be zero-emission by 2035, with interim targets for new light-duty vehicle sales beginning in 2026. There are some limited exceptions for plug-in hybrid vehicles. CARB adopted similar rules for heavy-duty vehicles and state and local government fleets in 2020 (Advanced Clean Trucks) and 2023 (Advanced Clean Fleets). Advanced Clean Cars II and Advanced Clean Fleets are not included in the modeling used to assess GHG reductions from the Clean Car Standards. These GHG reductions are counted as part of the reductions associated with Strategy TR-2.

- **The updated Title 24 building energy efficiency standards** require new buildings to achieve increased energy-efficiency targets. The latest version of these standards is set to go into effect January 1, 2023. California Code of Regulations, Title 24, Part 6 is California's energy efficiency standards for new and renovated buildings, applied at the local level through the project review and building permit process. The standards are strengthened every three years, with the goal of making new buildings net-zero energy, meaning that they would generate as much energy as they use. The most recent set of Title 24 standards went into effect on January 1, 2020. On August 11, 2021, the California Energy Commission (CEC) adopted the 2022 Title 24 standards. In December, it was approved by the California Building Standards Commission for inclusion into the California Building Standards Code. The 2022 Title 24 standards encourage efficient electric heat pumps, establish electric-ready requirements for new homes, expand solar photovoltaic and battery storage standards, and strengthen ventilation standards. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Title 24 standards.
- **The Low Carbon Fuel Standard (LCFS)** mandates reduced carbon intensity of fuels used in off-road equipment. The Low Carbon Fuel Standard was adopted in 2009 and required a 10 percent reduction in the carbon intensity of all transportation and equipment fuels by 2020. This policy reduces GHG emissions from on-road transportation and from off-road equipment. The LCFS has since been revised several times, most recently in 2020. The 2020 LCFS requires further reductions in carbon intensity of around 1.25 percent every year until 2030.
- **The Short-Lived Climate Pollutant Reduction Strategy**, also known as Senate Bill (SB) 1383, requires that communities divert 75 percent of organic waste (food scraps, grass, and plant trimmings, etc.) away from landfills and toward alternatives such as composting or energy generation. As a part of this requirement, all jurisdictions must offer curbside composting to single-family and small multifamily properties (less than five units). Larger multifamily properties and businesses must either participate in

curbside composting or subscribe to self-haul organic waste to a composting program or collection site. SB 1383 also includes requirements related to diverting surplus food to people in need, increasing the use of products made from recycled organics, and providing more detailed reporting statistics.

- **Renewable Natural Gas** assumes that biomethane and renewable hydrogen fuels will be blended into the fossil gas pipeline and that, in the 2030s, dedicated hydrogen pipelines will be constructed to serve certain industrial clusters.

In addition to these five state-level policies, the County's default electricity provider, MCE, has also taken action to reduce the GHG emissions from the electricity it supplies to Contra Costa community members, beyond the minimum required by RPS. In 2019, MCE electricity was approximately 60 percent renewable and 90 percent carbon-free. In 2023, MCE sourced over 95 percent of its electricity from carbon-free sources. Since MCE supplies more electricity from carbon-free sources than RPS requires it to, the County can receive "credit" for the GHG reductions that result from going beyond the State minimum. The County also enacted an all-electric reach code in 2022 (suspended in February 2024), which required many types of new buildings to be built using only electricity, not use natural gas, thereby reducing GHG emissions associated with residential and nonresidential energy. To replace its suspended all-electric ordinance, in October 2024, the County adopted Ordinance No. 2024-17, adopting and amending the 2022 California Energy Code to require increased energy efficiency standards for newly constructed residential buildings, hotels, offices, and retail buildings. The more stringent energy efficiency standards support low levels of GHG emissions for new construction. This ordinance is expected to take effect on January 1, 2025, and will be considered for updates during future revisions to the Building Standards Code.

Overall, these existing policies are expected to reduce Contra Costa County's future GHG emissions. Without these policies in place, community-wide GHG emissions in the unincorporated area are expected to be approximately 1,300,320 MTCO₂e by 2045, or 28 percent above 2019 levels. With these policies enacted, community-wide GHG absolute emissions in the unincorporated area are projected to be approximately 874,420 MTCO₂e by 2045, or 18 percent below 2019 levels. **Table B-25** shows the absolute reductions achieved by these policies.

TABLE B-25. GHG EMISSION REDUCTIONS FROM EXISTING AND PLANNED STATE, REGIONAL, AND LOCAL ACTIONS, 2019–2045

	2019	2030	2045	PERCENTAGE CHANGE, 2019–2045
Forecast emissions without state and regional actions	986,310	1,125,230	1,288,490	31%
Reductions from RPS	-	-24,620	-115,400	-
Reductions from Clean Car standards	-	-110,250	-214,120	-
Reductions from Title 24	-	-9,880	31,600	-
Reductions from LCFS (off-road only) *	-	740	7,430	-
Reductions from SB 1383	-	-21,880	-53,870	-
Reductions from renewable natural gas	-	-18,460	-78,050	-
Reductions from MCE clean energy procurement	-	-1,240	-	-
Reductions from all-electric reach code (suspended February 2024)	-	-3,150	-2,590	-
Reductions from all existing and planned state and regional actions	-	-188,740	-488,200	-
Emissions with all existing and planned state and regional actions	986,310	957,470	874,420	-11%

Note: All numbers are rounded to the nearest 10. Due to rounding, totals may not equal the sum of the individual values.
 * Due to the methods used in the forecast and assessment of state GHG reduction potential, future projections for off-road equipment GHG emissions are higher than forecast above.

TECHNICAL DATA FOR GHG REDUCTION STRATEGIES

This section discusses the data sources, methods, and assumptions for the quantification of the GHG-reduction strategies included in the Contra Costa County 2024 CAAP. In addition to the sources presented here, these calculations also rely on the GHG inventory and forecast. These calculations rely on emission factors that reflect the reductions already achieved by the existing actions discussed in the previous section. **Table B-26** shows these emission factors.

TABLE B-26. EMISSION FACTORS WITH EXISTING ACTIONS, 2019–2045

ACTIVITY TYPE	UNITS	2019	2030	2045
Electricity (PG&E)	MTCO ₂ e/kWh	0.000108	0.000077	0.000000
Electricity (MCE)	MTCO ₂ e/kWh	0.000045	0.000044	0.000000
Electricity (direct access)	MTCO ₂ e/kWh	0.000187	0.000134	0.000000
Electricity (PG&E and MCE)	MTCO ₂ e/kWh	0.000054	0.000047	0.000000
Natural gas	MTCO ₂ e/Therms	0.005310	0.005311	0.005310
Propane	MTCO ₂ e/Gallons	0.005845	0.005845	0.005845
Kerosene	MTCO ₂ e/Gallons	0.010417	0.010417	0.010417
Wood	MTCO ₂ e/MMBTU	0.095664	0.095664	0.095664
On-road transportation	MTCO ₂ e/VMT	0.000408	0.000325	0.000408
Solid waste (MSW)	MTCO ₂ e/Tons	0.261659	0.261678	0.261676
Solid waste (ADC)	MTCO ₂ e/Tons	0.245383	0.245132	0.245854
Solid waste (combined)	MTCO ₂ e/Tons	0.004628	0.003958	0.260191
BART	MTCO ₂ e/Passenger miles	0.000013	0.000008	0.000013

For each strategy, this appendix discusses the following items:

- The savings in activity data (e.g., kWh of electricity or tons of solid waste) in 2030 and 2045 resulting from implementing the strategy as described. A negative value indicates an increase in activity data.
- The decreases in GHG emissions in 2030 and 2045 resulting from implementing the strategy as described.
- The assumptions made about the strategy's performance, such as the level of community participation required to achieve the specified reductions by 2030 and 2045.
- The performance targets, which are quantifiable metrics about the projected level of success the strategy must meet to achieve the specified reductions by 2030 and 2045.
- Sources: Key studies, analyses, and other sources of data used to inform the quantification. This does not include the GHG inventory, forecast, or other technical analyses prepared as part of the 2024 CAAP or the 2045 Contra Costa General Plan.

CLEAN AND EFFICIENT BUILT ENVIRONMENT

Strategy BE-1: Require and incentivize new buildings and additions built in unincorporated Contra Costa County to be low-carbon or carbon neutral.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Natural gas savings (therms)	889,870	2,754,380
Electricity savings (kWh)	-1,198,930	-6,086,080

GHG SAVINGS

	2030 MTCO ₂ e	2045 MTCO ₂ e
GHG reduction (Absolute MTCO ₂ e)	4,340	10,970

KEY ASSUMPTIONS

	2030	2045
Cumulative percentage of residential new construction influenced by Energy Design Rating (EDR) code	95%	95%
Cumulative percentage of new eligible nonresidential construction influenced by EDR code (once implemented)	95%	95%
Cumulative percentage of new nonresidential buildings eligible for EDR code	50%	50%
Year EDR reach code is first implemented	2025	2025

PERFORMANCE TARGETS

	2030	2045
Number of new EDR-compliant residential units	8,450	22,020
Number of new EDR-compliant commercial buildings	140	360

SOURCES

Frontier Energy, Inc, Misti Bruceri & Associates, LLC. 2023. "2022 Cost-Effectiveness Study: Single Family New Construction."

Frontier Energy, Inc, Misti Bruceri & Associates, LLC. 2023. "2022 Cost-Effectiveness Study: Multifamily New Construction."

Goyal, A., Farahmand, F., TRC Companies, Inc. 2023. "Nonresidential New Construction Reach Code Cost-effectiveness Study."



Greenblatt, J.B. 2015. "Modeling California policy impacts on greenhouse gas emissions." <https://eta-publications.lbl.gov/sites/default/files/lbni-7008e.pdf>.

Strategy BE-2: Retrofit existing buildings and facilities in the unincorporated County, and County infrastructure, to reduce energy use and convert to low-carbon or carbon-free fuels.

In March 2023, BAAQMD adopted amendments to Regulation 9, Rules 4 and 6. These revisions require that, when existing natural-gas-powered space heaters and water heaters reach the end of their operational life, they be replaced with electric-powered models. These requirements are scheduled to take effect in 2027 to 2031 for water heaters (depending on the capacity of the unit) and in 2029 for space heaters.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Electricity savings (kWh) – With BAAQMD rule	100,583,970	190,187,380
Natural gas savings (therms) – With BAAQMD rule	6,596,190	16,882,720
Propane savings (gallons) – With BAAQMD rule	130,620	344,450
Gallons kerosene	2,090	5,500
MMBTU wood	13,010	34,300

GHG SAVINGS

WITH BAAQMD RULE	2030 MTCO _{2e}	2045 MTCO _{2e}
GHG reduction (Absolute MTCO _{2e})	55,990	156,150

KEY ASSUMPTIONS

	2030	2045
Percentage of existing homes conducting standard retrofits	20%	40%
Percentage of existing homes upgrading to Title 24 Standards	20%	40%
Percentage of existing mobile homes conducting standard retrofits	30%	60%
Percentage of businesses conducting standard retrofits (not including fuel switching)	15%	25%
Percentage of businesses retrofitting to current Title 24 standards (not including fuel switching)	15%	25%
Cumulative percentage of homes electrifying water heaters (BAAQMD compliance)	15%	85%
Cumulative percentage of homes electrifying space heaters (BAAQMD compliance)	10%	90%
Cumulative percentage of businesses electrifying water heaters (BAAQMD compliance)	Less than 10%	70%
Cumulative percentage of businesses electrifying space heaters (BAAQMD compliance)	5%	90%
Percentage of commercial buildings covered by BAAQMD rules	50%	50%
Cumulative percentage of homes electrifying cooking appliances	5%	65%
Cumulative percentage of homes electrifying clothes drying appliances	10%	80%
Cumulative percentage of businesses electrifying cooking appliances	5%	60%

PERFORMANCE TARGETS

	2030	2045
Number of housing units undergoing retrofits	14,160	28,310
Number of housing units renovated to Title 24 energy efficiency standards	13,210	26,430
Number of commercial buildings undergoing retrofits	490	820
Number of commercial buildings renovated to Title 24 energy efficiency standards	490	820

SOURCES

California Public Utilities Commission. 2017. *Final Report: 2015 Home Upgrade Program Impact Evaluation*.

https://www.calmac.org/publications/RES_5.1_HUP_FINAL_REPORT_ATR_06-30-17.pdf.



Martin, E. Sutherland, K., Parker, D. 2016. "Measured Performance of Heat Pump Clothes Dryers." https://www.aceee.org/files/proceedings/2016/data/papers/1_160.pdf.

Pacific Northwest National Laboratory. 2011. "Advanced Energy Retrofit Guides: Office Buildings." https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.

Pacific Northwest National Laboratory. 2011. "Advanced Energy Retrofit Guides: Retail Buildings." https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20814.pdf.

US Department of Energy. n.d. "Energy-Efficient Manufactured Homes." <https://www.energy.gov/energysaver/energy-efficient-manufactured-homes>.

