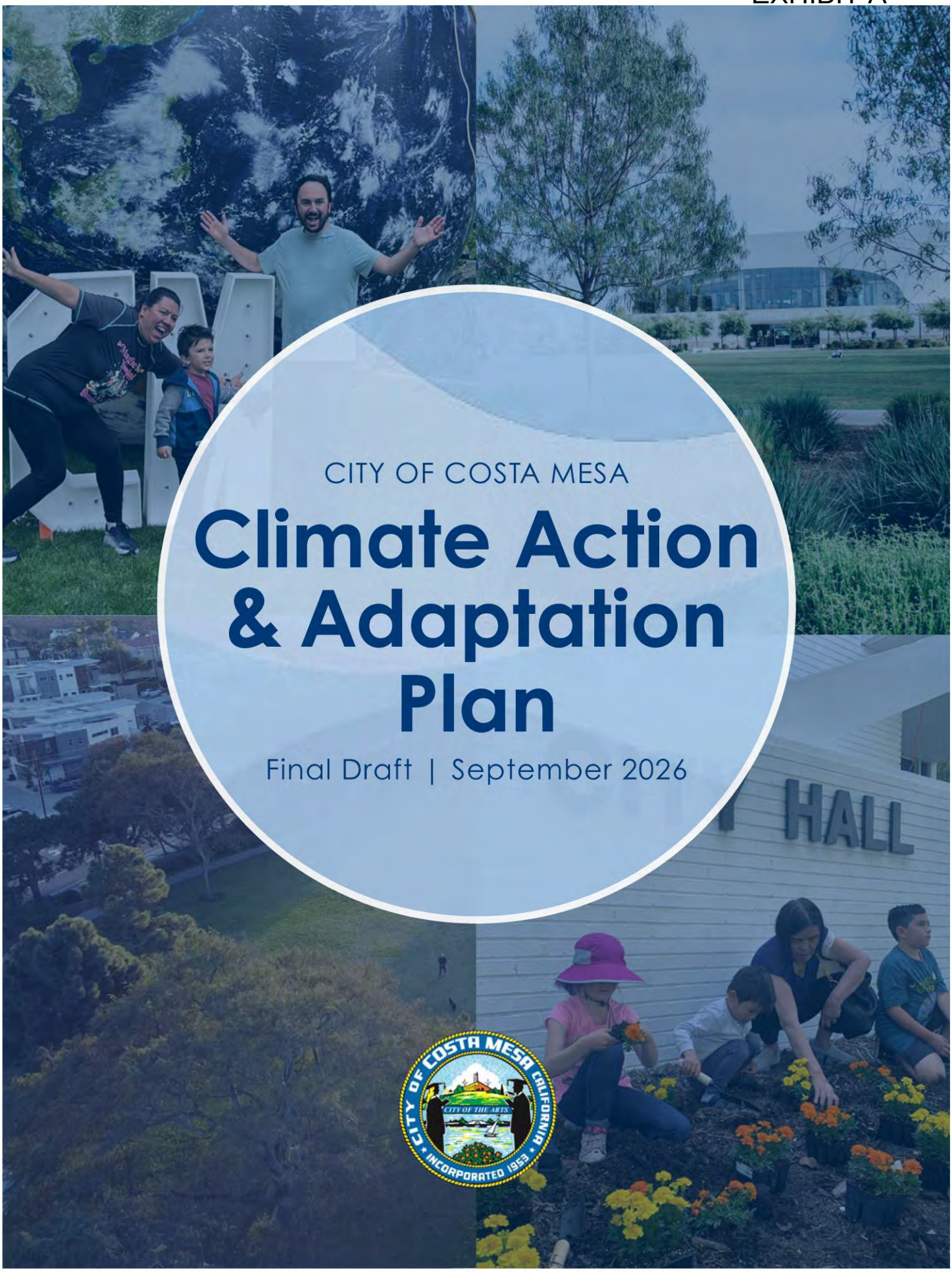


CITY OF COSTA MESA

# Climate Action & Adaptation Plan

Final Draft | September 2026

# Contents

SECTION PAGE NO.


Acknowledgments ..... iii
Executive Summary ..... vi
Reader's Guide ..... xi
1 Introduction ..... 1
2 Climate Action ..... 13
3 Climate Adaptation ..... 18
4 Outreach and Engagement ..... 36
5 Climate Action and Adaptation Strategy ..... 48
6 Implementation and Monitoring ..... 82
Acronyms and Abbreviations ..... xvii
Glossary ..... xix


## TABLES


3-1 Changes in Extreme Heat ..... 21
3-2 Changes in Extreme Precipitation ..... 25
5-1 Sectors, Objectives, and Actions ..... 61
5-2 Community Greenhouse Gas Reduction Summary ..... 72
5-3 Municipal Greenhouse Gas Reduction Summary ..... 77


## FIGURES


1-1 Greenhouse Effect ..... 6
1-2 Venn Diagram of Climate Action and Adaptation ..... 7
2-1 Climate Action Process ..... 13
2-2 City of Costa Mesa 2023 Baseline Emissions Inventory ..... 14
2-3 Communitywide ABAU GHG Emissions Projections ..... 16
2-4 Communitywide ABAU GHG Emissions Projections, Reduction Targets, and Local Gap ..... 17
3-1 Urban Heat Island Infographic ..... 22
3-2 Urban Heat Island Severity ..... 24
3-3 Federal Emergency Management Agency–Designated Flood Zones ..... 27
3-4 Fire Hazard Severity Zones ..... 30
3-5 Deep-Seated Landslide Zones and Fire Hazard Severity Zones ..... 32
4-1 Outreach Timeline ..... 37

## APPENDICES

A Greenhouse Gas Emissions Inventory, Forecasting, and Target Setting
B Climate Vulnerability Assessment
C Outreach and Engagement Materials
D Greenhouse Gas Reduction Supporting Material
E Implementation Plan
F Cost-Effectiveness Analysis

# Acknowledgments


## City Council

John Stephens, Mayor

Manuel Chavez, Mayor Pro Tem, District 4

Council Member Mike Buley, District 1

Council Member Loren Gameros, District 2

Council Member Andrea Marr, District 3

Council Member Arlis Reynolds, District 5

Council Member Jeff Pettis, District 6

## Consultants

Community Catalyst

Dudek

Fehr & Peers

M. Cubed

Michael Hendrix Consulting

## City Departments

City Manager's Office

Community Development Department

Finance Department

Fire and Rescue Department

Information Technology Department

Office of Emergency Management

Parks and Community Services Department

Police Department

Public Works Department

INTENTIONALLY LEFT BLANK

# Executive Summary

# Executive Summary

The City of Costa Mesa (City or Costa Mesa) Climate Action and Adaptation Plan (CAAP) presents a comprehensive, forward-looking strategy to address the dual challenges of reducing greenhouse gas (GHG) emissions and preparing the community for the growing impacts of climate change. The CAAP is a locally tailored, integrated roadmap that aligns climate-ready goals with how the community lives, grows, and plans for the future, while supporting continued growth and quality of life.

**A PRACTICAL FRAMEWORK**

Building on existing efforts and grounded in community input, the CAAP prioritizes practical actions to reduce emissions, strengthen resilience, and advance equitable, responsible development.

## Greenhouse Gas Emissions

A GHG inventory was prepared to define Costa Mesa's emissions profile and establish a baseline for forecasting emissions and tracking progress toward achieving the City's reduction goals. On-road transportation and building energy use account for 94% of total community-wide GHG emissions and therefore represent the largest and most impactful opportunities for emission reductions. The City's GHG reduction targets are aligned with California's statewide climate goals, which are established through state law. The City's targets for 2030 and 2045 reflect the reduction goals set by Senate Bill (SB) 32 (reduce GHG emissions 40% below 1990 levels by 2030) and Assembly Bill (AB) 1279 (reduce anthropogenic GHG emissions 85% below 1990 levels by 2045), respectively, and are based on the City's proportional share of the emissions reductions needed statewide.

While State and Federal regulations are expected to reduce emissions over time, they are not sufficient to meet the City's targets and additional reductions of approximately 154,700 metric tons (MT) of carbon dioxide equivalent ($CO_2e$) by 2030 and 198,600 MT $CO_2e$ by 2045. To mitigate the City's contribution to climate change and achieve the necessary GHG reductions, the CAAP strategy proposes targeted actions to reduce vehicle miles traveled (VMT), accelerate electrification, improve efficiency, reduce waste, and expand nature-based solutions to drive carbon sequestration.

## Climate-Related Hazards

To adapt to the inevitable impacts of climate change, the City must prepare for long-term shifts in temperature, precipitation patterns, and extreme weather. Costa Mesa typically benefits from

a mild coastal climate, strong infrastructure, and valued public parks, community centers, and emergency facilities; however, climate change is projected to intensify key hazards. Extreme heat is projected to increase significantly, with the number of extreme heat days rising from a historical average of 3 days per year to 11–25 days per year by 2100. Both drought conditions and precipitation extremes are expected to intensify; extreme storms have historically averaged 3.14 inches of rain but are projected to result in 4.52–5.10 inches of rain by 2100.

These changes will place growing stress on infrastructure, natural systems, and public health, with disproportionate impacts on vulnerable populations and neighborhoods. Addressing these inequities is central to the City's adaptation strategy.

## Outreach and Engagement

The CAAP was shaped through a comprehensive, inclusive, and collaborative engagement process that reflects Costa Mesa's diverse community. The City meaningfully engaged more than 340 residents, businesses, and stakeholders to ensure the plan is grounded in community priorities and lived experiences. There were multiple opportunities for the community to engage with plan development including the following:

- A public open house
- Community survey
- Pop-up outreach activities at public events and high schools
- Site visits and presentations to local and regional utilities
- External focus group outreach
- Internal working group with City departments and divisions
- Presentation to the City Council
- Digital outreach via social media, email, and the City Hall Snapshot newsletter
- Informative fliers posted in local coffee shops and at sustainability events

Engagement efforts emphasized broad accessibility, with bilingual materials, flexible participation options, and targeted outreach to underrepresented groups.

Community input was essential and directly informed the CAAP's strategies and actions, ensuring they are grounded in local context and community needs. Engagement will continue beyond plan adoption, to support community education, participation, and shared ownership of Costa Mesa's climate goals.

## Framework for Climate Action and Adaptation

The CAAP establishes a coordinated strategy that integrates GHG emissions reduction and climate resilience into a single framework of eight key sectors that reflect sources of emissions and areas of climate vulnerability. The CAAP establishes clear objectives, outlined below:

### On-Road Transportation

T1. Transition to Electric Vehicles
T2. Promote Walking and Biking
T3. Reduce Single-Occupancy Vehicle Trips
T4. Increase Public Transportation Use
T5. Support Smart Growth

### Energy and Buildings

E1. Reduce Energy Demand in Buildings
E2. Decarbonize Building Energy Use
E3. Increase Carbon-Free Energy Supply

### Water and Wastewater

W1. Reduce Water Use
W2. Increase Water Reuse

### Solid Waste

SW1. Reduce Waste Generation

### Off-Road Equipment

OR1. Accelerate Zero-Emission Off-Road Equipment Adoption

### Natural and Urban Lands

NU1. Increase Carbon Sequestration through Urban Greening

### People and Community

PC1. Prepare Community Members for Hazards
PC2. Limit Hazard Impacts
PC3. Build City and Regional Capacity for CAAP Implementation
PC4. Foster Local Sustainable Practices

### Municipal

M1. Reduce City Vehicle Emissions
M2. Reduce City Energy Use
M3. Zero-Emission Off-Road and Landscaping Equipment
M4. Reduce City Facility Water Use
M5. Reduce City-Generated Solid Waste

The CAAP objectives are supported by a comprehensive set of 106 individual actions to achieve the City's 2030 and 2045 goals. To accelerate early momentum, the CAAP prioritizes a set of "20 Actions in 2 Years" that are achievable, impactful, and foundational to long-term success. The City is positioned to meet its 2030 and 2045 GHG reduction targets, provided all performance metrics are achieved.

## Implementation

The CAAP includes an implementation framework to ensure actions are coordinated, accountable, and tracked over time. Led by the City Manager's Office, implementation will involve all City departments and partnerships with community and regional organizations, with progress measured through performance indicators tied to emissions reductions and other outcomes.

### IMPORTANCE OF CITY LEADERSHIP

The City will lead by example by transitioning its own fleet and facilities to zero-emission systems, investing in renewable energy and efficiency upgrades, reducing water use, and integrating sustainability into day-to-day operations.

The CAAP builds upon the City's existing efforts to envision a cleaner, more efficient, and more resilient Costa Mesa. Residents benefit from improved air quality, more sustainable mobility options, energy-efficient buildings, and expanded green spaces, while the community is better prepared for climate impacts through stronger systems, informed residents, and targeted support for those most at risk. By integrating climate action and adaptation into a unified strategy, Costa Mesa is positioning itself to support the State's GHG reduction goals, protect public health, and enhance quality of life for current and future generations.



INTENTIONALLY LEFT BLANK

# Reader's Guide

This guide is designed to help readers quickly locate key information within the CAAP. The document is written to be accessible and informative for a wide range of audiences; more detailed technical data, methodologies, and supporting analyses are provided in the appendices. Each chapter of the CAAP includes references to relevant appendices for readers seeking additional detail.

Chapter 1, Introduction, outlines the approach and core goals of the CAAP, and provides an understanding of key CAAP concepts and relevant regulatory efforts. In addition, Chapter 1 outlines how the CAAP builds on the City's existing sustainability efforts, discusses how the CAAP enhances community well-being through co-benefits, and highlights the importance and need for community contribution.

Chapter 2, Climate Action, presents the core components of the City's climate action planning process, including development of a baseline GHG emissions inventory, future emissions forecasting, target setting, and gap analysis. Together, these elements establish the foundation for identifying emission reduction actions, as detailed in Chapter 5. Supporting materials for Chapter 2 are provided in Appendix A, GHG Emissions Inventory, Forecasting, and Target Setting.

Chapter 3, Climate Adaptation, provides an overview of current and project climate-related hazards in Costa Mesa, and examines their potential impacts on specific community members. This chapter establishes the foundation for understanding local vulnerabilities and the need for targeted adaptation measures and actions. Additional technical details are provided in Appendix B, Climate Vulnerability Assessment.

Chapter 4, Outreach and Engagement, summarizes the community engagement process that informed the CAAP, detailing the strategies used to gather input and key outcomes that reflect the unique needs and perspectives of Costa Mesa's residents and businesses. Supporting materials for Chapter 4 are provided in Appendix C, Community Engagement and Outreach Materials.

Chapter 5, Sectors, Objectives, and Actions, presents a clear roadmap for achieving the emission reduction targets outlined in Chapter 2 and addressing the climate hazards identified in Chapter 3. It is organized across eight sectors with key objectives and specific actions. Supporting technical details are provided in Appendix D, Greenhouse Gas Reduction Supporting Materials.

Chapter 6, Implementation and Monitoring, outlines the City's approach to implementing and monitoring progress on the CAAP to ensure the successful achievement of its climate action and adaptation goals. It establishes a framework for accountability and adaptability, including roles and responsibilities, performance metrics, timelines, funding strategies, and ongoing community engagement. Detailed implementation materials are provided in Appendix E, Implementation Plan.

A glossary of key terms and an acronym and abbreviation list are provided following the chapters.



CHAPTER 1

# Introduction

# 1 Introduction

## A Climate Plan Tailored to Our Community

The City of Costa Mesa CAAP is a roadmap for the community to thrive, supporting continued growth and quality of life while preparing for and addressing climate change. The CAAP is tailored to Costa Mesa and focuses on practical, locally relevant efforts that align with how the Costa Mesa lives, grows, and plans for the future.

**THE CAAP WILL HELP US:**

- Protect our environment
- Safeguard our community
- Support economic growth
- Plan for our future

Bringing together the City's current and past climate initiatives, the CAAP serves as a unified framework that builds on what has worked while addressing gaps and opportunities for improvement. It focuses on steady, practical progress, prioritizing actions that reduce emissions while strengthening resilience.

The CAAP is designed to work with, not against, continued growth and development by supporting smart, sustainable land use, transportation, and infrastructure decisions. The City recognizes that the goal is not to slow progress but to ensure it happens responsibly and equitably.

To ensure alignment with local priorities, community input from residents, businesses, and interested parties was central to CAAP development and highlighted the importance of affordability, mobility, and community character. This feedback guided the approach to advancing climate goals in a balanced, intentional manner.

The CAAP reflects an integrated approach to align multiple priorities while moving forward with local climate action and adaptation. It provides clear opportunities to reduce emissions, prepare for climate impacts, and support a resilient, thriving community into the future.

RELATIONSHIP TO OTHER PLANS

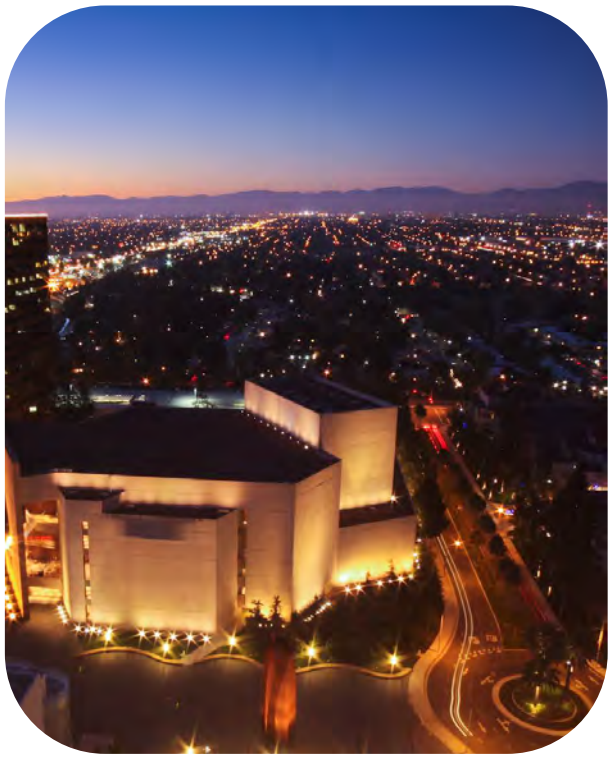
The CAAP unifies the City's existing plans, policies, and previous climate initiatives into a single, cohesive framework.

Plans reviewed and considered during CAAP development include the General Plan, Local Hazard Mitigation Plan, Urban Water Management Plan, Active Transportation Plan, and Pedestrian Master Plan.

## Building on Existing Efforts

Costa Mesa is not starting from zero. Since establishing its Energy and Sustainability Division in 2019, the City has advanced a range of programs to reduce emissions, improve efficiency, and strengthen resilience. These efforts provide a strong foundation for this plan and help build momentum toward achieving ambitious climate goals.

Energy Efficiency and Municipal Operations. Costa Mesa is improving efficiency across City operations, including the upgrade of over 6,000 streetlights to energy-efficient LEDs, in partnership with Southern California Edison. The upgrade has reduced energy use and lowered maintenance costs and needs. The City is also advancing energy efficiency and renewable energy across municipal facilities. These results earned Costa Mesa the Leadership in Energy and Environmental Design (LEED) for Cities and Communities Gold certification, recognizing strong performance across the energy, water, waste, transportation, and resilience sectors.



**Transportation and Mobility.** Costa Mesa is expanding lower-emission, accessible transportation options for the community. The City has added public electric vehicle (EV) charging at City Hall and is advancing a transition to a zero-emission municipal fleet, supported by grant funding. The City has also launched "Let's Go Costa Mesa," an on-demand, all-electric rideshare service that improves mobility for seniors and underserved residents while reducing trips and tailpipe emissions. Ongoing investments in bicycle, pedestrian, and Complete Streets improvements are making it safer and easier to choose affordable lower-emission travel options.




**Waste Reduction.** Costa Mesa is reducing waste through targeted policies and programs. In 2019, the City prohibited the use and purchase of expanded polystyrene (Styrofoam) food service products at City facilities and events. The City also supports recycling and organic waste reduction efforts and provides community education on State requirements like Senate Bill (SB) 1383, helping residents and businesses better manage waste and reduce landfill impacts.





**Urban Forestry, Open Space, and Nature-Based Resilience.** The City continues to invest in urban greening and ecosystem health. Examples of recent and ongoing projects include over 20 acres of restoration spanning the Mesa Restoration Project; Bluff Restoration Project; Vernal Pool 5, 6, and 7 Restoration Project; and a variety of other smaller community restoration projects.

Costa Mesa has earned the Arbor Day Foundation's Tree City USA designation for over two decades, reflecting its commitment to effective tree management. This program provides a framework for maintaining a healthy urban forest while increasing awareness of the environmental and community benefits that trees provide.

The City's Integrated Pest Management (IPM) Plan also ensures the health of Costa Mesa's ecosystems. Adopted in 2019, the IPM Plan prioritizes organic and least-toxic treatments, reduces fertilizer use, and focuses on prevention first. This balanced, eco-friendly approach protects community health, supports local ecosystems, and goes beyond the regulatory requirements of Federal, State, and Orange County agencies.



# Enhancing Community Well-Being

While the primary goals of the CAAP are to reduce greenhouse gas (GHG) emissions and increase community resilience, the actions in this plan also bring a wide range of additional benefits. These "co-benefits" are the positive indirect effects that come from efforts to address climate change.

Beyond reducing emissions and preparing for climate impacts, the CAAP can help support a strong local economy, improve air and water quality, enhance public health, make it easier and safer to get around, and foster a greater sense of community well-being. Together, they contribute to a more livable, inclusive, and equitable Costa Mesa.

In this plan, these benefits are grouped into the following categories:



**Improves Air Quality.** Efforts that would reduce air pollutants, such as particulate matter, ozone precursors, and toxic air contaminants



**Improves Mobility.** Efforts that enhance travel within the city limits, including increased access to transportation options, reduced congestion, improved public transit, enhanced bicycle and pedestrian infrastructure, and overall efficiency of movement



**Improves Public Health and Safety.** Efforts that contribute to the well-being and security of individuals and the community, such as reducing illness and injury, increasing opportunities for physical activity, and lowering exposure to environmental hazards and stressors



**Enhances the Natural Environment.** Efforts that positively impact the ecosystems, biodiversity, and natural resources within Costa Mesa



**Enhances the Local or Regional Economy.** Efforts that stimulate economic growth or support job creation within Costa Mesa



**Provides Cost Savings.** Efforts that generate direct or indirect cost savings for residents, businesses, or the City, including reduced utility bills, healthcare costs, maintenance expenses, and climate related damages



**Promotes Equity.** Efforts that advance fair and just access to resources and opportunities within Costa Mesa



**Provides Education.** Efforts that increase awareness, understanding, and knowledge of climate action, climate adaptation, and related issues

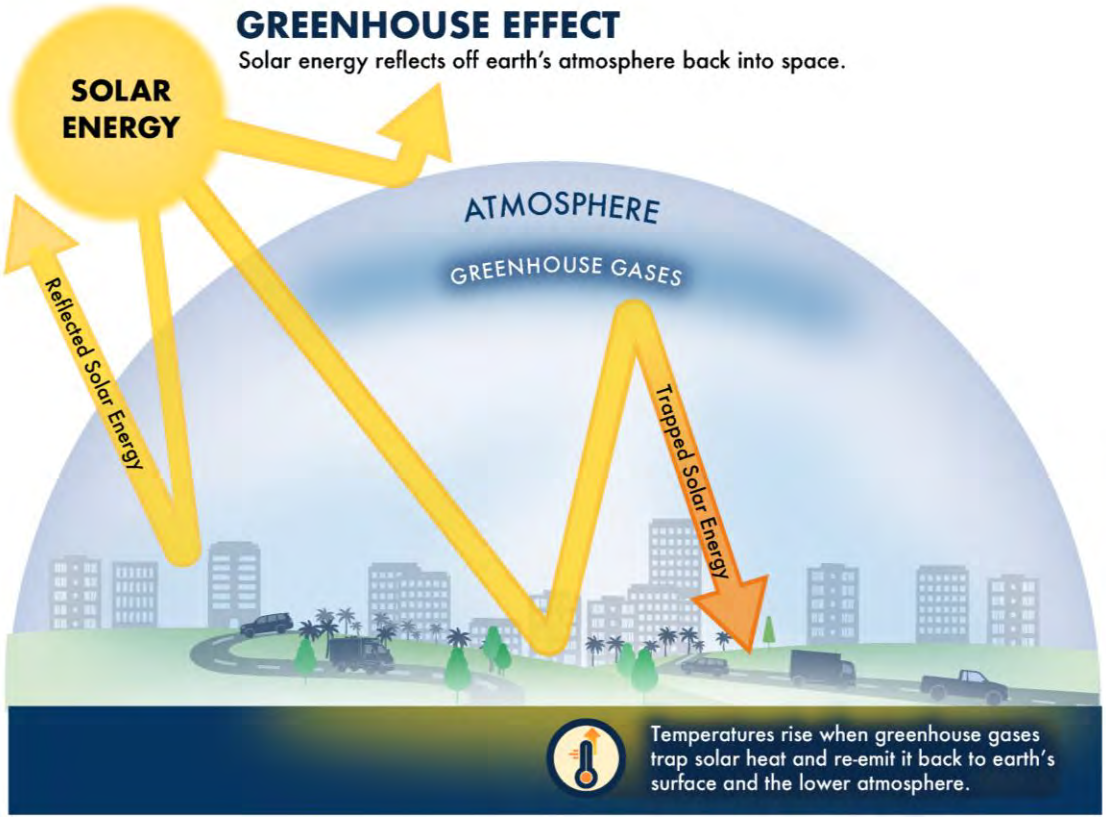
# Understanding the Basics

## Science of Climate Change

Climate change refers to long-term shifts in climate, such as changes to temperature, precipitation, and wind patterns. While the climate has changed naturally in the past, recent changes are mainly caused by human activities that release GHGs, such as burning fossil fuels, as well as changes in land use.

GHGs trap heat and warm the planet through a process known as the greenhouse effect (Figure 1-1). This is a natural process that makes Earth livable, but higher levels of GHGs are intensifying this process and causing temperatures to rise beyond what's typical, and GHG levels in the atmosphere are higher than they have been in hundreds of thousands of years. Although climate change is a global issue, its effects are also felt locally. In California, this includes more frequent and intense heat waves, increased risk of flooding and drought, and larger, more severe wildfires.

Figure 1-1. Greenhouse Effect



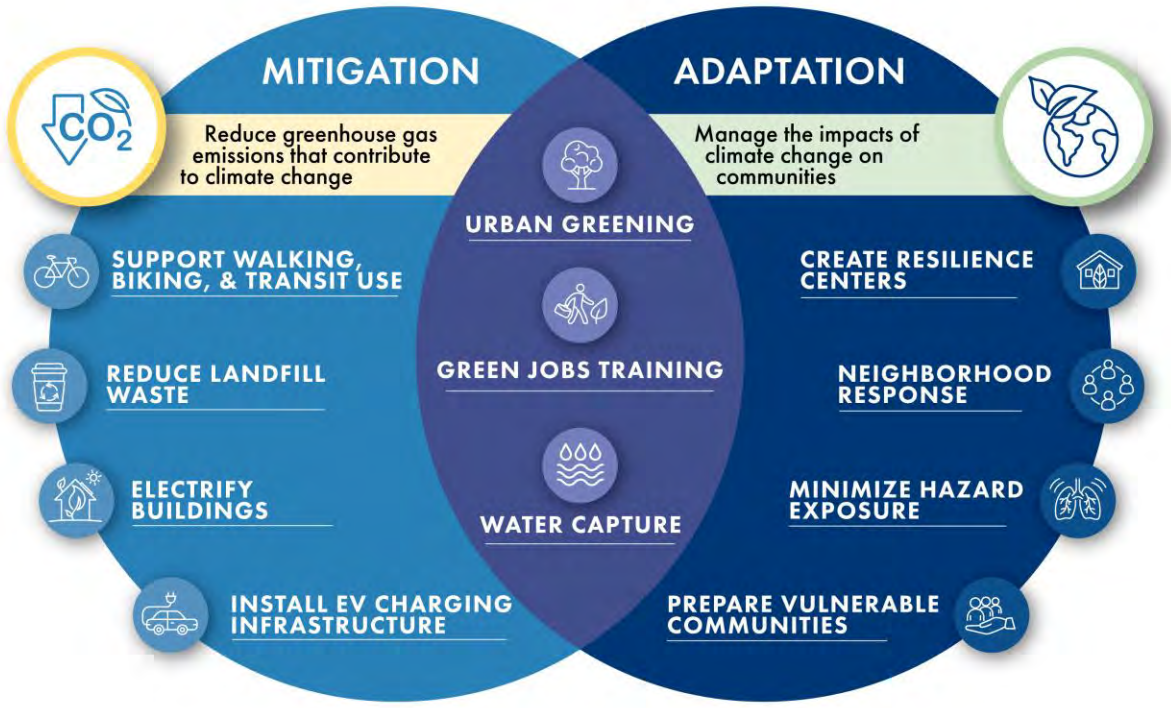

*Source: Dudek.*

## Climate Action and Adaptation

Addressing climate change requires a holistic, integrated approach that both reduces contributions to climate change and prepares for its impacts. To lessen—or "mitigate"—their contributions to climate change, communities can reduce GHG emissions through climate action. To address the unavoidable effects of climate change—or "adapt"—communities assess vulnerabilities and prepare for current and future climate-related impacts through climate adaptation.

As shown in Figure 1-2, climate action and adaptation are complementary and often overlapping approaches. Many strategies can both reduce emissions and build resilience, demonstrating how coordinated efforts can maximize benefits and support a more sustainable, climate-ready future.

Figure 1-2. Venn Diagram of Climate Action and Adaptation




*Source: Dudek.*

## Regulatory Efforts to Address Climate Change

Federal, state, regional, and local efforts work together to reduce emissions and prepare for climate impacts. The policies below provide context for the CAAP and help guide local action.

### FEDERAL CONTEXT

Federal policies help support climate action and adaptation across the country by funding projects and setting national goals. Recent laws, including the Infrastructure Investment and Jobs Act (2021) and the Inflation Reduction Act (2022), invest in clean energy, EVs, energy efficiency, and more-resilient infrastructure. Executive Order 14057 (2021) also established Federal goals to achieve a carbon-pollution-free electricity sector by 2035 and net-zero emissions economy-wide by 2050. These programs and policies are helping communities reduce emissions and prepare for climate impacts.