Strategy BE-3: Increase the amount of electricity used and generated from renewable sources in the county.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Electricity savings (kWh)	114,969,980	271,666,080

GHG SAVINGS

	2030 MTCO ₂ E	2045 MTCO ₂ E
GHG reduction (Absolute MTCO ₂ e)	10,830	0

KEY ASSUMPTIONS

	2030	2045
Percentage of existing homes installing solar energy systems	15%	35%
Percentage of existing homes with solar energy systems and installing battery storage systems	20%	50%
Percentage of new homes installing battery storage systems	40%	60%
Percentage of existing businesses installing solar energy systems	3%	11%
Percentage of existing businesses with solar energy systems and battery storage systems	15%	45%
Percentage of residents enrolling in MCE	90%	90%
Percentage of businesses enrolling in MCE	90%	90%
Percentage of residents enrolling in 100% renewable tiers	10%	30%
Percentage of businesses enrolling in 100% renewable tiers	5%	20%
Percentage of direct access customers switching to MCE	5%	10%

PERFORMANCE TARGETS

	2030	2045
Residential solar systems installed	9,190	23,030
Residential battery systems installed	5,330	0
Nonresidential solar systems installed	30	290
Nonresidential battery systems installed	10	0
Residential electricity supplied by MCE (kWh)	272,202,760	292,636,220
Residential electricity provided at Deep Green tier (kWh)	25,842,700	83,347,910
Nonresidential electricity provided by MCE (kWh)	219,413,250	220,477,040
Nonresidential electricity provided at Deep Green tier (kWh)	10,533,730	42,339,190

SOURCES

California Distributed Generation Statistics. 2021. Interconnected Project Sites, 2021-09-30 [data set]. https://www.californiadgstats.ca.gov/archives/interconnection_rule21_projects/.

MCE. 2020. *Operational Integrated Resource Plan, 2021- 2030*. https://www.mcecleanenergy.org/wp-content/uploads/2020/10/MCE-Operational-Integrated-Resource-Plan_2021.pdf.

National Renewable Energy Laboratory. n.d. "PWWatts". <https://pwwatts.nrel.gov/>.

NO WASTE CONTRA COSTA

Strategy NW-1: Increase composting of organic waste.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Waste savings (tons)	5,580	9,190

GHG SAVINGS

	2030 MTCO ₂ E	2045 MTCO ₂ E
GHG reduction (Absolute MTCO ₂ e)	2,240	4,000

KEY ASSUMPTIONS

	2030	2045
Current compost diversion rate	77%	77%
Target compost diversion rate	90%	95%

PERFORMANCE TARGETS

	2030	2045
Number of households with composting service	62,290	79,330
Number of businesses with composting service	2,930	3,510

SOURCES

California Air Resources Board. 2011. Landfill Methane Emissions Tool [data table].

<https://ww2.arb.ca.gov/resources/documents/landfill-methane-emissions-tool>.

California Department of Resources Recycling and Recovery. 2019. "Residential Waste Stream by Material Type".

<https://www2.calrecycle.ca.gov/WasteCharacterization/ResidentialStreams?lg=7&cy=7>.

California Department of Resources Recycling and Recovery. 2019. "Waste Characterization Tool for California Jurisdictions". <https://www2.calrecycle.ca.gov/WasteCharacterization/>.

Contra Costa County. 2020. *Climate Action Plan Progress Report for 2020*.

<https://www.contracosta.ca.gov/AgendaCenter/ViewFile/Agenda/12142020-3083>.

Strategy NW-2: Reduce waste from County operations.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Waste savings (tons)	2,630	3,510

GHG SAVINGS

	2030 MTCO ₂ e	2045 MTCO ₂ e
GHG reduction (Absolute MTCO ₂ e)	1,090	1,620

KEY ASSUMPTIONS

	2030	2045
Target composting diversion rate for County activities	85%	95%
Target recycling diversion rate for County activities	85%	95%

PERFORMANCE TARGETS

	2030	2045
Weekly average cubic yards of composted organics (uncompacted)	1,050	1,140
Weekly average cubic yards of recycled materials (uncompacted)	270	300

SOURCES

California Air Resources Board. 2011. Landfill Methane Emissions Tool [data table]. <https://ww2.arb.ca.gov/resources/documents/landfill-methane-emissions-tool>.

California Department of Resources Recycling and Recovery. 2019. "Residential Waste Stream by Material Type." <https://www2.calrecycle.ca.gov/WasteCharacterization/ResidentialStreams?lg=7&cy=7>.

California Department of Resources Recycling and Recovery. 2019. "Waste Characterization Tool for California Jurisdictions". <https://www2.calrecycle.ca.gov/WasteCharacterization/>.

Intergovernmental Panel on Climate Change. 2006. "2006 IPCC Guidelines for National Greenhouse Gas Inventories." <https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.



Strategy NW-3: Increase community-wide recycling and waste programs.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Waste savings (tons)	5,560	16,770

GHG SAVINGS

	2030 MTCO ₂ e	2045 MTCO ₂ e
GHG reduction (Absolute MTCO ₂ e)	520	2,530

KEY ASSUMPTIONS

	2030	2045
Target community diversion rate	77%	85%
Decrease in non-organic and non-recyclable waste tonnage	20%	50%

PERFORMANCE TARGETS

	2030	2045
Reduction in landfilled recyclables (tons)	0	1,280
Decrease in non-compostable/recyclable tonnage (tons)	5,560	15,490
Pounds of waste per person per day	2.08	1.85

SOURCES

California Air Resources Board. 2011. Landfill Methane Emissions Tool [data table]. <https://ww2.arb.ca.gov/resources/documents/landfill-methane-emissions-tool>.

California Department of Resources Recycling and Recovery. 2019. “Residential Waste Stream by Material Type”. <https://www2.calrecycle.ca.gov/WasteCharacterization/ResidentialStreams?lg=7&cy=7>.

California Department of Resources Recycling and Recovery. 2019. “Waste Characterization Tool for California Jurisdictions”. <https://www2.calrecycle.ca.gov/WasteCharacterization/>.

United States Environmental Protection Agency. 2016. *Volume-to-Weight Conversion Factors*. https://www.epa.gov/sites/default/files/2016-04/documents/volume_to_weight_conversion_factors_memorandum_04192016_508fnl.pdf.

Strategy NW-4: Reduce emissions from landfill gas.

GHG SAVINGS

	2030 MTCO ₂ E	2045 MTCO ₂ E
GHG reduction (Absolute MTCO ₂ e)	57,460	61,410

KEY ASSUMPTIONS

	2030	2045
Current methane capture rate	75%	75%
Future methane capture rate (Keller and Acme only)	85%	85%
Decrease in flared landfill gas	15%	30%

PERFORMANCE TARGETS

	2030	2045
Methane capture rate at Keller and Acme landfills	15%	30%
Tons of flared landfill gas	5,460	4,330

SOURCES

Contra Costa County Department of Conservation and Development. 2020. "Attachment 8: November 2020 Draft MND SCH #2020100267."

http://64.166.146.245/docs/2021/BOS/20210713_1776/46178_8%20November%202020%20Draft%20MND%20SCH%20%232020100267.pdf.

REDUCE WATER USE AND INCREASE DROUGHT RESILIENCE

Strategy DR-1: Reduce indoor and outdoor water use.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Electricity savings (kWh)	1,436,210	2,560,780
Water (MG)	360	650

GHG SAVINGS

	2030 MTCO ₂ e	2045 MTCO ₂ e
GHG reduction (Absolute MTCO ₂ e)	970	1,440

KEY ASSUMPTIONS

	2030	2045
Percentage of existing homes with graywater systems	5%	20%
Percentage of existing businesses with graywater systems	2%	10%
Percentage of existing homes retrofitting water fixtures	60%	90%
Percentage of existing businesses retrofitting water fixtures	60%	90%
Percentage of new homes with graywater systems	10%	35%
Percentage of new businesses with graywater systems	5%	20%

PERFORMANCE TARGETS

	2030	2045
Number of residential graywater system installations	3,910	20,180
Number of commercial graywater systems installations	70	440
Number of nonresidential buildings receiving water efficiency upgrades	1,790	2,680
Number of residential buildings receiving water efficiency upgrades	36,190	54,290

SOURCES

Environmental Protection Agency. 2009. "Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program."

<https://www.epa.gov/sites/default/files/2017-03/documents/ws-commercial-ci-whitepaper.pdf>

State of California, Natural Resources Agency, Department of Water Resources. 2014. "California Water Plan Update 2013."

State of California, Natural Resources Agency, Department of Water Resources. 2019. "California Water Plan Update 2018." <https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/CaliforniB-Water-Plan/Docs/Update2018/Final/CaliforniB-Water-Plan-Update-2018.pdf>

Water Research Foundation. 2016. "Residential End Uses of Water Study, Version 2: Executive Report."

Strategy DR-2: Ensure sustainable and diverse water supplies.

This is a supportive measure that does not result in direct measurable GHG emissions. There are no activity or GHG savings, assumptions, performance indicators, or sources associated with this measure.

CLEAN TRANSPORTATION NETWORK

Strategy TR-1: Improve the viability of walking, biking, zero-emission commuting, and using public transit for travel within, to, and from the county.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Vehicle Miles Traveled (VMT)	52,447,950	153,067,310

GHG SAVINGS

	2030 MTCO ₂ E	2045MTCO ₂ E
GHG reduction (Absolute MTCO ₂ e)	17,050	40,370

KEY ASSUMPTIONS

	2030	2045
Miles of bicycle lanes	45	132
Average round trip length for bicycle trips (miles)	2.1	2.1
Is bike parking provided in most nonresidential locations?	Yes	Yes
Percentage increase in combined housing units/acre due to TOD	15%	63%
Percentage increase in jobs/acre due to TOD	10%	45%
Percentage increase in transit frequency	5%	15%
Level of implementation (increase in transit frequency)	10%	25%
Percentage increase in transit service miles	5%	15%
Percentage of employers participating in TDM	5%	20%
Average trip reduction from voluntary TDM participation	15%	45%
Percentage of county with expanded sidewalks	5%	15%
Change in percentage of households that have access to electric bike sharing	5%	9%
Percentage of multifamily units permanently designated as affordable	5%	15%
Percentage of transit routes that receive supportive treatments	1%	2%

PERFORMANCE TARGETS

	2030	2045
Miles of bicycle lanes	50	130
Bicycle mode share	1%	1%
Bus ridership (commute share)	5%	15%
BART ridership (passenger miles)	17,227,850	22,459,900
VMT reduction from TDM programs	1,705,370	25,757,280
New affordable multifamily units	70	540
Percentage of transit routes that receive supportive treatments	1%	2%
Change in percentage of households that have access to electric bike sharing	5%	9%

SOURCES

California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." <http://www.aqmd.gov/docs/default-source/ceqa/handbook/capcoB-quantifying-greenhouse-gas-mitigation-measures.pdf>.

Contra Costa Transportation Authority. 2018. "Contra Costa Countywide Bicycle Pedestrian Plan." <https://ccta.net/wp-content/uploads/2018/10/5b8ec26192756.pdf>.

US Census. "Contra Costa County 2019 ACS 5-Year Estimates, Table B08006."

Strategy TR-2: Increase the use of zero-emissions vehicles. Transition to a zero-emission County fleet by 2035 and a community fleet that is at least 50 percent zero-emission by 2030.

ACTIVITY DATA SAVINGS

ACTIVITY DATA TYPE	2030	2045
Electricity used (kWh)	-111,003,180	-260,019,140
Natural gas (gallons)	2,760	5,450
Diesel (gallons)	530,690	1,353,420
VMT	14,260	14,260

GHG SAVINGS

	2030 MTCO ₂ E	2045 MTCO ₂ E
GHG reduction (Absolute MTCO ₂ e)	148,000	343,890



KEY ASSUMPTIONS

	2030	2045
Percentage of County vehicles that are zero-emission	80%	95%
Percentage of community fleet that is zero-emission (light-duty)	35%	85%
Target percentage of total community TNC VMT from electric vehicles	75%	90%
Percentage of community fleet that is zero-emission (heavy-duty)	10%	70%
Target percentage total commercial Natural Gas VMT replaced by biomethane	2%	5%
Target percentage total commercial Diesel VMT replaced by biomethane	5%	15%
Percentage of lawn and garden fuel use converted to electric	30%	80%
Percentage of construction equipment fuel use converted to electric	30%	60%
Percentage other commercial fuel use converted to electric	20%	55%
Number of EVs in EV car sharing	50	100

PERFORMANCE TARGETS

	2030	2045
New VMT from electric vehicles, community-wide, including municipal operations	325,676,160	968,702,100
Reduction in municipal vehicle gasoline use (gallons)	230,120	250,030
New VMT from electric vehicles, TNC	82,961,910	101,629,820
Reduction in offroad gasoline use (gallons)	2,113,740	0
Reduction in offroad diesel use (gallons)	3,625,240	0
Increase in biomethane VMT	3,003,670	8,050,840
Number of EVs in car sharing	50	100

SOURCES

California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." <http://www.aqmd.gov/docs/default-source/ceqa/handbook/capcoB-quantifying-greenhouse-gas-mitigation-measures.pdf>.