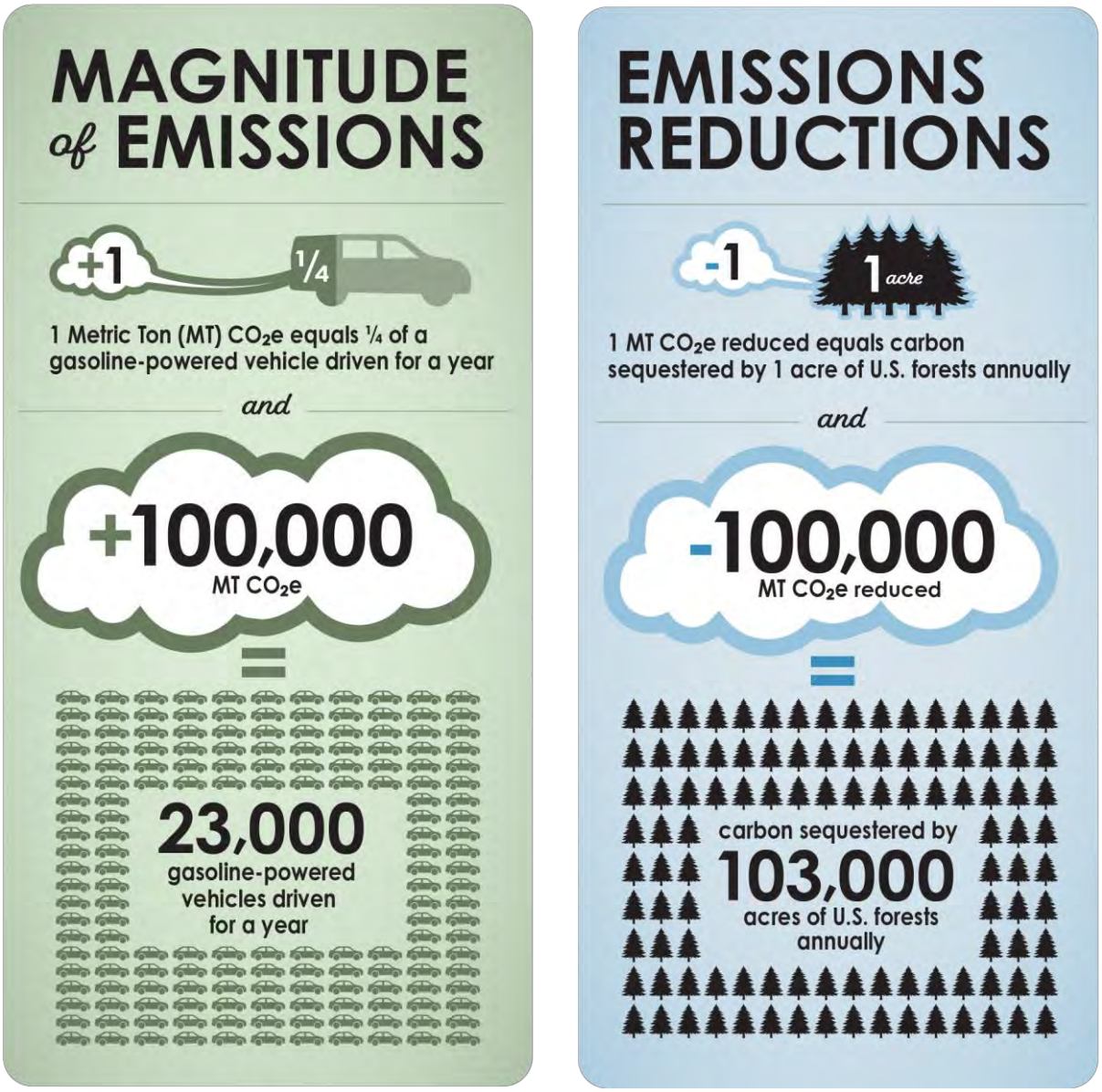
While national goals to reduce GHG emissions remain in place, implementation and priorities continue to evolve. Despite this progress, uncertainty around long-term policy direction highlights the important role of State and local governments in advancing consistent and sustained climate action.

### STATE CONTEXT

California has established one of the nation's most comprehensive climate policy frameworks through Executive Orders, legislation, and statewide plans that address GHG emissions reduction and climate resilience. Together, these policies set a clear direction for the pace and scale of climate action and adaptation and provide an important foundation for local planning efforts.

State regulations and policies inform the CAAP effort by establishing statewide benchmarks, implementing GHG-reducing regulations, and providing tools to measure progress. Regulations reflected in GHG forecasting and target-setting assumptions are summarized in Appendix A.

**MEASURING EMISSIONS**
Carbon dioxide equivalents ($CO_2e$) are used in this plan to express all GHGs on a common scale based on their climate impact.




*Source: Dudek (graphic); data from U.S. EPA Greenhouse Gas Equivalencies Calculator.*

## Climate Mitigation Goals

California's long-term GHG reduction targets include:

- Executive Order S-3-05 (2005): Reduce GHG emissions to 2000 levels by 2010, 1990 levels by 2020, and 80% below 1990 levels by 2050.
- Assembly Bill (AB) 32 (2006): Established a comprehensive program to reduce GHG emissions to 1990 levels by 2020.
- SB 32 (2016): Requires a 40% reduction in GHG emissions below 1990 levels by 2030.

- Executive Order B-55-18 (2018): Sets a goal of carbon neutrality by 2045 and net-negative GHG emissions thereafter.
- AB 1279 (2022): Codifies the 2045 net-zero-emissions goal and requires at least an 85% reduction below 1990 GHG emission levels by that year.

## Climate Adaptation Goals

California law also emphasizes climate adaptation and resilience. SB 379 (2015) amended Government Code Section 65302 to require local governments to address climate-related risks in long-term planning. Consistent with these requirements, the CAAP includes:

- A vulnerability assessment identifying climate risks, such as flooding and wildfire, as well as areas most at risk
- Adaptation goals, policies, and objectives informed by identified vulnerabilities
- Feasible implementation measures designed to improve resilience and reduce climate impacts

## A Community-Driven Approach

Delivering the CAAP will take continued coordination across City departments, regional partners, businesses, and the community. Costa Mesa is already building this collaborative foundation by working with utilities, agencies, and community organizations to expand programs, secure funding, and deliver practical, cost-effective solutions.



Community involvement will remain central. Input from residents, businesses, and stakeholders has helped shape this plan and will continue to guide updates, priorities, and on-the-ground efforts. Importantly, everyday choices such as conserving energy and water, choosing alternative transportation, reducing waste, and caring for neighborhood green spaces play a critical role. Although these actions may seem small on their own, taken together across the community, they will drive measurable progress and help scale local efforts into lasting, citywide impact.

By building on existing programs and working together, Costa Mesa can take meaningful, locally relevant steps toward a more sustainable and resilient future.

INTENTIONALLY LEFT BLANK

CHAPTER 2

# Climate Action

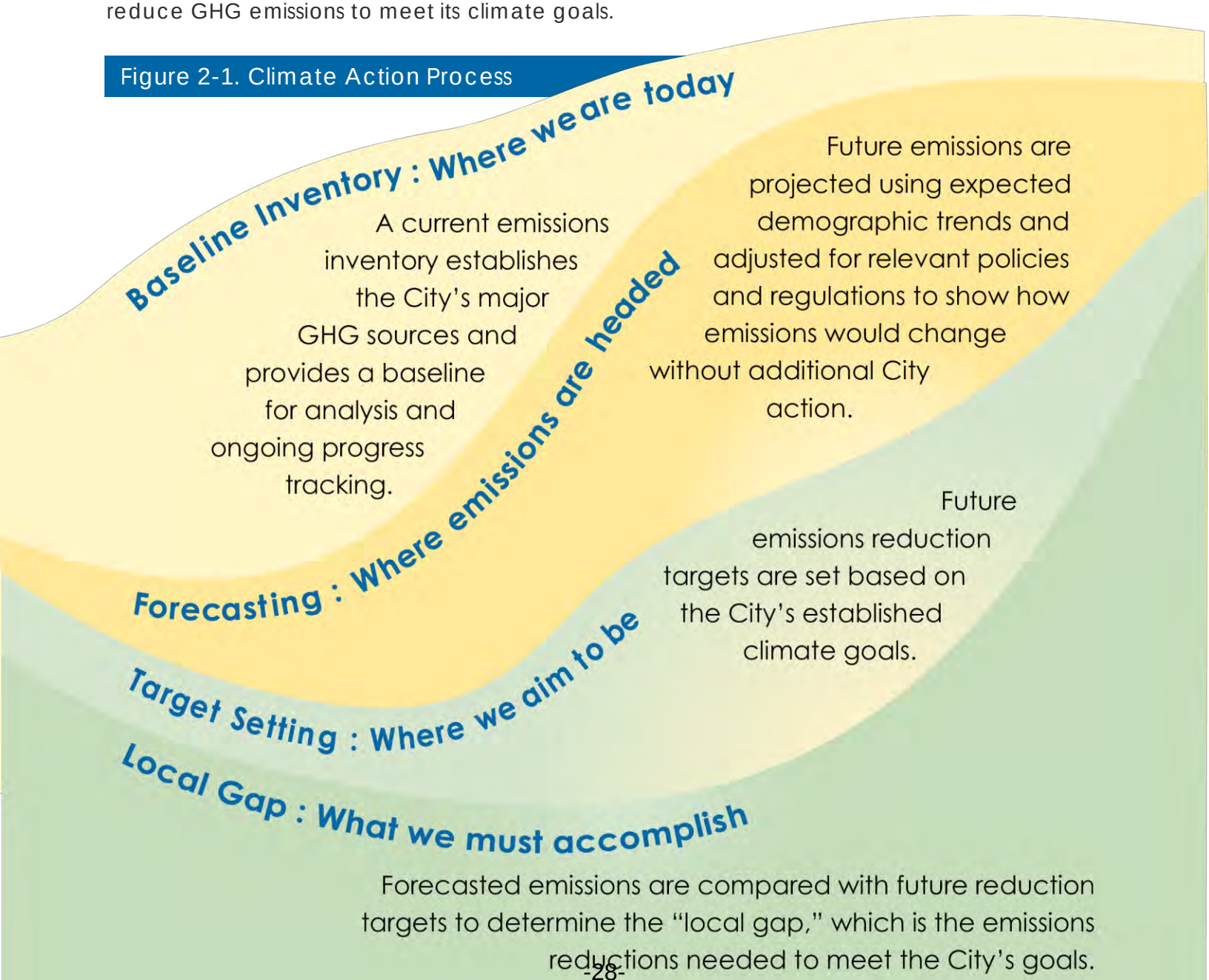
# 2 Climate Action

## Process

Climate action includes the steps we take to reduce the impacts of climate change by avoiding, reducing, or sequestering GHG emissions. The CAAP climate action process centers on establishing a baseline emissions inventory, projecting future emissions, setting reduction targets, identifying the resulting emissions gap, and outlining strategies to close that gap.

This chapter summarizes these foundational steps: inventory, forecasting, target setting, and gap analysis (Figure 2-1). Chapter 5 then describes the specific actions the City can take to reduce GHG emissions to meet its climate goals.

Figure 2-1. Climate Action Process

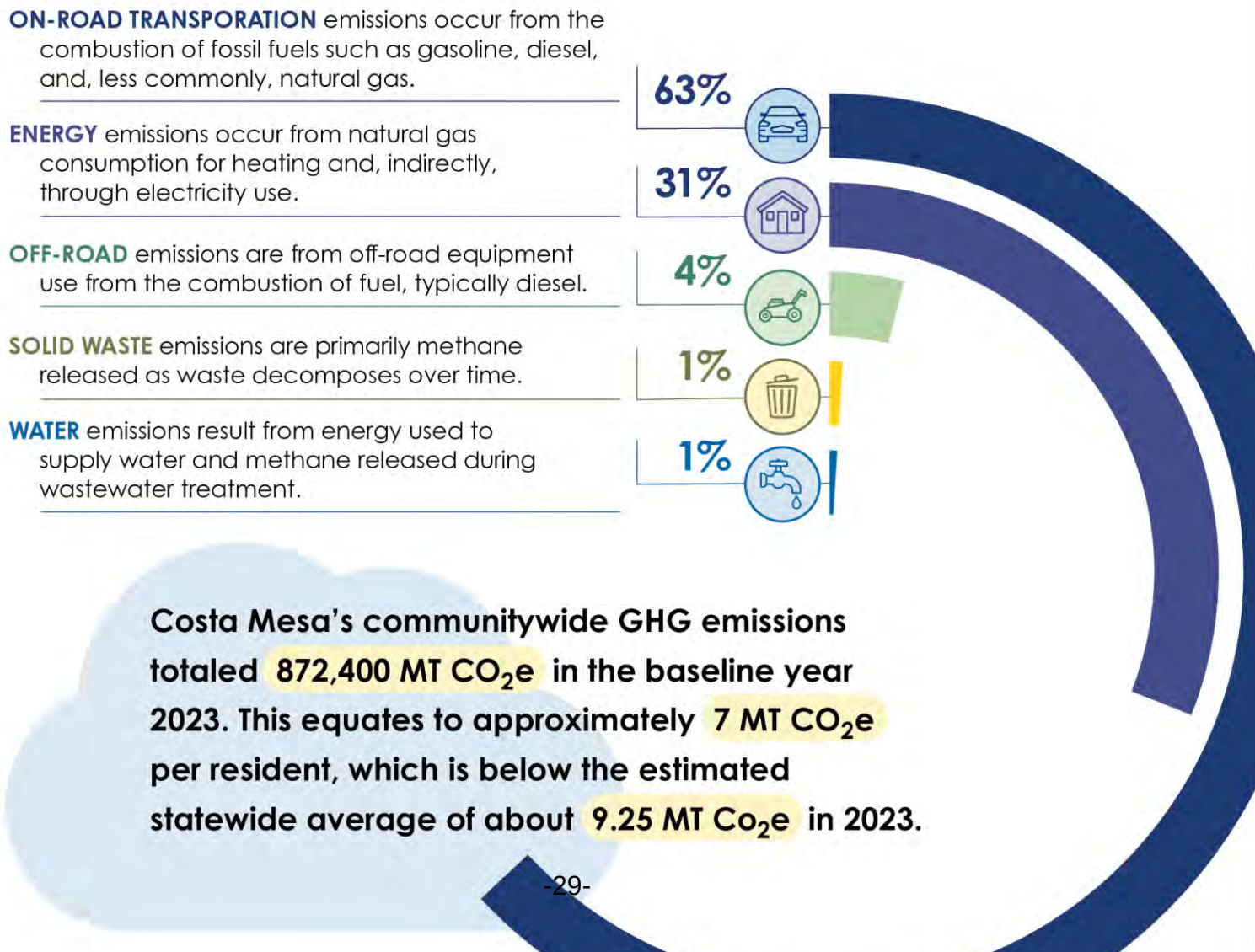


## Baseline Inventory

An emissions inventory provides a snapshot of GHG emissions within a defined area during a given year. For the CAAP, the baseline inventory reflects emissions in Costa Mesa in 2023. Establishing a baseline inventory helps identify the primary sources of emissions across sectors, which informs where actions can have the greatest impact. The baseline inventory also provides a foundation for tracking progress over time and for evaluating how emissions may change in the future.

Figure 2-2 summarizes the 2023 baseline communitywide emissions inventory. As shown, on-road transportation and energy are the largest sources of emissions, together accounting for the majority of communitywide GHG emissions (totaling approximately 94%). Additional methodological details and assumptions are provided in Appendix A.

Figure 2-2. City of Costa Mesa 2023 Baseline Emissions Inventory



## Forecasting

The City's GHG emissions were projected for 2030 and 2045 using two scenarios: business as usual (BAU) and adjusted business as usual (ABAU). The BAU scenario estimates future emissions based only on expected growth in population, employment, and other factors, assuming no additional actions are taken to reduce emissions beyond those already in place today.

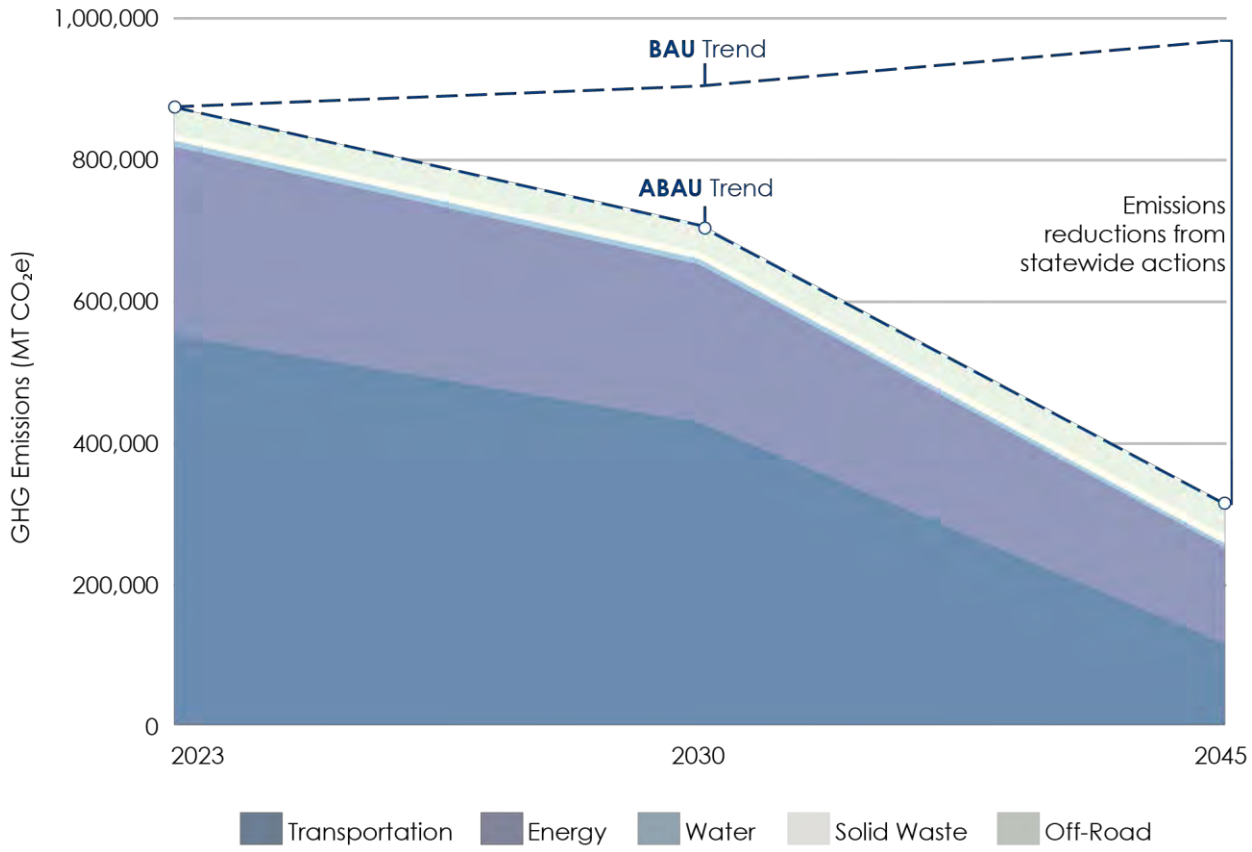
The ABAU scenario uses the same growth assumptions but also reflects the effects of existing federal and state policies that are expected to reduce emissions over time. These include regulations that have already been adopted and are scheduled to take effect between the 2023 baseline year and 2030 and 2045. Additional methodological details are provided in Appendix A.

### MUNICIPAL EMISSIONS
*4,683 MT $CO_2e$*

The City also prepared a municipal inventory that estimates GHG emissions from City government operations, including City buildings, vehicle fleets, and employee activities. These emissions are a subset of the communitywide inventory and so are already included in the communitywide total. Municipal emissions are reported separately to highlight emissions from City operations and should not be interpreted as additional emissions beyond the communitywide inventory.

Figure 2-3 compares projected emissions under the ABAU scenario with the BAU trend. As shown, state-mandated policies and programs are expected to account for a substantial portion of future emissions reductions.

Figure 2-3. Communitywide ABAU GHG Emissions Projections



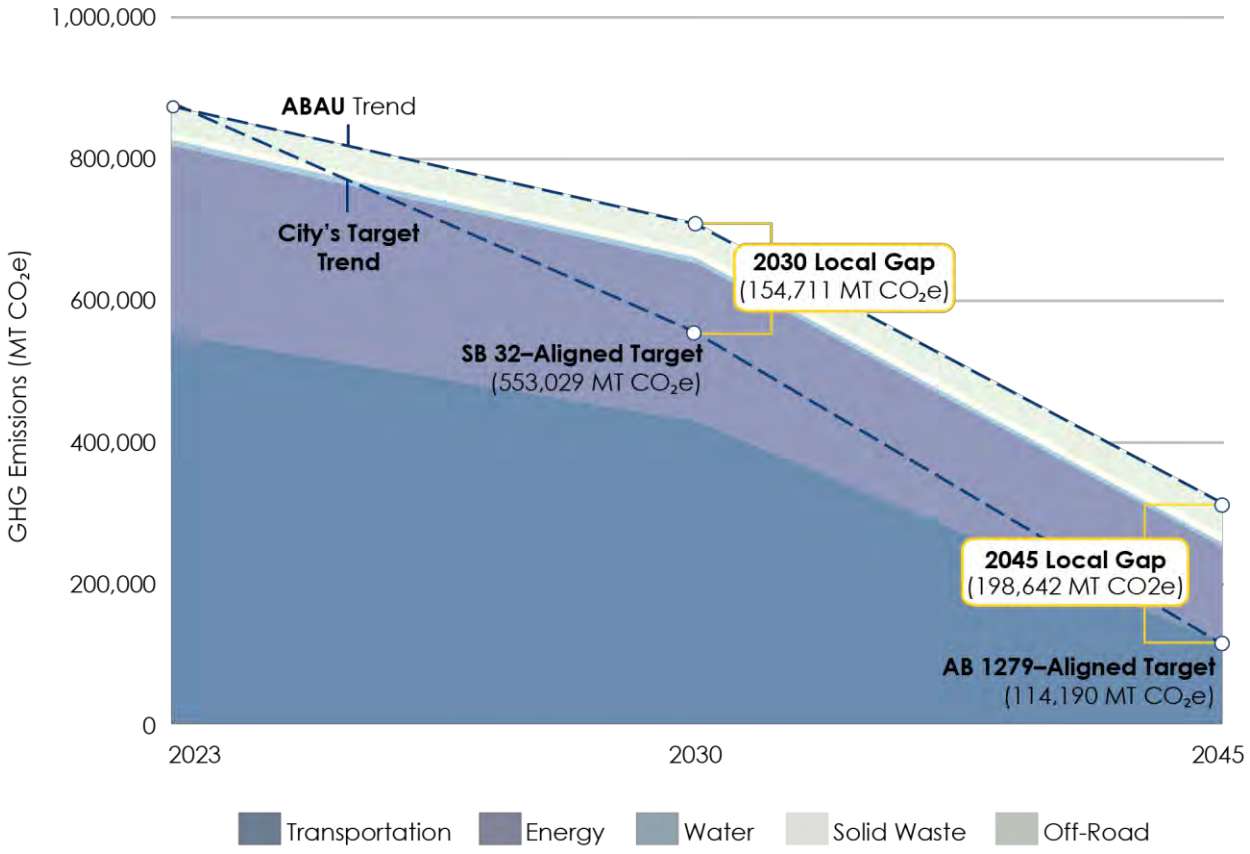

*Source: Dudek.*

## Target Setting and Local Gap

The City's GHG reduction targets are aligned with California's statewide climate goals, which are established through state law. The City's targets for 2030 and 2045 reflect the reduction goals set by SB 32 (reduce GHG emissions 40% below 1990 levels by 2030) and AB 1279 (reduce anthropogenic GHG emissions 85% below 1990 levels by 2045), respectively, and are based on the City's proportional share of the emissions reductions needed statewide. These targets were refined to reflect local conditions by focusing on sectors and emission sources relevant to Costa Mesa's community and jurisdiction. Aligning local targets with the state framework helps ensure that Costa Mesa is contributing to statewide efforts to reduce GHG emissions. Additional details on the target-setting approach are provided in Appendix A.

Figure 2-4 compares projected emissions under the ABAU scenario with the City's 2030 and 2045 GHG reduction targets. While state policies are expected to reduce emissions over time, these actions alone are not sufficient to meet the City's long-term climate goals. To close this gap, the City will need to implement additional local actions to reduce communitywide emissions by approximately 154,700 MT $CO_2e$ by 2030 and 198,600 MT $CO_2e$ by 2045.

## Figure 2-4. Communitywide ABAU GHG Emissions Projections, Reduction Targets, and Local Gap




*Source: Dudek.*

At the municipal level, the City will need to implement actions to achieve reductions of approximately 911 MT $CO_2e$ by 2030 and 1,516 MT $CO_2e$ by 2045, to align with the state's climate goals. GHG emission reduction and sequestration sectors, objectives, and actions identified to fill the local gap are discussed in Chapter 5.

CHAPTER 3

# Climate Adaptation

# 3 Climate Adaptation

Natural hazards are physical events, like flooding, extreme heat, or earthquakes, that have the potential to cause harm or damage to people or places. Every city has unique risks associated with certain natural hazards; some natural hazards, referred to as climate-related hazards, are projected to experience changes in the future due to a variety of factors, including global GHG emissions. In Costa Mesa, the primary climate-related hazards include extreme heat, drought, flooding, and wildfire. Climate adaptation focuses on reducing risks and strengthening resilience to these climate-related hazards.

The following chapter outlines the interactions between Costa Mesa's people, infrastructure, natural environment, and climate-related hazards. It draws on state climate modeling, local hazard data, and community characteristics to identify key vulnerabilities and inform equitable and effective adaptation strategies.

Additional climate hazard analysis can be found in Appendix C.

### PROJECTING HAZARDS

Climate models project future hazard trends. This chapter includes modeled data for three timelines: a historical baseline (1961–1990), mid-century projections (2034–2064), and end-of-century projections (2065–2099).

Long-term climate models are heavily impacted by the amount of global GHG emissions. As such, end-of-century projections often discuss two scenarios:

- A medium-emissions scenario that assumes global emissions peak in 2040 and then decline
- A high-emissions scenario that assumes emissions continue to rise through 2100

*Source: Cal-Adapt. 2025. "Global Climate Models HadGEM2- ES, CNRM-CM5, CanESM2, MIROC5." Cal-Adapt website developed by University of California at Berkeley's Geospatial Innovation Facility under contract with the California Energy Commission. Accessed July 1, 2025. https://cal-adapt.org.*

# Drought

Droughts are long periods of time with limited precipitation and have historically occurred naturally in Southern California.

## Projected Changes

Under a high-emissions scenario, climate models project significantly drier soils in the future and an 80% chance of prolonged, multi-decade drought between 2050 and 2099.[1]

## Spatial Extent

Drought occurs on a regional scale, and its local impacts are most closely tied to water supply. Costa Mesa's two water suppliers, Mesa Water District (90% of Costa Mesa water users) and Irvine Ranch Water District, both rely primarily on local groundwater.[2] This water supply type offers more immediate drought resilience than surface water supply. It also involves more local control over watershed management than imported water, from the State Water Project or Colorado River, for example. However, groundwater remains sensitive to long-term recharge conditions and requires careful management and planning.

## Impacts

In Costa Mesa, drought is expected to cause long-term stress to groundwater systems, increasing the need for groundwater recharge and additional water-efficiency measures and likely resulting in increased water costs. Low-income households may be particularly affected because a larger share of their income goes to necessities. Water management planning, infrastructure, and cost assistance programs by Mesa Water District, Irvine Ranch Water District, and regional water management agencies like Orange County Water District are important to ensure long-term adaptive capacity.

---

1 *Swain et al. 2018. "Increasing Precipitation Volatility in Twenty-First-Century California." Nature Climate Change 8: 427–433.*

2 *Mesa Water District. 2021. 2020 Urban Water Management Plan. Final. June 2021. https://www.mesawater.org/sites/default/files/Save%20Water/Documents/Mesa%20Water%202020%20UWMP%20FINAL-2021.06.30.pdf. Irvine Ranch Water District. 2021; 2020 Urban Water Management Plan. June 2021. https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/2020_urban_water_management_plan_irwd_adopted_june2021.pdf.*

# Extreme Heat

Extreme heat refers to times when temperatures rise to levels that community members are not accustomed to. This means that extreme heat events can be different from place to place; for example, an extreme heat event in Costa Mesa can occur at a cooler temperature than one in San Bernardino.

Extreme heat can be a single occurrence of high temperatures, such as an extreme heat day. In Costa Mesa, this is defined as a day exceeding 93°F. Extreme heat can also be continuously high temperatures over the course of multiple days, which can make it difficult for a person to recover. This type of extreme heat can include heat waves (four or more consecutive extreme heat days) or warm nights (when nighttime temperatures remain above 80°F).[3]

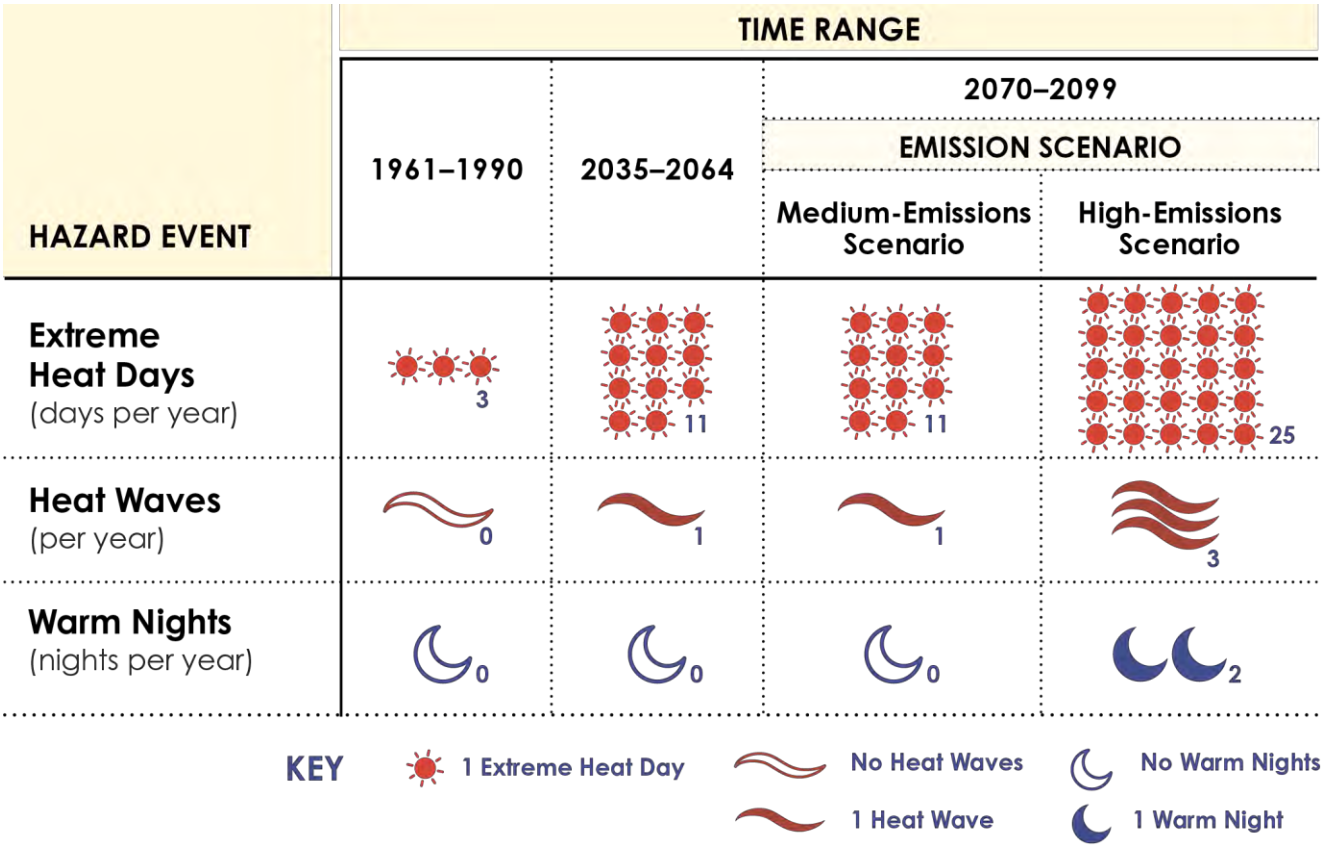
## Projected Changes

Historically, Costa Mesa's proximity to the ocean has limited extreme heat to only a handful of days per year, but extreme heat represents one of the most significant growing climate risks for Costa Mesa (see Table 3-1).

Extreme heat days are projected to more than triple by mid-century; depending on global GHG emissions, they may stabilize or increase further. In addition, while heat waves and warm nights are currently an uncommon occurrence, they each have the potential to become more common under a high-emissions scenario.[4]

[3] *Cal-Adapt 2025, "Extreme Heat Day."*
[4] *Cal-Adapt 2025, "Extreme Heat Days."*

Table 3-1. Changes in Extreme Heat




*Source: Cal-Adapt 2025, "Extreme Heat Days."*

## Spatial Extent

Heat impacts vary locally due to the urban heat island effect (described on Figure 3-1). In Costa Mesa, inland areas, large parking lots, turf sports fields, industrial zones, and areas with limited tree canopy experience higher temperatures than coastal or well-vegetated areas (see local urban heat island severity on Figure 3-2).

## Figure 3-1. Urban Heat Island Infographic

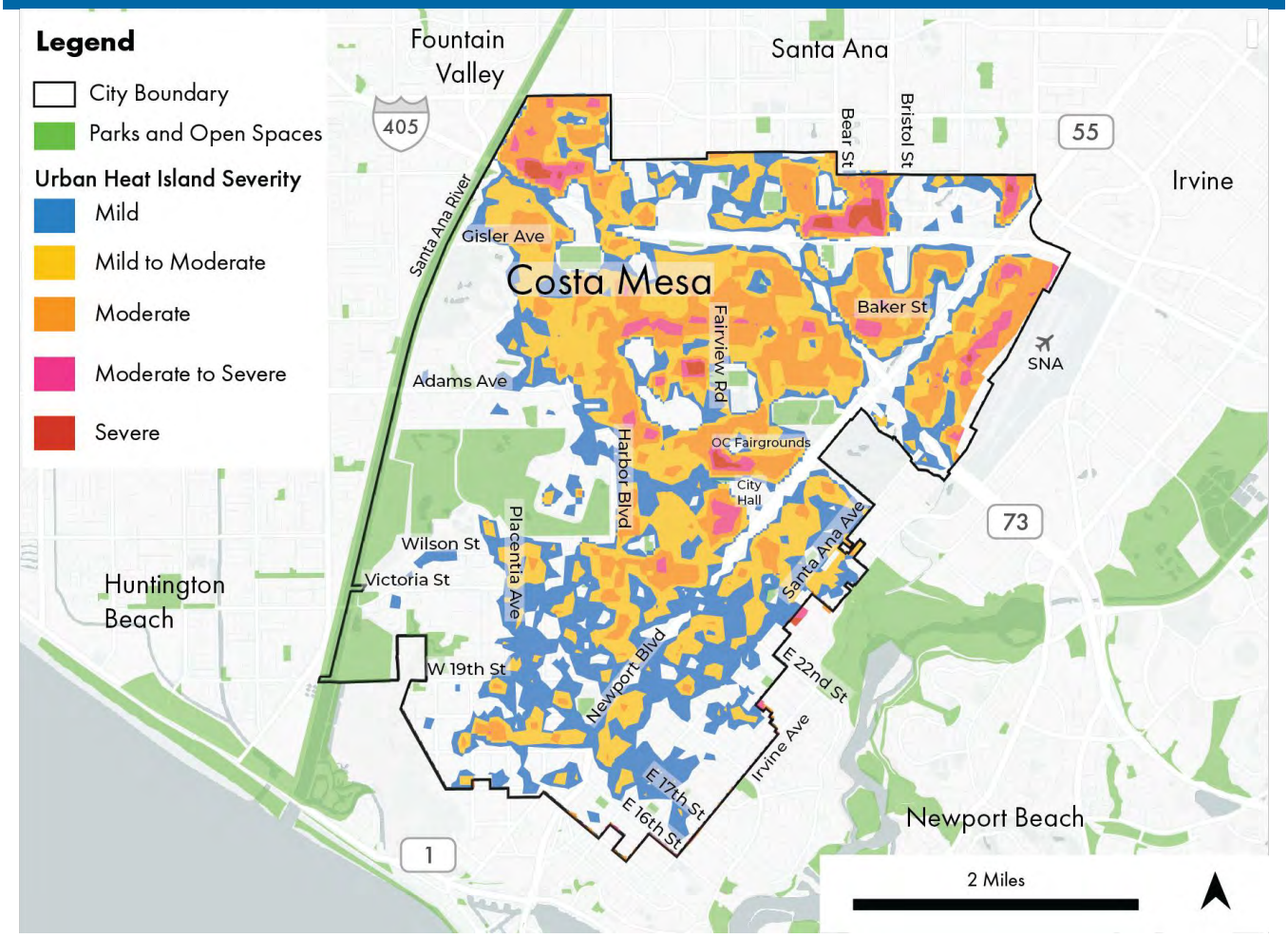



*Source: Dudek.*

## Impacts

Extreme heat poses serious public health risks. Older adults and young children often feel the impacts of extreme heat earlier or more intensely than others. Outdoor workers and people experiencing homelessness are outside more frequently and are therefore more exposed to extreme heat. Residents may also experience extreme heat more regularly if they're without air conditioning or are forced to not run air conditioning due to the additional cost of energy. Rising temperatures also drive increased electricity demand, raising concerns about strain on the regional power grid and the affordability of cooling. Southern California Edison works throughout the region to improve energy reliability and provides assistance programs that can reduce the energy cost burdens for qualified households.

## Figure 3-2. Urban Heat Island Severity




*Source: The Trust for Public Land. 2023. "Heat Severity USA 2023." https://www.arcgis.com/apps/webappviewer/index.html?id=1b6cad6dd5854d2aa3d215a39a4d372d.*

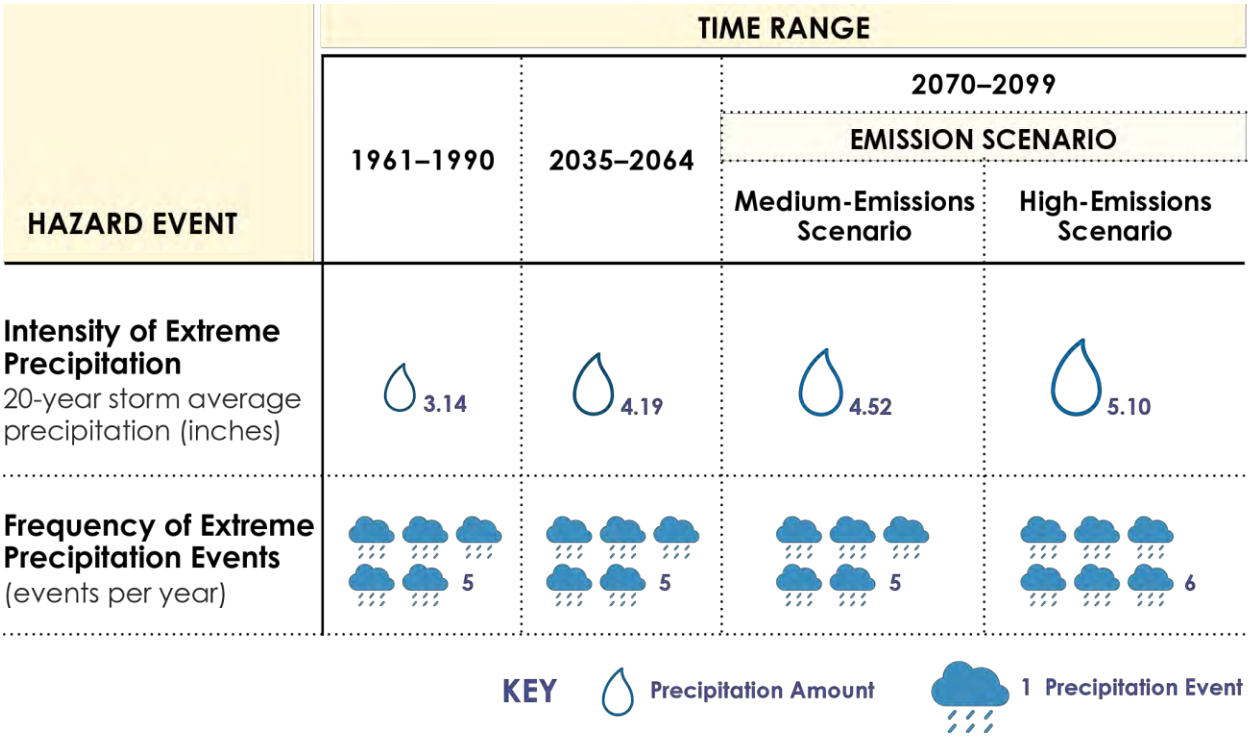
# Flooding

Flooding occurs when water inundates land that is normally dry, and it can endanger human life or cause infrastructure damage or utility interruptions. Flooding in Costa Mesa is primarily associated with extreme precipitation or atmospheric river events. Dam or levee failures connected to the Santa Ana River system also have the potential to result in flooding. Additionally, coastal communities can experience flooding from tidal events and sea level rise.

## Projected Changes

Extreme precipitation intensity is projected to increase over time. An approximately 20% increase by mid-century and up to a 50% increase by the end of the century are projected under a high-emissions scenario.[5] While the intensity of extreme precipitation is projected to increase, the frequency of extreme precipitation events is projected to remain relatively stable moving forward. See Table 3-2 for projected extreme precipitation data trends.

### Table 3-2. Changes in Extreme Precipitation




*Source: Cal-Adapt. 2025. "Extreme Precipitation for Costa Mesa, Global Climate Models HadGEM2- ES, CNRM-CM5, CanESM2, MIROC5." Cal-Adapt website developed by University of California at Berkeley's Geospatial Innovation Facility under contract with the California Energy Commission. Accessed July 1, 2025. https://cal-adapt.org.*

[5] *Cal-Adapt. 2025. "Extreme Precipitation for Costa Mesa."*

## Spatial Extent

Figure 3-3 displays the City's flood risk zones as designated by the Federal Emergency Management Agency. The City's developments are generally outside of flood zones; however, extreme scenarios could produce broader impacts, particularly in northeastern Costa Mesa.

Flooding as a result of dam failure is another risk. Major dams can experience overtopping during extreme precipitation, increasing the potential for failure. Costa Mesa is downstream of the Prado, Santiago, and Villa Park Dams, which each present major flood risk in northern and western Costa Mesa in the unlikely event of failure. To learn more information about these dams, refer to the City's Local Hazard Mitigation Plan.[6]

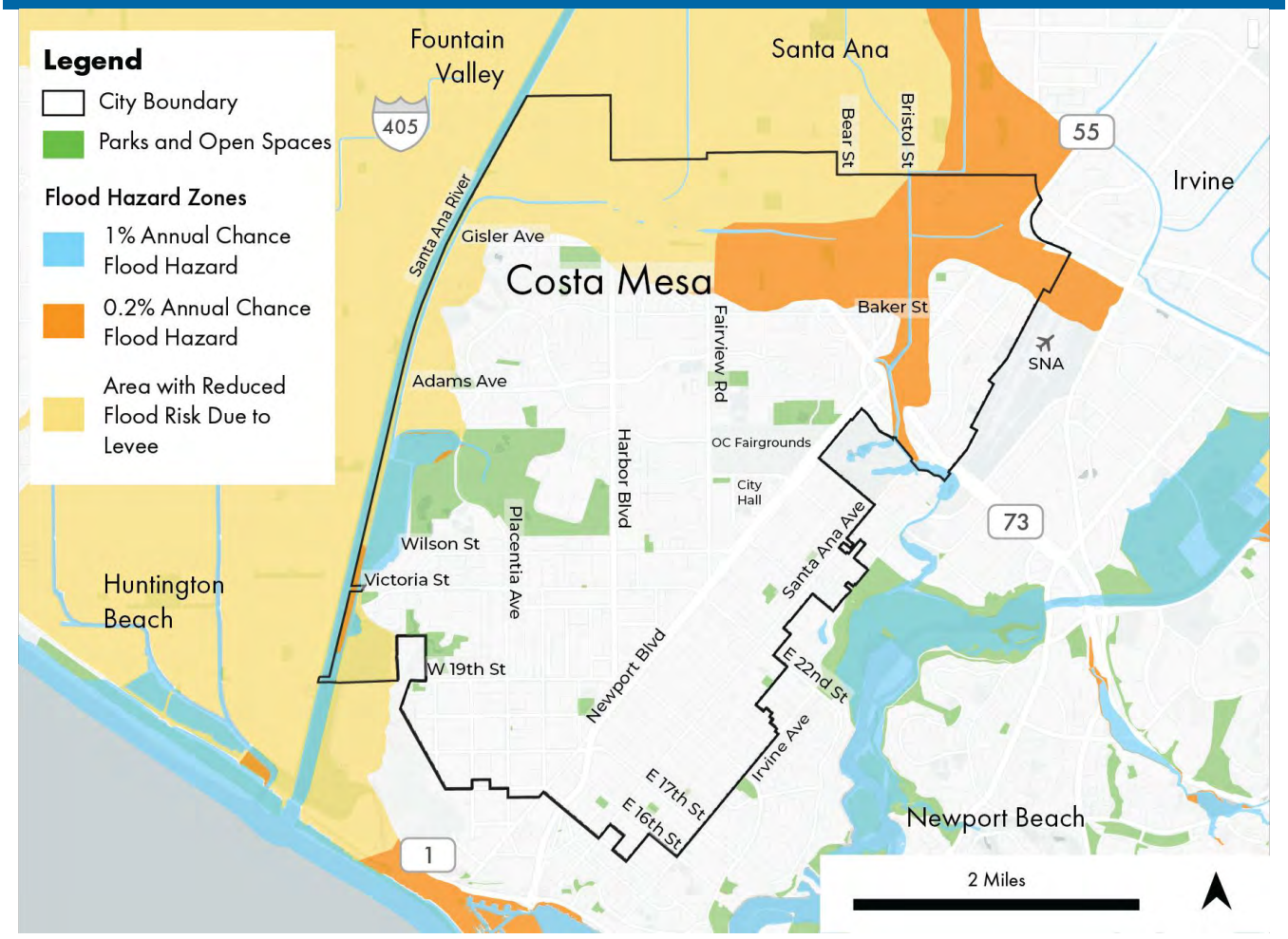
## Impacts

The City's local stormwater system and regional dams and levees largely protect residents from flooding, but extreme events such as 500-year storms (0.2% annual chance of occurrence) or dam failures have the potential to result in impacts to upward of 5,000 households and a variety of City facilities. The City's Storm Drain Master Plan is the primary local plan for accommodating stormwater and limiting flooding. Beyond that, the U.S. Army Corps of Engineers, Irvine Ranch Water District, and County of Orange each operate and manage the risks of their respective dams and communicate with the City regarding emergency planning and testing.

Flooding can damage structures, disrupt transportation, and create indoor air quality issues such as mold growth. When recovering from flood damage, Costa Mesa's renters and housing-cost-burdened residents may experience additional burdens related to cost or maintenance logistics.

[6] *City of Costa Mesa. 2022. Local Hazard Mitigation Plan. November 4, 2022. Accessed June 30, 2026. https://www.costamesaca.gov/home/showpublisheddocument/52032/637992796596200000.*

## Figure 3-3. Federal Emergency Management Agency–Designated Flood Zones




*Source: Federal Emergency Management Agency. 2025. National Flood Hazard Layer. Accessed June 16, 2025. https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd&extent=-95.45126763363174,29.70432951603742,-95.44609633465032,29.70665923986828.*

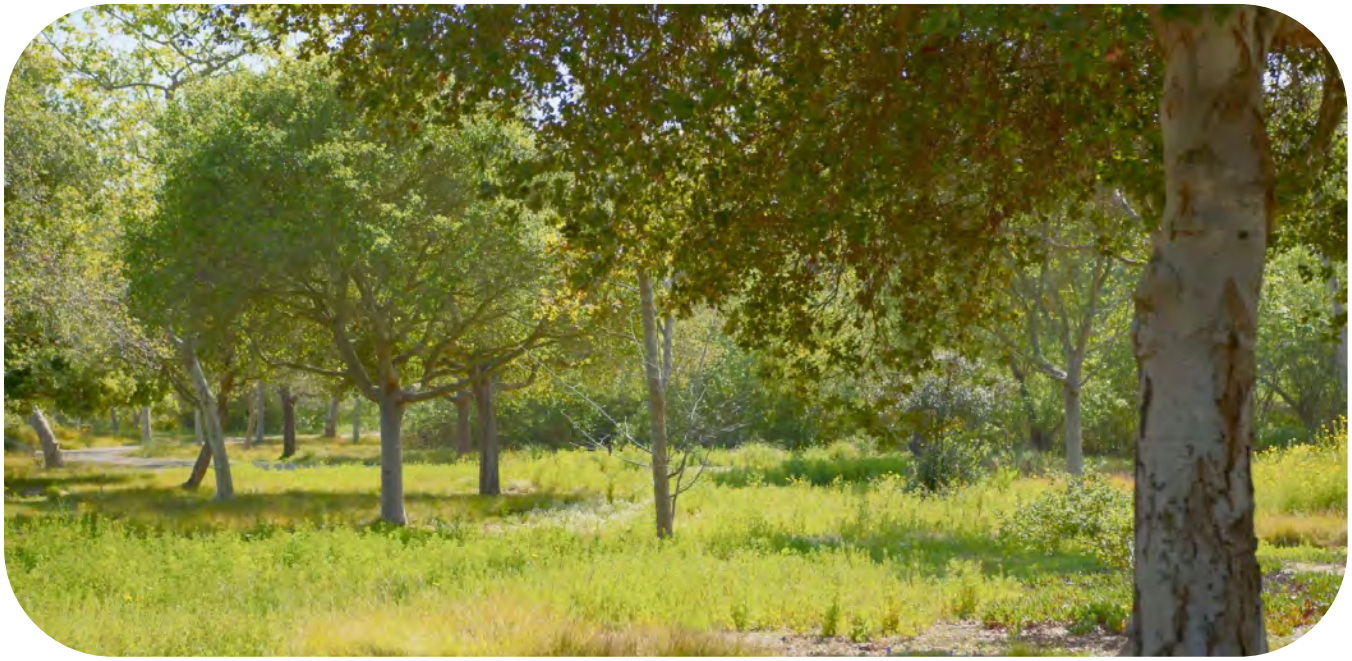
# Wildfire

Wildfires are intense fires that generally ignite in wildlands but can cover large expanses of land and spread quickly to developed areas.

## Projected Changes

The regional average of burned area is projected to remain relatively consistent with existing conditions. Factors such as continued warming and intensified drought can increase immediate wildfire risks, although available fuel may decrease over time due to intensified drought. It should also be noted that burned area projections apply across the broader region or county, but vegetation management of local open spaces can limit local risk.[7]

Santa Ana winds are another important wildfire factor, as they can intensify the spread of wildfires. These are strong, dry winds that blow from inland deserts out to the coast. Generally, these winds occur in late fall or winter. They are especially significant in Orange County, as 25% of wildfires in the region occur during Santa Ana wind events. Future trends for Santa Ana wind intensity and frequency are uncertain at this time and should be reviewed during future CAAP updates.[8]



[7] *State of California. 2018. "Los Angeles Region Report." In California's Fourth Climate Change Assessment. Accessed July 1, 2025. https://www.energy.ca.gov/sites/default/files/2019-11/Reg%20Report-%20SUM-CCCA4-2018-007%20LosAngeles_ADA.pdf.*

[8] *State of California 2018, "Los Angeles Region Report."*

## Spatial Extent

Costa Mesa's local wildfire risk emanates from the open space in the western and southwestern portions of the City near Talbert Park. The California Department of Forestry and Fire Protection designates Fire Hazard Severity Zones (FHSZs), which signify elevated likelihood of fire hazard due to characteristics like vegetation, slope, and weather. Costa Mesa's FHSZs can be seen on Figure 3-4, primarily covering open space but also overlapping with over 500 dwelling units of housing. Areas designated as High or Very High FHSZs are subject to certain California Building Code regulations related to ignition-resistant building materials for new development, and Very High FHSZs are also subject to defensible-space vegetation regulations.

## Impacts

Wildfires have the potential to endanger community members, damage structures, trigger evacuations, and cause poor air quality.

As stated above, over 500 dwelling units are located within the City's FHSZ. These homes are most at risk, but wildfire conditions are variable and can still impact homes outside of the defined hazard zones. The City implements a Fire Prevention Program and other ongoing actions, such as vegetation management, to limit fire risk.

Regional wildfires can also impact Costa Mesa's air quality through smoke. The public health impacts of wildfire smoke are especially dangerous to older adults and people with existing respiratory or cardiovascular conditions.

## Figure 3-4. Fire Hazard Severity Zones




*Source: California Department of Forestry and Fire Protection (CAL FIRE). 2025. Fire Hazard Severity Zones. Accessed July 1, 2025. https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones.*

# Compounding Hazards

Compounding hazards occur when multiple climate-related hazards interact, leading to new or more intense impacts than a single hazard in isolation. The two compounding hazards identified for the City are debris flows and climate migration, which are summarized below.

## Debris Flows

Debris flows, also known as mudslides, are a dangerous type of landslide that moves fast, carrying soil and debris and damaging objects in its path. Wildfire and drought can contribute to conditions that lead to debris flows by burning vegetation or causing vegetation to die off, leading to destabilized hillsides. When extreme precipitation follows these conditions, debris flows are more likely.

Debris flows have not yet occurred within the City. However, bluffs in the southwestern portion of the City have been identified as deep-seated landslide zones, which indicate slow-moving or dormant landslides.[9] Some of these deep-seated landslide zones overlap with FHSZs, making these zones more susceptible to debris flows should a combination of a wildfire and extreme precipitation occur in these areas (see Figure 3-5). Pre-planning for this risk and building upon continued efforts outlined in the LHMP to prepare for emergency response, maintain drainage, and stabilize vegetation on and above landslide-prone areas can ensure an efficient and effective response.

[9] *City of Costa Mesa 2022, Local Hazard Mitigation Plan.*

## Figure 3-5. Deep-Seated Landslide Zones and Fire Hazard Severity Zones




*Source: California Department of Conservation. 2019. California Landslide Inventory and Deep Landslide Susceptibility. https://data.ca.gov/dataset/california-landslide-inventory-and-deep-landslide-susceptiblity; CAL FIRE 2025, Fire Hazard Severity Zones.*

## Climate Migration

Climate migration happens when people move out of an area or home either because of specific major climate hazard events or long-term strain from climate hazards. Climate migration in the Southern California region is likely to occur as a result of damage from wildfires or flooding events, loss of insurance, or chronic issues like extreme heat, air quality issues, or regular flooding as a result of sea level rise.

Costa Mesa's strong economy and relatively low exposure to climate hazards as compared to the region may make it an attractive destination for climate-displaced populations from other parts of Southern California. While this may bring economic opportunities, it could also exacerbate existing housing affordability pressures. Regional collaboration with agencies, like the Southern California Association of Governments, who establish Regional Housing Needs Allocations and direct various housing-related funds is necessary to collectively address this issue over time and limit negative impacts.



INTENTIONALLY LEFT BLANK

CHAPTER 4

# Outreach and Engagement

# 4 Outreach and Engagement

To ensure the CAAP reflects the needs and priorities of Costa Mesa's unique community, meaningful engagement with diverse community members and stakeholders was essential. The plan was shaped through a collaborative process that included multiple opportunities for input from City leadership, residents, businesses, and key stakeholders.

This chapter provides an overview of the public engagement strategy, summarizes key themes identified through outreach, and describes how community feedback informed the final CAAP.

**INCLUSIVE OUTREACH EFFORTS**

- ✓ Broad, accessible outreach
- ✓ English and Spanish materials
- ✓ Live language support at events
- ✓ Online + in-person participation
- ✓ Flexible times and locations
- ✓ Family-friendly activities

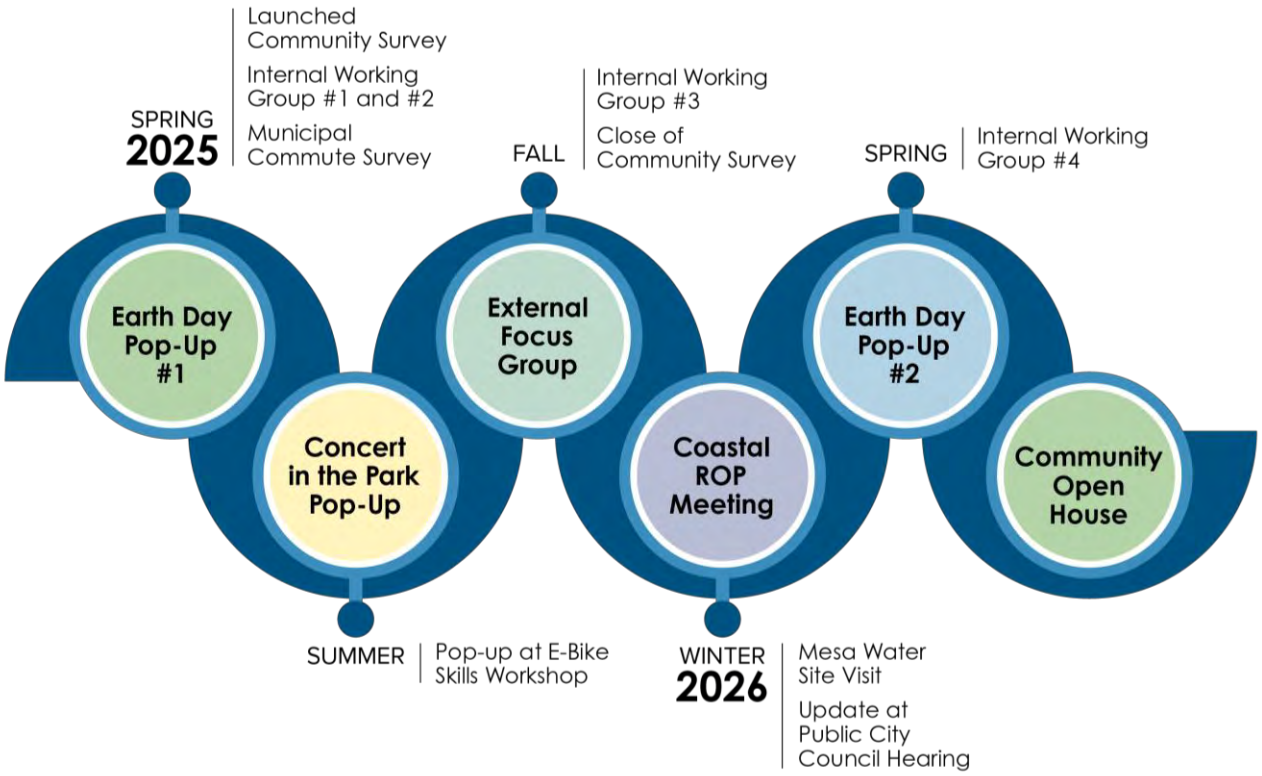
## Outreach and Engagement Efforts

To enable participation from a diverse range of community members and interested parties in Costa Mesa, the City took a multipronged approach to outreach and engagement. Opportunities for engagement included:

- A community open house including CAAP sectors and objectives
- Pop-up outreach activities at well-attended public events
- A community survey to solicit more in-depth feedback
- Internal working group meetings with relevant City departments to facilitate collaboration in the CAAP development process
- An external focus group with key interested parties
- Presentation and workshop with the Coastline Regional Occupation Program (ROP) Sustainability Cohort
- Site visits to Mesa Water District and the Orange County Water District Groundwater Replenishment System (GWRS)
- Public City Council hearing to provide an update on the CAAP's status and outreach
- Digital engagement via social media, the City Hall Snapshot newsletter, and email blasts
- Flyers posted at City Hall, other City facilities, and coffee shops

Outreach and engagement touchpoints were scheduled to occur throughout key points in the planning process, ensuring lived experiences and local priorities informed each stage of the development of the CAAP, from background analysis to policy development and implementation. The timeline for outreach and engagement events is shown in Figure 4-1.

## Figure 4-1. Outreach Timeline




Through in-person and online engagement activities, the City heard from more than 340 community members, whose feedback and input were invaluable for shaping each component of the plan. The following sections summarize each of the engagement touchpoints and their role in the outreach and engagement program. Detailed summaries of feedback received from the pop-up events, community survey, and community open house are available in Appendix C.

# A Balanced Outreach Approach

**The CAAP outreach was designed to reflect a range of perspectives, bringing together insights from City staff, external partners, and the community to inform a well-rounded understanding of local priorities.**

## Community Outreach

**340+ participants engaged** at community events, including pop-ups, open house, and youth outreach

**158 survey responses** collected through two online surveys

## Coordination between City Departments

Four meetings were held, throughout the CAAP development process, with the Communications and Marketing, Public Works, Economic and Development Services, Parks and Community Services, Fire and Rescue, Police, Finance, and Information Technology.

## Coordination with External Partners

**22 community organizations,** businesses, institutions, builders, and utilities

### In-depth conversations

with representatives from each of the following:

- building and real estate industries
- local nonprofit organizations
- institution of higher education
- a regional electricity utility

### Coastline Regional Occupation Program

Presentation to 10 members of the Coastline Regional Occupation Program (ROP) Sustainability Cohort, with an opportunity to provide input on the CAAP

### Mesa Water District

Site visit with Mesa Water District to see sustainability initiatives and coordinate CAAP efforts

## Key Insights

- Strong support for greener, more livable communities, including more trees, parks, and urban greening
- Demand for safer and more accessible transportation options, especially walking, biking, and transit
- Interest in sustainability actions paired with persistent barriers, such as cost, infrastructure gaps, and limited access
- Desire for practical, community-oriented solutions, including incremental improvements and local partnerships
- Recognition of resilience and equity considerations, including addressing extreme heat and protecting vulnerable populations

## Earth Day Event Pop-Ups

Two Earth Day pop-up/tabling events were held—the first in the spring of 2025 and the second in the spring of 2026—to build awareness of the CAAP and receive input from community members about their priorities and vision for a more sustainable Costa Mesa.

The first Earth Day pop-up was held on Saturday, April 26, 2025, from 10:00 a.m. to 2:00 p.m. on the City Hall lawn. Event attendees had the opportunity to interact with City staff, read educational poster boards, contribute their vision for a more sustainable Costa Mesa on an interactive community collage, and learn about the community survey.




*2025 Earth Day event collage*



*2025 Earth Day kid's table*

Over 65 participants provided comments on the community collage that emphasized the need to increase renewable energy sources; plant additional trees and improve access to parks and green spaces; and improve alternative transportation options, such as biking, walking, and public transit as a way to reduce carbon emissions.

The second Earth Day pop-up was held Saturday, April 18, 2026, from 10:00 a.m. to 2:00 p.m., at the same location. This pop-up focused on educating the community about the CAAP and its benefits, goals, and progress; informing community members about potential CAAP objectives and actions; and raising awareness for the community open house, which was scheduled for Thursday, April 30, 2026, from 6:00 p.m. to 8:00 p.m.

## Concert in the Park Pop-Up

The City conducted a pop-up outreach event at the Costa Mesa Concert in the Park on Tuesday, July 29, 2025, from 5:00 p.m. to 7:00 p.m. at Fairview Park. This event provided an opportunity to engage community members in an informal, family-friendly setting and expand awareness of the CAAP.