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[California Air Resources Board. 2020. "2020 Emissions Model for Small Off-Road Engines – SORE2020." https://ww2.arb.ca.gov/sites/default/files/2020-09/SORE2020_Technical_Documentation_2020_09_09_Final_Cleaned_ADA.pdf.](https://ww2.arb.ca.gov/sites/default/files/2020-09/SORE2020_Technical_Documentation_2020_09_09_Final_Cleaned_ADA.pdf)

California Air Resources Board. 2021. "Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity." [https://www.airquality.org/ClimateChange/Documents/Handbook%20Public%20Draft_2021-Aug.pdf.](https://www.airquality.org/ClimateChange/Documents/Handbook%20Public%20Draft_2021-Aug.pdf)

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Contra Costa Transportation Authority. 2018. "Contra Costa Countywide Bicycle Pedestrian Plan." [https://ccta.net/wp-content/uploads/2018/10/5b8ec26192756.pdf.](https://ccta.net/wp-content/uploads/2018/10/5b8ec26192756.pdf)

Contra Costa Transportation Authority. 2019. "Contra Costa Electric Vehicle Readiness Blueprint." [https://ccta.net/wp-content/uploads/2019/07/CCTB-EV-Blueprint.pdf.](https://ccta.net/wp-content/uploads/2019/07/CCTB-EV-Blueprint.pdf)

US Department of Energy. 2021. "FuelEconomy.gov". [https://fueleconomy.gov/.](https://fueleconomy.gov/)

RESILIENT COMMUNITIES AND NATURAL INFRASTRUCTURE

Strategy NI-4: Sequester carbon on natural and working lands in Contra Costa County.

ACTIVITY DATA SAVINGS

There are no activity data savings associated with this strategy.

GHG SAVINGS

	2030 MTCO ₂ e	2045 MTCO ₂ e
GHG reduction (Absolute MTCO ₂ e)	22,630	88,910

KEY ASSUMPTIONS

	2030	2045
Percentage of irrigated crops with seasonal cover crops	15%	35%
Percentage of irrigated crops practicing mulching	5%	35%
Percentage of irrigated crops with compost application	15%	80%
Percentage of irrigated crops with field borders	2%	8%
Percentage of irrigated crops practicing alley cropping	10%	30%
Percentage of irrigated crops with conservation crop rotation	25%	50%
Percentage of irrigated crops practicing reduced tillage	15%	35%
Percentage of irrigated crops practicing no tillage	5%	10%
Percentage of orchards/vineyards with seasonal cover crops	5%	25%
Percentage of orchards/vineyards practicing mulching	5%	25%
Percentage of orchards/vineyards with compost application	15%	80%
Percentage of orchards/vineyards with windbreaks	0%	2%
Percentage of orchards with reduced tilling	10%	35%
Percentage of vineyards with reduced tilling	10%	35%
Percentage of pastures and rangeland with compost application	5%	15%
Percentage of pastures and rangeland with prescribed grazing	15%	40%
Percentage of pastures and rangeland practicing oak restoration	1%	5%
Percentage of pastures and rangeland practicing riparian restoration	0%	1.2%
Percentage of rangeland with range planting	2%	10%
Percentage of grasslands with native grass restoration	2%	10%
Percentage of forested areas undergoing annual fuel reduction	5%	25%

PERFORMANCE TARGETS

	2030	2045
Acres of irrigated crops with seasonal cover crops	3,770	8,130
Acres of irrigated crops practicing mulching	1,260	8,130
Acres of irrigated crops with compost application	3,770	18,590
Acres of irrigated crops with field borders	500	1,860
Acres of irrigated crops converted due to alley cropping	510	1,480
Acres of irrigated crops with conservation crop rotation	6,280	11,620
Acres of irrigated crops practicing reduced tillage	3,770	8,130
Acres of irrigated crops practicing no tillage	1,260	2,320
Acres of orchards or vineyards with seasonal cover crops	220	1,060
Acres of orchards or vineyards practicing mulching	220	1,060
Acres of orchards or vineyards with compost application	660	3,380
Acres of orchards or vineyards with windbreaks	-	80
Acres of orchards with reduced tilling	250	790
Acres of vineyards with reduced tilling	210	690
Acres of pastures and rangeland with compost application	7,430	21,430
Acres of pastures and rangeland with prescribed grazing	22,300	57,140
Acres of pastures and rangeland practicing oak restoration	1,490	7,140
Acres of pastures and rangeland practicing riparian restoration	-	1,710
Acres of rangeland with range planting	2,870	13,780
Acres of grasslands with native grass restoration	2,610	13,150
Acres of forested areas undergoing annual fuel reduction	3,030	15,250

SOURCES

California Air Resources Board. 2010. "Local Government Operations Protocol For the quantification and reporting of greenhouse gas emissions inventories."

https://ww3.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

APPENDIX C: VULNERABILITY ASSESSMENT

In January 2019, Contra Costa County prepared a Vulnerability Assessment in compliance with Section 65302 of the California Government Code to identify key vulnerable assets and populations in the county and set the groundwork for short- and long-term adaptation efforts. This Vulnerability Assessment highlighted the county's potential vulnerabilities to agricultural pests and diseases, changes in air quality, drought, extreme heat, flooding, fog, human health hazards, landslides and debris flows, severe storms, sea level rise, shoreline flooding, and wildfire.

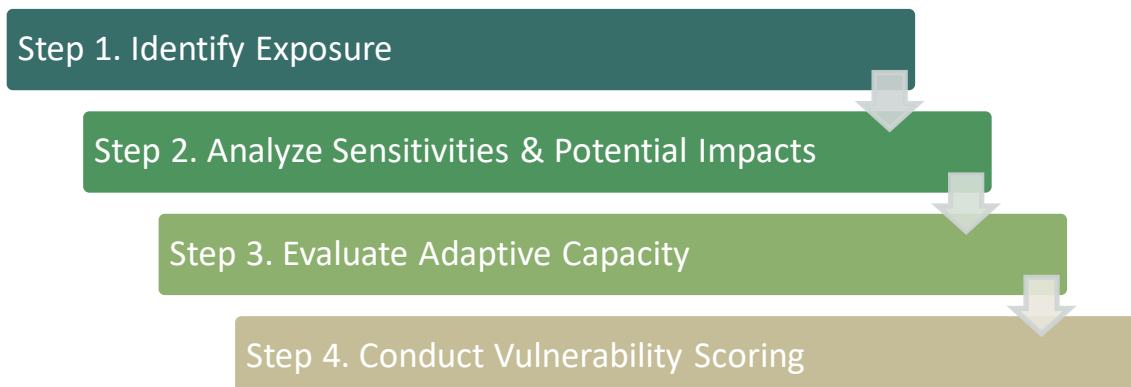
METHOD

The Vulnerability Assessment follows the recommended process in the *California Adaptation Planning Guide* (APG). The APG suggests vulnerability assessments follow a four-step process, including the following steps, as shown in **Figure C-1**:

- **Identify Exposure.** Exposure is the presence of people; infrastructure; natural systems; and economic, cultural, and social resources in areas subject to harm from hazardous conditions. A *hazard*, or climate hazard, is an event or physical condition that has the potential to cause types of harm or loss. The project team looked at the exposure of different populations and assets to specific climate change hazards.
- **Analyze Sensitivity and Potential Impacts.** *Sensitivity* is the level to which changing climate conditions affect a species, natural system, community, government, etc. Potential *impacts* are the effects of a climate change hazard, or the combination of *exposure* and *sensitivity*. The project team first identified which hazard would likely affect particular populations and assets because not all hazards will affect all populations or assets. For example, human health hazards are likely to affect most populations, but they would not affect the structural stability of a bridge or a dam. The project team then evaluated the severity of the impacts from the climate change hazard, to generate an impact score ranging from High (most severe) to Low (least severe).

- **Evaluate Adaptive Capacity.** *Adaptive capacity* is the ability of people and assets to adjust to potential damage from climate change hazards, to take advantage of existing opportunities such as funding, tools, and resources, or to respond to the impacts of climate change. The project team evaluated the adaptive capacity of each population or asset for each applicable identified hazard. As with impact scoring, the project team scored the adaptive capacity of populations or assets ranging from High (more adaptable to a hazard) to Low (least adaptable to a hazard).
- **Conduct Vulnerability Scoring.** *Vulnerability* is the degree to which populations and assets are susceptible to harm, based on a combination of impact and adaptive capacity for each applicable identified hazard as affected by the level of exposure to changing climate conditions. In accordance with the process in the APG, the project team used the impact and adaptive capacity scoring to identify and prioritize the most vulnerable populations and assets in Contra Costa County.

FIGURE C-1. CALIFORNIA ADAPTATION PLANNING GUIDE RECOMMENDED MODEL



Key Concepts in Climate Change Vulnerability

Exposures: the presence of people, infrastructure, natural systems, and economic, cultural, and social resources in areas that are subject to harm. For example, the number and frequency of extreme heat days is expected to increase across Contra Costa County. To prepare this vulnerability assessment, the project team determined which effects of climate change are expected to occur in and around Contra Costa County, as well as those that may already be occurring.

Sensitivity: the degree to which a species, natural system, or community, government, and other associated systems would be affected by changing climate conditions. The project team prepared a list of the various types of people and assets in and around Contra Costa County that could be affected by climate change to be included in the vulnerability assessment.

Impact: a specific negative result of a climate change effect, generally on a particular population or asset. Impact is often determined by the combination of exposure and sensitivity. For example, if the effect of climate change is that droughts are likely to become more frequent and severe, a potential impact to farmers is that less water could be available for irrigation. Every population and asset in Contra Costa County is likely to experience different impacts. In this vulnerability assessment, the project team looked at the potential impacts to each sensitivity from each identified exposure.

Adaptive Capacity: the combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts [or] moderate harm or to exploit beneficial opportunities. Adaptive capacity is the ability to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. For example, during extreme heat events, populations with a greater risk of heat-related illnesses can go to cooling centers, which improve their adaptive capacity. The project team looked at the adaptive capacity of each sensitivity for each identified exposure as part of the vulnerability assessment.

Assessment Process

Following the APG's recommended process, the project team selected the hazards that made the most sense to analyze in the vulnerability assessment. The project team reviewed various guidance documents and reports to select these exposures and sensitivities, including the Adaptation Planning Guide, the Contra Costa County Hazard Mitigation Plan, and the County's existing General Plan.

Once these were identified, the project team looked at who and what in the community are likely to be affected by which hazards since not all hazards will affect all populations and assets. For example, human health hazards affect most population sensitivities, but they would not affect the structural stability of a bridge or a dam. The project team then assessed the impacts and adaptive capacity for each relevant hazard for all affected populations and assets.

County staff from various departments and a representative from the Contra Costa County Sustainability Commission with related technical expertise reviewed the impact, adaptive capacity, and vulnerability scores to provide local knowledge and additional accuracy for the assessment.

Potential Impact

Cascading Impacts: Climate change hazards can have cascading or compounding effects throughout the county. Cascading or compounding climate change effects means one climate change hazard leads to another, and the effects can "cascade" into a disaster. Human health hazards, for example, have cascading effects, such as rendering workers unable to work and visitors unable to travel to an area, that harm both economic drivers and key community services. The project team accounted for these when developing the applicability matrix, during the assessment process, and while summarizing the vulnerability results.



To identify the magnitude of the impacts of each relevant hazard on the populations and assets, the project team considered a number of different questions that helped ensure that the assessment broadly covers the range of potential harm. Examples of these questions include:

- What types of impacts may occur? Could they cause physical injury or damage? Is there a risk of behavioral or mental harm, loss of economic activity, or other nonphysical effects?
- How many people or community assets could be affected by both direct and indirect harm?
- How long would the impacts persist?
- Is there a substantial chance of death or widespread destruction?

Based on the results of the impact assessment (IM), the County ranked each population and asset on a five-point scale (0 – 4) for each relevant hazard. IM0 is the lowest score (lowest impact), and IM4 is the highest score (highest impact). Impact is a negative quality, so a lower impact score is better. Contra Costa County adjusted these scores up or down to account for risk levels and onset.

Table C-1 provides more detail about what each impact score means.

Direct and Indirect Impacts

Direct and Indirect Impacts: The project team marked the hazard as applicable to the population or asset if the hazard directly or indirectly affects a population or asset. Direct impacts affect physical assets, health, or immediate operations, which can lead to indirect impacts on the broader system or community, including asset types in a different category. For example, severe weather can directly damage electrical transmission lines and cause power outages, which can indirectly impact persons with chronic illnesses who depend on electricity for life support systems. Therefore, the project team marked both electrical transmission lines and persons with chronic illnesses who depend on life support systems as being potentially affected by severe weather, the project team evaluated them for their susceptibility to severe weather in the Vulnerability Assessment .

TABLE C-1. IMPACT SCORE RUBRIC

IMPACT SCORE	MEANING (PEOPLE AND ECOSYSTEMS)	MEANING (BUILDINGS, INFRASTRUCTURE, SERVICES, AND ECONOMIC DRIVERS)
IM0. Minimal Impact	Community members may not notice any change.	Damage, interruption in service, or impacts on the local economy are small or intermittent enough to mostly go unnoticed.
IM1. Low Impact	Community members notice minor effects. Daily life may experience mild, occasional disruptions.	There are minor but noticeable interruptions in service, damage, or negative effects on the economy.
IM2. Moderate Impact	There is a marked impact to the community. Quality of life may decline. Impacts may be chronic, and at times substantial.	Damage, service interruptions, and other impacts are clearly evident. Impacts may be chronic and occasionally substantial.
IM3. Significant Impact	The well-being of the community declines significantly. The community's current lifestyle and behavior may no longer be possible.	Impacts are chronic. Buildings, infrastructure, and services may be often or always unable to meet community demand. Large sections of the economy experience major hardships.
IM4. Severe Impact	There is a severe risk of widespread injury or death to people, or of significant or total ecosystem loss.	Buildings, infrastructure, and services cannot function as intended or needed. Economic activities are not viable.

Adaptive Capacity

The project team next assessed the adaptive capacity of each population and asset for each relevant hazard. Using a similar process as the team used to analyze impacts, the County considered various questions to help ensure that the adaptive capacity assessment addresses the full potential of a sensitivity to resist and recover from harm. Examples of these questions include:

- Are there existing programs and policies to provide assistance? Can affected community members take advantage of these programs?
- Are there barriers that limit response or recovery? Are these barriers financial limitations, political challenges, lack of access to technology or other resources, or others?

- For community assets, do alternatives exist in or near Contra Costa County that community members can use?

Based on the results of the adaptive capacity (AC) assessment, the project team ranked each sensitivity on a five-point scale (0 - 4) ranging from AC0 (the lowest adaptive capacity) to AC4 (the highest adaptive capacity). Adaptive capacity is a positive quality, so a higher adaptive capacity score is better. As recommended by the APG, the project team adjusted the adaptive capacity scores to ensure that they reflect risk levels and onset periods.

Table C-2 provides more detail about what each adaptive capacity score means.

TABLE C-2. ADAPTIVE CAPACITY SCORE RUBRIC

ADAPTIVE CAPACITY SCORE	MEANING (ALL SENSITIVITIES)
AC0. No Adaptive Capacity	Currently, there are no feasible means of adapting.
AC1. Low Adaptive Capacity	Adaptive solutions are available, but they are expensive, technologically difficult, and/or politically unpopular.
AC2. Some Adaptive Capacity	Some adaptation methods are available, but not always feasible. Adapting may create significant challenges for some sensitivities.
AC3. High Adaptive Capacity	Adaptation solutions are feasible for most or all sensitivities. There may be occasional or small-scale challenges to implementing adaptation methods.
AC4. Outstanding Adaptive Capacity	Sensitivities can adapt with little or no effort. Quality of life is unchanged or may improve.

Vulnerability Scoring

The project team used the impact and adaptive capacity scores for each sensitivity and relevant exposure to determine a vulnerability score. The vulnerability (V) score reflects how susceptible the sensitivity is to be harmed by a particular exposure.

Vulnerability is assessed on a scale of V1 to V5:

V1	Minimal vulnerability
V2	Low vulnerability
V3	Moderate vulnerability
V4	High vulnerability
V5	Severe vulnerability

Table C-3 shows how different impact and adaptive capacity scores translate to a vulnerability score.

TABLE C-3. SCORING MATRIX

		IMPACT SCORE				
		IM0	IM1	IM2	IM3	IM4
Adaptive Capacity Score	AC0	V3	V4	V5	V5	V5
	AC1	V2	V3	V4	V5	V5
	AC2	V1	V2	V3	V4	V5
	AC3	V1	V1	V2	V3	V4
	AC4	V1	V1	V1	V2	V3

Data Sources

The County used data from a variety of credible sources to prepare the vulnerability assessment, determine the impact and adaptive capacity scores, and support conclusions. These resources include the following:

- **Scholarly Research:** Much of the information came from an extensive body of scientific research that discusses how climate change may affect people and community assets. Much of this research is peer reviewed, which ensures greater accuracy, including studies published in the Proceedings of the National Academy of Science, Geophysical Research Letters, and Climate Change journals.
- **Local Data:** Regional government agencies have already prepared a number of plans and reports that support the vulnerability assessment or contain information relevant to the analysis. The County relied on several local plans and reports to prepare the vulnerability assessment, most notably the 2018 Contra Costa County Hazard Mitigation Plan and Contra Costa County Adapting to Rising Tides Project.
- **State and federal Data:** The County supplemented scholarly research and local data with data from State and federal agencies, including published reports and datasets. The County relied on information from several agencies, including the Centers for Disease Control and Prevention, Federal Emergency Management Agency (FEMA), the California Energy Commission, California Office of Emergency Services (Cal OES), the California Governor's Office of Planning Resources (OPR), California Natural Resources Agency (CNRA), and the California Department of Forestry and Fire Protection (CAL FIRE).

Population and Asset Consideration

When selecting assets and populations to include in the vulnerability assessment, the County considered the following:

- **Sample pool:** the sample pool is a subset of the overall group of people that are being measured or studied. For example, in a political poll among registered voters, the sample pool only includes registered voters, since unregistered voters do not fall into this category. This concept is important for the Contra Costa County Vulnerability Assessment because some of the demographics used in the Vulnerability Assessment have different sample pools. Most of the demographic data come from the US Census Bureau's American Community Survey (ACS), and most of these data have a sample

pool of either all residents or all households in the county. However, a few are different. This does not affect the outcome of the Vulnerability Assessment, but it creates slight differences in the number of people counted as part of each population. Some of these differences in the sample pool size include:

- Data on persons with limited English proficiency only count people who are at least 14 years old instead of the total population, since young children generally are not proficient in any language.
- Statistics that only count the noninstitutionalized population (e.g., people not in prisons or long-term care homes).
- **Data limitations:** The vulnerability assessment pulls data from a wide array of sources. The project team took care to only use reliable, credible sources with the best available information. In some cases, the vulnerability assessment is constrained by the lack of available high-quality information, such as the number of undocumented persons or outdoor workers.
- **Related assets:** Throughout the 65 populations and assets in the vulnerability assessment, there are a few that may appear redundant. For example, the vulnerability assessment looks at both public safety buildings (as a Buildings asset) and at public safety response (as a Key Community Service asset). To be as comprehensive as possible, the vulnerability assessment looks at physical structures separately from the services or benefits they provide. Similarly, this assessment looks at vulnerable people separately from the homes they live in or the industries where they are employed. This is because the effects of climate change on one type of population or asset can be different from the effects on related populations and assets.

POPULATION VULNERABILITIES

A number of factors can contribute to differences in climate change vulnerability across age, occupation, socio-economic status, and lifestyle conditions. The four primary overarching drivers of climate change vulnerability for populations are:

- **Physiology:** Older individuals, children, individuals with disabilities, and those who are immunocompromised or with chronic health conditions may be more physically susceptible to the health effects of heat, wildfire smoke exposure, and human health hazards. These individuals may encounter barriers to evacuating in the event of a fire, flood, or other emergency.

- **Access to financial resources:** Low-income households, households in poverty, and those with precarious employment may struggle to acquire the financial resources necessary to prepare for and recover from the effects of climate change.
- **Exposure:** Outdoor workers and those in low-resilience or precarious housing are more likely to be directly exposed to effects of climate change such as high heat, poor air quality, severe storms, and flooding.
- **Exclusion and social isolation:** Individuals who are physically or socially isolated from the rest of the community, especially from community decision-making, may lack communication or transportation access, face language or cultural barriers, or may lack social connections. Excluded and isolated persons are often at risk because they are overlooked in community planning and are less able to access supportive resources.

A given individual or community may experience more than one of these underlying contributors to climate change vulnerability. These underlying contributors are often structural in nature. This means that, for these vulnerabilities to be comprehensively addressed, community members and policymakers must look beyond the level of individual choice and actively investigate how federal, state, and local economic, health and safety, and housing policy can both exacerbate vulnerability and help resolve it.

Some of Contra Costa County's most vulnerable communities and the climate hazards to which they are most vulnerable are highlighted below:

Children Under 10

Children are considered those that are 10 years of age or younger. According to the 2017 ACS, approximately 20,500 children live within the unincorporated areas of Contra Costa County, or approximately 12 percent of the total population. High concentrations of children live in parts of Concord, Richmond, Pittsburg, Brentwood, and San Ramon.

On average, children spend more time than adults outdoor, which leaves them more susceptible to allergens and pollution from poor air quality and wildfire.¹ Poor air quality can cause asthma and lung diseases, in addition to exacerbating existing conditions that children may have.² Infants and young children are physiologically less able to regulate their body temperature than adults, and children also may not recognize the need to hydrate and cool down when overheated. Schools or daycares where children spend a majority of their time could be damaged by a flood or landslide.³ Children could have to stay home, which may have greater economic challenges as parents would also have to

stay home or find daycare options for their children. Children could also be swept away and drown in flood waters.

- 
Air Quality
- 
Wildfire
- 
Extreme Heat
- 
Shoreline Flooding
- 
Flooding
- 
Landslides and Debris Flows

Households in Poverty

Households with an income below the poverty line, which is \$24,300 for a household of four people. Approximately 7,600 households in Contra Costa County live in poverty, or approximately 12 percent of total households for which poverty status can be determined. Within Contra Costa County, the areas with the highest concentrations of poverty occur in central Richmond, North Richmond and San Pablo, tracts of Concord and Martinez, and in Bay Point, Pittsburg, and Antioch.



Air Quality

Households in poverty are located within areas that currently have high levels of DPM, PM 2.5, and high ground-level ozone concentrations, which can worsen as air temperatures continue to increase.⁴ Households in poverty are likely to be more exposed to poor air quality due to lack of vegetation and trees and lower access to air conditioning.^{5, 6} Persons in these households may become more susceptible to respiratory and cardiovascular related illnesses.⁷



Extreme Heat

Poverty is associated with greater vulnerability to heat in a number of ways. The long-standing association between low-income and poor health outcomes, as well as pre-existing health conditions among people in poverty, play a key role in vulnerability. Impoverished and low-income people who are uninsured may be less likely to seek medical help if they do become ill, may live in poorly insulated housing, and may also be less likely to use fans or air conditioning out of concern for high utility bills. During extreme heat days, temperatures in uninsulated homes may reach unhealthy temperatures. Households in poverty are located throughout the County, however those in central and eastern Contra Costa may face the greatest exposure from extreme heat.



Shoreline
Flooding

Households in poverty affected by coastal flooding are primarily located within North Richmond, Bay Point, and the tracts and islands in the Delta.⁸ Most of the households in poverty are located within or near 100-year flood zones.⁹ Flooding can damage homes, cause mildew and mold to grow, destroy infrastructure, and contaminate water supplies.



Flooding



Human Health
Hazards

Households in poverty may be living in conditions that increase the chances of catching vector-borne illness, pathogens, or diseases. Households in poverty may be disproportionately affected by higher rates of pollution and poor air quality.



Landslides and
Debris Flows

Households in poverty may live in homes that are less structurally sound. Rodeo, Crockett, Bay Point, and Port Costa have a high concentration of households in poverty and also have high landslide susceptibility areas.^{10, 11} Landslides can damage the foundations of homes or destroy them completely.¹²



Sea Level Rise

Vine Hill, Bay Point, and North Richmond households in poverty may be affected by sea level rise. Households in poverty may live in structures that are not waterproofed or built above the current 100-year flood elevation.¹³ These households are more likely to live in low-lying areas that are already subject to flooding, which may worsen as sea levels rise.



Severe Storms

Households in poverty may live in structures that are less resilient to severe weather.¹⁴ This increases the likelihood that high winds, thunderstorms, and heavy rainstorms can damage their homes or cause mold or mildew growth. Persons living in these households can be physically harmed or experience a decrease in quality of life due to severe weather.



Wildfire

Households in poverty may be subject to greater damage from wildfires, due to financial limitations or neighborhood characteristics that make it difficult to maintain defensible space in fire-prone areas. Some households in poverty are located within the wildland-urban interface, which is the most susceptible to damage from wildfires.¹⁵ Smoke and ash from wildfires can also harm households in poverty.

Low-Income Households

Households with an income of 80 percent or less of the median income, which is approximately \$104,400 in Contra Costa County. Approximately 25,340 households or 41 percent of all households in the County are within the low-income category. Low-income households may have fewer financial resources to devote to preparing for and recovering from the effects of climate change.

Many low-income households are located within or near a flood zone or dam inundation area, especially in north and east county.¹⁶ High concentrations of low-income households vulnerable to shoreline flooding occur in Rodeo, Crockett, the islands in the Delta, and Discovery Bay.¹⁷ Low-income households may live in structures that are not waterproofed or built above the current 100-year flood elevation.¹⁸ Coastal flooding can damage homes, cause mildew and mold to grow, and destroy infrastructure.



Shoreline Flooding



Flooding

Outdoor Workers

People who mostly work outdoors, including construction workers, agricultural workers, and people who work at outdoor recreation centers throughout Contra Costa County.