The primary goals of the event were to raise awareness about the City's climate planning efforts, communicate the objectives and benefits of the CAAP, and gather community input to better understand current barriers to sustainable behaviors. Participants were also encouraged to share their priorities and help build a shared vision for a more sustainable Costa Mesa.




*Concert in the Park pop-up*

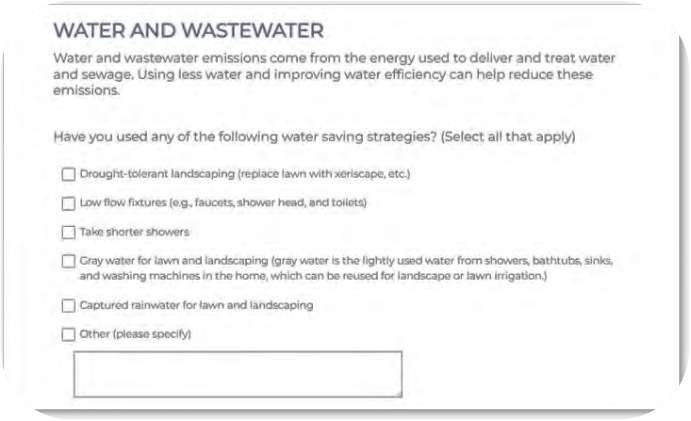



*Kid's activity drawing*

More than 40 community members participated in the outreach activities, providing valuable feedback that reinforced key themes seen throughout the broader engagement process. Participants expressed strong interest in enhancing landscaping and improving access to parks and green space, expanding transportation options such as biking, walking, and public transit, and increasing efforts to compost and recycle to reduce waste.

## Community Surveys

The City conducted two online community surveys to better understand existing behaviors, community priorities, and barriers to adopting more sustainable practices. In total, 228 community survey responses were received, of which 158 were fully completed.


WATER AND WASTEWATER

Water and wastewater emissions come from the energy used to deliver and treat water and sewage. Using less water and improving water efficiency can help reduce these emissions.

Have you used any of the following water saving strategies? (Select all that apply)

- ☐ Drought-tolerant landscaping (replace lawn with xeriscape, etc.)
- ☐ Low flow fixtures (e.g., faucets, shower head, and toilets)
- ☐ Take shorter showers
- ☐ Gray water for lawn and landscaping (gray water is the lightly used water from showers, bathtubs, sinks, and washing machines in the home, which can be reused for landscape or lawn irrigation.)
- ☐ Captured rainwater for lawn and landscaping
- ☐ Other (please specify)

*Screenshot of a portion of the community survey*

To encourage broad participation, the City offered both a long-form and condensed survey format. The long-form survey was available from April 22 to October 3, 2025, while the condensed version was available from July 29 to October 3, 2025. There were 31 responses received on the short-form survey during the first Earth Day Festival event, and 62 additional responses were received thereafter; 65 responses were received on the long-form survey.

Survey responses highlighted a range of common barriers to sustainable actions, including challenges related to walking, biking, and transit use; installing energy efficiency upgrades and renewable energy systems (such as solar photovoltaic [PV]); transitioning to drought-tolerant landscaping; implementing graywater and rainwater capture systems; and composting organic materials.

## Internal Working Group

The City formed an internal working group and conducted four meetings (virtual and in-person) with the goal of grounding the CAAP in internal expertise, operational realities, and cross-departmental collaboration. The fifth internal working group meeting will be held upon completion of the Final CAAP and will focus on preparing City staff for successful plan implementation. In addition to the internal working group, as part of data collection for the municipal GHG emissions inventory, a commute survey for City employees was conducted to better understand commute habits.

Working group meetings were designed to engage internal City staff across departments in developing a coordinated and actionable CAAP. Through a series of structured meetings, staff were introduced to the CAAP's purpose, goals, and timeline and were provided opportunities to review existing City policies, programs, and initiatives that support sustainability and resilience.

Discussions focused on identifying successful efforts, understanding implementation challenges such as resource constraints and coordination needs, and establishing priorities for future action.

As the process advanced, working group members contributed to shaping the CAAP's strategy framework and reviewing draft actions to ensure they are feasible, aligned with departmental capacity, and effective. These meetings culminated in a comprehensive review of the draft CAAP, including implementation roles and next steps toward adoption.

## External Focus Group

The external focus group meeting was designed to gather targeted input from businesses and key interested parties to help shape the CAAP. Participants included representatives from the building industry and real estate industry, local nonprofit organizations, an institution of higher education, and a regional electricity utility.

The meeting introduced the CAAP's purpose, scope, and timeline, then invited participants to enter breakout rooms assigned to each participant's sector: land use development, local organizations and advocacy, and utility partners. In these breakout rooms, participants shared their current successes and challenges related to implementing practices to reduce GHG emissions and/or improve resilience to climate impacts, and they also discussed opportunities for collaboration with the City to realize the goals of the CAAP. Feedback focused on identifying existing programs, barriers to implementation, and potential incentives that could better support local action.

## Community Open House

A community open house was held on Thursday, April 30, 2026, from 6:00 p.m. to 8:00 p.m., with approximately 30 community members in attendance. It was a joint event for the CAAP and the City's General Plan Environmental Justice Policies Update, and engagement activities



*Community open house event*

both projects were incorporated. Distinct stations were prepared for the CAAP and the Environmental Justice Policies Update, each with educational materials, project staff to facilitate conversations, and opportunities to provide feedback on draft content.

CAAP stations included draft objectives and sample actions for each of the sectors of the CAAP, providing opportunities for community members to provide their input through brief comments as well as stickers that could be used to indicate priority.

Participants provided the largest number of comments on the following sectors: transportation, energy and the built environment, and natural and urban lands. Participants also indicated several transportation sector objectives as a priority.

## Additional Targeted Outreach

The City conducted targeted outreach to facilitate discussion and input on the CAAP. The following sections summarize outreach efforts to the Coastline Regional Occupational Program Sustainability Cohort and Mesa Water District.

### COASTLINE REGIONAL OCCUPATIONAL PROGRAM

The City conducted targeted outreach to the Coastline Regional Occupational Program Sustainability Cohort to engage younger residents and students in the CAAP process. City staff delivered a presentation introducing the CAAP and its goals. They also facilitated an interactive activity in which participants shared their input, via leaf-shaped comment cards tied to the community collage begun at the community open house, on what the CAAP's analysis and actions should address. The session included 10 participants, consisting of both high school students and young adults, who were highly engaged and interested in sustainability topics. Key themes from their feedback included the importance of improving public transportation, enhancing walkability, and expanding green space.

### MESA WATER DISTRICT

The City conducted a site visit and tour of Mesa Water District on March 25, 2026, to better understand the agency's ongoing sustainability initiatives and coordinate efforts for the CAAP. During the tour, district staff highlighted a range of programs and practices, including water conservation initiatives, public outreach and education programs, use of recycled water, system efficiency improvements, and efforts to reduce energy use in operations.

City staff also provided an overview of the CAAP's purpose and scope, facilitating a collaborative discussion on how water-related strategies could align with existing district efforts. This coordination helped ensure that the CAAP's proposed actions related to water conservation and wastewater management are realistic, complementary, and reflective of practices already being implemented by Mesa Water District.

## ORANGE COUNTY WATER DISTRICT




*City staff tour of the GWRS*

City staff toured the Orange County Water District's GWRS facility on March 25, 2026. The GWRS is a joint project of the Orange County Water District and Orange County Sanitation District. The facility provides enough new water for up to 1 million residents, making it the largest advanced water purification system for potable reuse in the world.

During the facility tour, City staff learned about the role of the GWRS facility in replenishing groundwater resources, received detailed information about the treatment process, and were guided through the facility to observe operations and water quality monitoring. This site visit informed the City about current regional efforts to conserve water supplies and reduce reliance on imported water.

## ESTANCIA HIGH SCHOOL COMMUNITY E-BIKE SKILLS WORKSHOP

On August 7, 2025, City staff hosted a pop-up at the Estancia High School Community E-Bike Skills Workshop to engage students and their families on climate action and sustainable transportation. The event provided an opportunity to share information about the CAAP's goals, key focus areas, and anticipated strategies.

During the workshop, participants learned about the benefits of e-bikes as a clean transportation alternative while City staff facilitated informal discussions to gather input on community priorities, barriers to adopting active transportation, and ideas for improving bike infrastructure and safety. Attendees were encouraged to take the community survey.



*E-Bike Skills Workshop*

## BUILDING INDUSTRY ASSOCIATION OF SOUTHERN CALIFORNIA

Following the external focus group meeting, the City held a follow-up discussion with the Building Industry Association of Southern California on January 14, 2025. The purpose of the meeting was to gain a better understanding of the building industry's experience with current development practices and the feasibility of common GHG reduction and adaptation measures, including implementation challenges, technological considerations, and other barriers, as well as areas where they have been able to advance sustainable goals and practices. Discussion topics included EV charging infrastructure, energy performance standards, renewable energy generation and storage, zero-emission off-road equipment, end-of-trip bicycle facilities, indoor and outdoor water conservation strategies, and nature-based climate solutions. The meeting provided an opportunity for open dialogue, allowing Building Industry Association representatives to ask questions, share perspectives, and provide feedback on their experience with industry-standard climate action and adaptation strategies, as well as finding ways to collaborate on sustainable efforts now and in the future.

## Digital Engagement

To build awareness of and encourage meaningful participation in the CAAP, the City developed a dedicated project webpage that serves as a central hub for information and engagement opportunities. The webpage includes detailed content such as the project timeline, key milestones, and clear explanations of how community members can get involved at each stage of the process. It also features frequently asked questions to address common inquiries, along with summaries of engagement activities and input gathered to date, helping to keep the public informed and demonstrate how feedback is being incorporated.




*Screenshot of City's CAAP webpage*

To ensure broad and inclusive outreach, the City created and distributed materials in both English and Spanish. These materials were shared through multiple communication channels and formats, including content on the City's official website and features in the City's e-newsletter, as well as social media. Social media outreach included Instagram reels, a Let's Talk Costa Mesa interview feature on the City's YouTube channel, and posts, reels, and stories on multiple social media platforms to boost engagement leading up to major public events, such as Earth Day, the close of the community survey, and the community open house. Cumulatively, social media content reached more than 9,000 people.

This coordinated outreach effort was intended to increase visibility of the CAAP process, provide accessible information, and create multiple touchpoints for community members to stay informed and participate.

CHAPTER 5

# Climate Action and Adaptation Strategy

# 5 Climate Action and Adaptation Strategy

Chapter 5 provides the CAAP strategy for achieving the City's climate action and adaptation goals. The strategy is organized within a tiered framework and serves as a roadmap to help the City achieve its GHG emissions reduction goals, as outlined in Chapter 2, and ensure the City is prepared for the climate change–induced hazards discussed in Chapter 3. The strategy advances a vision of a climate-ready, resilient future for Costa Mesa through a series of targeted actions that, together, build momentum toward transformative, citywide transitions.

## Costa Mesa's Climate-Ready Future

Through implementation of the CAAP strategy, Costa Mesa's future will build upon existing sustainability efforts (see Chapter 1) and further take shape as a cleaner, more efficient, and more connected community, one that reflects the cumulative impact of many coordinated actions driving meaningful, citywide transitions. Over time, these efforts will reshape how residents live, move, and interact with their environment, embedding resilience and sustainability into everyday life.

In this climate-ready future, getting around Costa Mesa will continue to evolve. Streets become quieter and cleaner as EVs replace gasoline-powered cars, supported by an expanding reliable, citywide charging network. At the same time, reliance on driving alone is reduced. Walkable neighborhoods, enhanced transit, and shared mobility options make it easier to choose alternatives, reducing congestion and contributing to a more livable urban environment.



Homes and buildings evolve through steady improvements in efficiency and energy use. Across Costa Mesa, buildings consume less energy, reduce waste, and transition to renewable energy sources. Residents and businesses benefit from efficient spaces that operate with lower costs and emissions. These incremental upgrades collectively drive a broader transformation of the built environment toward long-term sustainability.

Water is used more wisely, building on existing conservation efforts, with homes and landscapes designed for efficiency in a changing climate. Drought-tolerant landscaping,

water reuse systems, and smart irrigation continue to be adopted and become standard, helping the City reduce its environmental impact while strengthening resilience to water scarcity.

Waste is reduced and the amount generated is increasingly managed as a resource, reflecting ongoing progress in recycling and diversion programs. Recycling and composting become standard practices citywide, dramatically reducing what ends up in landfills and minimizing methane emissions.

At the same time, construction, landscaping, and other off-road equipment activities progress to using efficient electric equipment, further reducing emissions and improving local air quality.



Green spaces expand and improve across Costa Mesa, reflecting ongoing investment in nature-based solutions. Trees, parks, and urban landscapes enhance quality of life while capturing carbon and cooling neighborhoods. These improvements, implemented over time, complement emissions reductions while making neighborhoods healthier and more vibrant.

Equally important is the strength of the community itself. Costa Mesa's future builds on our strong community engagement, where residents, especially those most vulnerable to climate impacts, are informed, supported, and actively engaged. Partnerships with local organizations, businesses, and schools help drive innovation and build a shared culture of sustainability. Cooling centers, outreach programs, and new resilience initiatives ensure that the community can withstand and adapt to climate challenges.

The City also plays a critical leadership role by advancing progress within its own operations. By expanding renewable energy solutions, improving efficiency, and embedding sustainable practices, the City demonstrates how incremental changes can collectively drive broader transitions across the community.

Together, these changes and expanded efforts tell the story of a Costa Mesa that is not just reducing GHG emissions but continuing to advance itself as a sustainable, resilient, and

forward-looking community, one where environmental responsibility and quality of life go hand in hand well beyond 2045.

## Tiered Framework

To achieve Costa Mesa's climate-ready future, the roadmap for the CAAP is organized within a tiered framework to ensure a manageable, organized approach. The CAAP's tiered framework includes three main components: sectors, objectives, and actions.

- Sectors are the first tier and reflect the main GHG emission source and adaptation sectors where meaningful change can be made.
- Objectives are the second tier of the implementation framework and are contained within each sector to further define the specific goals.
- Actions are the final tier of the implementation framework and include specific policies, programs, plans, initiatives, or tools that will be deployed to achieve the expressed goals of the related objective and sector.




### Sectors

The CAAP includes eight sectors, which represent the broad categories for enacting climate action and adaptation within Costa Mesa. The sectors largely align with the emission sectors presented in Chapter 2 and provide the focus areas for the CAAP's overall strategy. The eight sectors are as follows, with their letter code noted in parentheses:

- On-Road Transportation (T)
- Energy and Buildings (E)
- Water and Wastewater (W)
- Solid Waste (SW)
- Off-Road Equipment (OR)
- Natural and Urban Lands (NU)
- People and Community (PC)
- Municipal (M)

## Objectives

Objectives set clear, measurable goals for each sector. They define priority climate mitigation and adaptation outcomes, organized around shared approaches to reducing emissions and strengthening resilience. Objectives are implemented through specific, actionable measures, with performance metrics tracked at the measure level where applicable.

## Actions

Each objective includes actions that specify the steps the City will take to implement it. Actions are the discrete tasks that, taken together, deliver the measure and advance the CAAP's goals. As such, actions outline how the City will carry out the work needed to achieve these broader objectives.

At the action level, a range of tools is used to drive change, and the CAAP integrates a balanced mix of action types to achieve its climate goals. These action types include:

| | |
|---|---|
| Education/Marketing | Efforts to increase awareness and address knowledge gaps (e.g., technical assistance programs, marketing materials) |
| Incentives | Tools to encourage voluntary behavior change (e.g., subsidies, recognition, process streamlining) |
| Infrastructure | Upgrades or installation of physical systems or facilities to achieve goals (e.g., transit improvements, renewable energy installations) |
| Investment/Funding | Efforts to secure or allocate financial resources to implement CAAP actions (e.g., pursue grant funding, bonds, special taxes) |
| Partnerships | Coordinated efforts between the City and other parties to achieve collective goals (e.g., school programs, corporate vanshare) |
| Plan/Program | Identification of next steps, or development of a City service, good, or operational change |
| Regulations | Mechanisms to enforce required behavior change (e.g., ordinances, rules) |

Each sector summary page shows the sector's share of the community inventory, where applicable. For sectors that do not contribute to—or were not included in—the community GHG inventory, emissions are not displayed on their summary page.

## Co-Benefits

Each sector summary page identifies the co-benefits associated with its actions. Co-benefits are the positive, indirect outcomes of climate strategies that support broader community goals, such as improved health, environmental quality, mobility, and economic vitality.

Co-benefits were introduced in Chapter 1 and are briefly summarized here for reference. The legend below provides a visual guide to the categories used throughout this chapter; please refer to Chapter 1 for additional detail on each co-benefit category and how they are defined.

**Co-Benefits Legend**




## Ways to Contribute

Each sector sheet highlights ways that community members can contribute on an individual level to achieving the City's GHG emission reduction and resilience goals. While this list is not exhaustive, it includes ideas and inspiration for how residents, businesses, and others can support emissions reduction efforts and help advance the community's CAAP goals.

# On-Road Transportation

**63%**
**of community emissions**

The on-road transportation sector addresses GHG emissions generated from the combustion of fossil fuels, including gasoline, diesel, and natural gas, across passenger vehicles, commercial vehicles, and public transit serving Costa Mesa.

## Objectives

**Accomplished through actions related to:**

**T1** Transition to Electric Vehicles — EV Chargers

**T2** Promote Walking and Biking — Sidewalks and bike lanes

**T3** Reduce Single-Occupancy Vehicle Trips — Rideshare and carpooling

**T4** Increase Public Transportation Use — Improved transit and reliability

**T5** Support Smart Growth — Mixed-use development

## WAYS TO CONTRIBUTE

**Switch to electric:** Consider an EV when replacing your current car to reduce GHG emissions.

**Expand EV access:** Property owners and landlords can support electric travel by installing EV charging stations for tenants.

**Choose cleaner travel options:** Walk, bike, or use public transit whenever possible to reduce emissions and ease traffic congestion.

**Share your ride:** Carpool with coworkers, friends, or neighbors to reduce single-occupancy vehicle trips.

**Explore commute programs:** Check with your employer about carpooling, vanpooling, or shuttle services to make your daily commute more sustainable.

## Co-Benefits

# Energy and Buildings

**31%**
**of community emissions**

The energy and buildings sector addresses GHG emissions associated with natural gas consumption, as well as indirect emissions from electricity use within Costa Mesa.

## Objectives

**Accomplished through actions related to:**

**E1** **Reduce Energy Demand in Buildings**

Building retrofits and weatherization

Passive cooling (cool roofs, cool walls)

**E2** **Decarbonize Building Energy Use**

Transition from gas to electric appliances

**E3** **Increase Carbon-Free Energy Supply**

Install photovoltaics (PV) solar

## WAYS TO CONTRIBUTE

**Upgrade to energy-efficient equipment:** Improve energy performance and lower utility costs by replacing appliances with energy efficient alternatives in your home or business.

**Electrify your space:** Replace gas-powered appliances, such as stoves, water heaters, and furnaces, with efficient electric alternatives.

**Install solar energy systems:** Add rooftop solar panels and consider battery storage to increase energy independence and resilience.

**Choose clean electricity:** Enroll in 100% renewable electricity options, when available, to power your home or business with clean energy.

**Keep buildings cool:** Install cool roofs and reflective wall materials during roof replacements or renovations to reduce heat and improve efficiency.

## Co-Benefits

# Water and Wastewater

**1%**
**of community emissions**

The water and wastewater sector addresses GHG emissions associated with energy use for the extraction, conveyance, and distribution of water to Costa Mesa's residents and businesses, as well as emissions from wastewater treatment processes.

## Objectives

**Accomplished through actions related to:**

### W1 Reduce Water Use

- Drought-tolerant and native landscaping
- Water-efficient fixtures, appliances and irrigation systems

### W2 Increase Water Reuse

- On-site reuse systems and rainwater capture
- Recycled water irrigation systems

## WAYS TO CONTRIBUTE

**Upgrade to efficient fixtures:** Replace older water-using appliances and fixtures with low-flow and high-efficiency alternatives to conserve water and lower utility costs.

**Take advantage of available incentives:** Explore available rebate programs, such as those offered by Mesa Water District, for upgrades such as high-efficiency washers and fixtures, turf replacement, drip irrigation systems, rain barrels, and flow monitors.

**Replace turf with water-wise landscaping:** Transition from traditional turf to native or drought-tolerant plants and incorporate water-efficient landscape design to reduce outdoor water use.

**Consider alternative irrigation sources:** Explore the use of rain barrels and graywater systems to meet landscape irrigation needs.

**Monitor and reduce water use:** Track your water usage to help identify leaks and avoid unnecessary waste.

## Co-Benefits

# Solid Waste

**1%**
of community emissions

The solid waste sector addresses GHG emissions generated from the decomposition of solid waste, including fugitive emissions released as organic materials break down in landfills.

## Objectives

Accomplished through actions related to:

- Reduce and repair materials
- Waste sorting
- Composting
- Recycling

### SW1 Reduce Waste Generation

## WAYS TO CONTRIBUTE

**Sort and compost properly:** Learn and practice proper waste sorting and composting at home, and help build community awareness by sharing these habits with family and neighbors.

**Reduce waste:** Minimize waste by choosing products with less packaging, avoiding single-use items, and only purchasing what is needed.

**Support reuse:** Extend the life of products by donating usable items or using local rental and reuse centers. During renovations, evaluate opportunities to reuse materials where feasible and reiterate to contractors the importance of diverting construction waste.

**Support repair:** Extend the life of products by repairing items (e.g., fixing a bicycle instead of replacing it) or attending repair workshops.

**Participate in food recovery programs:** Businesses can connect surplus food with local recovery organizations.

## Co-Benefits

# Off-Road Equipment

**4%**
**of community emissions**

The off-road equipment sector addresses GHG emissions from combustion of fuel for use of off-road equipment such as landscaping, construction, industrial, light commercial, recreational, and portable equipment.

## Objectives

**Accomplished through actions related to:**

### OR1 Accelerate Zero-Emission Off-Road Equipment Adoption

**Electrification of landscaping, construction, and other off-road equipment**

## WAYS TO CONTRIBUTE

**Upgrade your lawn equipment:** Replace gas- or diesel-powered lawn and garden tools such as mowers, leaf blowers, chainsaws, and trimmers with electric alternatives that reduce GHG emissions and improve air quality. *If contracting these services, have conversations with your landscapers and gardeners about cleaner alternatives.*

**Take advantage of available incentives:** Costa Mesa residents and businesses can explore rebate and incentive programs offered by the South Coast Air Quality Management District to help offset the cost of upgrading to zero-emission landscaping equipment.

## Co-Benefits

# Natural and Urban Lands

The natural and urban lands sector focuses on enhancing carbon sequestration across parks, open spaces, and urban landscapes. This sector advances strategies that capture and store $CO_2$ in vegetation while expanding nature-based solutions to strengthen climate resilience.

## Objectives

Accomplished through actions related to:

Expand green spaces and tree canopy

Restore and enhance soil

### NU1 Increase Carbon Sequestration through Urban Greening

## WAYS TO CONTRIBUTE

**Plant a parkway tree:** Use the City's online request form to participate in the City's Parkway Tree Planting Program to have a tree planted in eligible parkway locations.

**Incorporate nature-based solutions:** Integrate low-impact, nature-based strategies into your home or business, such as green infrastructure or drought-tolerant landscaping, to support climate resilience.

**Get involved in urban greening:** Participate in local greening initiatives such as shade-creating vegetation, urban farms, and rain gardens.

**Learn about compost and mulch use:** Learn and inquire with City representatives about compost and mulch as beneficial soil amendments, material sourcing locations, and other available community resources.

## Co-Benefits

# People and Community

The people and community sector is centered around fostering community benefits, strengthening resilience, and building capacity for CAAP implementation. It highlights the critical role of social and community-focused efforts in advancing climate action, while addressing cross-cutting themes such as regional coordination, responsible consumption, and climate adaptation not covered in other sectors.

## Objectives

**Accomplished through actions related to:**

**PC1 Prepare Community Members for Hazards**

- Educational Resources

**PC2 Limit Hazard Impacts**

- Cooling center amenities
- Resilient urban design (tree canopy, stormwater capture)

**PC3 Build City and Regional Capacity for CAAP Implementation**

- Multi-jurisdictional projects

**PC3 Foster Local Sustainable Practices**

- Sustainable business practices and green workforce development

## WAYS TO CONTRIBUTE

**Learn and enact less carbon-intensive practices at home:** Repair or mend appliances or goods instead of replacing them, line-dry your clothes, eat locally grown produce, and consider environmentally friendly purchasing.

**Eat locally grown produce:** Purchase locally grown food, including from farmers' markets, to support more environmentally friendly farming practices that often use fewer pesticides and less industrial machinery.

**Volunteer with local organizations:** Look into local organizations that align with your passions and see how you can get involved.

**Prepare for emergencies:** Learn about how you can be prepared for emergencies and sign up for emergency alerts on the City's website: https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/emergency-preparedness

## Co-Benefits

# Municipal

The municipal sector addresses GHG emissions related to the facilities, equipment, and vehicles that the City owns and/or operates, as well as employee activities.

## Objectives

| | | Accomplished through actions related to: |
|---|---|---|
| M1 | Reduce City Vehicle Emissions | EV Infrastructure |
| M2 | Reduce City Energy Use | Energy retrofits and electric appliances in City buildings |
| M3 | Zero-Emission Off-Road and Landscaping Equipment | Zero-emission landscape equipment |
| M4 | Reduce City Facility Water Use | Drought-tolerant landscaping on City property |
| M5 | Reduce City-Generated Solid Waste | Food waste reduction for City operations and events |

## WAYS TO CONTRIBUTE

**Use low-carbon commute options:** City employees are encouraged to take advantage of rideshare programs, transit, biking, walking, or telecommuting options, and to participate in City commute trip reduction programs when possible.

**Improve energy use in City facilities:** City employees can turn off lights and equipment when not in use, report maintenance or efficiency issues, and support energy-saving practices in day-to-day operations.

**Advance sustainable operations and purchasing:** City employees can reduce waste by minimizing single-use materials, following sustainable purchasing practices, conserving water, and supporting food waste reduction efforts at City facilities and events.

**Stay informed and provide input:** Community members can stay up to date on City sustainability initiatives and share feedback as programs, projects, and policies are developed and implemented.

## Co-Benefits

## 20 Actions in 2 Years

Achieving Costa Mesa's climate mitigation and adaptation goals requires sustained effort across multiple sectors and timelines. The CAAP outlines a comprehensive set of 106 actions to be implemented between now and 2045, with a significant portion targeted for completion by 2030 to align with near-term emissions reduction milestones.

To focus City resources and accelerate progress, the City is prioritizing an initial set of "20 Actions in 2 Years." This focused approach highlights key early actions that can be kickstarted early on and are achievable in the near term while delivering meaningful GHG reductions and advancing climate resilience. These priority actions reflect the goals of City leadership, opportunities for measurable impact, and foundational steps that support broader implementation of the CAAP over time.

The 20 priority actions to initiate within the first 2 years of CAAP implementation are highlighted in the comprehensive action list in Table 5-1 below. These priority actions will carry momentum forward from CAAP adoption to full realization in 2045.

## Comprehensive Action List

A comprehensive list of the CAAP Sectors, Objectives, and Actions are provided in Table 5.1. Additional details regarding implementation of these actions are included in Appendix E. The "20 actions in 2 years" actions are noted with green shading.