Agricultural Pests and Diseases

Outdoor workers may not be directly affected by agricultural pests and diseases. However, outdoor workers can be indirectly affected due to damage to crops and vineyards within the County. This can reduce work opportunities and create economic hardship for outdoor workers. Those working outside of agriculture may not be impacted by agricultural pests and diseases.



Air Quality

Outdoor workers are directly exposed to poor air quality due to the nature of their occupation. Exposure to increased pesticides, ground level ozone concentrations, and particulate matter can lead to asthma, lung disease, cardiovascular health risks.¹⁹ If outdoor work is stopped due to poor air quality, outdoor workers may face economic hardship.



Drought

Drought can reduce water availability for agricultural operations, parks, and recreation areas, which can indirectly harm outdoor workers. Agricultural operations and Delta recreational opportunities can be halted, which may cause outdoor workers to lose jobs.



Extreme Heat

Outdoor workers in the agriculture, construction, building maintenance, landscaping and refinery operations fields are disproportionately impacted by extreme heat because they are required to be outside and risk heat exhaustion from exertion at jobs.²⁰ Outdoor work is often physically intense, increasing the risk of individuals suffering heat-related medical complications. Outdoor work may also be halted during high temperatures, which can cause significant economic hardships.

Persons Experiencing Homelessness

Persons who do not have a permanent home, including those who live in their vehicles or temporary shelters. There are approximately 2,230 persons experiencing homelessness in Contra Costa County, according to the County's 2018 homeless count, although most of these persons are likely in incorporated communities.

Persons experiencing homelessness lack permanent, and often temporary, shelter, and therefore are more exposed to climate change impacts. Most of the homeless encampments within Contra Costa County occur along the coastline and near or within coastal flood areas.²¹ Coastal flooding and sea level rise can destroy homeless encampments and homeless facilities near the shoreline, creating additional hardships for persons experiencing homelessness. These events could become more frequent as sea levels rise, and coastal storms intensify.

Persons experiencing homelessness, especially those in central and east county, face greater exposure to extreme heat because they lack access to permanent, and often temporary shelter. Dehydration is common among homeless persons, which makes health-related complications from extreme heat more likely. Homeless persons are more likely to suffer respiratory infections, which are exacerbated by extreme heat. Homeless persons on medication are also at greater risk from extreme heat, as some medication interferes with the body's ability to maintain a safe internal temperature during times of extreme temperatures. Homeless persons may face a significant decline in health due to direct exposure to poor air quality that can cause reduced lung function, pneumonia, asthma, and cardio-vascular-related morbidity.²² Homeless encampments located near Bay Point and other wildland-urban interface areas may also be in danger of being burned in the event of a wildfire.²³



Air
Quality



Shoreline
Flooding



Extreme
Heat



Flooding



Human
Health
Hazards



Sea
Level
Rise



Severe
Weather



Wildfire

Persons Living on Single Access Roads

Persons living in areas with a sole route in and out of the neighborhood or area. Several neighborhoods and communities in the Delta and in the hillside areas of central and western Contra Costa County are only accessible via one roadway.

Flooding events, landslides, and wildfire can block, damage, and destroy roadways that are essential for persons living on single access roads. Bethel Island and Delta islands are accessible by single access roads, and many residential areas with single access roads are in the hilly areas in the center of the County. If roadways become impassable, persons living on single access roads can become isolated from the community and emergency services may not be able to reach these communities. Those that are not connected to urban water systems can also have water contamination.²⁴



Shoreline Flooding



Flooding



Landslides and Debris Flows



Sea Level Rise



Wildfire

Persons with Chronic Illnesses

People who have a long-term or permanent health condition that can create regular challenges in their day-to-day lives. These health problems include cancer, asthma, heart disease, and arthritis.



Air Quality

Persons with chronic illnesses may face increased health risks during poor air quality conditions. Poor air quality can exacerbate existing conditions such as asthma and respiratory illnesses, in addition to causing pneumonia.²⁵



Shoreline Flooding

Persons with chronic illnesses, such as cardiovascular diseases and asthma, that may experience coastal flooding are primarily located in Rodeo, Bay Point, and the islands and tracts in the Delta region on the County.²⁶ Persons with chronic illnesses may live in homes that are not flood-proofed and can have mold growth or be damaged during coastal flooding.



Extreme Heat

Persons with chronic health problems, including cardiovascular disease, respiratory disease and diabetes, may face a significantly elevated risk of heat-related illness and death during extreme heat events.²⁷ Extreme heat can exacerbate existing conditions such as diabetes, cardiovascular conditions, respiratory ailments, and cerebrovascular diseases.^{28 29 30} Persons with chronic illnesses may also be on medication that can reduce the ability of the body to maintain a safe internal temperature.³¹



Human Health Hazards

Persons with chronic illnesses may have weaker immune systems due to pre-existing conditions that make it more difficult to fight off new illnesses.³² Allergens and vector-borne illnesses can exacerbate existing illnesses, which can create difficulties in existing or new treatment.



Severe Storms

Severe weather may cause power outages throughout the County, which can affect the life support systems that persons with chronic illnesses may rely on.³³



Wildfire

Wildfires can create smoke that travels 50-100 miles from the fire, which can exacerbate illnesses that persons with chronic illnesses have and cause asthma, acute bronchitis, chronic obstructive disease, and pneumonia.³⁴

Persons with Limited English Proficiency

This group includes people who say they do not speak English “well” or “very well”, although the Census Bureau does not formally define what these terms mean. The 2017 ACS reports that approximately 10,060 people in Contra Costa County who are at least 5 years old have limited English proficiency, or approximately 6 percent of the total population. Other languages spoken in the County are primarily Spanish, Mandarin, Cantonese, Tagalog, and Persian. The highest proportion of households with limited English proficiency occur in Richmond, Concord, and San Pablo.



Air Quality

Persons with limited English proficiency are more likely to live in areas that have poor air quality, such as particulate matter and lower-level ozone. Exposure to increased ground level ozone concentrations and particulate matter can lead to asthma, lung disease, and cardiovascular health risks.³⁵ They may also not be aware of air quality warnings or other alerts.



Flooding

Persons with limited English proficiency are more likely to be in low-income areas, which are also more likely to be located in low-lying areas. Flooding from atmospheric rivers can damage homes and cause them to become uninhabitable or unhealthy to live in. Homes are also more likely to be damaged by high winds or hail events.



Severe Storms



Human Health
Hazards

Persons with limited English proficiency may work outdoors or live in conditions that make them more susceptible to vector-borne illnesses or diseases. These conditions could exacerbate existing illnesses.



Wildfire

Persons with limited English proficiency may not have control over their homes or live in neighborhoods that make it difficult to maintain defensible space. These persons may live in the wildland-urban interface or may not have shelter from smoke conditions.

Persons Without Access to Lifelines

These are individuals who do not have access to basic technology or services, such as transportation or modern communication. These persons may live in areas where these lifelines are not available or feasible, may not be able to afford these lifelines, or for personal reason may choose not to have them. While data is not available on all persons without lifelines, the 2017 ACS reports that approximately 2,850 households in Contra Costa County do not have vehicles, or approximately 5 percent of all households.

Persons without access to lifelines, such as cars and communication systems, may encounter barriers in preparing for and responding to emergency events. They may be unaware of an approaching emergency, may be unable to evacuate in a timely manner, and may become isolated if power services or transit systems are not working. Areas where large numbers of households do not have access to private vehicles may be important sites to strengthen public transit and also to provide mass transportation options to cooling centers during extreme heat events. Areas with clusters of households that do not have access to a vehicle occur in Concord, Richmond, Martinez, and San Pablo.



Shoreline flooding



Flooding



Wildfire

Seniors

Seniors are defined as persons 65 years of age or older. The 2017 ACS reports that there are approximately 26,110 seniors in Contra Costa County, or approximately 15 percent of the total population. Some areas within Contra Costa County, including central Contra Costa County, Bethel Island, the eastern part of Richmond, and several parts of Walnut Creek, have particularly high concentrations of seniors due to both institutional and residential retirement communities. People living in supportive senior housing, such as Rossmoor, may have access to protective resources, including staff paying attention to their well-being.

Seniors' physiology makes these individuals especially vulnerable to the health effects associated with poor air quality, extreme heat, and wildfire exposure. Meanwhile, physical limitations may make it harder for seniors to evacuate in the event of an emergency. Communities with high concentrations of seniors are primarily located on the hillsides in Contra Costa County, which are within high landslide susceptibility areas and are at elevated wildfire risk.³⁶



Air quality



Extreme Heat



Landslides and
Debris Flows



Wildfire

Seniors Living Alone

This group includes senior citizens who are the only people living in their homes, although they may have one or more caretakers. According to the 2017 ACS, approximately 5,070 senior citizens live alone in Contra Costa County, or approximately 19 percent of seniors.

Like other seniors, seniors living alone may be especially vulnerable to the health effects associated with high heat, poor air quality, and wildfire smoke. Seniors living alone generally face elevated overall vulnerability compared to other seniors because they may lack access to social connections and community support to assist in preparing for and responding to emergency events, evacuating, improving home resiliency, managing medical needs, and locating support services. These individuals may be especially isolated in the event of a power outage or road closure. Communities with high concentrations of

seniors are primarily located on the hillsides in Contra Costa, which are within high landslide susceptibility and wildfire risk areas.³⁷



Undocumented Persons

This group includes people who do not have formal permission to live in the United States (they do not have citizenship, permanent residency, visas, or other similar status). There are no official counts of how many undocumented persons live in Contra Costa County, but a 2017 study estimated that the total number of undocumented persons in Contra Costa County (including those living in incorporated areas) was 77,500.

Many undocumented persons have outdoor occupations or work in highly unregulated environments, which leaves them susceptible to harm from extreme heat conditions, exposure to poor air quality, and exposure to disease vectors such as ticks and mosquitoes. Outdoor work is often physically intense, increasing the risk of individuals suffering heat-related medical complications. Outdoor work may also be halted during high temperatures, which can cause significant economic hardships. Undocumented agricultural workers may face economic hardship if crops, vineyards, or rangeland are damaged by agricultural pests and diseases. Agricultural workers who are undocumented are more likely to be let go when farms experience economic hardship.

Undocumented persons are most likely to fall in the households in poverty or low-income categories and are more likely to live in low-lying areas that may be inundated during flooding or damaged by severe weather. Undocumented persons may live in structures that are not waterproofed or built above the current 100-year flood elevation.³⁸ Flooding can damage homes, cause mildew and mold to grow, and destroy infrastructure.



Agricultural
pests and
diseases



Air Quality



Shoreline
Flooding



Extreme Heat



Flooding



Human Health
Hazards



Landslides and
Debris Flows



Severe Weather



Wildfire

INFRASTRUCTURE VULNERABILITIES

Bridges

Bridges may carry roads, rails, or trails. In Contra Costa County, these range from the large, state-owned bridges that carry interstate freeways, to locally owned bridges that carry rural roads and pedestrians over small creeks. There are over 400 bridges countywide, with approximately 80 owned by the Contra Costa County and approximately 160 owned by Caltrans. Damage to bridges could interrupt local and regional transportation patterns, disrupting economic activity and potentially emergency response. Bridge damage or failure could also lead to injury or loss of life.



Shoreline Flooding

According to the Local Hazard Mitigation Plan, 8 bridges are within the coastal flood zones within the County, including 4 on local roads, 3 on Interstate 680, and 1 on State Route 4 west bound.³⁹

Major bridges include the Benecia-Martinez Bridge and the Carquinez Bridge, which are major transportation routes within the Bay Area. Additional bridges that provide key linkages are the Highway 160 bridge and Bethel Island bridge. Damage to these bridges would cause major congestion on other roadways and bridges in the County.⁴⁰ Failure of the Bethel Island bridge could also leave residents and business owners stranded on the island.



Flooding

There are 26 bridges within the 100-year flood zone and dam inundation areas.⁴¹ Some of these bridges are located in low-lying areas that could become covered in floodwater.



Landslides and Debris Flows

Forty bridges, including those on State Route 4 and Interstates 80 and 680 are within the moderate to very high landslide areas.⁴² Landslides can cause these bridges to become unstable and fail.



Severe Storms

Bridges may be damaged or periodically closed due to severe weather.⁴³

Electricity Transmission and Distribution Lines

Electrical transmission and distribution lines are power lines that carry high-voltage electricity long distances between power plants and electricity customers. There are transmission lines located throughout the county, primarily owned by Pacific Gas & Electric (PG&E). Other transmission lines in eastern Contra Costa County are owned by the Western Area Power Administration (WAPA) and the Transmission Agency of Northern California.⁴⁴



Extreme Heat

Extreme heat conditions may most likely affect electricity transmission and distribution lines in east and central Contra Costa, as temperatures in those areas are projected to increase substantially on extreme heat days. Extreme heat can cause an increase in air conditioning use, which can stress and overload the grid, subsequently causing power outages and damage to the lines.