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| **On-Road Transportation** | | |
| T1. Transition to Electric Vehicles | a. Develop a citywide education program that educates residents and businesses on the advantages of EVs. | Education/ Marketing |
| | b. Install EV charging stations at nonresidential public parking areas. | Infrastructure |
| | c. Partner with regional agencies (e.g., Orange County Transportation Authority, South Coast Air Quality Management District) to co-promote EV infrastructure incentives for buildings. | Partnerships |
| | d. Host EV-ready building roundtables with local builders, architects, and contractors to highlight best practices and available funding sources. | Education/ Marketing |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | e. Develop and implement a communitywide zero-emission-vehicle action plan to guide strategic EV charging deployment; assess upgrade needs and grid capacity; evaluate public charging corridors; support the transition of light-, medium-, and heavy-duty fleets; and expand equitable access to zero-emission-vehicle transportation. | Plan/Program |
| | f. Apply for state grants to fund the installation of EV chargers. | Investment/Funding |
| | g. Promote voluntary upgrades of electric plug-in infrastructure for Transport Refrigeration Units and Auxiliary Power Units at loading docks through incentives, technical assistance, pilot projects, and/or partnerships with utilities and regional agencies. | Plan/Program |
| T2. Promote Walking and Biking | a. Explore bicycle parking requirements that incentivize or allow for shared bicycle parking hubs. | Partnerships |
| | b. Implement the Pedestrian Master Plan and Active Transportation Plan to identify pedestrian, bicycle, and roadway circulation gaps and opportunities; update existing plans and the zoning code as needed to support active transportation, including tiered bike facilities and amenities on private property based on development scale. | Infrastructure |
| | c. Continue to explore feasibility and identification of corridors with excess roadway capacity, such as South Coast Drive, and consider reducing the number of vehicle lanes to improve safety and provide space for bicyclists, pedestrians, transit amenities, landscaping, or parklets. | Plan/Program |
| T3. Reduce Single-Occupancy Vehicle Trips | a. Develop voluntary citywide commute trip reduction program for employers to opt in that provides active travel options to/from work (e.g., carpool, transit, walking/biking). | Plan/Program |
| | b. Via marketing campaigns building on current efforts, continue to educate the community on travel options for commuters to reduce commute trips. | Education/ Marketing |
| | c. Develop program to facilitate ridesharing/ carpooling for employees. | Plan/Program |
| | d. Review and explore reducing parking minimums, consistent with AB 2097, while maintaining City flexibility to manage parking impacts through tools such as shared parking, valet parking, and other parking management strategies. | Regulations |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | e. Offer impact-fee credits for multifamily residential projects that voluntarily unbundle residential parking costs from property costs. | Incentives |
| T4. Increase Public Transportation Use | a. Develop program for residents and/or employees to receive subsidized/discounted transit passes. | Plan/Program |
| | b. Expand the Let's Go Costa Mesa voucher program to support local transit services. | Plan/Program |
| | c. Continue working with Orange County Transit Authority to monitor ridership and focus available resources for efficient frequency of transit service. | Partnerships |
| | d. Continue to construct roadway improvements to improve transit service and reliability, including boarding islands, queue jump lanes, transit signal priority, dedicated transit lanes, business access or transit lanes, and enhanced bus stops, and work with Orange County Transit Authority to pursue support of capital projects, where feasible. | Infrastructure |
| | e. Work with the Newport–Mesa Unified School District to enhance and coordinate school bus programs within the school districts serving Costa Mesa, as feasible, with a focus on providing service for middle and high school students living in low-income neighborhoods. | Partnerships |
| T5. Support Smart Growth | a. Implement rezoning efforts, such as the Neighborhoods Where We All Belong plan, that allow for increased residential and job density. | Regulations |
| | b. Explore potential incentives for mixed-use development within 0.5 miles of major transit stations and priority transit-oriented development corridors, especially the Fairview Road corridor, by examining benefits such as expedited permitting, height incentives, density/floor area ratio bonuses, and targeted infrastructure improvements that support walkability and transit access. | Incentives |
| | c. Continue to implement the City's Inclusionary Housing Ordinance, which incentivizes and/or requires the inclusion of below-market-rate or affordable units. | Incentives |
| **Energy and Buildings** | | |
| E1. Reduce Energy Demand in Buildings | a. Support energy audits for homes and businesses through partnership with the Green Business Program, providing resources, technical assistance, and targeted social media outreach and collateral. | Education/ Marketing |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | b. Partner with utilities to connect property owners with available rebates and discounted energy-efficient appliances, supported by targeted social media outreach and collateral. | Partnerships |
| | c. Seek grants to offer incentives for passive cooling and heating systems (such as cool roofs and walls) during roof replacements or renovations. | Investment/Funding |
| E2. Decarbonize Building Energy Use | a. Explore providing incentives for projects that commit to installing all zero-emission appliances, such as expedited plan review (e.g., accelerated 10-day timeline). | Incentives |
| | b. Promote and facilitate existing rebate vouchers for gas-to-electric swaps during permitted remodels. | Incentives |
| | c. Provide education and technical assistance on gas-to-electric appliance swaps, highlighting economic and health benefits and addressing common concerns through demonstrations. | Education/ Marketing |
| | d. Develop and implement a Green Builder Program to highlight and honor green builders in the community. | Plan/Program |
| E3. Increase Carbon-Free Energy Supply | a. Offer voluntary development incentives (e.g., fee reductions, dedicated staff review, expedited processing) for projects that incorporate on-site renewable energy systems capable of producing at least 95% of total annual load. | Incentives |
| | b. Provide education and technical assistance for paired solar and battery systems. | Education/ Marketing |
| | c. Consider joining Orange County Power Authority, or other clean energy provider or program, and launch a voluntary clean energy enrollment support program that uses targeted outreach, community partnerships, and incentives such as bill-savings comparisons, enrollment assistance, and recognition or rebate-style perks to encourage households and businesses to opt into the 100% renewable energy tier. | Partnerships |
| | d. Identify areas where grid infrastructure upgrades are needed to meet the City's existing and future decarbonization, transportation, and building electrification needs in coordination with Southern California Edison and other potential future electric utilities. | Infrastructure |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| **Water and Wastewater** | | |
| W1. Reduce Water Use | a. Continue to establish drought-tolerant landscape demonstration sites in public rights-of-way. Promote these practices with an educational campaign using virtual tours to showcase locally appropriate designs, plant combinations, and irrigation best practices. | Plan/Program |
| | b. Promote existing Mesa Water District (rebates for water-efficient appliances across new and existing development by training City staff and using City communication channels, including the website, social media, utility bills, and permitting touchpoints, to direct residents and developers to available Mesa Water District programs. | Education/ Marketing |
| | c. Develop and promote a voluntary drought-tolerant landscape resource program that provides design templates, native plant palettes, and irrigation best practice guidance tailored to the City's climate to support residents, landlords, and businesses in transitioning to low-water landscapes. | Plan/Program |
| W2. Increase Water Reuse | a. Educate residents on the benefits and practical applications of rain barrels and gray-water systems for landscape irrigation through hands-on workshops, step-by-step installation guides, and demonstrations of appropriate plants, irrigation layouts, maintenance practices, and pest management. | Education/ Marketing |
| | b. Promote rebates or provide financial assistance for homeowners to install rain barrels and gray-water systems by offering rebates for system design and installation. | Investment/Funding |
| | c. Evaluate feasibility of recycled water for residential and commercial irrigation in partnership with Mesa Water District. | Plan/Program |
| **Solid Waste** | | |
| SW1. Reduce Waste Generation | a. Maintain construction and demolition waste diversion per CALGreen. During annual budgeting, consider anticipated development and adjust staffing and/or cross-train staff accordingly to respond to increased need for construction and demolition inspections. | Incentives |
| | b. Develop a facilitation program that connects local reuse yards and nonprofits with contractors interested in building deconstruction, helping coordinate the collection, sorting, and resale of salvaged materials. | Plan/Program |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | c. Evaluate the potential to offer cost-effective bulk composting to residents. | Incentives |
| | d. As part of Parks and Community Services afterschool program, teach students proper waste sorting and composting. | Partnerships |
| | e. In conjunction with franchise waste haulers, continue to provide multiunit and commercial properties with clear waste sorting guidance. | Education/ Marketing |
| | f. Build partnerships and assess the feasibility of an urban wood-reuse program. | Partnerships |
| | g. Share information with the community, including through the City's website, on proper e-waste disposal, reuse and repair resources, donation and material exchange programs, community swap events, and other waste reduction programs and resources, as available. | Education/ Marketing |
| **Off-Road Equipment** | | |
| OR1. Accelerate Zero-Emission Off-Road Equipment Adoption | a. Promote the transition from gas- and diesel-powered landscaping equipment to zero-emission models among residents and businesses by providing resources on the City's website, including information about the South Coast Air Quality Management District Residential Electric Lawn Mower Rebate Program and the Commercial Electric Lawn and Garden Equipment Exchange Program. | Education/ Marketing |
| | b. Support adoption of zero-emission off-road equipment during construction by promoting contractors who have zero-emission off-road equipment within their fleet. | Incentives |
| | c. Establish a voluntary zero-emission off-road equipment transition program that helps contractors and landscaping companies evaluate electric equipment, access available incentives, and participate in field testing or demonstration events. | Plan/Program |
| **Natural and Urban Lands** | | |
| NU1. Increase Carbon Sequestration through Urban Greening | a. Build upon and implement the City's Urban Canopy and Land Assessment to encourage equitable tree canopy expansions and native plantings. | Infrastructure |
| | b. Educate the community on carbon sequestration and on native and drought-tolerant landscaping through informative materials and exposure to ongoing campaigns and organizations. | Education/ Marketing |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | c. Continue to offer the parkway tree planting program. | Plan/Program |
| | d. Promote Low Impact Development[10] and nature-based solutions such as bioswales, shaded parking, permeable surfaces, and green roofs. | Education/ Marketing |
| | e. Partner with schools and community organizations to implement green schoolyards, urban farms, rain gardens, and tree plantings. Provide urban greening education as part of Parks and Community Services after-school programs. | Partnerships |
| | f. Consider demand for additional community garden plots. If new plots are desired, prioritize sites in disadvantaged neighborhoods. | Infrastructure |
| | g. Establish a voluntary urban greening incentive program that offers rebates or grants for tree planting, shade-creating vegetation, and climate-appropriate landscaping on private property, prioritizing multifamily residences and heat-vulnerable neighborhoods. | Incentives |
| | h. Amend the municipal code to limit the removal of mature trees and incorporate tree and landscaping replacement standards. | Regulations |
| **People and Community** | | |
| PC1. Prepare Community Members for Hazards | a. Educate community members about the health risks of extreme heat and wildfire smoke and the resources available during these hazard events. Use communication methods, such as social media, that reach a broad audience in addition to targeted campaigns that reach older adults and people experiencing homelessness, such as handouts at key locations like the Senior Center or Bridge Shelter. | Education/ Marketing |
| | b. Share resources and facilitate discussions with local landscaping and construction businesses and outdoor sports leagues to prevent heat illness. | Education/ Marketing |
| | c. Continue to educate property owners on Fire Hazard Severity Zone requirements and regulations. | Education/ Marketing |
| | d. Promote agency cost assistance programs for utilities, air purifiers, or similar programs as they become available. | Education/ Marketing |

[10] *Low Impact Development is an approach to site design and stormwater management that mimics natural hydrology by infiltrating, filtering, storing, evaporating, and detaining runoff close to where it falls. Unlike traditional systems that convey runoff away, Low Impact Development reduces runoff volume and improves water quality by maintaining near-pre-development conditions.*

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| PC2. Limit Hazard Impacts | a. Develop facility plans to increase the accessibility of public spaces as cooling centers when necessary. Consider the potential for pre-planned programming, expanded hours, and temporary spaces for pets. | Plan/Program |
| | b. Consider the incorporation of recreational water features, such as splash pads, during park master planning and infrastructure updates. | Infrastructure |
| | c. Continue to conduct feasibility assessments for solar and battery backup systems at key critical facilities within the City, prioritizing public facilities that do not already have backup power, such as the City community centers and Senior Center. | Infrastructure |
| | d. Continue to regularly review cool and permeable pavement technology effectiveness and consider incorporating pilot programs into City maintenance and capital improvement plan programs. | Infrastructure |
| | e. Continue to coordinate with the Costa Mesa Fire Department for development plan review. | Plan/Program |
| | f. Continue to conduct regular vegetation management activities to reduce fire hazard risks in parks, open spaces, rights-of-way, and other areas where vegetation could become fuel for fires. | Infrastructure |
| | g. Pre-plan for post-wildfire debris flow potential. | Plan/Program |
| PC3. Build City and Regional Capacity for CAAP Implementation | a. Hold quarterly working meetings with City staff to facilitate CAAP implementation. | Investment/Funding |
| | b. Include staff time in annual budgets for CAAP funding pursuits. | Investment/Funding |
| | c. Prioritize grant pursuits that benefit low-income households, small local businesses, and the City's disadvantaged communities. | Investment/Funding |
| | d. Coordinate with the following agencies on dam operational planning and related flood risks:<br>▪ U.S. Army Corps of Engineers, Los Angeles District<br>▪ Irvine Ranch Water District<br>▪ County of Orange | Partnerships |
| | e. Communicate with the County of Orange and City of Newport Beach during their sea-level-rise planning and mitigation efforts and contribute public comments when appropriate. | Partnerships |
| | f. Continue to provide support and planning input for the City's water and energy providers' efforts to provide safe, cost-effective, and reliable water and energy. | Partnerships |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | g. Participate in discussions with the Southern California Association of Governments and the Orange County Council of Governments regarding regional climate migration planning. | Partnerships |
| PC4. Foster Local Sustainable Practices | a. Market less-carbon-intensive practices and resources, including natural and sustainably sourced building materials (when feasible), to residents and promote responsible consumption. | Education/ Marketing |
| | b. Reassess the City's Green Business Program, outlining the existing process and benefits; considering adjustments to the marketing, certification process, or incentives offered; weighing the benefits of possible expansions to the program; and identifying staff and budgetary needs. | Incentives |
| | c. Assess the feasibility and desire for cooling centers hosted by businesses and local organizations. Feasibility considerations should include legal implications, existing City programs that could incorporate this initiative (such as the Green Business Program), and incentives for participating organizations. If determined to be feasible, develop the initiative. | Plan/Program |
| | d. Engage with education providers such as Coastline ROP and Newport–Mesa Unified School District to advance local green industry workforce opportunities. | Partnerships |
| | e. Engage local non-governmental organizations and compile a list relative to their interests and capabilities on a variety of topics related to climate action and adaptation, such as distributing related news or grant opportunities, or participating in or facilitating volunteer events such as cleanups or tree plantings. | Partnerships |
| **Municipal** | | |
| M1. Reduce City Vehicle Emissions | a. Develop and implement a municipal fleet zero-emission transition plan that evaluates the implications for vehicle transition and prioritizes purchasing, phasing, EV charging infrastructure appropriately based on feasibility and availability, and considers other electric vehicles like e-bikes and e-scooters. | Plan/Program |
| | b. Transition the City's non-emergency light-duty gasoline- and diesel-powered fleet to EVs, with exceptions for emergency and life safety vehicles. | Infrastructure |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| | c. Install EV charging stations at City facilities to facilitate the use of City-owned EVs. | Infrastructure |
| | d. Implement a voluntary commute trip reduction program, including providing commute trip reduction marketing materials to City employees. | Plan/Program |
| | e. Continue to promote employee use of the Let's Go Costa Mesa rideshare service and consider expansions or regional partnerships. | Plan/Program |
| | f. Implement an employee EV incentive program. | Plan/Program |
| M2. Reduce City Energy Use | a. Continue to conduct energy audits of existing City buildings and facilities at regular intervals to determine energy-saving opportunities. | Plan/Program |
| | b. Implement energy-efficiency retrofits of existing City-owned buildings and facilities, based on the results of energy audits. | Infrastructure |
| | c. Require new City facilities to be all-electric (i.e., no natural gas) where feasible. Coordinate with the Office of Emergency Management to incorporate fail-safe measures for electrical outages, such as backup power. | Infrastructure |
| | d. During major redevelopment of existing City-owned buildings, retrofit facilities to remove natural gas and install all-electric end uses (where feasible). Coordinate with the Office of Emergency Management to incorporate fail-safe measures for electrical outages, such as backup power. | Regulations |
| | e. Install solar PV systems as shade structures at City-owned parking lots and facilities. | Infrastructure |
| | f. Include solar panel installation and cool roofs in the design of all new City-owned buildings, where feasible. | Infrastructure |
| | g. During roof replacements, retrofit City-owned buildings and facilities to include PV solar and cool roofs where feasible. | Regulations |
| | h. Install battery energy storage systems at key City facilities to supplement PV solar. | Infrastructure |
| | i. Pursue participation in Orange County Power Authority or another available Community Choice Aggregator to enroll municipal energy accounts in a 100%-renewable-energy procurement program. | Partnerships |
| | j. Develop a microgrid feasibility plan for City-owned emergency response and critical facilities. | Plan/Program |

Table 5-1. Sectors, Objectives, and Actions

| Objective | Action | Type |
|---|---|---|
| M3. Zero-Emission Off-Road and Landscaping Equipment | a. Transition City-owned landscaping equipment to zero-emission, as feasible. Continue to contract with landscape maintenance contractors who use zero-emission equipment, as feasible. | Infrastructure |
| | b. At replacement and as commercially available, transition City-owned and -contracted fossil-fueled off-road equipment used during construction or operation to zero-emission. | Infrastructure |
| | c. Accelerate replacement of diesel- or natural-gas-powered backup generators at City facilities to zero-emission options. | Infrastructure |
| M4. Reduce City Facility Water Use | a. Continue to require use of water-efficient appliances in new City buildings. | Regulations |
| | b. Upgrade existing City buildings with water-efficient appliances during renovations or when funding allows. | Infrastructure |
| | c. When funding allows, replace non-programmed turf at City-owned buildings and facilities with native, drought-tolerant landscaping. Consider creative opportunities for turf replacement, such as volunteer events and local organization partnerships. | Infrastructure |
| | d. When available, pursue grants to install gray-water systems at City-owned buildings and facilities. | Infrastructure |
| M5. Reduce City-Generated Solid Waste | a. Develop guidelines for food waste prevention planning for City food service operations and large events at City facilities. | Plan/Program |
| | b. Evaluate opportunities to revise and expand the City's Sustainable Purchasing Policy to minimize waste, including the use of single-use plastics, paper, and other disposable or nonrecyclable materials. | Plan/Program |

## Achieving Climate Goals

The City will work to reduce GHG emissions in line with State targets while enhancing resilience to climate change. Costa Mesa has established target GHG emissions levels of 553,029 MT $CO_2e$ by 2030 and 114,190 MT $CO_2e$ by 2045, which requires achieving a local reduction of 154,711 MT $CO_2e$ by 2030 and 198,642 MT $CO_2e$ by 2030 by 2045. Progress toward these goals will be driven by six key sectors: On-Road Transportation, Energy and Buildings, Off-Road Equipment, Water and Wastewater, Solid Waste, and Municipal Operations. Efforts in the

Natural and Urban Lands sector will complement these reductions by increasing carbon sequestration—capturing and storing $CO_2$ in vegetation and soils.

Achieving the necessary reductions to reach the State-aligned targets will require a significant and sustained effort. Although many of the actions included in the CAAP strategy are non-regulatory, they are supported by programs, incentives, and resources designed to encourage behavior change. Success will depend on strong community participation, including residents and businesses choosing to adopt more sustainable practices and behaviors over time.

With sustained effort and ongoing evaluation to ensure actions are achieving their intended outcomes and supporting behavioral change (i.e., all performance metrics are achieved), energy and building strategies can deliver approximately 41% of total emissions reductions needed in 2030, while on-road transportation contributes around 53% of 2030 reductions. Looking ahead to 2045, as the State's electricity grid achieves full reliance on renewable energy, transportation-related reductions will continue to be the dominant contributor, representing about 58% of total reductions. Energy-focused measures will remain important, accounting for roughly 26% of reductions, primarily through the transition away from natural gas. Table 5-2 summarizes the City's community-wide objectives, underlying performance assumptions, and corresponding GHG reduction outcomes for 2030 and 2045 for actions that result in quantifiable reductions.[11] As shown, the City is positioned to meet its 2030 and 2045 GHG reduction targets, provided all performance metrics are achieved. Additional details are provided in Appendix D.

Table 5-2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| On-Road Transportation Sector | | | | | |
| T1: Transition to Electric Vehicles* | Targeted BEV/PHEV population % | 25% | 30% | 84,970 | 115,216 |

[11] *Some actions were not quantified in due to limitations in data availability or calculation methodologies. However, future improvements in data and methods may enable the quantification of these actions at a later date.*

Table 5-2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| T2: Promote Walking and Biking* | Provide secure bike parking and repair stations | At all new workplaces | At all new workplaces | 99 | 64 |
| | Fill sidewalk gap identified in Pedestrian Master Plan Opportunity Zones | 25% of sidewalk gaps | 50% of sidewalk gaps | | |
| | Fill proposed bicycle facility length identified in Active Transportation Plan | 15% of bicycle facility length | 50% of bicycle facility length | | |
| T3: Reduce Single-Occupancy Vehicle Trips | Provide voluntary commute trip reduction programs for employees in City | 2% of employees in City | 2% employees in City | 258 | 114 |
| | Implement commute trip reduction marketing | 2% of employees in City | 2% of employees in City | | |
| | Provide rideshare program for employees in City | 2% of employees in City | 2% of employees in City | | |
| T4: Increase Public Transportation Use* | Implement subsidized transit voucher | For 2.5% of residents in City | For 2.5% of residents in City | 398 | 158 |

Table 5-2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| | Increase school bus neighborhood coverage | By 10% | By 10% | | |
| | Increase transit route coverage in Costa Mesa | By 10% (6.2 miles) | By 10% (6.2 miles) | | |
| | Increase transit frequency | By 20% across 50% of routes/ service hours | By 20% across 50% of routes/ service hours | | |
| | Implement transit-supportive roadway improvements | On 15% of transit routes in Costa Mesa | On 15% of transit routes in Costa Mesa | | |
| T5: Support Smart Growth | Reductions accounted for in ABAU forecasted emissions | | | | |
| **Energy and the Built Environment Sector** | | | | | |
| E1: Reduce Energy Demand in Buildings | % of households replacing appliances with ENERGY STAR | 50% | — | 1,633 | — |
| | % of households that install cool roofs | 50% single family<br>25% multifamily | — | | |
| E2: Decarbonize Building Energy Use* | % of new development all-electric | 20% | 30% | 25,331 | 52,655 |
| | % of existing development all-electric | 20% | 30% | | |

## Table 5-2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| E3: Increase Carbon-Free Energy Supply* | % of available existing roof space installed with PV solar | 10% | 30% | 33 | — |
| | % of accounts enrolled in 100% renewable choice plan | 75% single-family<br>50% multifamily<br>30% commercial<br>30% industrial | — | 38,893 | — |
| **Off-Road Equipment Sector** | | | | | |
| OR1: Accelerate Zero-Emission Off-Road Equipment Adoption* | % of equipment electrified | 50% | 60% | 3,692 | 24,742 |
| **Water and Wastewater Sector** | | | | | |
| W1: Reduce Water Use | % of development that install low-flow appliances | 50% | — | 1,253 | — |
| W2: Increase Water Reuse | Supporting measure | | | | |
| **Solid Waste Sector** | | | | | |
| SW1: Reduce Waste Generation | % reduction in waste to landfill | 25% | 50% | 2,697 | 5,448 |
| **Natural and Urban Lands Sector** | | | | | |
| NU1: Increase Carbon Sequestration through Urban Greening* | Number of trees planted | 1,940 | 7,760 | 63 | 317 |
| | | | Total Reductions[a] | 159,173 | 198,646 |

Table 5-2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| | | | Target Reductions | 154,711 | 198,642 |
| | | | Remaining Gap | −4,462 | −5 |

*Note: GHG = greenhouse gas; MT $CO_2e$ = metric tons carbon dioxide equivalent; BEV = battery electric vehicles; PHEV = plug-in hybrid electric vehicles; ABAU = adjusted business-as-usual, PV = photovoltaic.*
*[a] Because multiple VMT reduction measures may influence the same travel behavior, the total reduction value accounts for overlapping effects and is less than the absolute sum of the individual action reductions.*
** Objectives marked with an asterisk include one or more actions that are part of the "20 Actions in Two Years" implementation phase; therefore, a portion of the associated emissions reductions may be realized in the near term.*

Adaptation efforts are supported by the People and Community sector, which emphasizes community well-being and resilience through targeted programs, resources, and outreach. This includes engaging a broad range of stakeholders and strengthening partnerships to expand access to sustainable practices. Key adaptation initiatives include enhancing cooling center programs and piloting innovative, locally driven solutions. These efforts are further supported by cross-cutting actions implemented across all sectors to advance both mitigation and resilience outcomes.

## Municipal Reductions

As explained in Chapter 2, a separate municipal emissions inventory was developed to provide a more detailed understanding of the GHG emissions from City operations. Because municipal emissions are a subset of the communitywide inventory, they are already included in the communitywide emissions total.

Nonetheless, to highlight specific municipal-related GHG emissions reductions, Table 5-3 presents a summary of the City's municipal objectives, underlying performance assumptions, and corresponding GHG reduction outcomes for 2030 and 2045. As shown in Table 5-3, under the assumed achievement levels for each objective, Costa Mesa is projected to achieve the municipal GHG emissions reductions of 911 MT $CO_2e$ in 2030 and 1,516 MT $CO_2e$ in 2045, which will achieve the State-aligned targets.

### Table 5-3. Municipal Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| M1: Reduce City Vehicle Emissions* | Replace fleet vehicles with EVs | 31 vehicles | 61 vehicles | 341 | 1,130 |
| | Implement a voluntary commute trip reduction program | All employees | All employees | | |
| | Employees purchase EVs | 5% | 20% | | |
| M2: Reduce City Energy Use* | Energy retrofits, energy use reductions | 5% | 20% | 1,045 | 345 |
| | Buildings all-electric | All new buildings, 10% of existing | All new buildings, all existing | | |
| | PV solar shade structures | 800 kW capacity | — | | |
| | PV solar roof top installation | 800 kW capacity new buildings,<br>600 kW capacity existing buildings | — | | |
| | Battery energy storage system installation | 4,800 kW capacity | — | | |
| | Enrollment in 100% renewable choice plan | All City accounts | — | | |

Table 5-3. Municipal Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| M3: Zero-Emissions Off-Road and Landscaping Equipment | % of equipment electrified | — | All off-road equipment | — | 37 |
| M4: Reduce City Facility Water Use | Upgrade existing City buildings with water-efficient appliances | All buildings or as funding allows | All buildings or as funding allows | 20 | 16 |
| M5: Reduce City-Generated Solid Waste | Supporting measure | | | | |
| | | | Total Reductions | 1,408 | 1,528 |
| | | | Target Reductions | 911 | 1,516 |
| | | | Remaining Gap | -497 | -12 |

*Note: GHG = greenhouse gas; MT $CO_2e$ = metric tons carbon dioxide equivalent; EV = electric vehicle; PV = photovoltaic; kW = kilowatt.*
** Objectives marked with an asterisk include one or more actions that are part of the "20 Actions in Two Years" implementation phase; therefore, a portion of the associated emissions reductions may be realized in the near term.*

## Achieving Carbon Neutrality

California has established statewide goals of achieving net-zero GHG emissions and reducing anthropogenic GHG emissions at least 85% below 1990 levels by 2045, as established under AB 1279. The California climate strategy recognizes that achieving net-zero GHG emissions, often referred to as carbon neutrality, will require a combination of substantial reductions in anthropogenic GHG emissions and carbon removal or sequestration activities.

The City's 2045 GHG reduction target is aligned with California's climate framework established under AB 1279 and represents Costa Mesa's appropriate, local contribution to achieve the State's carbon neutrality goal. Consistent with the CARB Scoping Plan, local climate action targets should reflect what each jurisdiction can control, the emissions sources it can address, and the actions it can take to reduce emissions. Because carbon removal and sequestration efforts are largely outside the City's direct control and depend on evolving statewide guidance and emerging technologies, Costa Mesa's target focuses on achieving a reduction

in communitywide anthropogenic emissions that aligns with AB 1279 (85% below 1990 levels) goal by 2045. This approach is consistent with the State's emission reduction goals and helps ensure the City does its part to support California's goal of achieving carbon neutrality.

As state policies, methodologies, and technologies for carbon removal and sequestration continue to evolve, the City can evaluate additional opportunities through future CAAP updates.

## Assembly Bill 39

In October 2025, the State of California enacted AB 39, the Local Electrification Planning Act. The law requires jurisdictions with populations greater than 75,000 to adopt a local electrification plan or incorporate equivalent components into their general plan. These plans must include locally based goals, objectives, policies, and feasible implementation measures that, among other elements, identify opportunities to expand EV charging infrastructure, support building electrification, and prioritize equitable investments in zero-emission technologies for disadvantaged communities, low-income households, and small businesses. Jurisdictions must adopt the required plan or general plan updates by January 1, 2030.

While the CAAP is not intended to fully satisfy all requirements of AB 39, it includes a suite of relevant objectives and actions. These actions can be further developed, expanded, and refined to meet the more detailed and specific requirements of AB 39. Select actions within the following objectives position the City to support and advance future compliance with AB 39:

- T1. Transition to Electric Vehicles
- E2. Decarbonize Building Energy Use
- E3. Increase Carbon-Free Energy Supply
- M1. Reduce City Vehicle Emissions
- M2. Reduce City Energy Use

INTENTIONALLY LEFT BLANK

CHAPTER 6

# Implementation and Monitoring

# 6 Implementation and Monitoring

Clearly defined implementation procedures and monitoring metrics are essential to ensure accountability and enable adjustments as the plan evolves. Accordingly, Chapter 6 presents the framework for implementing and monitoring the CAAP.

Successful implementation of the CAAP relies on the following key components:

- Clearly defined roles and responsibilities
- Identification of funding opportunities
- A timeline with established milestones
- Performance indicators to track progress
- Ongoing community engagement

**CAAP IMPLEMENTATION**

Implementation refers to the process of carrying out the actions identified in Chapter 5.

The core elements of effective implementation are described below with additional detail provided in Appendix E.

## Roles and Responsibilities

### City Departments

The following key departments will lead implementation of the individual CAAP actions:

- The ***City Manager's Office*** will lead the coordination of overall CAAP implementation and monitoring of progress. The Energy and Sustainability Services Manager within the City Manager's Office will be the CAAP point of contact.
- The *Community Development Department* will lead actions related to permitting, zoning, and development standards and will support workforce development and job creation initiatives. The Planning Division will ensure that CAAP actions are integrated into new development, as appropriate.
- *Public Works* will lead a wide range of actions, including those involving modifications to the City's public right-of-way, infrastructure improvements, equipment installation, water and solid waste systems, and urban forestry programs.
- The *Finance Department* will provide funding, budgeting, and financial oversight for CAAP initiatives.
- *Parks and Community Services* will support actions related to community programs and events and will be involved with projects in City parks and community centers.

- *Communications and Marketing* will lead outreach and promotional efforts associated with CAAP implementation and will coordinate with applicable departments on educational resources.
- The *Office of Emergency Management* will support long-term planning and coordination efforts focused on emergency preparedness and adaptation to climate change.
- *Fire and Rescue* will focus on response- and operations-based actions addressing the immediate impacts of climate-related events and will lead or coordinate on actions addressing wildfire.
- The *Police Department* will support public safety and emergency response during climate-related incidents.
- *Information Technology* will provide the technological infrastructure necessary for data collection, monitoring, and communication to support CAAP implementation.

While the City Manager's Office will lead CAAP implementation, success will depend on strong collaboration across all departments and a shared sense of responsibility.



## Community Partners

In addition to City departments and leadership, successful implementation of the CAAP will require active participation and collaboration from community partners including residents, businesses, community-based organizations, schools, and regional agencies. Many CAAP actions depend on voluntary behavior changes to reduce GHG emissions and enhance community resilience, necessitating meaningful involvement from residents and business owners. These individual efforts will contribute incrementally to achieving CAAP goals while encouraging broader community participation.

Local community-based organizations and educational institutions can further support implementation through outreach, education, and marketing initiatives, offering subject matter expertise and expanding the reach of community engagement efforts.

### BUILDING PARTNERSHIPS

Local and regional partnerships can expand capacity, enabling the City to reach more community members and achieve greater impact.

Regional agencies play a critical role in supporting CAAP implementation through partnerships that promote efficient resource use, coordinated planning, enhanced engagement, and strengthened funding opportunities. Further, several topics, such as climate hazards like flood risk, span beyond the boundaries of Costa Mesa and require multi-jurisdictional collaboration for actions to be most effective.






## Cost-Effectiveness Analysis

The City prepared a cost-effectiveness analysis to evaluate the estimated costs and benefits to Costa Mesa residents, businesses, community organizations, and government agencies associated with implementing select CAAP actions. The analysis provides information to help prioritize CAAP actions and pursue State, Federal, and regional funding opportunities to support implementation.

The analysis included 13 actions across the On-Road Transportation, Energy and Building, Natural and Urban Lands, Off-Road Equipment, and Municipal sectors. The actions were selected based on their quantitative GHG reduction or carbon sequestration potential. Each action was assessed based on its estimated cost per MT of GHG emissions reduced or carbon sequestered, allowing for comparison across sectors and providing insight into the relative costs and benefits.

The cost-effectiveness analysis is intended to inform implementation priorities, support grant and funding applications, and provide decision makers with a better understanding of the relative economic performance of key CAAP actions. Because costs, technology performance, energy prices, funding availability, and regulatory conditions will continue to evolve, the findings are used as a planning-level tool to support early implementation rather than as definitive estimates. Additional information regarding methodology, assumptions, and results is provided in Appendix F, Cost-Effectiveness Analysis.

## Funding Opportunities

Identifying funding sources for Costa Mesa's CAAP actions is essential to successful implementation. Although many actions are expected to yield long-term economic benefits, the upfront costs can be substantial and pose challenges for the City and its implementing partners, including residents and local businesses, without access to external funding.

A range of external funding opportunities is available to support climate-related initiatives, including Federal, State, regional, and local programs. However, funding availability and program requirements are continually evolving and can change significantly from year to year. As such, it is important that City staff regularly monitor these sources to ensure the most current and advantageous funding opportunities are pursued in support of CAAP implementation. Key funding sources are identified in Appendix E and Appendix F.

# Timeline

Establishing a clear timeline is essential to the successful implementation of the Costa Mesa CAAP. Because the City uses the CAAP as a roadmap to achieve State-aligned GHG reduction targets for 2030 and 2045, strategically sequencing actions over time helps to translate long-term goals into measurable outcomes. To support this, the CAAP is implemented in phases, with performance metrics used to monitor progress and measure success over time.

## Phasing

Given the scale and complexity of the actions required to meet the City's climate goals, implementation will follow a deliberate, phased approach. Strategically sequencing actions helps ensure efficient use of City resources while maximizing overall impact. Phasing considerations include factors such as GHG reduction potential, cost-effectiveness, State mandates and regulations, feasibility, and readiness.