Landslides and Debris Flows

Many electrical transmission lines pass over hills and mountains in east and west Contra Costa and are also within high landslide potential areas.⁴⁵ Landslides can damage or destroy the power lines and towers that support them. These power lines carry electricity to other regions in the Bay Area and could cause widespread power outages if multiple lines are disrupted at the same time.



Severe Storms

Electricity transmission and distribution lines can be damaged or destroyed by high velocity winds. This can cause secondary impacts such as power outages, which would impact County residents and businesses.



Wildfire

Several electrical transmission and distribution lines go through mountainous areas that are within high fire hazard severity zones. Electrical transmission lines and the poles that support them can be damaged or destroyed by the flames and high temperatures created by wildfires. This can cause residents and businesses within the County to lose power if electricity lines fail. This can cause economic hardship and potential public safety concerns.

Flood Control Infrastructure

Flood control infrastructure includes levees, dikes, and drainage channels, and other infrastructure meant to help prevent the creeks, Delta, and other water bodies throughout Contra Costa County from overflowing their banks and causing floods. The Contra Costa County Flood Control District is the agency responsible for local flood control projects. Many of the levees and drainage facilities in the Delta region of the county are privately owned and operated.

Levees near North Richmond, Vine Hill, and the Delta could all be damaged and/or overtopped due to the increase in tidal levels from a coastal storm. Coastal storms can damage or destroy levees and other flood-control infrastructure, making them unable to function as intended or needed. Sea level rise may exacerbate these effects.



Shoreline Flooding



Sea Level Rise

Major Roads and Highways

Major roads and highways within Contra Costa County include Interstates 80, 680, and 580; State Routes 4, 24, and 123; and local roads such as Richmond Parkway, San Pablo Avenue, San Pablo Dam Road, Ygnacio Valley Road and Kirker Pass, Vasco Road, Byron Highway, Marsh Creek Road, and Morgan Territory Road.



Shoreline Flooding



Flooding



Sea Level Rise

Major regional roadways, including Interstates 680 and 80, as well as State Route 4 are within flooding zones. Interstates 680 and 80 and State Route 160 are within sea level rise inundation areas. Flooding to these roadways, in addition to major local roadways could cause major disruptions to local and regional transportation, transit, and commuters.⁴⁶ Large sections of the economy could face economic hardship if commuters in the Bay Area are unable to reach their jobs and communities are isolated because of flooding.



Landslides and Debris Flows

Major roadways, such as Interstate 80 and 680, and State Routes 4 and 24 are within high landslide susceptibility areas⁴⁷. These roadways could be damaged and become impassable, including the fourth bore of the Caldecott Tunnel. This could substantially disrupt regional transportation and connections between Contra Costa County and the rest of the Bay Area.



Wildfire

State Route 4, 24, and Interstate 80 go through moderate to very high fire hazard zones within Contra Costa⁴⁸. Wildfires can damage roadways and cause road closures, which can cause major disruption to commute and traffic patterns in the Bay Area. Closure of Highway 4 and 24 may prevent those living in eastern and central Contra Costa from traveling to west Contra Costa County.

Railroads and BART

There are three standard rail lines that run through Contra Costa County. The rail lines are operated by Union Pacific, Burlington Northern Santa Fe, and Richmond Pacific Railroad Corporation that run along the western, northern, and eastern boundaries on the county along Interstate 80, State Route 4, and Byron Highway.⁴⁹ Each rail line is used for freight trains, and the Capitol Corridor commuter train runs along the Union Pacific railway. The Bay Area Rapid Transit District (BART) operates its own separate rail lines which are used exclusively for public transit. There are two BART rail lines in Contra Costa County, one

beginning in Richmond and heading south toward Berkeley, and the second in the central part of the county extending from Orinda to Antioch.



Shoreline Flooding



Flooding



Sea Level Rise

Amtrak, freight lines, and BART are within the flood areas within coastal and northern of Contra Costa.⁵⁰ Flooding can damage the track bed and ballast material, and the entire system could shut down. Some of these rail lines, including the Martinez and Antioch Amtrak stations, rail lines along Bay Point, Montalvin Manor, Rodeo, Port Costa serve as first line of defense to coastal flooding for communities.⁵¹ Damage to the rail and BART lines could mean disruptions to regional transit networks that are essential for economic activity.⁵²



Landslides and Debris Flows

The North Concord/Martinez BART station, Martinez Amtrak station, Pittsburg/Bay Point BART station, and Lafayette BART station, in addition to the adjacent rail lines are within moderate to high landslide susceptibility zones.⁵³ Landslides could damage the tracks or destroy a station, which could prevent rail cars from passing through the station in either direction. This could limit transit opportunities within east and west county.

Single Access Roads

These are roadways that are one of few, or the only, ways in and out of some communities of neighborhoods. The single or limited number of entry and exit points does not make the road itself more vulnerable than other roads, but the loss of these roadways can effectively cut off large number of people from the rest of Contra Costa County. Single access roadways are primarily located in Bay shoreline and Delta fronting neighborhoods, as well as communities located on the San Pablo Ridge, Canyon, and Briones Hills.

Single access roads can be damaged or blocked by falling trees, flooding, landslides, and wildfire. Single access roads are primarily located in hillside community that are also within high or very high fire hazard severity zones.⁵⁴ Within these forested areas, trees can be damaged by redwood bark beetle or sudden oak death. These diseases can weaken trees and can cause them to fall on and damage roadways.

Single access roads in Bay Point, Bethel Island, and in the Delta may be affected by coastal flooding; single access roads throughout the County are located within the 100- and 500-year floodplain. Single access roads can become inundated and be damaged by a flood event, especially those that rely on bridges that cross through the Delta. This can leave residents and business owners stranded and isolated during a flood.

Damage to or blockage of a single access road can leave residents stranded during an emergency and can inconvenience residents and businesses that rely on access to these roads.



Agricultural pests and diseases



Shoreline Flooding



Flooding



Landslides and Debris Flows



Wildfire

Wastewater Treatment Plants

These facilities treat wastewater so it can be safely discharged into the environment. There are 10 wastewater treatment plants in the county, which treat wastewater for people living in cities and unincorporated areas of Contra Costa County.⁵⁵ Failure of these treatment plants could cause sewer systems to back up and potentially contaminate streams and water systems with raw sewage.



Shoreline Flooding

Three wastewater treatment plants (WWTP): Rodeo sewage treatment plant, West Contra Costa Wastewater, and Mt View Sanitary District are within low lying or coastal flooding areas.⁵⁶ Coastal flooding can exacerbate wet weather flows into the treatment plants with higher levels of stormwater and rising sea levels, which can prevent the system from functioning properly.⁵⁷ Pumps and control panels that are not waterproofed or salt-resistant could also fail.



Flooding

Two WWTPs are within the 100- and 500-year floodplain, one WWTP is within dam inundation zone, including the West Contra Costa and Pinole Hercules plants.⁵⁸



Sea Level Rise

Three wastewater treatment plants: Rodeo sewage treatment plant, West Contra Costa Wastewater, and Mt View Sanitary District are within low lying areas along the shoreline.⁵⁹ Inundation due to sea level rise can exacerbate wet weather flows into the treatment plants with higher levels of stormwater and rising sea levels, which can prevent the system from functioning properly.⁶⁰ Pumps and control panels that are not waterproofed or salt-resistant could also fail.

Water and Wastewater Infrastructure

These facilities convey water from water treatment plants for public use and convey wastewater to wastewater treatment plants through sewer systems. This includes piping, pump stations, wells, and septic systems.

The Mokelumne Aqueduct could be exposed to coastal flooding if the Delta levees fail.⁶¹ Contra Costa Canal and the Clifton Court Forebay are also within the coastal flooding area. If the levees fail during a coastal flooding event, these pieces of infrastructure would also fail, and fresh water would become contaminated with salt water, reducing the amount of suitable drinking water and agricultural water. This could halt economic activities in Contra Costa and the greater California area. These hazards could be exacerbated by sea level rise.



Shoreline Flooding



Flooding



Sea Level Rise

BUILDING VULNERABILITIES

Industrial Buildings

These are buildings that contain industrial and manufacturing uses and businesses. There are approximately 270 industrial buildings in the unincorporated area of Contra Costa County.



Shoreline
Flooding

Approximately 61 industrial buildings in Contra Costa County are within coastal flooding areas.⁶² Coastal flooding can cause damage to industrial structures and increase the potential for hazardous materials release that would contaminate soil, water, and air in surrounding areas.⁶³ Industrial structures that are currently outside of the 100-year flood zone are also unlikely to be waterproofed or flood resistant.⁶⁴



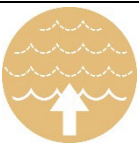
Flooding

There are 68 industrial buildings within the 500-year floodplain and 99 industrial buildings within a dam inundation area⁶⁵. This includes 5 hazardous materials facilities that could potentially release toxic substances into the ground, air, and water if damaged.⁶⁶



Landslides and
Debris Flow

There are 34 industrial structures within landslide-prone areas.⁶⁷ Landslides can disturb holding tanks or damage industrial buildings, and cause chemicals to be released into the air, water, or ground in the surrounding areas.



Sea Level Rise

Approximately 44 industrial buildings in Contra Costa County are within sea level rise inundation areas.^{68, 69} Sea level rise can cause damage to industrial structures over time and increase the potential for hazardous materials release that would contaminate soil, water, and air in surrounding areas due to high mean high tide levels.⁷⁰ Industrial structures that are currently outside of the 100-year flood zone are also unlikely to be waterproofed or flood resistant.⁷¹



Wildfire

There are 24 industrial buildings within the fire hazard zone.⁷² Wildfires can damage holding tanks or manufacturing centers that contain harmful chemicals. Damage to these facilities can release toxic materials into the air, water, and soil of the surrounding communities.

ECONOMIC DRIVER VULNERABILITIES

Agriculture

This category includes field crops (such as tomatoes, sweet corn, and other vegetables), fruit and nut orchards, vineyards, and plant nurseries. These agricultural operations are primarily located in eastern Contra Costa County, between Mt. Diablo State Park and the Delta. In 2017, farms and orchards produced approximately \$95 million in agricultural products.⁷³



Agricultural
Pests and
Diseases

Agriculture within Contra Costa County can be affected by fungal pathogens and invasive disease vectors, which could affect agriculture as an economic asset.⁷⁴ Pests and diseases can affect the quality or viability of crops and vineyards that are within the county. Impacts could become chronic as conditions continue to change and warmer temperatures persist.



Shoreline
Flooding

Agricultural lands in the eastern and Delta portions of the County are within the coastal flood zone. Coastal flooding can inundate farmland and damage or destroy crops. Damage to the freshwater canals and aqueducts could also severely harm the agriculture industry. Eastern Contra Costa County may face significant economic hardship if agriculture is not viable.



Drought

Agriculture may be directly harmed from drought conditions due to an increase in soil salinity, top-soil erosion, and reduced water supply.⁷⁵ This can limit crop production and in turn result in a loss of income for agriculture owners. The economy in eastern Contra Costa can be especially harmed by limited water for agricultural production.



Extreme Heat

Extreme heat conditions can damage crops or reduce yield, which can create economic hardships in eastern Contra Costa. High heat conditions can also make crops more difficult to manage and can lead to die off of crops. Wine grapes are expected to experience a decline in fruit quality due to extreme heat.⁷⁶



Flooding

Agriculture within Contra Costa is located in low-lying areas that are in both floodable areas and dam inundation areas. Flooding can cause significant damage to crop production because they can damage plants, wash away topsoil nutrients, and degrade essential microbial activity. This can harm plants and reduce agricultural productivity, subsequently harming the agricultural economy in east Contra Costa.⁷⁷



Sea Level Rise

Agricultural land in the eastern and Delta portions of the County are within the sea level rise inundation area. Sea level rise can inundate farmland creating higher salinity water and soils. Water supplies, including groundwater, can also experience saltwater intrusion, which can be damaging to crops that do not grow in high salt conditions. Damage to the freshwater canals and aqueducts could also severely harm the agriculture industry. Eastern Contra Costa County may face significant economic hardship if agriculture is not viable.



Severe Storms

High winds, hail, and thunderstorms can decimate agricultural operations. Crops can be flattened by high velocity winds and food crops can be damaged by hail.⁷⁸ This can severely damage the agricultural economy in east Contra Costa and bring economic hardship to farm owners in that area.



Wildfire

Smoke and ash can damage crops, farms, and agricultural fields in Contra Costa County. While many of the agricultural areas are outside of fire hazard zones, smoke and ash can change crops such as wine grapes and change nutrients in the soil.⁷⁹ This may cause plants to die or not produce as many useable fruits. This can cause major economic hardship for farmers.

Industrial and Manufacturing Centers (including oil refineries)

Industrial and manufacturing centers include facilities that have light and heavy industrial and manufacturing businesses. In the unincorporated areas in Contra Costa County, these centers are located in North Richmond, Rodeo, Crockett, Bay Point, Pacheco, and Clyde. Oil refineries are included in this category, as they are industrial facilities where crude oil is processed into gasoline and industrial byproducts for a variety of retail and wholesale

markets. There are three of these facilities in the unincorporated areas of Contra Costa County, which are in Rodeo, Pacheco, and Martinez (straddling the City/County boundaries).