CAAP actions are grouped into four implementation phases, as described below:

- Ongoing: The "ongoing" phase includes actions that have already been implemented or are underway at the time of CAAP adoption. These efforts will be maintained, expanded, or enhanced as part of ongoing implementation.
- Phase 1 (20 actions in 2 years): Phase 1 actions reflect City priorities and establish the foundation for successful implementation within a short timeframe. Many of these actions are momentum-building and provide strategic planning to focus resources, facilitate funding, or build capacity to accelerate meaningful progress.
- Phase 2 (by 2030): Phase 2 actions are high-impact measures that are feasible with existing technologies, resources, and institutional capacity. Phase 2 actions often expand on the policies, infrastructure, and partnerships established in Phase 1. Many of these actions offer scalable benefits that can be built on to achieve greater reductions beyond 2030.
- Phase 3 (by 2045): Phase 3 actions reflect the City's long-term vision and commitment to climate innovation. At the time of CAAP adoption, these efforts may be less feasible due to emerging technologies, evolving regulatory frameworks, or limited funding. Alternatively, these actions may be less effective at reducing emissions or result in fewer co-benefits. While planning and research may begin in earlier phases, full implementation is expected to occur later in the timeline.

## Performance Indicators

Performance indicators are included for CAAP actions, where appropriate, to provide clear guidance and measurable benchmarks for implementation. In most cases, indicators are established for the target years of 2030 and 2045, enabling lead City departments to identify key milestones necessary to achieve each action within those timeframes.

Performance indicators are tied to quantifiable GHG emission reductions where feasible, allowing for objective evaluation of progress and outcomes. These indicators are intentionally designed to be straightforward and easy to track, minimizing administrative burden on City staff while promoting transparency, accountability, and consistent progress monitoring.

# Monitoring

CAAP monitoring refers to the broader, ongoing process that evaluates the cumulative success of the individual actions. This involves tracking progress, evaluating outcomes, and making adjustments when necessary to ensure that the implemented actions are collectively achieving the plan's fundamental goals. Monitoring will be the responsibility of the City Manager's Office Energy and Sustainability Services Division, with regular input from the lead implementing City departments.

City staff will use an implementation matrix to track the progress of individual CAAP actions. The implementation matrix is a comprehensive table that includes all relevant components needed for the lead departments to implement their actions (see Appendix E for the full implementation matrix). Relevant implementation components provided in the matrix include the following:

- Sector
- Objective
- Action
- Action Type
- Lead City Department
- Partners
- Phase
- Performance Indicators
- Funding Opportunities

The matrix serves as a roadmap that can easily be referenced and monitored to assess CAAP progress.

## Ongoing Community Engagement

Ongoing community engagement is critical to the successful implementation of the CAAP.



Several CAAP actions focus on increasing education and awareness of mitigation and adaptation programs. Continued outreach efforts will include targeted marketing to promote available incentives, rebates, and funding opportunities for residents and businesses undertaking voluntary actions. These educational initiatives and promotional campaigns will occur throughout implementation, raising awareness of key topics while also serving as ongoing touchpoints with the community. Through these efforts, the City aims to empower individuals to take action and to foster a shared sense of ownership in achieving CAAP goals.

### SUSTAINING ENGAGEMENT

Sustained dialogue with community members will help ensure the CAAP remains responsive, inclusive, and effective in achieving its goals for all those it impacts.

While community engagement activities will primarily be led by the City staff, coordination with community partners, including schools, community-based organizations, and regional agencies, will be essential to broaden the reach and effectiveness of these efforts.



# Acronyms and Abbreviations

# Acronyms and Abbreviations

| Acronym/Abbreviation | Definition |
|---|---|
| AB | Assembly Bill |
| ABAU | adjusted business as usual |
| BAU | business as usual |
| CAAP | Climate Action and Adaptation Plan |
| CALGreen | California Green Building Standards Code |
| $CH_4$ | methane |
| City or Costa Mesa | City of Costa Mesa |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| EV | electric vehicle |
| FHSZ | Fire Hazard Severity Zone |
| GHG | greenhouse gas |
| GWP | global warming potential |
| GWRS | Groundwater Replenishment System |
| IPM | Integrated Pest Management |
| LCFS | Low Carbon Fuel Standard |
| MT | metric ton |
| $N_2O$ | nitrogen dioxide |
| PV | photovoltaic |
| RCP | Representative Concentration Pathway |
| ROP | Regional Occupation Program |
| RTAC | Regional Transportation Advisory Committee |
| SB | Senate Bill |
| VMT | vehicle miles traveled |

# Glossary

# Glossary

## Adaptive Capacity

"Adaptive capacity" refers to a community's ability to withstand, adapt to, and recover from hazards. City facilities and programs can enhance adaptive capacity by providing more resilient resources for the community. The Climate Action and Adaptation Plan (CAAP) describes Costa Mesa's adaptive capacity within the Community Assets section of Appendix B, and the CAAP includes policies to increase adaptive capacity.

## Anthropogenic

The word "anthropogenic" refers to environmental change caused or influenced by people, either directly or indirectly. Anthropogenic greenhouse gas emissions are human-caused greenhouse gas emissions.

## Baseline Greenhouse Gas Emissions (GHG) Inventory

A baseline GHG emissions inventory is a quantified snapshot of the GHG emissions generated within a defined geographic boundary during a specific year. For the City's CAAP, 2023 was chosen to represent the baseline year. The baseline inventory represents all emissions sources occurring within city limits and serves as a reference point for comparison over time. Establishing a baseline inventory is a critical first step in climate action planning, providing the foundation for tracking progress, evaluating trends, and forecasting future emissions to inform reduction strategies.

## Business as Usual (BAU) and Adjusted Business as Usual (ABAU)

The BAU scenario describes emissions based on projected growth in population, employment, and other factors and does not consider policies that would reduce greenhouse gas (GHG) emissions in the future (see "Forecasted Greenhouse Gas Emissions Inventory"). The ABAU scenario describes emissions based on projected growth and considers policies that will achieve GHG reductions in the future (i.e., it assumes Federal- and State-mandated GHG emissions reduction measures would be implemented by the projected forecast year). The ABAU scenario, unlike the BAU, accounts for adopted GHG emissions reductions due to regulations that would be implemented between the baseline year and future years. Costa Mesa's GHG emissions were forecasted for two future years (2030 and 2045) for two scenarios: BAU and ABAU.

California Air Resources Board (CARB)

CARB is a department of the California Environmental Protection Agency. It is responsible for regulating air quality in California. CARB develops and enforces regulations to reduce air pollution and protect public health and the environment. It also conducts research, monitors air quality, and promotes sustainable transportation and energy policies to improve air quality and reduce greenhouse gas emissions. CARB plays a crucial role in California's efforts to combat climate change and improve air quality for its residents.

California Green Building Standards Code (CALGreen)

The California Green Building Standards Code, also known as CALGreen, sets the minimum requirements for green building practices for new construction and renovations in California. It was established to reduce the environmental impact of buildings and promote sustainable design and construction practices. CALGreen covers various aspects of building design, construction, and operation, including energy efficiency, water conservation, indoor air quality, and material selection. The code requires builders to meet certain green building standards, such as using energy-efficient lighting and appliances, installing low-flow plumbing fixtures, and using environmentally friendly building materials.

Carbon Dioxide ($CO_2$)

$CO_2$ is a naturally occurring gas and a by-product of human activities and is the principal anthropogenic (i.e., caused by human activity) greenhouse gas that affects the earth's radiative balance. Natural sources of $CO_2$ include the respiration of bacteria, plants, animals, and fungus; evaporation from oceans; volcanic out-gassing; and the decomposition of dead organic matter. Human activities that generate $CO_2$ include the combustion of fuels such as coal, oil, natural gas, and wood, as well as changes in land use. $CO_2$ is the predominant greenhouse gas evaluated in the CAAP.

Carbon Dioxide Equivalent ($CO_2e$)

$CO_2e$ is a unit of measurement that is used to compare the emissions of various greenhouse gases (GHGs) based on their global warming potential. It represents the amount of $CO_2$ that would have the same global warming impact as a given quantity of another GHG over a specified period. $CO_2e$ is used in the CAAP inventory to easily compare GHG emissions across sectors and years.

### Carbon Sequestration

Carbon sequestration is the process by which carbon dioxide is removed from the atmosphere and stored in natural or artificial reservoirs, or "carbon pools." There are three types of carbon sequestration: biological, geological, and technological. Biological carbon sequestration is the storage of carbon dioxide in vegetation such as crops, forests, and grasslands, as well as in soils and oceans. Geologic carbon sequestration involves injecting carbon into underground geologic formations. Technological carbon sequestration captures and stores carbon from the atmosphere in engineered materials or devices.

### Climate Action and Adaptation Plan (CAAP)

A CAAP is a comprehensive road map that outlines the activities and informs the decisions that an agency will undertake to achieve reductions in greenhouse gas (GHG) emissions; it also develops comprehensive strategies to proactively address the impacts of climate change on climate-related hazards. A CAAP typically includes a range of actions aimed at reducing GHG emissions, such as promoting renewable energy, improving energy efficiency, and enhancing transportation options. It also includes measures to build resilience to climate change, such as upgrading infrastructure, hazard preparedness, managing water resources, and protecting natural ecosystems.

### Climate-Related Hazards

Climate-related hazards are natural hazards that are impacted by climate characteristics like temperature and precipitation. Climate characteristics are projected to change as a result of greenhouse gases in the atmosphere. Costa Mesa experiences the following climate-related hazards: drought, extreme heat, fire, and flooding.

### Community Choice Aggregator (CCA)

A CCA allows local governments to procure electricity on behalf of their residents, businesses, and municipal accounts from an alternative supplier while still receiving transmission and distribution services from their existing utility provider. CCAs are formed to provide energy options that are more local, renewable, and/or cost-effective than those offered by the existing utility provider.

Community-Based Organization

Community-based organizations are groups that work on local issues and causes, including within the Costa Mesa community or regionally. These groups include nonprofits, religious centers, local businesses, research centers or universities, culture- and ethnicity-oriented groups, immigrant groups, and others.

Compounding Hazards

Compounding hazards can result from climate-related hazards and lead to additional impacts. For example, in Costa Mesa, a combination of wildfire followed by extreme precipitation could lead to the compounding hazard of debris/mud flows. Further, regionally major flooding or wildfires could result in climate migration, a situation in which people move following a hazard.

Cooling Center

A cooling center is a publicly available facility that residents can use to access air conditioning and cool off. In Costa Mesa, facilities that fall under this definition include community centers (such as Balearic Community Center, Downtown Recreation Center, Norma Hertzog Community Center, and the Costa Mesa Senior Center) and City Hall.

Decarbonization

Decarbonization is a strategic approach to reduce or entirely remove carbon-emitting energy sources, fuels, industrial processes, and other products and activities to mitigate the impacts of climate change by lowering greenhouse gas emissions, primarily carbon dioxide. This process involves transitioning to cleaner, renewable energy sources, improving energy efficiency, and promoting carbon sequestration, among other measures. Decarbonization of the transportation and energy sector are key objectives of the CAAP.

Disadvantaged Communities (DACs)

DACs are areas that experience the highest combination of economic, health, and environmental burdens. Examples of these burdens include poverty, high unemployment, air and water pollution, the presence of hazardous waste, asthma, and more. One way that the State identifies these areas is through an analytical tool created by the California Environmental Protection Agency called CalEnviroScreen, which combines data on economic, health, and environmental burdens into a score to determine relative DACs.

Census tracts that score 75% or higher are considered disadvantaged by the State. Costa Mesa has two census tracts that are considered disadvantaged (approximately bounded by 19th Street to the north, 16th Street to the south, Newport Boulevard to the east, and city limits to the west). These are discussed more in Appendix B.

### Emergency Response Facilities

Emergency response facilities include police, fire, and other emergency response services activated during an emergency and used to respond to potentially harmful situations like hazard events. For the purposes of the CAAP, it is important to know where these buildings are located and if they are resilient to climate hazards in their current state.

### Emission Reduction Potential

Emission reduction potential is the capacity for reducing the emission of greenhouse gases from a particular source, sector, or activity. It quantifies the maximum amount of emissions that could be avoided or reduced through the implementation of specific measures or actions. For quantifiable measures, an emission reduction potential is noted in the CAAP.

### Emissions Scenarios

An emissions scenario is a possible future pathway of GHG emissions used by climate models to project how the climate may change over time, which can aid in assessing possible future climate hazards. Because of the uncertainty of future global emissions concentrations, models evaluate multiple scenarios to capture a range of possible outcomes. The medium-emissions scenario (formally referred to as Representative Concentration Pathway [RCP] 4.5) assumes that global emissions peak around 2040 and then decline, while the high-emissions scenario (formally referred to as RCP 8.5) assumes that emissions continue to increase through 2100. In line with State recommendations, this document considers only RCP 8.5 for mid-century (2035-2064) projections and discusses both RCP 4.5 and 8.5 for end-of-century (2070-2099) projections.

### Equity

Equity involves the fair and inclusive consideration of community needs, circumstances, and barriers to ensure all residents have meaningful opportunities to participate in and benefit from public programs, services, investments, and decision-making processes. It recognizes that individuals and communities face different challenges and vulnerabilities and calls for those differences to be reflected in policy development and resource allocation.

In the context of climate action and adaptation planning, equity focuses on identifying and addressing disproportionate impacts from climate-related hazards while ensuring fair access to resilience strategies, sustainability programs, public engagement opportunities, and the benefits of climate investments. An equitable approach supports the health, safety, and well-being of all residents, particularly those most vulnerable to environmental, economic, and climate-related risks.

Fire Hazard Severity Zones (FHSZs)

These zones are designated by the California Department of Forestry and Fire Protection and adopted by local governments to signify an elevated likelihood of fire hazard due to inherent characteristics of the land, like fuel loading, slope, and weather patterns. These zones do not account for mitigation measures such as vegetation management. Areas designated as High or Very High FHSZs are subject to certain Building Code regulations related to ignition-resistant building materials for new development, and Very High FHSZs are also subject to defensible space vegetation regulations. Portions of western and southwestern Costa Mesa are designated as High FHSZs. The City's High FHSZs are primarily open space but also overlap with parcels containing approximately 547 dwelling units, one school, and a religious institution.

Forecasted Greenhouse Gas Emissions (GHG) Inventory

A forecasted GHG emissions inventory is a projection of future GHG emissions within a defined geographic boundary over a specified planning horizon. For the City's CAAP, GHG emissions were forecasted for 2030 and 2045 in alignment with key statewide GHG emission reduction goals. A forecasted inventory estimates how emissions are expected to change over time based on anticipated factors such as regulatory conditions and population and employment growth (see the "Business-as-Usual (BAU) and Adjusted Business-as-Usual (ABAU)" entry). The forecasted inventory is used to identify trends, evaluate the projected emissions gap relative to reduction targets, and inform the development of strategies and measures needed to achieve GHG reduction goals.

Global Warming Potential (GWP)

GWP is a measure of how much heat a greenhouse gas (GHG) traps in the earth's atmosphere over a specified period relative to the same amount of carbon dioxide ($CO_2$). It is used to compare the relative impact of different GHGs on global warming and climate change. For example, methane has a GWP that is 21 times that of $CO_2$.

### Greenhouse Effect

The greenhouse effect is a natural process that warms the earth. The earth's atmosphere naturally contains greenhouse gases (GHGs) that trap some of the sun's outgoing radiation, keeping the earth warm enough to support life. Increased concentrations of GHGs due to human activities, such as burning fossil fuels, are causing the earth to warm at an accelerated rate, leading to climate change.

### Greenhouse Gas (GHG)

A GHG is a gas that absorbs and emits radiation in the earth's atmosphere, contributing to the greenhouse effect. GHGs act as a blanket around the earth, trapping heat and leading to increases in global temperatures. The primary GHGs in the earth's atmosphere include water vapor, carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$), which may be caused by natural or human processes. The CAAP GHG inventory includes $CO_2$, $CH_4$, and $N_2O$, which represent the primary GHGs associated with activities within Costa Mesa.

### Low Carbon Fuel Standard (LCFS)

An LCFS is a regulatory program that requires a reduction in the carbon intensity of transportation fuels, such as gasoline and diesel. The goal of an LCFS is to reduce greenhouse gas emissions from the transportation sector by promoting the use of low-carbon and renewable fuels. California's LCFS law requires changes to the types of fuels used in vehicles.

### Methane ($CH_4$)

$CH_4$ is a key greenhouse gas evaluated in the CAAP. $CH_4$ is a flammable gas and is the main component of natural gas. $CH_4$ is produced through both natural and human activities. $CH_4$ is produced through the anaerobic (without oxygen) decomposition of waste in landfills, flooded rice fields, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

### Natural and Urban Lands

For the purposes of this plan, the term natural and urban lands refers to parks, urban and community forests, trails, greenbelts, landscaped open spaces and public rights-of-way, community gardens, and other similar lands within the City. Consistent with California's Natural and Working Lands program, protection and management of these lands can help meet the

State's greenhouse gas reduction goals through the removal of carbon from the atmosphere and the sequestration of carbon in vegetation and soils. Additionally, these lands can also support climate adaptation, improve water quality, reduce flood risk, and provide recreational, environmental, and economic benefits.

Nitrous Oxide ($N_2O$)

$N_2O$ is a key greenhouse gas evaluated in the CAAP. $N_2O$ is produced through natural and human activities, mainly through agricultural activities and natural biological processes, although fuel burning and other processes also create $N_2O$. Sources of $N_2O$ include soil cultivation practices (microbial processes in soil and water), especially the use of commercial and organic fertilizers, manure management, industrial processes (such as in nitric acid production, nylon production, and fossil-fuel-fired power plants), vehicle emissions, and using $N_2O$ as a propellant (e.g., rockets, racecars, and aerosol sprays).

Renewables Portfolio Standard (RPS)

RPS is a regulatory policy that requires utilities to obtain a certain percentage of their electricity from renewable sources, such as wind, solar, and geothermal energy. RPS policies are intended to promote the development of renewable energy and reduce greenhouse gas emissions from the electricity sector. California's RPS requires utility providers like Southern California Edison to generate 52% of their retail electricity using qualified renewable energy technologies by the end of 2027; 60% by 2030; 90% by 2035; 95% by 2040; and 100% by 2045.

Risk

Risk considers the overall potential impact of climate-related hazards. It accounts for a community's potential exposure to climate-related hazards in combination with social or environmental factors that exist within the community and can heighten or reduce the impacts of climate-related hazards.

Urban Heat Island Effect

The urban heat island effect refers to temperatures in urban areas with higher rates of dark and impervious surfaces, like roads, parking lots, and buildings, which can be up to 7°F warmer than outlying areas during the day and retain heat longer into the night. This is due to these materials absorbing and re-emitting heat more than natural features, like trees. Urban heat islands in Costa Mesa are primarily concentrated inland, in areas with large parking lots and artificial turf athletic fields.

Vehicle Miles Traveled (VMT)

Vehicle miles traveled (VMT) is a metric that represents the total number of miles driven by all vehicles within a defined geographic area over a specified period, typically expressed on a daily or annual basis. VMT reflects overall transportation activity and demand, accounting for the frequency and length of vehicle trips made by residents, workers, and visitors.

For the CAAP, VMT was calculated using the Regional Transportation Advisory Committee (RTAC) VMT calculation methodology, which proportions the VMT generated by Costa Mesa according to the location of the trip start (origin) and end (destination). The RTAC methodology estimates VMT for the various origin/destination trip types within Costa Mesa using the following accounting:

- Include 100% of internal–internal (II) trips
- Include 50% of internal–external and external–internal (IX and XI) trips
- Exclude 0% of external–external (XX) trips

Vulnerability Assessment

A vulnerability assessment evaluates how climate-related hazards may affect a community's residents, infrastructure, natural resources, and services. The assessment considers factors such as exposure to climate hazards, the sensitivity of people and assets to those hazards, and the community's adaptive capacity to prepare for, respond to, and recover from climate impacts. The results help identify areas of greatest climate risk and inform strategies to improve resilience and reduce vulnerability.

APPENDIX A

# Greenhouse Gas Emissions Inventory, Forecasting, and Target Setting

Climate action refers to any deliberate efforts to mitigate future impacts of climate change by avoiding, reducing, or sequestering greenhouse gas (GHG) emissions. The critical components of the Climate Action and Adaptation Plan (CAAP) climate action process are development of the baseline GHG emissions inventory, forecasting future emissions, establishing reduction targets, estimating the related emissions gap, and identifying reduction strategies needed to close this gap. This appendix outlines the foundational components of this process, including the inventory, future emissions forecast, and target setting.

# Introduction

The information below introduces climate change and GHG emissions to provide the necessary context to understand the purpose and benefits of preparing a GHG emissions inventory and addressing climate action within the City of Costa Mesa (City).

## Greenhouse Effect and Climate Change

GHGs are gases that absorb infrared radiation (i.e., trap heat) in the earth's atmosphere. The trapping and buildup of heat in the atmosphere near the earth's surface is referred to as the "greenhouse effect" and is a natural process that contributes to the regulation of the earth's temperature, creating a livable environment. The earth's temperature depends on the balance between energy entering and leaving the planet's system, and many factors (natural and human) can cause changes in the earth's energy balance. Human activities that generate and emit GHGs into the atmosphere increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and causing the earth's surface temperature to rise. This rise in temperature has led to large-scale changes to the earth's system (e.g., temperature, precipitation, wind patterns), which are collectively referred to as climate change.

## Greenhouse Gases

GHGs include carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Of these gases, $CO_2$ and $CH_4$ are emitted in the greatest quantities from human activities. Some GHGs are man-made, including fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, which are used in a variety of industrial products and processes.

Some gases are more effective than others at trapping heat, warming the earth's oceans, land, and atmosphere. For each GHG, a global warming potential (GWP) was developed to

allow comparisons of the global warming impacts of different GHGs. Specifically, per industry-standard calculations, GWP measures how much energy the emissions of 1 ton of a gas absorbs over a given period, typically a 100-year time span, relative to the emissions of 1 ton of $CO_2$. Gases with a higher GWP contribute more to the earth's warming because they absorb more energy (per ton emitted) than gases with a lower GWP.[1]

All GHGs in the emissions inventory and reduction measures in this CAAP are presented in terms of metric tons of $CO_2$ equivalent (MT $CO_2e$), which account for weighted GWP factors for $CH_4$ and $N_2O$. The GWPs applied are from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6).[2] Table 1 provides a summary of the three primary GHGs, their sources, and their GWPs.

Table 1. Greenhouse Gases and Global Warming Potential

| GHG | Description | GWP (100-year value) |
|---|---|---|
| Carbon Dioxide ($CO_2$) | $CO_2$ is a naturally occurring gas that is also a byproduct of human activities, primarily through the combustion of fossil fuels and changes in land use, such as deforestation. It is the principal anthropogenic (i.e., human-caused) GHG that affects the earth's solar radiative balance. | 1 |
| Methane ($CH_4$) | $CH_4$ is produced through both natural and human activities and is the main component of natural gas. It is produced through anaerobic (without oxygen) decomposition of landfill and animal waste, flooded rice fields, animal digestion, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion. $CH_4$ derived from fossil fuel sources has a slightly higher GWP than $CH_4$ from non-fossil fuel sources. | 27.9[a] |
| Nitrous Oxide ($N_2O$) | $N_2O$ is produced through natural and human activities, mainly through agricultural activities and natural biological processes, although fuel burning and other processes also create $N_2O$. Sources of $N_2O$ include soil cultivation practices, especially the use of fertilizers; manure management; industrial processes (such as in the production of nylon, and from fossil-fuel-fired power | 273 |

1 *United States Environmental Protection Agency (EPA). 2024. Understanding Global Warming Potentials. https://www.epa.gov/ghgemissions/understanding-global-warming-potentials.*

2 *IPCC. 2021. Chapter 7: The Earth's Energy Budget, Climate Feedbacks and Climate Sensitivity - Supplementary Material. August. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter_07_Supplementary_Material.pdf.*

Table 1. Greenhouse Gases and Global Warming Potential

| GHG | Description | GWP (100-year value) |
|---|---|---|
| | plants); vehicle emissions; and its use as a propellant (such as in rockets, racecars, and aerosol sprays). | |

*Notes: GHG = greenhouse gas; GWP = global warming potential.*
*The descriptions of GHGs are summarized from the Intergovernmental Panel on Climate Change Sixth Assessment Report and the California Air Resources Board's Glossary of Terms Used in GHG Inventories.*
[a] *The Intergovernmental Panel on Climate Change's Sixth Assessment Report provides two methane ($CH_4$) GWP values: 29.8 (Methane – fossil) and 27.0 (Methane – non-fossil). Per industry guidance, the value 27.9 is used herein, given that sources include those from biogenic origin and fossil-fuel combustion.*[3]

# Greenhouse Gas Emissions Inventory

An emissions inventory is a snapshot of the GHG emissions associated within a geographic boundary during a given period—in this case, 2023 emissions within Costa Mesa's city limits. Establishing a baseline inventory of GHG emissions is an important initial step to set a baseline for future inventories, to track progress against the baseline and for forecasting future GHG emissions. These foundational steps are also necessary to estimate the GHG emissions gap that must be addressed to meet the City's GHG reduction targets.

The Costa Mesa CAAP includes two GHG emissions inventories: communitywide and municipal, as described below:

- Communitywide Inventory: All GHG emissions generated within the City's direct or indirect jurisdiction constitute the communitywide inventory. This includes all the GHG emissions that result from activities associated with residents, businesses, tourists, visitors, and other community sources.
- Municipal Inventory: The municipal inventory is limited to emissions generated by City-owned operations. Examples of these sources include the City's vehicle fleet, and energy use in City buildings and facilities. By establishing a municipal inventory, the City can identify its own contribution and better lead the emissions reduction effort by example.

[3] *GHG Management Institute. 2024. Which Methane GWP Value Do I Use? October 17, 2024. https://ghginstitute.org/2024/10/17/which-methane-gwp-value-do-i-use/.*

## Methodology

Consistent with recommendations from the state's Office of Land Use and Climate Innovation,[4] development of the communitywide GHG inventory and projections follows the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions,[5] and development of the municipal inventory follows the Local Government Operations Protocol.[6] Where appropriate, the inventories and projections also follow best practice guidance from the Association of Environmental Professionals (AEP) California Communitywide Greenhouse Gas Baseline Inventory Protocol,[7] Forecasting Communitywide Greenhouse Gas Emissions and Setting Reduction Targets,[8] and California Supplement to the United States Communitywide Greenhouse Gas (GHG) Emissions Protocol.[9]

Estimating GHG emissions from each sector requires activity data and emission factors. Activity data can refer to the amount of energy consumed (kilowatt-hours [kWh] or therms), waste produced (tons), and water used (gallons), while emission factors are a measure of how carbon-intensive each of the activities is (i.e., the amount of GHGs that are emitted by a unit of activity). Each emissions sector and the relevant activity data used to estimate 2023 GHG emissions are outlined in the following sections. Tracking activity data enables the City to evaluate GHG emissions reductions resulting from behavioral changes rather than improvements in efficiency (i.e., changes in emission factors).

Per relevant protocols, local governments should define jurisdictional boundaries for communitywide GHG emissions inventories. These boundaries typically align with the geographic area over which the local government has authority, such as city limits. This ensures that the inventory accurately reflects the emissions from all sources and activities within the community's control. As such, the 2023 GHG inventory estimates emissions from all the meaningful sources within the City's direct or indirect control, including energy

[4] *California Office of Land Use and Climate Innovation. 2017. General Plan Guidelines and Technical Advisories, Chapter 8: Climate Change. https://lci.ca.gov/planning/general-plan/guidelines.html.*

[5] *ICLEI (International Council for Local Environmental Initiatives). 2019. U.S. Community Protocol and Reporting of GHG Emissions. July 2019. Local Governments for Sustainability – USA. https://icleiusa.org/us-community-protocol/.*

[6] *CARB, CCAR, ICLEI, and TCR. 2018. Local Government Operations Protocol For the quantification and reporting of GHG emissions inventories Version 1.1. May 2010. https://icleiusa.org/resources/local-government-operations-lgo-protocol/.*

[7] *AEP. 2011. California Community-Wide GHG Baseline Inventory Protocol White Paper. June. https://califaep.org/docs/Community-wide_GHG_Protocol.pdf.*

[8] *AEP. 2012. Forecasting Community-Wide GHG Emissions and Setting Reduction Targets. May. https://califaep.org/docs/Forecasting_and_Target_Setting.pdf.*

[9] *AEP. 2013. The California Supplement to the United States Community-Wide GHG (GHG) Emissions Protocol. December. https://califaep.org/docs/California_Supplement_to_the_National_Protocol.pdf.*

consumption, on-road transportation, off-road equipment, solid waste, water use, and wastewater.

The results of the communitywide and municipal inventories, along with detailed descriptions of each emissions sector and the relevant activity data used to estimate 2023 GHG emissions, are outlined in the following sections.

## Communitywide Emissions Inventory

The communitywide GHG emissions inventory includes emissions from all the meaningful sources within the City's direct or indirect jurisdictional control. When data is available, the communitywide inventory is shown in terms of the different land uses within the City (e.g., residential and non-residential). Because the communitywide inventory captures all typical sources, it can be easily correlated with statewide efforts to reduce GHG emissions. Table 2 provides a summary of the City's communitywide GHG emissions inventory for baseline year 2023 by sector.

Table 2. 2023 Communitywide Baseline Inventory

| Sector | MT $CO_2e$ | Percent of Total |
|---|---|---|
| On-Road Transportation | 551,893 | 63% |
| Energy | 266,921 | 31% |
| Water | 3,767 | <1% |
| Wastewater | 4,686 | <1% |
| Solid Waste | 10,140 | 1% |
| Off-Road Equipment | 34,993 | 4% |
| Total | 872,400 | 100% |

*Notes: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Percentage may not total due to rounding.*

The detailed approach and results of the emissions inventory estimate is provided in the sections below by sector, including what activities are included, the activity data used, and the emission factors or methods to calculate emissions.

## On-Road Transportation

GHG emissions from on-road vehicle travel are related to the combustion of fossil fuels, including gasoline, diesel, and natural gas.[10] Activity data used to estimate on-road transportation emissions includes vehicle miles traveled (VMT) by speed and vehicle type within Costa Mesa.

For the communitywide inventory, VMT estimates include the vehicle travel associated with residents, workers, students, visitors, etc. engaged in activities that begin and end in Costa Mesa. Annual City VMT for baseline year 2023 was provided by Fehr & Peers.[11]

VMT was calculated using the Regional Transportation Advisory Committee (RTAC) VMT calculation methodology, which proportions the VMT generated by the City according to the location of the trip start (origin) and end (destination). The RTAC methodology estimates VMT for the various origin/destination trip types within Costa Mesa using the following accounting:

- Include 100% of internal–internal (II) trips. The VMT associated with vehicle trips that have an origin and destination within Costa Mesa are multiplied by 1.0, given that the City is responsible for and has the opportunity to reduce these emissions through land use changes at both locations (i.e., the ability to provide transit connecting both locations and other methods of VMT reduction).
- Include 50% of internal–external and external–internal (IX and XI) trips. The VMT for vehicle trips that have an origin within and destination outside of Costa Mesa and conversely those that have an origin outside of and destination within Costa Mesa are multiplied by 0.5. With this assumption, half of the VMT from these trips is assigned to the City, while the other half is assumed to be the responsibility of the relevant jurisdiction outside of the City.
- Exclude 0% of external–external (XX) trips. The VMT for vehicle trips with origins and destinations outside of Costa Mesa (i.e., vehicles passing through) are not included, as these trips are assigned to the relevant origin/destination geographic regions outside of the City's jurisdictional control.