Shoreline Flooding



Flooding



Sea Level Rise

The majority of these centers are located within the coastal flood hazard areas along the bayfront and Delta in western and northern Contra Costa County, with additional centers located within the flood hazard zones on the northern and western edges of the county. Industrial and manufacturing centers can be damaged by flooding, which could result in lost productivity, jobs, and income sources for employees. Coastal flooding hazards could be exacerbated by sea level rise.



Landslides and Debris Flows

Industrial and manufacturing centers, including oil refineries, are located within the landslide prone areas on the northern and western edges of Contra Costa.⁸⁰ Landslides can damage these facilities and cause hazardous material release that can harm the oil refining industry and also the surrounding communities. Impacts may become chronic if landslides increase.



Wildfire

Few industrial and manufacturing centers are located within fire hazard severity zones. However, oils refineries and holding tanks can be damaged by wildfires, which can cause hazardous materials to be released into the surrounding air, water, and soil. This can negatively impact both economic and public health.

Rangeland

Rangeland are lands where many livestock species, including cattle, are raised. Rangeland is primarily located in eastern Contra Costa County. In 2017, rangeland produced approximately \$26 million in livestock products.⁸¹



Drought

Rangeland is primarily located on grassland habitats, which can lose topsoil and productivity due to the drier conditions created by droughts.⁸² This can reduce the available foraging habitat for livestock and cause economic hardship for rangeland owners.



Extreme Heat

Extreme heat is very harmful to livestock animals, especially cattle. Temperatures above 100 degrees can create heat stress, increase the risk of infection, reduce milk production and fertility, and may lead to death of animals. Animals that are already stressed by existing illnesses are at the highest risk.



Flooding

Rangeland located on Bethel Island and the Delta areas are within the 100-year floodplain and dam inundation areas. Flood waters can damage important rangeland infrastructure and the natural grassland that feeds cattle and livestock⁸³. This can harm the local economy in east County.

Regional Parks

Regional parks within Contra Costa County are scattered throughout the county. East Bay Regional Park District operates over 113,000 acres of regional parkland in Alameda and Contra Costa Counties.⁸⁴



Sea Level Rise

Regional shorelines and parks on the Bay/Delta could be permanently inundated by sea level rise. This could make the regional parks unusable, and the parks may not be able to meet the demands of the public.



Wildfire

Many regional parks within the County are located within high or very high fire hazard severity zones.⁸⁵ Wildfires can destroy park facilities, damage trails and walking paths, and damage scenic views and vistas within these parks. This may reduce the number of visitors to the parks, as they may not be as desirable to visit.

The Delta

The Sacramento-San Joaquin River Delta (Delta) spans from Pittsburg in the west, Locke in the east, Sacramento to the North, and Tracy to the south. The Delta primarily encompasses the northern and easternmost borders of Contra Costa County and provides opportunities for boating, fishing, transportation, and a water source for the County.



Air Quality

The Delta supports fishing, water recreation, and park activities that could be curtailed due to poor air quality.⁸⁶ Those who rely on the Delta could have a periodic loss of economic activity as long as poor air quality curtails outdoor and water recreation.



Shoreline Flooding

The Delta, including marinas, harbors, farmland, and recreational opportunities may be continuously flooded and inundated by coastal storms. This can significantly reduce the economic viability of the Delta due to damage to ecosystems, recreation facilities such as marinas and harbors, and farmland on the islands and tracts within the Delta.



Drought

Reduced streamflow and water quality can decrease both commercial fishing, agricultural production, and recreational opportunities in the Delta.⁸⁷ Certain fish species may die off if water conditions change and high salinity water may not be able to be used for agricultural production.⁸⁸



Extreme Heat

The Delta supports fishing, water recreation, and park activities that could be curtailed due to extreme heat.⁸⁹ Extreme heat may also alter the water quality, cause water temperatures to rise, and cause fish to die off and algae growth.



Sea Level Rise

The Delta, including marinas, harbors, farmland, and recreational opportunities may be continuously flooded and inundated by sea level rise. This can significantly reduce the economic viability of the Delta due to damage to ecosystems, recreation facilities such as marinas and harbors, and farmland on the islands and tracts within the Delta. Salt water may also travel farther into the Delta, disrupting water quality and fish/wildlife populations.



Severe Storms

Severe weather can damage harbors, marinas, and outdoor recreation centers within the Delta, which can harm both the fishery and recreation-based economies in the Delta. Severe storms can also damage bridges that connect islands and tracks within the Delta, which can isolate them from other areas in the region.

ECOSYSTEM AND NATURAL RESOURCE VULNERABILITIES

Aquatic

Aquatic habitat includes streams, reservoirs, ponds, and sloughs or channels. This ecosystem includes the Delta and shoreline areas that are submerged by water. In Contra Costa County, the three large reservoirs include San Pablo Reservoir, Briones Reservoir, and Los Vaqueros Reservoir. Aquatic wildlife species include various duck species, California red-legged frog, western pond turtle, and juvenile and spawning adult Chinook salmon.⁹⁰



Drought

Drought can cause lower water levels and water quality, in addition to raising water temperatures in aquatic habitats. These conditions can cause algal blooms in the Delta areas, harm salmonid populations, and cause system wide failures.^{91, 92} Lower dissolved oxygen levels and increased algae growth can also harm a variety of aquatic species.⁹³



Extreme Heat

Extreme heat events can cause water temperatures in aquatic habitats to rise, which can alter water quality and other water characteristics. Native fish species may have a more difficult time surviving in warmer waters and non-native species may out compete native species.⁹⁴



Landslides and Debris Flows

Aquatic habitat within landslide prone areas includes lakes and streams, which are in the central and western parts of the county. Landslides can cause streams to be blocked and significantly affect fish and wildlife habitat through additional debris in aquatic systems.⁹⁵



Sea Level Rise

Sea level rise may push salt water into the Delta aquatic system, which may degrade the water quality and harm fish and other aquatic organisms.⁹⁶ Aquatic habitats may also be harmed if industrial/oil facilities are inundated, as hazardous materials could be released into the soils and water.⁹⁷

Riparian Woodland and Shrub

Riparian woodland and shrub ecosystems consist of Valley foothill riparian, undetermined shrub, and riverine habitat. These areas are scattered throughout Contra Costa County and have wildlife species such as gray fox, striped skunk, broad-handed mole, mule deer, dusky-footed woodrat, yellow warbler, northern flicker, white tailed kite, and Cooper's hawk.⁹⁸



Drought

Drought conditions can cause smaller streams to run dry, which can subsequently harm the plants and animal habitat within the ecosystem. Trees may not have adequate water during drought periods, which can lead to pests and diseases destroying important habitat for the Gray fox, Cooper's hawk, and mule deer.⁹⁹ Soil erosion can also occur on the banks of streams.¹⁰⁰



Severe Storms

Severe storms can cause trees to fall in riparian ecosystems, which can disrupt the flow of water through the systems and impact aquatic wildlife in the streams.



Wildfire

Riparian ecosystems can be harmed by wildfires due to loss of canopy and changes in soil structure, erosion, and shifts in specific composition due to changes in habitat structure.¹⁰¹ Impacts may become chronic as wildfire frequency increases.

Wetland

Wetland ecosystems include permanent wetland, seasonal wetland, fresh emergent wetland, alkali wetland, and marsh. These areas are located adjacent to the San Francisco Bay and Delta. Wildlife in these ecosystems includes Great blue heron, great egret, wood duck, green-winged teal, mallard, California red-legged frog, western pond turtle, garter

snakes, western spadefoot toad, western toad, California tiger salamander, tri-colored blackbird, and vernal pool fairy shrimp.¹⁰²



Shoreline Flooding

Coastal flooding and rising sea levels may inundate most of the wetland and tidal marshes by 2070.¹⁰³ The wildlife habitat, recreation, and flood protection that these ecosystems provide may not be able to be sustained.¹⁰⁴



Drought

Wetlands can be directly affect by reduced water quantity and quality due to drought conditions.¹⁰⁵ Drought can contribute to algal blooms, low streamflow, degraded water quality, higher temperatures, and increased erosion in both Delta and inland wetland habitats.¹⁰⁶ This can in turn harm wildlife such as the California red-legged frog and western pond turtle that depend on these ecosystems.¹⁰⁷



Extreme Heat

Warmer waters may change wetland habitats so that native species can no longer survive.¹⁰⁸ Warmer temperatures may also cause harmful algal growth that can harm both plant and wildlife species.



Sea Level Rise

Rising sea levels may inundate most of the wetland and tidal marshes by 2070.¹⁰⁹ The wildlife habitat, recreation, and flood protection that these ecosystems provide may not be able to be sustained.¹¹⁰

Woodland

Woodland ecosystems include oak savannah, oak woodland, and mixed evergreen forest. These ecosystems are primarily located on the hillsides and mountainous regions of western and central Contra Costa County. Wildlife in these ecosystems include deer mouse, western gray squirrel, coyote, red-tailed hawk, barn owl, great horned owl, and acorn woodpecker.¹¹¹



Agricultural Pests and Diseases

Both evergreen and oak woodlands in the county can be damaged by forestry pests and diseases such as sudden oak death and redwood bark beetles. This can decimate the ecosystems and wildlife such as coyote, gray fox, barn owl, red-tailed hawk, and Copper's hawk that depend on these ecosystems for habitat and foraging.¹¹²



Fog

Redwoods, which are a common species in woodland habitats in western Contra Costa, depend on the coastal fog in the summer months. Redwoods can get up to one third of their water from fog in the summer.¹¹³ The absence of coastal fog may cause higher evapotranspiration rates and increase the demand for water in woodland ecosystems during the drier summer months.



Wildfire

Fire sensitivity varies by species, but most species have an elevated risk of damage. Large fires can cause widespread devastation throughout woodland areas in Contra Costa County, particularly if trees have been weakened or killed by drought, extreme heat, and/or pests or infestation.¹¹⁴

KEY COMMUNITY SERVICES VULNERABILITIES

Energy Delivery

Energy delivery services in Contra Costa County include electricity and natural gas delivered through high-capacity utility lines and pipelines. In more rural areas of Contra Costa County, propane may be delivered via truck. Energy is needed for vital functions such as space heating, telecommunications, as well as entertainment and comfort. Major energy providers are MCE and PG&E.



Extreme Heat

Extreme heat can regularly cause power outages due to a combination of mechanical failure of electrical grid equipment, heat damage to the wires themselves, and high demand for electricity as a result of cooling equipment, all of which causes stress on the grid. As extreme heat events become more frequent and intense, disruptions in service are likely to become more frequent. The US Department of Energy estimates that a 9-degree increase in temperature reduces the capacity of power lines by 7 to 8 percent, and the capacity of electrical substations by 2 to 4 percent.¹¹⁵



Landslides and Debris Flows

Landslides can damage or destroy transmission lines and substations that are located in the hillside areas of the County. This could cause major disruptions in the power grid and could cause widespread power outages. Power outages can harm vulnerable populations and businesses.¹¹⁶



Severe Storms

Energy delivery could be disrupted by severe weather if wind, hail, or thunderstorms cause the electrical grid to not function properly. If multiple sections or element of the system fail (substations, power plants, electricity lines) county residents and businesses could be without power for hours, days, or weeks depending on severity.



Wildfire

Wildfires can damage or destroy energy delivery infrastructure, which can cause power outages that can last for days or weeks depending on the severity of the event. This can directly harm the economy, government operations, public safety, and hinder wildfire recovery efforts.

Public Transit Access

Public transit within Contra Costa County is provided by County Connection, WestCAT, Tri Delta Transit, and AC Transit. Additional public transit that provides access to other regional locations includes BART and Amtrak.



Shoreline Flooding



Flooding

Public transit routes are at risk of disruption to the extent they rely on vulnerable roads and bridges. The disruption of these services would be detrimental to those who do not own or operate vehicles.¹¹⁷ Residents may not be able to get essential goods and services, and commuters may be unable to go to work without public transit access. For rail and BART, if part of the lines is not functioning, then that could affect transit access on other parts of the line.



Landslides and
Debris Flows

Landslides can block roadways, tunnels, and rail lines, which could substantially disrupt access to public transit in north, central, and west Contra Costa. These areas rely on public transit more and when disrupted, public transit may not be able to meet the needs of the community.

Water and Wastewater

These services involve treating and transporting water to be used by customers and transporting and treating wastewater so it can be safely released into the environment. Water and wastewater services are provided by several agencies and small private organizations throughout Contra Costa County and are critical to ensuring public and environmental health. Major water providers are East Bay Municipal Utilities District and Contra Costa Water District. Additional service districts within the county are Byron Sanitary District, Castle Rock County Water District, Central Contra Costa Sanitary District, County Sanitation District 6, Crockett Community Services District, Delta Diablo Sanitation District, Diablo Community Services District, Diablo Water District, Dublin-San Ramon Services District, Ironhouse Sanitary District, Mt. View Sanitary District, Rodeo Sanitary District, Stege Sanitary District, Town of Discovery Bay Community Services District, and West County Wastewater District.