On-road vehicle emission factors were calculated using the California Air Resources Board (CARB) EMission FACtor (EMFAC) mobile-source emissions inventory model (EMFAC2025 v2.0.0).[12] EMFAC provides emission factors for different California geographical regions, years, vehicle types, and other vehicle information, such as fuel and speed. Emission factors for $CO_2$,

[10] *Emissions related to electricity consumed for electric vehicle (EV) charging are included in the building energy sector.*

[11] *Fehr & Peers. 2026. Costa Mesa Climate Action & Adaptation Plan (CAAP) Vehicle Miles Traveled (VMT) Methodology and Inventory Summary. April 3.*

[12] *CARB. 2025. EMFAC2025 (v2.0.0) Emission Inventory. https://arb.ca.gov/emfac/.*

$CH_4$, and $N_2O$ were obtained from EMFAC2025 for baseline year 2023 for the Orange County region. A weighted average emissions factor was applied for City-wide VMT provided by Fehr & Peers.

Annual VMT and GHG emissions from on-road transportation within Costa Mesa for baseline year 2023 are provided in Table 3.

Table 3. 2023 Communitywide On-Road Transportation Activity Data and Emissions

| Source | Annual VMT | MT $CO_2e$ |
|---|---|---|
| On-Road Transportation | 1,347,686,776 | 551,893 |

*Note: VMT = vehicle miles traveled; MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Building Energy

Building energy generates GHG emissions directly through consumption of natural gas for heating and indirectly through the use of electricity. Annual GHG emissions from community energy use within Costa Mesa for baseline year 2023 are provided in Table 4. The activity data, emission factors, and methodologies for estimating GHG emissions from energy are described below for each respective energy type.

Table 4. 2023 Communitywide Energy Emissions

| Source | MT $CO_2e$ | Percent of Total |
|---|---|---|
| Electricity | 152,054 | 57% |
| Natural Gas | 114,867 | 43% |
| Total | 266,921 | 100% |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

### ELECTRICITY

Indirect GHG emissions from the use of electricity within Costa Mesa were estimated using annual electricity consumption data (i.e., kWh per year) provided by Southern California Edison (SCE). For baseline year 2023, electricity consumption was provided for residential, commercial, industrial, and agricultural customers.

GHG emissions intensity factors (pounds of $CO_2e$ per megawatt-hour [MWh]) for SCE were obtained from the 2023 Power Content Label and are reflective of the power mixes therein. The SCE emissions rate was adjusted using information on the total enrollment of SCE customers within Costa Mesa within each of the specific rate options (i.e., Green Rate 50%,

Green Rate 100%, SCE Community Renewable, and SCE Power Mix).[13] The adjusted rate was then applied to the 2023 SCE electricity consumption.

Communitywide consumption and GHG emissions from electricity use within Costa Mesa for baseline year 2023 are provided in Table 5.

### Table 5. 2023 Communitywide Electricity Activity Data and Emissions

| Land Use Type | Annual MWh | MT $CO_2e$ |
|---|---|---|
| Residential | 198,578 | 44,087 |
| Non-Residential | 486,301 | 107,966 |
| Total | 684,879 | 152,054 |

*Note: MWh= megawatt-hour; MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Totals may not sum due to rounding.*

## NATURAL GAS

GHG emissions related to the combustion of natural gas were estimated using consumption data (i.e., therms per year) by land use type, including single-family and multifamily residential, commercial, and industrial. For baseline year 2023, natural gas consumption for all land use types was provided by Southern California Gas Company (SoCalGas). Natural gas emission factors for $CO_2$, $CH_4$, and $N_2O$ were obtained from The Climate Registry and applied to annual consumption data to estimate emissions.[14]

Communitywide consumption and GHG emissions from natural gas use within Costa Mesa for baseline year 2023 are provided in Table 6.

### Table 6. 2023 Communitywide Natural Gas Activity Data and Emissions

| Land Use Type | Annual Therms | MT $CO_2e$ |
|---|---|---|
| Residential | 13,394,998 | 71,148 |
| Non-Residential | 8,231,106 | 43,720 |
| Total | 21,626,104 | 114,867 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

[13] *SCE. 2025. Green Tariff Shared Renewables Program Data Request. Prepared by Michael Tong C Shu. June 12, 2025.*
[14] *The Climate Registry. 2023. "2023 Default Emission Factors." June 2023. https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.*

## Water

GHG emissions associated with the City's water use come from the electricity consumed in the extraction (groundwater pumping), conveyance (groundwater and imports), and distribution of water to residents and businesses. The City's GHG emissions are primarily associated with energy used to pump groundwater.

For the communitywide inventory, emissions from water include all residential and non-residential water usage from customers of the City's water system. Water consumption data was obtained from the Irvine Ranch Water District (IRWD) and Mesa Water District.[15,16] Local utility emission factors from SCE for the baseline year 2023 were applied to the energy estimated for the City's groundwater extraction, while eGRID factors were applied to water imports. Energy intensity factors for water supply were obtained from the IRWD and Mesa Water District 2020 Urban Water Management Plans (UWMP).[17,18]

Communitywide consumption and GHG emissions from water use within Costa Mesa for baseline year 2023 are provided in Table 7.

Table 7. 2023 Communitywide Water Activity Data and Emissions

| Land Use Type | Annual Million Gallons | MT $CO_2e$ |
|---|---|---|
| Residential | 3,010 | 2,226 |
| Non-Residential | 2,085 | 1,540 |
| Total | 5,095 | 3,767 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Wastewater

Wastewater treatment emits GHGs such as $CH_4$ when the chemical and microbial processes that break down sewage in anaerobic (without oxygen) environments release biogas as a byproduct. The facilities that treat wastewater generated by Costa Mesa are owned and operated by the Orange County Sanitation District (OCSAN). The City's wastewater emissions

15 *IRWD. 2025. Costa Mesa Water Usage. Prepared by Amy McNulty. April 3, 2025.*
16 *Mesa Water District. 2025. City of Costa Mesa Consumption Public Records Request. Prepared by Isabel Stevens. August 12, 2025.*
17 *IRWD. 2021. IRWD – 2020 Urban Water Management Plan. June. https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/2020_urban_water_management_plan_irwd_adopted_june2021.pdf.*
18 *Mesa Water District. 2021. Mesa Water District 2020 Urban Water Management Plan. June. https://www.mesawater.org/sites/default/files/Save%20Water/Documents/Mesa%20Water%202020%20UWMP%20FINAL-2021.06.30.pdf.*

were calculated using annual per-capita wastewater production values for Costa Mesa residents obtained from the City's 2021 Wastewater Master Plan Update,[19] annual flow data obtained from OCSAN,[20] and GHG emissions data for the OCSAN Treatment Plant No. 2 obtained from CARB.[21]

Annual input and GHG emissions from wastewater treatment within Costa Mesa for baseline year 2023 are provided in Table 8.

Table 8. 2023 Communitywide Wastewater Activity Data and Emissions

| Source | Annual Million Gallons | MT $CO_2e$ |
|---|---|---|
| Wastewater Treatment | 3,311 | 4,686 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Solid Waste

GHG emissions from solid waste include fugitive emissions of $CH_4$ and $CO_2$ as waste decomposes over time. The community inventory includes emissions from waste generated within Costa Mesa, which was provided by the Public Works Department for baseline year 2023. Material composition data for the state's overall disposed waste stream was obtained from the California Department of Resources Recycling and Recovery (CalRecycle) and applied to the City's total tonnage for 2023.[22] Landfill emission factors for each waste type were provided by the U.S. Environmental Protection Agency (EPA) Waste Reduction Model (WARM).[23] The landfill gas collection efficiency and oxidation rate were assumed to be 75% and 10%, respectively, consistent with the U.S. Community Protocol assumptions.[24]

Table 9 outlines annual generation and related GHG emissions from communitywide solid waste within Costa Mesa for baseline year 2023.

[19] *City of Costa Mesa. 2021. Wastewater Master Plan Update for the Costa Mesa Sanitary District. November 8. https://cms9files.revize.com/cmsd/Document_Center/Sewer/Sewer%20System%20Information/2022_08_29_sewer_master_plan_red_size.pdf.*

[20] *OCSAN. 2024. Regional Sewer Service: Facts and Key Statistics. https://www.ocsan.gov/regional-sewer-service/.*

[21] *CARB. 2024. Annual Summary of GHG Emissions Data. November 15. https://ww2.arb.ca.gov/mrr-data.*

[22] *CalRecycle. 2021. 2021 Disposal-Facility-Based Characterization of Solid Waste in California (DRRR-2024-1737). https://www2.calrecycle.ca.gov/Publications/Details/1738.*

[23] *EPA. 2023. Documentation for GHG Emission and Energy Factors Used in the Waste Reduction Model (WARM). December. https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste.*

[24] *ICLEI. 2019. U.S. Community Protocol for Accounting and Reporting of GHG Emissions. July.*

Table 9. 2023 Communitywide Solid Waste Activity Data and Emissions

| Land Use Type | Annual Tons | MT $CO_2e$ |
|---|---|---|
| Residential | 15,171 | 2,079 |
| Non-Residential | 58,806 | 8,061 |
| Total | 67,183 | 10,140 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Totals may not sum due to rounding.*

## Off-Road Equipment

Use of off-road equipment generates GHG emissions from the combustion of fuel such as diesel, gasoline, or natural gas.[25] Examples of off-road equipment include forklifts for industrial uses, excavators for construction, lawn mowers for lawn and garden maintenance, and all-terrain vehicles for recreation. The following off-road categories are included in the Costa Mesa community inventory:

- Agricultural Equipment
- Transport Refrigeration Units
- Construction
- Industrial
- Lawn and Garden
- Light Commercial
- Pleasure Craft
- Recreational
- Portable Equipment

Annual emissions of $CO_2$, $CH_4$, and $N_2O$ were estimated using the CARB OFFROAD model, which provides data at the county level.[26] For $CO_2$, OFFROAD provides an estimated total tons of $CO_2$ per day, which was converted to MT of $CO_2$ per year. For $CH_4$ and $N_2O$, emissions were estimated using the OFFROAD fuel consumption output in gallons per year. The Climate

[25] *In the industrial category, some equipment like forklifts were assumed to be electric. Emissions related to electricity generation were assumed to be captured by the building energy inventory.*

[26] *CARB develops off-road emissions models for specific equipment categories that align with the applicability and scope of regulatory, incentive, and other air quality programs. A web-based query tool provides access to the latest model outputs across all off-road-equipment categories. For more information about the CARB OFFROAD model, see: https://offroad.arb.ca.gov/?_gl=1%2aml61no%2a_ga%2aMTQ0MDI5MDYzMi4xNzcxMjY3Mzg1%2a_ga_7M1ZZPXDBL%2aczE3ODQyNDEwNDMkbzE4JGcwJHQxNzg0MjQxMDQ4JGo1NSRsMCRoMA.*

Registry U.S. default factors for calculating $CH_4$ and $N_2O$ emissions from non-highway vehicles were used to convert fuel to annual emissions.

Because the OFFROAD model provides data at the county level, the emissions attributable to the City were determined as a percentage of the county's total emissions, based on population, service population, or employment depending on equipment type.

While the City does not designate agricultural zoning, limited agricultural production occurs within the North Costa Mesa Specific Plan. As such, for agricultural equipment, City emissions were determined as a percentage of the County's total emissions, based on total acreage of agricultural land within the County, which was obtained from the USDA's Census of Agriculture[27], and City, which was obtained from the City's General Plan Land Use Element[28].

Annual fuel use and GHG emissions from off-road equipment use within Costa Mesa for baseline year 2023 are provided in Table 10.

Table 10. 2023 Communitywide Off-Road Equipment Activity Data and Emissions

| Equipment Type | Annual Fuel Use (gallons) | | | MT $CO_2e$ |
|---|---|---|---|---|
| | Gasoline | Diesel | Natural Gas | |
| Agricultural Equipment | 16 | 516 | N/A | 6 |
| Transport Refrigeration Units | N/A | 120,905 | N/A | 1,252 |
| Construction | 47,086 | 643,813 | N/A | 6,943 |
| Industrial | 513,855 | 123,437 | 930,259 | 11,089 |
| Lawn and Garden | 315,327 | 5,980 | N/A | 1,991 |
| Light Commercial | 646,919 | 78,718 | 81,746 | 5,206 |
| Pleasure Craft | 244,022 | N/A | N/A | 1,622 |
| Recreation | 3,227 | N/A | N/A | 26 |
| Portable Equipment | N/A | 622,314 | N/A | 6,858 |
| Total | 1,770,434 | 1,635,166 | 1,012,004 | 34,993 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent; N/A = not applicable.*
*Totals may not sum due to rounding.*

[27] *USDA. 2024. 2022 Census of Agriculture County Profile: Orange County California. https://www.nass.usda.gov/Publications/AgCensus/2022/Online_Resources/County_Profiles/California/cp06059.pdf.*

[28] *City of Costa Mesa. 2025. Costa Mesa General Plan Chapter 2: Land Use Element. Updated February 5. https://www.costamesaca.gov/home/showpublisheddocument/59580/638767695525970000.*

## Municipal Emissions Inventory

The municipal inventory is limited to the facilities, equipment, vehicles that the City owns and/or operates as well as the trips related to employee commute. It is important to note that the municipal inventory has substantial overlap with the communitywide inventory; for example, mobile emissions from employee commute are captured in the on-road transportation emissions within the communitywide inventory. As such, the municipal inventory is treated separately and not simply combined with the communitywide inventory. Municipal inventories are beneficial in addressing City-controlled emission sources. The primary purpose of a municipal inventory is to "lead by example" and develop reduction measures associated with City activities and operations.

Table 11 provides a summary of the City's municipal GHG emissions inventory for baseline year 2023 by sector.

Table 11. 2023 Municipal Baseline Inventory

| Sector | MT $CO_2e$ | Percent of Total |
|---|---|---|
| On-Road Transportation | 2,373 | 60% |
| Energy | 1,332 | 33% |
| Water/Wastewater | 1 | <1% |
| Solid Waste | 95 | 2% |
| Off-Road Equipment | 183 | 5% |
| Total | 3,983 | 100% |

*Notes: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Percentage may not total due to rounding.*

## On-Road Transportation

The municipal on-road transportation inventory accounts for mobile source emissions from City-owned vehicle fleet and City employee commutes. Fuel consumption, mileage, and vehicle specifications (i.e., make, model, and year) were provided by the City for the entire vehicle fleet for 2023. City employee commute activity data (i.e., distance, commute frequency, and mode of transportation) was obtained from the Costa Mesa employee commuter survey.

Fuel-specific $CO_2$ emission factors obtained from The Climate Registry were used to estimate $CO_2$ emissions from the City's vehicle fleet.[29] Vehicle emission factors for employee commute and $CH_4$ and $N_2O$ for the City's vehicle fleet were calculated using EMFAC.

Annual GHG emissions from municipal on-road transportation for baseline year 2023 are provided in Table 12.

Table 12. 2023 Municipal On-Road Transportation Emissions

| Source | MT $CO_2e$ | Percent of Total |
|---|---|---|
| Vehicle Fleet | 796 | 32% |
| Employee Commute | 1,667 | 68% |
| Total | 2,463 | 100% |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Energy

The municipal energy inventory includes emissions from electricity use for City-owned buildings, facilities, and streetlights, as well as natural gas usage at City-owned buildings and facilities. Annual GHG emissions from municipal energy use in the City for baseline year 2023 are provided in Table 13.

Table 13. 2023 Municipal Energy Emissions

| Source | MT $CO_2e$ | Percent of Total |
|---|---|---|
| Electricity | 1,441 | 83% |
| Natural Gas | 296 | 17% |
| Total | 1,737 | 100% |

*Note: MT CO2e = metric tons of carbon dioxide equivalent.*

### ELECTRICITY

Annual municipal energy use for 2023 was provided by the City, and GHG emission intensity factors were obtained from the SCE 2023 Power Content Label, consistent with the communitywide inventory. Table 14 outlines annual consumption and related GHG emissions from municipal electricity use within Costa Mesa for baseline year 2023.

[29] *The Climate Registry 2023, Default Emission Factors.*

Table 14. 2023 Municipal Electricity Activity Data and Emissions

| Source | Annual MWh | MT $CO_2e$ |
|---|---|---|
| Municipal Facilities | 6,491 | 1,441 |

*Notes: MWh= megawatt-hour; MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Totals may not sum due to rounding.*

### NATURAL GAS

Annual natural gas consumption for City-owned buildings and facilities was provided by the City for baseline year 2023. Natural gas emission factors for $CO_2$, $CH_4$, and $N_2O$ were obtained from The Climate Registry and applied to annual consumption data to estimate emissions. Table 15 outlines annual consumption and related GHG emissions from municipal natural gas use within Costa Mesa for baseline year 2023.

Table 15. 2023 Municipal Natural Gas Activity Data and Emissions

| Source | Annual Therms | MT $CO_2e$ |
|---|---|---|
| Municipal Facilities | 55,654 | 296 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Water and Wastewater

Similar to the communitywide inventory, municipal GHG emissions associated with water use come from the electricity consumed in the extraction (e.g., groundwater pumping), conveyance, treatment, and distribution of potable water to City-owned and/or -operated buildings and facilities (including landscaping). Total annual water use for City-owned buildings and facilities was provided by IRWD and Mesa Water District for baseline year 2023. Local utility emission factors from SCE for the baseline year 2023 were applied to the energy estimated for the City's groundwater extraction, while eGRID factors were applied to water imports. Energy intensity factors for water supply were obtained from the IRWD and Mesa Water District 2020 Urban Water Management Plans (UWMP).[30,31]

[30] *IRWD. 2021. IRWD – 2020 Urban Water Management Plan. June. https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/2020_urban_water_management_plan_irwd_adopted_june2021.pdf.*

[31] *Mesa Water District. 2021. Mesa Water District 2020 Urban Water Management Plan. June. https://www.mesawater.org/sites/default/files/Save%20Water/Documents/Mesa%20Water%202020%20UWMP%20FINAL-2021.06.30.pdf.*

Table 16 outlines annual consumption and related GHG emissions from municipal water use within Costa Mesa for baseline year 2023.

Table 16. 2023 Municipal Water Use Activity Data and Emissions

| Source | Annual Gallons | MT $CO_2e$ |
|---|---|---|
| Municipal Water Use | 165,125 | 92 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Solid Waste

The municipal solid waste inventory includes emissions from waste generated by City operations, which was estimated based on an average waste factor from similar jurisdictions in the region. Consistent with the communitywide inventory, material composition data for the state's overall disposed waste stream was obtained from CalRecycle and applied to the City's total tonnage for 2023.[32] Landfill emission factors for each waste type were provided by EPA's WARM.[33]

Table 17 outlines annual generation and related GHG emissions from municipal solid waste within Costa Mesa for baseline year 2023.

Table 17. 2023 Municipal Solid Waste Activity Data and Emissions

| Source | Annual Tons | MT $CO_2e$ |
|---|---|---|
| Municipal Solid Waste | 195 | 95 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

## Off-Road Equipment

Off-road emissions for the municipal inventory include any off-road equipment owned and operated by the City. Fuel consumption and equipment specifications (i.e., make, model, and year) were provided by the City for the entire off-road equipment fleet for 2023. Fuel-specific $CO_2$ emission factors obtained from The Climate Registry were used to estimate $CO_2$ emissions from the City's vehicle fleet.[34]

[32] *CalRecycle. 2021. 2021 Disposal-Facility-Based Characterization of Solid Waste in California (DRRR-2024-1737). https://www2.calrecycle.ca.gov/Publications/Details/1738.*

[33] *EPA. 2023. Documentation for GHG Emission and Energy Factors Used in the Waste Reduction Model (WARM). December. https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste.*

[34] *The Climate Registry 2023, Default Emission Factors.*

Annual fuel consumption and GHG emissions from municipal off-road equipment for baseline year 2023 are provided in Table 18.

Table 18. 2023 Municipal Off-Road Equipment Activity Data and Emissions

| Source | Annual Fuel Use (gallons) | | MT $CO_2e$ |
|---|---|---|---|
| | Gasoline | Diesel | |
| Municipal Off-Road Equipment | 602 | 17,029 | 183 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

# Greenhouse Gas Emissions Forecasts

Forecasting future GHG emissions allows the City to understand how communitywide and municipal emissions are expected to change in the future. GHG emissions are forecasted using two scenarios: a Business-as-Usual (BAU) scenario and an Adjusted Business-as-Usual (ABAU) scenario. The BAU and ABAU projections are both based on the demographic trends discussed in the following section to reflect anticipated growth in the City.

- The BAU scenario describes emissions based on projected growth in population, employment, and other factors and does not consider policies that would reduce GHG emissions in the future.
- The ABAU scenario describes emissions based on projected growth *and* considers policies that will achieve GHG reductions in the future (i.e., assumes federal- and state-mandated GHG emission reduction measures would be implemented by the projected forecast year). The ABAU, unlike the BAU, accounts for adopted GHG emissions reductions because of regulations that would be implemented between the 2023 baseline year and 2030 and 2045.

By estimating emissions forecasts under these two scenarios, the City can evaluate the effect that existing policies may have on future emissions and determine which local measures would provide additional reductions. The additional reductions needed at the local level can also be estimated based on the emission reductions necessary between the "gap" of the ABAU inventory and the state-aligned reduction targets.

## Demographic Trends

Demographic trends are important factors in developing the CAAP because they enable projections, or forecasting, of GHG emissions based on changes anticipated for the City. For example, if residential population is anticipated to increase within a community, GHG

emissions associated with residential population would also increase when not considering other variables that would change the GHG emissions profile.

Forecast years selected for this CAAP include 2030 and 2045. Table 20 outlines the City's baseline 2023 and projected 2030 and 2045 metrics for population, households, employment, and VMT, which were used to project future emissions within the City. Forecasts of VMT are consistent with anticipated demographic changes and reflect the City's current upzoning efforts, including the Neighborhoods Where We Belong initiative, which is expected to add up to approximately 21,000 housing units. These additional units were incorporated into the population, household, and employment projections used to estimate future emissions.

As noted in Table 20, forecasting for on-road transportation is based on VMT; building energy was forecasted based on the projected number of households for residential energy use and on projected employment for commercial and industrial energy use; and GHG emissions related to water, wastewater, and solid waste were forecasted based on population.

Metrics for off-road equipment are not included in Table 19 because the GHG emissions for this sector were forecasted without using demographic trends. GHG emissions related to off-road equipment were forecasted using the CARB OFFROAD model, based on City-specific criteria within the model.

Table 19. City of Costa Mesa Demographic Trends

| Demographic Metric | Applicable Inventory Sector(s) | 2023 Baseline | Projected | | Data Source |
|---|---|---|---|---|---|
| | | | 2030 | 2045 | |
| Population (residents) | Water, Wastewater, Solid Waste | 126,871 | 136,626 | 157,530 | Fehr & Peers[a] |
| Employment (employees) | None | 116,858 | 120,145 | 127,189 | Fehr & Peers[a] |
| Service Population (residents + employees) | Energy (Non-Residential) | 243,730 | 256,772 | 284,719 | Fehr & Peers[a] |
| Households | Energy (Residential) | 49,146 | 54,311 | 65,379 | Fehr & Peers[a] |
| Daily VMT | On-Road Transportation | 3,883,824 | 3,927,159 | 4,020,022 | Fehr & Peers[a] |

*Notes: SCAG = Southern California Association of Governments; VMT = vehicle miles traveled.*

[a] *Fehr & Peers. 2026. Costa Mesa Climate Action & Adaptation Plan (CAAP) Vehicle Miles Traveled (VMT) Methodology and Inventory Summary. April 3.*

## Business-as-Usual Inventory Forecasts

The City's communitywide BAU GHG emissions forecasts for future years 2030 and 2045 are outlined in Table 20. As discussed previously, the BAU forecasts were estimated assuming that emissions would increase in-line with the demographic trends outlined in Table 20 and do not account for policies that would reduce GHG emissions in the future from state or federal legislative action.

### Table 20. Communitywide Business-as-Usual Inventory Projections

| Sector | 2023 Baseline | | 2030 | | 2045 | |
|---|---|---|---|---|---|---|
| | MT $CO_2e$ | % | MT $CO_2e$ | % | MT $CO_2e$ | % |
| On-Road Transportation | 551,893 | 63% | 558,051 | 62% | 571,247 | 59% |
| Energy | 266,921 | 31% | 286,335 | 32% | 327,936 | 34% |
| Water | 3,767 | <1% | 4,094 | <1% | 4,795 | <1% |
| Wastewater | 4,686 | <1% | 5,046 | <1% | 5,819 | <1% |
| Solid Waste | 10,140 | 1% | 10,790 | 1% | 12,182 | 1% |
| Off-Road Equipment | 34,993 | 4% | 37,531 | 4% | 43,837 | 5% |
| Total | 872,400 | 100% | 901,847 | 100% | 965,816 | 100% |

*Notes: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Percentage may not total due to rounding.*

Similarly, Table 21 presents the BAU projections for 2030 and 2045, along with the 2023 baseline, by emission sector for the City's municipal inventory.

### Table 21. Municipal Business-as-Usual Inventory Projections

| Sector | 2023 Baseline | | 2030 | | 2045 | |
|---|---|---|---|---|---|---|
| | MT $CO_2e$ | % | MT $CO_2e$ | % | MT $CO_2e$ | % |
| On-Road Transportation | 2,463 | 53% | 2,595 | 53% | 2,877 | 53% |
| Energy | 1,737 | 37% | 1,830 | 37% | 2,029 | 37% |
| Water/Wastewater | 206 | 4% | 217 | 4% | 240 | 4% |
| Solid Waste | 95 | 2% | 100 | 2% | 107 | 2% |
| Off-Road Equipment | 183 | 4% | 192 | 4% | 204 | 4% |

Table 21. Municipal Business-as-Usual Inventory Projections

| Sector | 2023 Baseline | | 2030 | | 2045 | |
|---|---|---|---|---|---|---|
| | MT $CO_2e$ | % | MT $CO_2e$ | % | MT $CO_2e$ | % |
| Total | 4,683 | 100% | 6,118 | 100% | 5,457 | 100% |

*Notes: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Percentage may not total due to rounding.*

## Adjusted Business-as-Usual Forecasts

As noted above, the ABAU scenario describes emissions based on projected growth *and* considers policies that will achieve GHG reductions in the future. State legislation has been approved and/or adopted that will reduce GHG emissions in Costa Mesa. Federal and state policies do not require additional local action but should be accounted for in the City's emissions forecasts to provide a more accurate picture of future emissions and the level of local action needed to reduce emissions to levels consistent with state recommendations.

The relevant federal and state policies and related ABAU projection assumptions are detailed in Table 22.

Table 22. Adjusted Business-as-Usual Projection Assumptions

| Emissions Sector | Policies | ABAU Assumptions |
|---|---|---|
| On-Road Transportation | Advanced Clean Cars for model year 2016+<br>Pavley I federal standard for model year 2012–2016<br>Truck and Bus Rule (including the 2014 Amendment)<br>Heavy-Duty GHG Phase 1 (2013), which includes the 2013 Tractor-Trailer GHG Regulation Amendments and Federal Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles<br>Federal GHG Phase 2 GHG Standards for Medium- and Heavy-Duty Engines and Vehicles<br>Advanced Clean Trucks<br>Innovative Clean Transit | Included in EMFAC 2025.[a] |

Table 22. Adjusted Business-as-Usual Projection Assumptions

| Emissions Sector | Policies | ABAU Assumptions |
|---|---|---|
| Energy | Renewables Portfolio Standard | Percent renewable targets for Renewables Portfolio Standard include the following:<br>▪ 60% by 2030 (SB 100)<br>▪ 90% by 2035 (SB 1020)<br>▪ 95% by 2040 (SB 1020)<br>▪ 100% by 2045 (SB 1020)<br>A revised GHG intensity value was calculated based on the 2023 Power Content Label value for SCE[b] adjusted to assume a percent of the power mix would be from eligible renewables per SB 100 and SB 1020 as appropriate for 2030 and 2045. |
| | 2022 Title 24 Building Energy Efficiency Standards | Energy consumption was manually adjusted for electricity and natural gas assumed to be generated by development after 2023.<br>Energy reductions were assumed based on the difference in energy use between the 2019 and 2022 Title 24 code that takes into account requirements for heat pump standard design for single-family, multifamily, and non-residential, and photovoltaic and battery storage for multifamily and non-residential.[c] |
| Water | Renewables Portfolio Standard | Incorporated into the SCE[b] GHG intensity for future years 2030 and 2045. |

### Table 22. Adjusted Business-as-Usual Projection Assumptions

| Emissions Sector | Policies | ABAU Assumptions |
|---|---|---|
| Wastewater | Renewables Portfolio Standard | Incorporated into the SCE[b] GHG intensity for future years 2030 and 2045. |
| Solid Waste | None | N/A |
| Off-Road Equipment | None | N/A |

*Notes: ABAU = Adjusted Business-as-Usual; GHG = greenhouse gas; EMFAC = EMission FACtor; SB = Senate Bill; SCE = Southern California Edison, OCPA = Orange County Power Authority; N/A = not applicable.*

[a] *CARB. 2021. EMFAC2021 Volume III Technical Documentation. April. https://ww2.arb.ca.gov/sites/default/files/2021-08/emfac2021_technical_documentation_april2021.pdf.*

[b] *SCE Power Content Label.*

[c] *California Energy Commission. 2023. Impact Analysis for the 2022 Update to the California Energy Code. June. https://www.energy.ca.gov/publications/2023/impact-analysis-2022-update-california-energy-code.*

The City's communitywide ABAU GHG emissions forecasts for future years 2030 and 2045 are outlined in Table 23, estimated using the assumptions outlined in Table 22.

### Table 23. Communitywide Adjusted Business-as-Usual Inventory Projections

| Sector | 2023 Baseline | | 2030 | | 2045 | |
|---|---|---|---|---|---|---|
| | MT $CO_2e$ | % | MT $CO_2e$ | % | MT $CO_2e$ | % |
| On-Road Transportation | 551,893 | 63% | 428,842 | 61% | 115,488 | 38% |
| Energy | 266,921 | 31% | 222,914 | 32% | 135,505 | 44% |
| Water | 3,767 | <1% | 2,617 | <1% | 0 | 0% |
| Wastewater | 4,686 | <1% | 5,046 | <1% | 5,819 | 2% |
| Solid Waste | 10,140 | 1% | 10,790 | 2% | 12,182 | 4% |
| Off-Road Equipment | 34,993 | 4% | 37,531 | 5% | 43,837 | 12% |
| Total | 872,400 | 100% | 707,741 | 100% | 312,831 | 100% |

*Notes: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Percentage may not total due to rounding.*

Similarly, Table 24 presents the ABAU projections for 2030 and 2045, along with the 2023 baseline, by emission sector for the City's municipal inventory.

Table 24. Municipal Adjusted Business-as-Usual Inventory Projections

| Sector | 2023 Baseline | | 2030 | | 2045 | |
|---|---|---|---|---|---|---|
| | MT $CO_2e$ | % | MT $CO_2e$ | % | MT $CO_2e$ | % |
| On-Road Transportation | 2,463 | 53% | 2,183 | 56% | 1,306 | 63% |
| Energy | 1,737 | 37% | 1,285 | 33% | 345 | 17% |
| Water/Wastewater | 206 | 4% | 182 | 5% | 133 | 6% |
| Solid Waste | 95 | 2% | 85 | 2% | 92 | 4% |
| Off-Road Equipment | 183 | 4% | 181 | 5% | 200 | 10% |
| Total | 4,683 | 100% | 3,916 | 100% | 2,076 | 100% |

*Notes: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Percentage may not total due to rounding.*

# Target Setting

Reduction targets are set to provide a clearly defined pathway to reduce GHG emissions by a specific amount and by a predetermined date. By establishing a target, the City can identify the amount of GHG emissions it must collectively reduce to meet its climate goals. The City's reduction targets are informed by the framework of GHG reduction legislation established through state legislation. A summary of the relevant state legislation and programs is provided in the following section.