Shoreline Flooding



Flooding



Sea Level Rise

Water and wastewater services can be disrupted from flooding if the wastewater treatment plants are not functioning properly. Flooding can exacerbate wet weather flows into the treatment plants with higher levels of stormwater and rising sea levels, which can prevent the system from functioning properly.¹¹⁸ Failure of these treatment plants could cause sewer systems to back up and potentially contaminate streams and water systems with raw sewage. Major points in the water delivery system could also be disrupted. Sea level rise may exacerbate these hazards.



Landslides and Debris
Flows

Water and wastewater services could be disrupted if the pipelines were to be damaged or destroyed from a landslide. This could cause both water and wastewater systems to not function properly.



Wildfire

Wildfires in the County could impact the reservoir water sources.¹¹⁹ Water quality can be degraded due to ash content or fire retardants that make their way into surface water storage. This may reduce the overall quantity of water that the water districts in the county have to supply agricultural, commercial, and residential demands.

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APPENDIX D: 2015 CAP GOALS

The 2015 Climate Action Plan (CAP) identified how the County planned to achieve the Assembly Bill (AB) 32 greenhouse gas (GHG) emissions reduction target of 15 percent below baseline levels by the year 2020, in addition to supporting other public health, energy efficiency, water conservation, and air quality goals identified in the County's General Plan and other policy documents. This appendix summarizes the key accomplishments of the 2015 CAP.

ENERGY EFFICIENCY

These measures focus on energy efficiency in new and existing homes in the unincorporated areas of the county. As shown in **Figures D-1** and **D-2**, the County has made strides towards achieving this goal with a total of 1,018 single-family home energy efficiency retrofits and 24 multifamily unit energy efficiency retrofits completed from 2015 through 2020.

FIGURE D-1. SINGLE-FAMILY HOME ENERGY EFFICIENCY PROJECTS COMPLETED IN THE UNINCORPORATED COUNTY

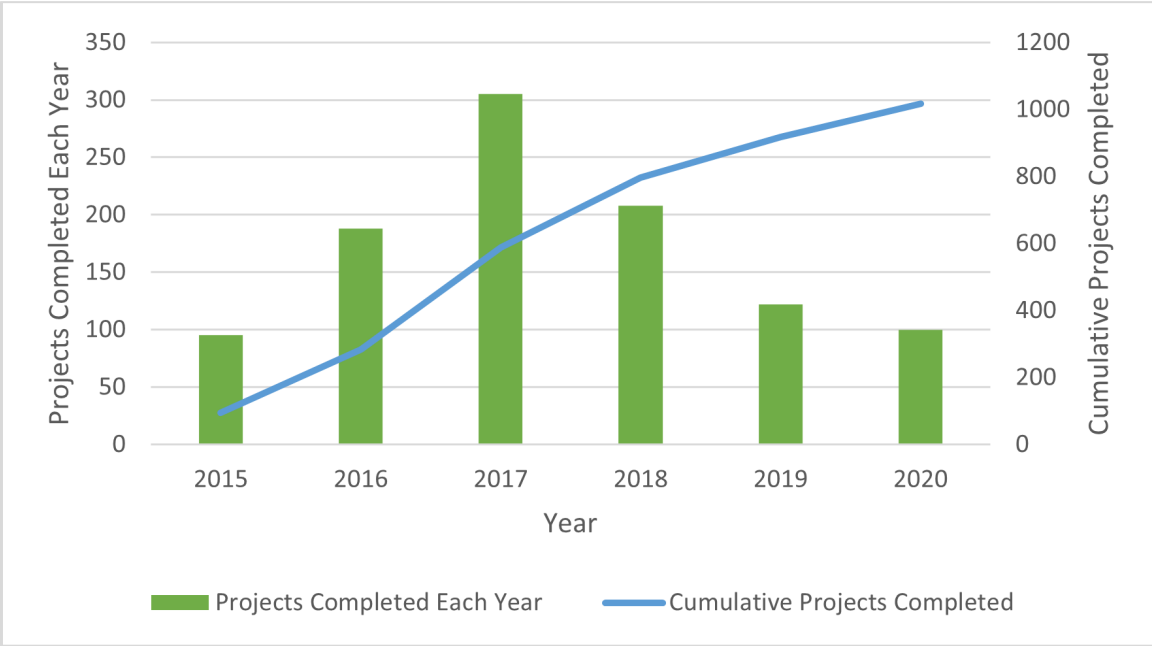
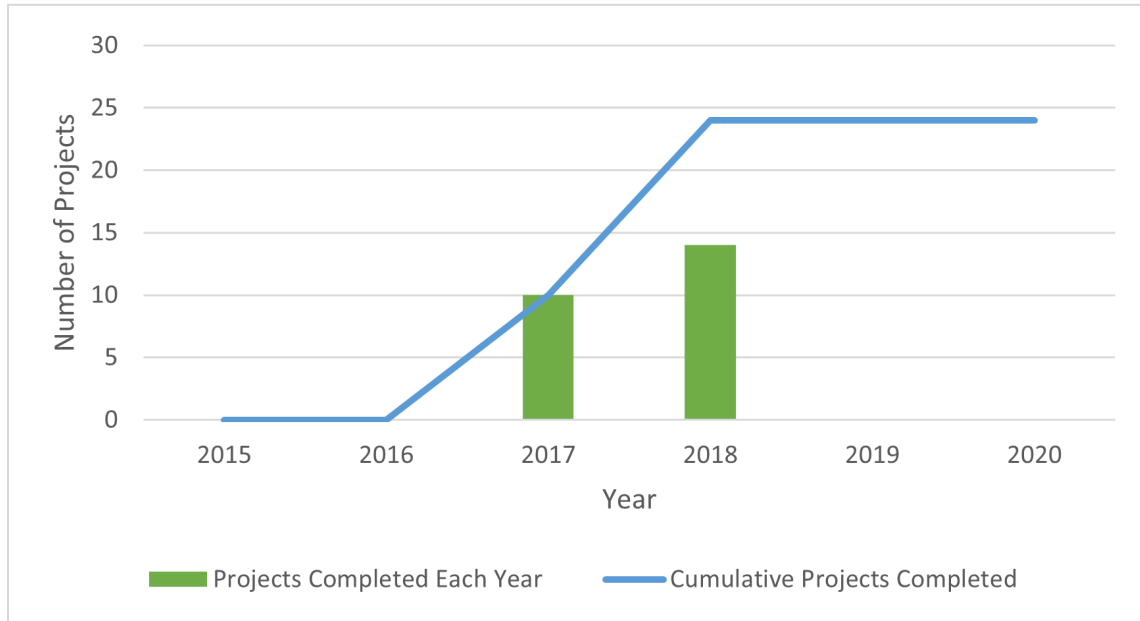


FIGURE D-2. MULTIFAMILY UNIT ENERGY EFFICIENCY PROJECTS COMPLETED IN UNINCORPORATED COUNTY



RENEWABLE ENERGY

The goals set in the 2015 CAP for renewable energy adoption included installing solar arrays to 50 new homes, 10 new businesses, 2,500 existing homes, and 60 existing businesses by 2020. As shown in **Figures D-3** and **D-4**, the County has shattered that goal, issuing over 5,000 residential photovoltaic (PV) permits between 2018 and 2020.

FIGURE D-3. RESIDENTIAL PV PERMITS IN UNINCORPORATED COUNTY

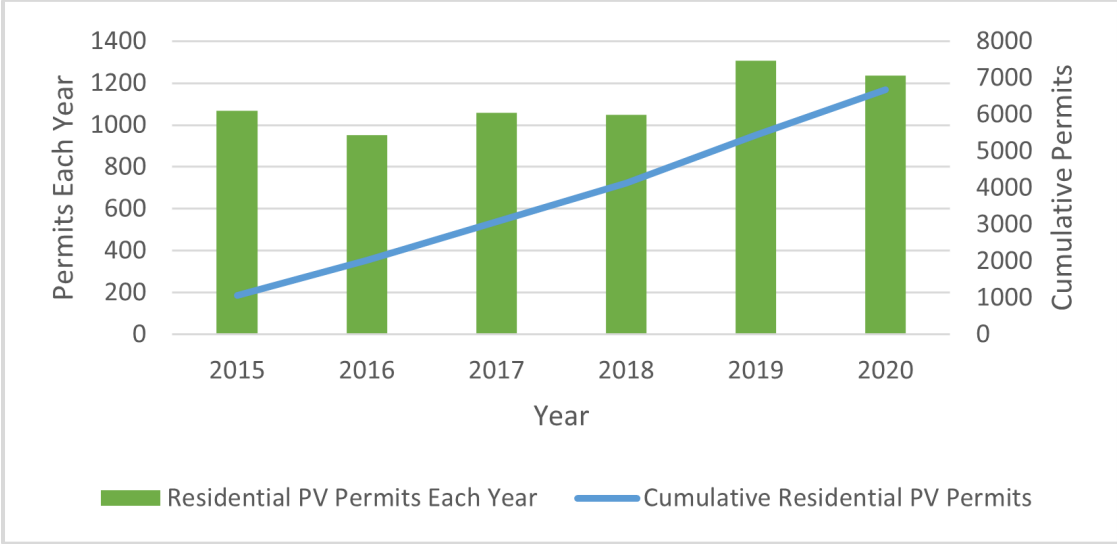
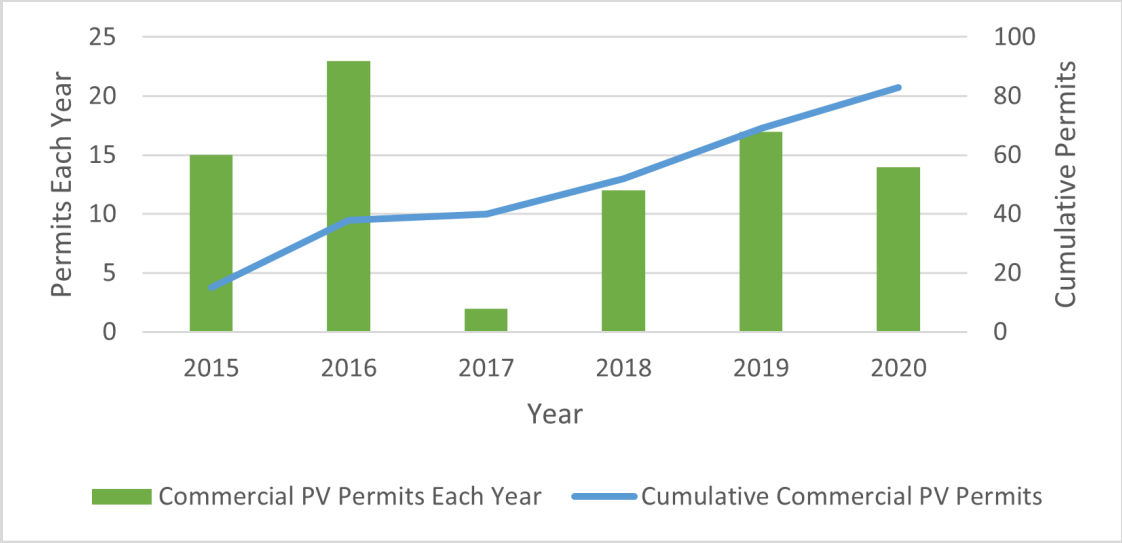


FIGURE D-4. COMMERCIAL PV PERMITS IN UNINCORPORATED COUNTY



LAND USE AND TRANSPORTATION

Improving mobility and encouraging alternative-fuel vehicle adoption were the biggest areas of focus in the County's 2015 CAP.

Mobility Improvements

The County Board of Supervisors has supported mobility improvements by accepting two mobility-related studies: the Iron Horse Corridor Active Transportation Study and the Marsh Creek Corridor Multi-Use Trail Feasibility Study. The Iron Horse Corridor Active Transportation Study will identify safety, access, and user-experience improvements on the 22-mile corridor. The Marsh Creek Corridor Multi-Use Trail Feasibility Study will inform the County of the feasibility of a new 12+ mile corridor between Clayton and the Round Valley Regional Preserve.

EV Charging Stations

For electric vehicle (EV) charging stations, the County has increased efforts to address the goals in the 2015 CAP.

- The Contra Costa Transportation Authority (CCTA) completed its [EV Readiness Blueprint](#) in 2019, with help from the County.
- In the same year, the Board of Supervisors [streamlined the permitting process for EV chargers](#).

Both efforts combined led to 1,325 charging stations being distributed throughout the county and an additional 317 stations added through the MCE's rebate program as of December 2020. This influx in charging stations makes it possible to reach the 2015 CAP goals centered around distance traveled per EV.

WASTE REDUCTION

The County set a waste reduction goal of a 75 percent reduction in Pounds of Disposal Per Person Per Day (PPD). The County used 3.9 PPD as the target PPD. In 2020, the County recorded a PPD rate of 2.2, which equates to a 72 percent reduction (**Figure D-5**).

FIGURE D-5. COUNTY WASTE DIVERSION RATE