## State Greenhouse Gas Reduction Legislation

The state's GHG target setting framework has been established through a series of Executive Orders (EOs) and adopted Assembly Bills (ABs) and Senate Bills (SBs). This framework sets the foundation upon which the City's own target setting is based. The key legislation related to the state's GHG reduction goals is outlined below.

### Executive Order S-3-05 (2005)

EO S-3-05 established California's GHG emissions reduction targets and outlined responsibilities among the state agencies for implementing the EO and for reporting on progress toward the targets. This EO established the following targets:

- By 2010, reduce GHG emissions to 2000 levels
- By 2020, reduce GHG emissions to 1990 levels
- By 2050, reduce GHG emissions to 80% below 1990 levels

## Assembly Bill 32 (2006)

In furtherance of the goals established in EO S-3-05, the legislature enacted AB 32, the California Global Warming Solutions Act of 2006 (California Health and Safety Code Sections 38500–38599). AB 32 provided initial direction on creating a comprehensive multiyear program to limit California's GHG emissions at 1990 levels by 2020 and initiate the transformations required to achieve the state's long-range climate objectives.

## Executive Order B-30-15 (2015)

EO B-30-15 identified an interim GHG-reduction target in support of targets previously identified under EO S-3-05 and AB 32. EO B-30-15 set an interim target goal of reducing GHG emissions to 40% below 1990 levels by 2030 to keep California on its trajectory toward meeting or exceeding the long-term goal of reducing GHG emissions to 80% below 1990 levels by 2050, as set forth in EO S-3-05.

## Senate Bill 32 (2016)

SB 32 codified the 2030 emissions reduction goal of EO B-30-15 by requiring CARB to ensure that statewide GHG emissions are reduced to 40% below 1990 levels by 2030.

## Executive Order B-55-18 (2018)

EO B-55-18 established a statewide policy for the state to achieve carbon neutrality as soon as possible (no later than 2045) and achieve and maintain net-negative emissions thereafter. The goal is an addition to the existing statewide targets of reducing the state's GHG emissions.

## Assembly Bill 1279 (2022)

AB 1279, the California Climate Crisis Act, declared the policy of 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.

Although AB 1279 established an overall policy to achieve net-zero GHG emissions as soon as possible, the legislature recognized the need to implement $CO_2$ removal and carbon capture, utilization, and storage technologies. AB 1279 established a specific target of 85% below 1990 levels by 2045 for anthropogenic GHG emissions. Therefore, the net-zero target does not directly apply to the City, but the 2045 target of 85% below 1990 levels represents the reductions required to contribute to accomplishing the state's overall net-zero policy.

## California Air Resources Board Scoping Plan

CARB is charged with monitoring and regulating sources of GHG emissions. Specifically, as outlined by AB 32, CARB is required to prepare a "Scoping Plan" to achieve the maximum technologically feasible and cost-effective GHG emissions reductions in line with state targets (California Health and Safety Code Section 38561[a]). The Scoping Plan is required to be updated every 5 years and requires CARB and other state agencies to adopt regulations and initiatives that will reduce GHG emissions statewide. The first Scoping Plan (Climate Change Scoping Plan: A Framework for Change) was adopted in 2008 and was updated in 2014, 2017, and 2022.

The 2022 Scoping Plan for Achieving Carbon Neutrality outlines the state's plan to reduce anthropogenic emissions to 85% below 1990 levels by 2045 and achieve carbon neutrality by 2045 or earlier in accordance with AB 1279. The Scoping Plan also assesses the progress the state is making toward reducing GHG emissions by at least 40% below 1990 levels by 2030, as is required by SB 32 and laid out in the Second Update. Furthermore, it indicates that additional reductions are needed by 2030 (i.e., 48% below 1990 levels) for the state to remain on track to achieve net-zero GHG emissions by 2045.

# Methodology

The 2022 Scoping Plan includes guidance for jurisdictions on setting local GHG reduction targets and indicates that these targets should support the state's long-term climate goals established through existing legislation.[35] As such, the City's reduction targets were chosen to align with the relevant reduction goals for future years 2030 and 2045 established by SB 32 and AB 1279, respectively.

The City's 2030 and 2045 reduction targets align with the statewide Scoping Plan, reflecting the City's respective share of statewide reductions needed to achieve long-term climate goals. The City's GHG emission reduction targets were adjusted to be locally appropriate, disaggregating emission sectors from the statewide plan (CARB Scoping Plan) that are not relevant based on local land use, jurisdictional authority, and emission source characteristics. Where limited emissions associated with an otherwise non-applicable sector occur within the City (e.g., agricultural electricity use or equipment), those emissions are captured within other applicable sectors of the inventory and are not treated as a distinct sector for target-setting.

[35] *CARB. 2022. 2022 Scoping Plan, Appendix D: Local Actions. November. https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-d-local-actions.pdf.*

Table 25 provides a review of the 2022 Scoping Plan emission sectors with an assessment of applicability for the City. As shown, the City has direct or indirect jurisdiction over activities that generate emissions and contribute to reductions in five of the seven Scoping Plan emissions sectors included in the statewide emissions inventory. Four of the seven Scoping Plan emissions sectors are relevant to the municipal inventory and are included in the target-setting for municipal reductions.

Table 25. 2022 Scoping Plan Emissions Sectors Applicability

| 2022 Scoping Plan Emissions Sector | Description[a] | Applicability to City of Costa Mesa | |
|---|---|---|---|
| | | Communitywide | Municipal |
| Transportation | The transportation sector includes emissions from in-state fuel combustion by on-road vehicles, intrastate flights, trains, waterborne vessels, and a few other smaller sources. | Applicable. The City's communitywide inventory includes emissions from on-road transportation, consistent with the calculated VMT.[b] | Applicable. The City's municipal inventory includes emissions from on-road transportation, including employee commute and vehicle fleet. |
| Electric Power | Electric power sector emissions include two broad categories: in-state generation (including the portion of industrial and commercial cogeneration emissions attributed to electricity generation) and imported electricity. | Applicable. The City's communitywide inventory includes emissions from electricity use, consistent with the usage information provided by SCE[c] (kWh). | Applicable. The City's municipal inventory includes emissions from electricity use, consistent with the usage information provided by SCE[c] (kWh). |
| Industrial | Emissions in this sector are primarily driven by fuel combustion from sources that include refineries, oil and gas production, cement plants, and the portion of cogeneration emissions attributed to thermal energy output. | Applicable. The City's communitywide inventory includes emissions from industrial energy use, consistent with the usage information provided by SCE (kWh) and SoCalGas[d] (therms). | Not Applicable. The City's municipal operations do not include activities or emissions from industrial sources. |

Table 25. 2022 Scoping Plan Emissions Sectors Applicability

| 2022 Scoping Plan Emissions Sector | Description[a] | Applicability to City of Costa Mesa | |
|---|---|---|---|
| | | Communitywide | Municipal |
| Commercial and Residential | Greenhouse gas emissions from the commercial and residential sector come predominantly from the combustion of fossil gas and other fuels for uses such as space heating, cooking, water heating, and steam generation. | Applicable. The City's communitywide inventory includes emissions from residential and commercial natural gas use, consistent with the usage information provided by SoCalGas[d] (therms). | Applicable. The City's municipal inventory includes emissions from commercial natural gas use, consistent with the usage information provided by SoCalGas[d] (therms). |
| Agriculture | Major emissions sources in the agricultural sector include enteric fermentation and manure management from livestock, crop production (fertilizer use, soil preparation and disturbance, and crop residue burning), and fuel combustion (water pumping, heating buildings, processing commodities, and tractors). | Not Applicable. The City does not have agricultural production activities or emissions sources consistent with the CARB-defined Agriculture sector. Limited emissions associated with electricity consumption or off-road equipment attributed to agricultural uses are captured within the Electric Power and Off-Road Equipment sectors of the community-wide inventory and are therefore not included as a standalone Agriculture sector for target-setting purposes. | Not applicable. The City's municipal inventory does not include sources of agricultural emissions. |
| High Global Warming Potential | High GWP emissions include releases of ozone-depleting substance substitutes, sulfur hexafluoride emissions from the | Not Applicable. The City does not have jurisdictional control or ability to influence emissions from the electricity transmission | Not Applicable. The City does not have jurisdictional control or ability to influence emissions from the electricity transmission |

Table 25. 2022 Scoping Plan Emissions Sectors Applicability

| 2022 Scoping Plan Emissions Sector | Description[a] | Applicability to City of Costa Mesa | |
|---|---|---|---|
| | | Communitywide | Municipal |
| | electricity transmission and distribution system, and emissions from semiconductor manufacturing. | and distribution system or from semiconductor manufacturing. | and distribution system or from semiconductor manufacturing. |
| Recycling and Waste | Emissions from the recycling and waste sector include $CH_4$ and $N_2O$ emissions from landfills and commercial-scale composting. | Applicable. The City's communitywide inventory includes emissions from recycling and waste, consistent with the usage information provided by the City and the EPA WARM model.[e] | Applicable. The City's municipal inventory includes emissions from recycling and waste, consistent with the usage information estimated based on generation rates for similar regional jurisdictions. |

*Notes: VMT = vehicle miles traveled; SCE = Southern California Edison; kWh = kilowatt-hour; SoCalGas = Southern California Gas Company; GWP = global warming potential; $CH_4$ = methane; $N_2O$ = nitrous oxide; CalRecycle = California Department of Resources Recycling and Recovery.*

[a] *CARB. 2025. California Greenhouse Gas Emissions from 2000 to 2023: Trends of Emissions and Other Indicators. November 4. https://ww2.arb.ca.gov/sites/default/files/2025-11/nc-2000_2023_ghg_inventory_trends.pdf.*

[b] *Fehr & Peers. 2026. Costa Mesa Climate Action & Adaptation Plan (CAAP) Vehicle Miles Traveled (VMT) Methodology and Inventory Summary. April 3.*

[c] *SCE. 2025. 2023 City of Costa Mesa Community Electricity Usage.*

[d] *SoCalGas. 2025. 2023 City of Costa Mesa Community Natural Gas Usage.*

[e] *EPA. 2023. Documentation for GHG Emission and Energy Factors Used in the Waste Reduction Model (WARM). December. https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste.*

In instances where the statewide emissions inventory included emissions sectors not relevant to the City (i.e., Agriculture and High Global Warming Potential), these sectors and related emissions were disaggregated from the statewide GHG emissions inventory and Scoping Plan projections. Table 26 outlines the adjusted statewide reduction targets when only including sectors relevant to the City.

As shown in Table 26, when adjusting for only the relevant sectors, the reduction targets (percent below current levels) for 2030 and 2045 are 36.6% and 86.9%, respectively. The statewide emissions used here assume implementation of the Scoping Plan Scenario, as outlined in the 2022 CARB Scoping Plan. As discussed previously, this scenario accounts for

additional reductions needed by 2030 (i.e., 48% below 1990 levels[36]) for the state to remain on track to achieve net-zero GHG emissions by 2045.

Table 26. Adjusted Statewide Emissions Reductions

| Sector | Statewide Inventory[a] ($MMT CO_2e$) | CARB Scoping Plan Scenario[b] ($MMT CO_2e$) | |
|---|---|---|---|
| | 2023 | 2030 | 2045 |
| Transportation | 134 | 81 | 8 |
| Electric Power | 57 | 39 | 9 |
| Industrial[c] | 67 | 41 | 12 |
| Commercial and Residential | 43 | 27 | 4 |
| Recycling and Waste | 9 | 9 | 8 |
| Total Adjusted Emissions | | | |
| *Communitywide Sectors* | *310* | *196* | *41* |
| *Municipal Sectors* | *243* | *156* | *29* |
| Emission Reduction Target (percent below current levels) | | | |
| *Communitywide* | *N/A* | *36.6%* | *86.9%* |
| *Municipal* | *N/A* | *35.8%* | *88.0%* |

*Notes: MMT $CO_2e$ = million metric tons of carbon dioxide equivalent; CARB = California Air Resources Board; N/A = not applicable.*

[a] *Statewide inventory data was obtained from CARB's current trends report data.*[37]

[b] *Statewide emission projections were obtained from CARB's Scoping Plan Scenario modeling.*[38]

[c] *Per results of Table 25, the industrial sector is not relevant to the municipal inventory and was therefore not included in the municipal target-setting.*

## City of Costa Mesa Reduction Targets

As discussed above, the City's CAAP is developed to align with the goals of SB 32 and AB 1279 for future years 2030 and 2045, respectively. Table 27 outlines the City's communitywide and municipal GHG reduction targets, which were estimated using the percentage reductions calculated from the adjusted CARB statewide inventory and Scoping Plan Scenario projections in Table 26. Given that the Scoping Plan Scenario projections were modeled to

[36] *The 48% below 1990 levels is CARB's mathematical benchmark (i.e., interpolated value) between 2022 and 2045 to achieve AB 1279 GHG emission reduction targets and does not supplant the established SB 32 2030 GHG emission reduction target of 40% below 1990 levels.*

[37] *CARB. 2025. Current California GHG Emission Inventory Data 2000-2023. https://ww2.arb.ca.gov/ghg-inventory-data.*

[38] *CARB. 2022. CARB Scoping Plan Model Outputs. November 14. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.*

demonstrate achievement of the relevant future state legislative targets for 2030 and 2045, aligning the City reduction targets with these adjusted percentages will ensure that the City is doing its fair share in helping the state reach its SB 32 and AB 1279 reduction goals.

### Table 27. Communitywide 2030 and 2045 Reduction Targets

| Inventory | Baseline | Reduction Target (MT $CO_2e$) | |
|---|---|---|---|
| | 2023 | 2030 | 2045 |
| Communitywide | 872,400 | 36.6% below baseline: 553,029 | 86.9% below baseline: 114,190 |
| Municipal | 4,683 | 35.8% below baseline: 3,005 | 88.0% below baseline: 560 |

*Note: MT $CO_2e$ = metric tons of carbon dioxide equivalent.*

Tables 28 and 29 compare the City's GHG reduction targets to the ABAU emissions projections for communitywide and municipal, respectively. The 2030 and 2045 emissions targets outlined in Tables 28 and 29 are presented with the projected ABAU emissions and remaining GHG reductions needed to meet targets, referred to as the "local gap."

### Table 28. Communitywide 2030 and 2045 ABAU Emissions and Reduction Targets

| Sector | GHG Emissions (MT $CO_2e$) | |
|---|---|---|
| | 2030 | 2045 |
| ABAU | 707,741 | 312,831 |
| Percent Below Baseline Level (%) | 36.6% | 86.9% |
| Target | 553,029 | 114,190 |
| Local Gap | 154,711 | 198,642 |

*Notes: ABAU = adjusted business-as-usual; GHG = greenhouse gas; MT $CO_2e$ = metric tons $CO_2e$.*

### Table 29. Municipal 2030 and 2045 ABAU Emissions and Reduction Targets

| Sector | GHG Emissions (MT $CO_2e$) | |
|---|---|---|
| | 2030 | 2045 |
| ABAU | 3,916 | 2,076 |
| Percent Below Baseline Level (%) | 35.8% | 88.0% |
| Target | 3,005 | 560 |
| Local Gap | 911 | 1,516 |

*Notes: ABAU = adjusted business-as-usual; MT $CO_2e$ = metric tons of carbon dioxide equivalent.*
*Totals may not sum due to rounding.*

# Summary

The City's baseline inventory estimates indicate that activities related to transportation and energy use are the largest source of communitywide and municipal emissions and will continue to be in future years. GHG emissions from on-road transportation account for the majority of emissions in both the communitywide (63%) and municipal (53%) baseline inventories, followed by emissions related to energy use, which account for 31% and 37% of the communitywide and municipal inventories, respectively. The BAU inventory forecasts indicate that when accounting only for population and employment growth within Costa Mesa, these trends will continue into 2030 and 2045.

As shown with the ABAU inventory forecasts, state legislative actions will result in meaningful reductions from the City's GHG emissions in future years. Overall, legislative actions will achieve approximately 22% reductions in 2030 and 67% reductions in 2045 from the communitywide BAU scenario. These reductions are due to state programs to advance renewable energy procurement (i.e., Renewables Portfolio Standard) and regulations to scale down emissions from vehicles (e.g., CARB's Advanced Clean Cars package of regulations).

Summaries of the City's ABAU emissions, state-aligned reduction targets, and local gap are provided in Figure 1 (communitywide) and Figure 2 (municipal). As shown, while state legislative actions would account for a meaningful portion of the reductions needed to achieve the City's 2030 and 2045 GHG emissions reduction goals; legislative actions on their own would not be adequate to achieve the City's goals. To close the local gap and meet the specified targets, the City will need to implement additional actions to achieve reductions of approximately 154,711 MT $CO_2e$ by 2030 and 198,642 MT $CO_2e$ by 2045 within the community. At the municipal level, the City will need to implement actions to achieve reductions of approximately 911 MT $CO_2e$ by 2030 and 1,516 MT $CO_2e$ by 2045.

Figure 1. Communitywide Adjusted Business-as-Usual Emissions and Reduction Targets.

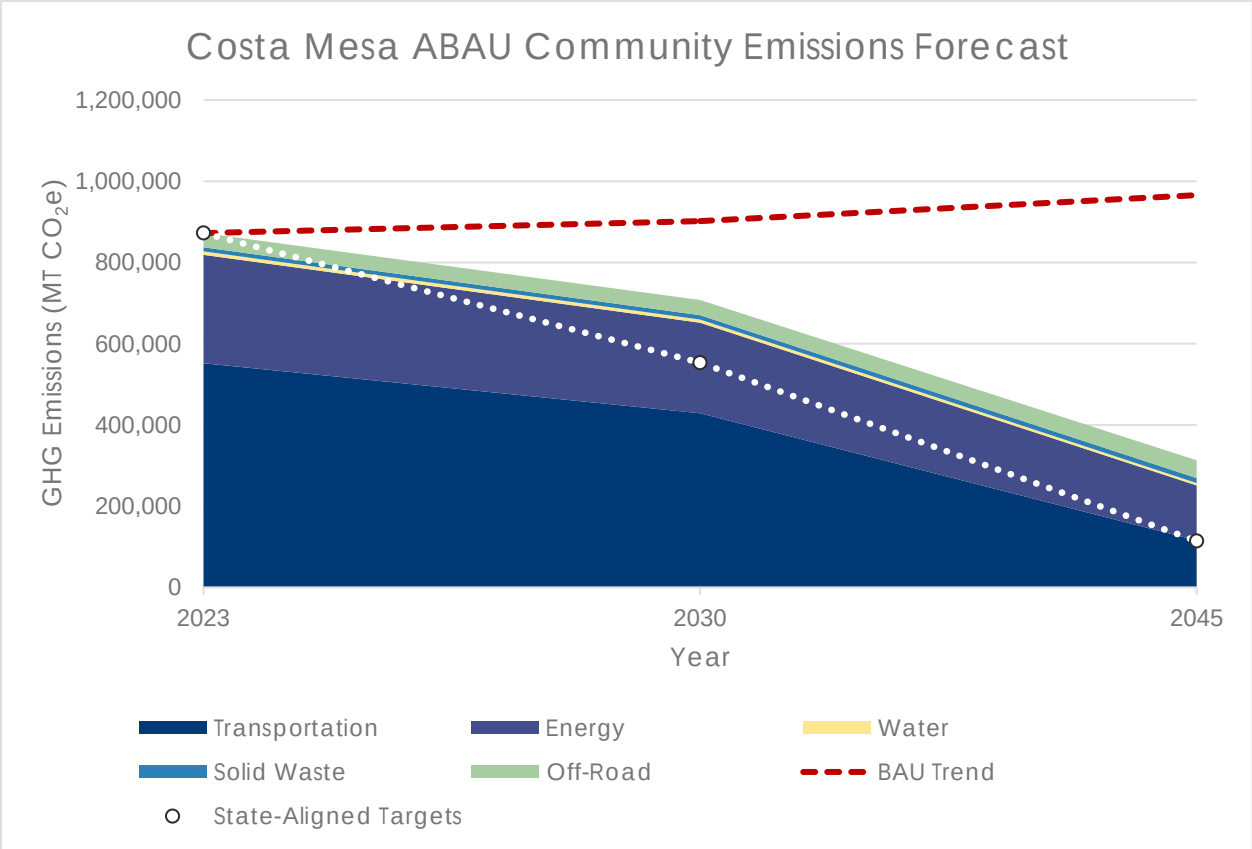
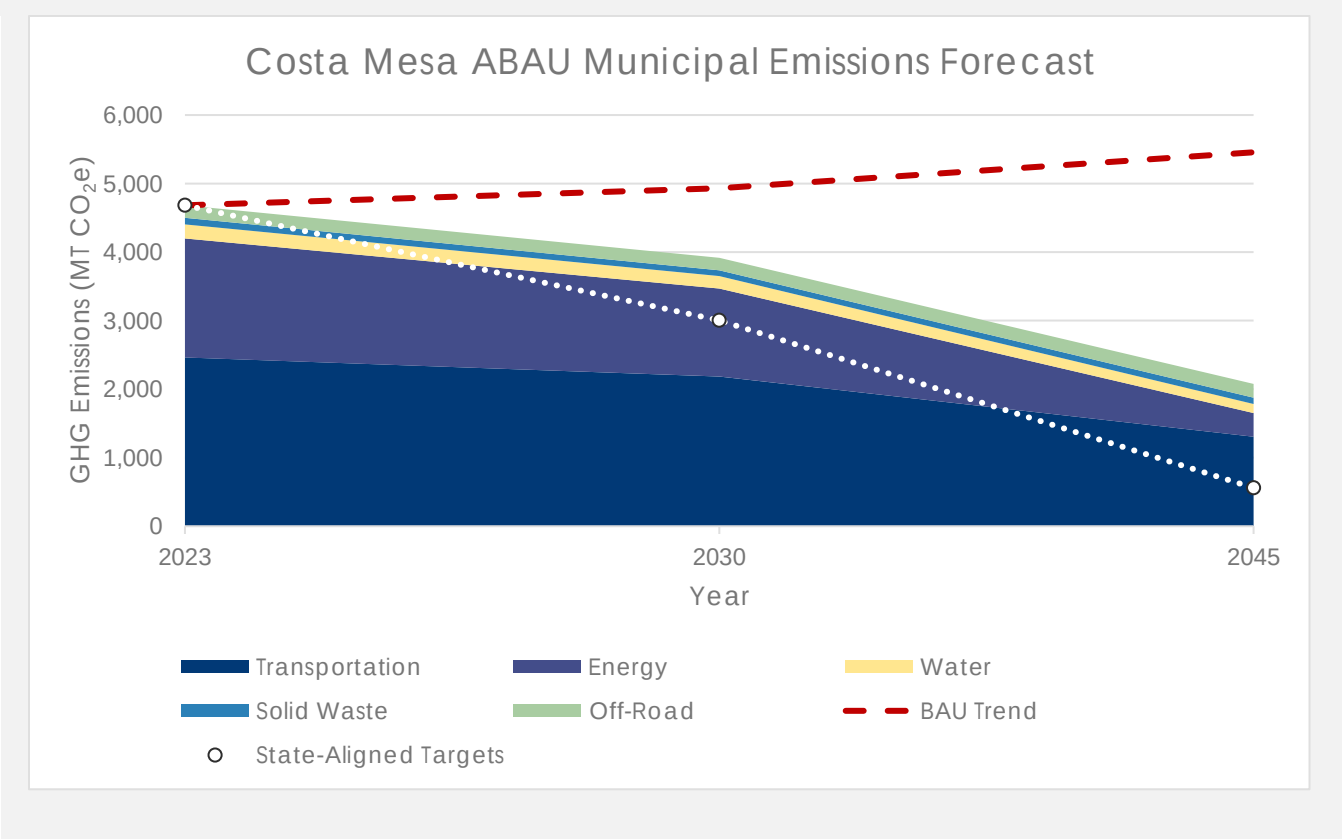


Figure 2. Municipal Adjusted Business-as-Usual Emissions and Reduction Targets.



INTENTIONALLY LEFT BLANK

APPENDIX B

# CLIMATE VULNERABILITY ASSESSMENT

# Climate Vulnerability Assessment

This Climate Vulnerability Assessment describes a detailed understanding of risk (for bolded words, refer to callout definitions below) relative to how community members experience climate-related hazards. It provides context about the City of Costa Mesa's (the City's) residents, built and natural environment, programming, and resources. It details current and projected climate-related hazards and discusses specific anticipated impacts. The Climate Vulnerability Assessment will be summarized within the adaptation chapter of the Climate Action and Adaptation Plan (CAAP) and will inform the development of climate adaptation policies within the CAAP. It may also serve as a resource for future city initiatives and provide a baseline for tracking changes over time.

- Risk
  - Risk considers the overall potential impact of climate-related hazards. It accounts for a community's potential exposure to climate-related hazards in combination with social or environmental factors that exist within the community and can heighten or reduce the impacts of climate-related hazards.
- Climate-related Hazards
  - Climate-related hazards are natural hazards that are impacted by climate characteristics like temperature and precipitation. Climate characteristics are projected to change as a result of greenhouse gases in the atmosphere.[1]
  - The City experiences the following climate-related hazards: drought, extreme heat, fire, and flooding. Compounding hazards, which lead to additional impacts like debris/mud flows or climate migration (people moving as a result of climate-related hazards), will also be considered.
- Climate Adaptation
  - This refers to activities that reduce risks from climate-related hazards, such as infrastructure improvements, hazard preparedness education, or recovery pre-planning.

## Relationship to Other Planning Documents

The City and applicable partner agencies have addressed natural hazards and climate adaptation through several existing plans. These plans respond to varying state and federal requirements, and their development is led by different agencies or departments. The CAAP adaptation strategy builds off these plans by utilizing existing background information and maintaining consistency with existing goals, policies, and programs that dictate local department and partner agency actions. Additionally, this CAAP intends to further City policy

[1] *International Panel on Climate Change (2021) "Climate Change 2021: The Physical Science Basis." https://www.ipcc.ch/report/ar6/wg1/.*

to address areas where existing policies can be built upon or where gaps exist. The related plans are described below.

## Local Hazard Mitigation Plan

The 2022 Local Hazard Mitigation Plan (LHMP) is a strategic document intended to reduce or eliminate the impact of human-caused hazards (for example aircraft crashes) and natural hazards (including climate-related hazards, as well as other natural hazards like earthquakes).[2]

The LHMP identifies hazards that have the potential to impact the City, outlines the vulnerability and risk associated with those hazards, and provides strategies to address hazards. City staff implement the LHMP's programs over time and report on progress during plan updates. The LHMP is updated every 5 years to retain certification and ensure the City is eligible to receive federal, pre-hazard mitigation funding. The LHMP informs the CAAP by providing relevant vulnerability and hazard information, and programs that can be incorporated into the CAAP's policies.

## General Plan

The City's General Plan serves as the official "blueprint" for long-range planning. It establishes the overall vision for the City, including current issues, changing conditions, and long-term community priorities for the 20-year planning horizon (as of the writing of this assessment, the planning horizon is 2035).[3]

Within the General Plan, the Safety Element has policies and programs to address hazards.[4] This element incorporates the LHMP by reference, which allows for it to work seamlessly with the LHMP and fulfills certain state disaster relief funding requirements. City staff implement the Safety Element policies and programs over time, though policies are often higher-level than those included within the LHMP due to the guiding nature of the General Plan. The CAAP will retain consistency with, expand, and refine the climate adaptation analysis and policies provided in the Safety Element to offer more specific implementation guidance.

---

2 *City of Costa Mesa. 2022. Local Hazard Mitigation Plan. Accessed August 1, 2025. https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/local-hazard-mitigation-plan.*

3 *City of Costa Mesa. 2016. 2015-2035 General Plan. https://www.costamesaca.gov/government/departments-and-divisions/economic-and-development-services/planning/general-plan/2015-2035-general-plan.*

4 *City of Costa Mesa. 2016. Safety Element. https://www.costamesaca.gov/home/showpublisheddocument/34702/636740022576330000.*

While the Safety Element is the most important element for this Climate Vulnerability Assessment, other elements of the General Plan discuss relevant topics that can be valuable to inform adaptation policy. For example, the Housing Element provides information on housing characteristics in the community, and that's relevant information because people often shelter from climate-related hazards in their homes. Depending on the dwelling's characteristics, residents may require different behaviors to withstand hazards (people without A/C may open windows or take cool showers during extreme heat events), while others may face barriers to making resilience improvements (i.e., renters may have limited control or incentive to install insulated windows or cool roofs).

## Urban Water Management Plan and Water Shortage Contingency Plan

The City has two water providers, Mesa Water District and Irvine Ranch Water District. Each district develops plans to address effective water management and consistent water supply in the face of drought.

Urban Water Management Plans (UWMP) assess the reliability of the water supply and drought risk and outline the approach to proactively plan for water supply.[5], [6] Key elements of a UWMP include efficient use of urban water supplies, water conservation programs, and other policies. In addition, UWMPs assess water reliability given normal and dry year scenarios. These plans are updated every 5 years and approved by the California Department of Water Resources. They serve as a way to regulate and benchmark water providers. Water providers implement the programs outlined in Urban Water Management Plans.

Water providers also have Water Shortage Contingency Plans (WSCP) as part of Urban Water Management Plans. WSCPs provide steps for the water provider to assess if a water shortage is occurring, outline appropriate actions based on the level of shortage, and provide implementation details such as communications planning, monitoring and enforcement.

UWMPs and WSCPs provide relevant water supply data and policies that the CAAP will support.

[5] *Mesa Water. 2021. 2020 Urban Water Management Plan. https://www.mesawater.org/sites/default/files/Save%20Water/Documents/Mesa%20Water%202020%20UWMP%20FINAL-2021.06.30.pdf.*

[6] *Irvine Ranch Water District. 2021. 2020 Urban Water Management Plan.*

## Community Insights

The following section describes aspects of the City's community members, society, and the natural and built environment. These characteristics can impact how climate-related hazards affect groups of people and areas of the City. By identifying which groups or regions may be more vulnerable, more effective and equitable adaptation strategies can be developed.

This assessment's Hazard Analysis Section considers how these community insights interact with climate-related hazards to impact the City. The Recommendations Section concludes specific policy interventions to limit impacts throughout the community and considers local nuances and existing programs to ensure that gaps are addressed.

# Environmental Health Burdens

Environmental health burdens refer to a combination of socioeconomic, health, and environmental factors which can culminate into disproportionately vulnerable communities to the impacts of pollution. The State uses the CalEnviroScreen 4.0 tool to understand a community's overall environmental health burden. Environmental health burdens can be exacerbated by climate-related hazards, widening the disproportionate burdens experienced. According to the EPA "the most severe harms from climate change fall disproportionately upon underserved communities who are least able to prepare for, and recover from, heat waves, poor air quality, flooding, and other impacts." [7] As such, this section examines the environmental health burdens within the City.

- CalEnviroScreen 4.0
  - CalEnviroScreen 4.0 is a tool developed by the State of California that combines socioeconomic, health, and environmental factors into a single score for each census tract throughout the state. This presents a relative evaluation of local conditions compared to state averages.

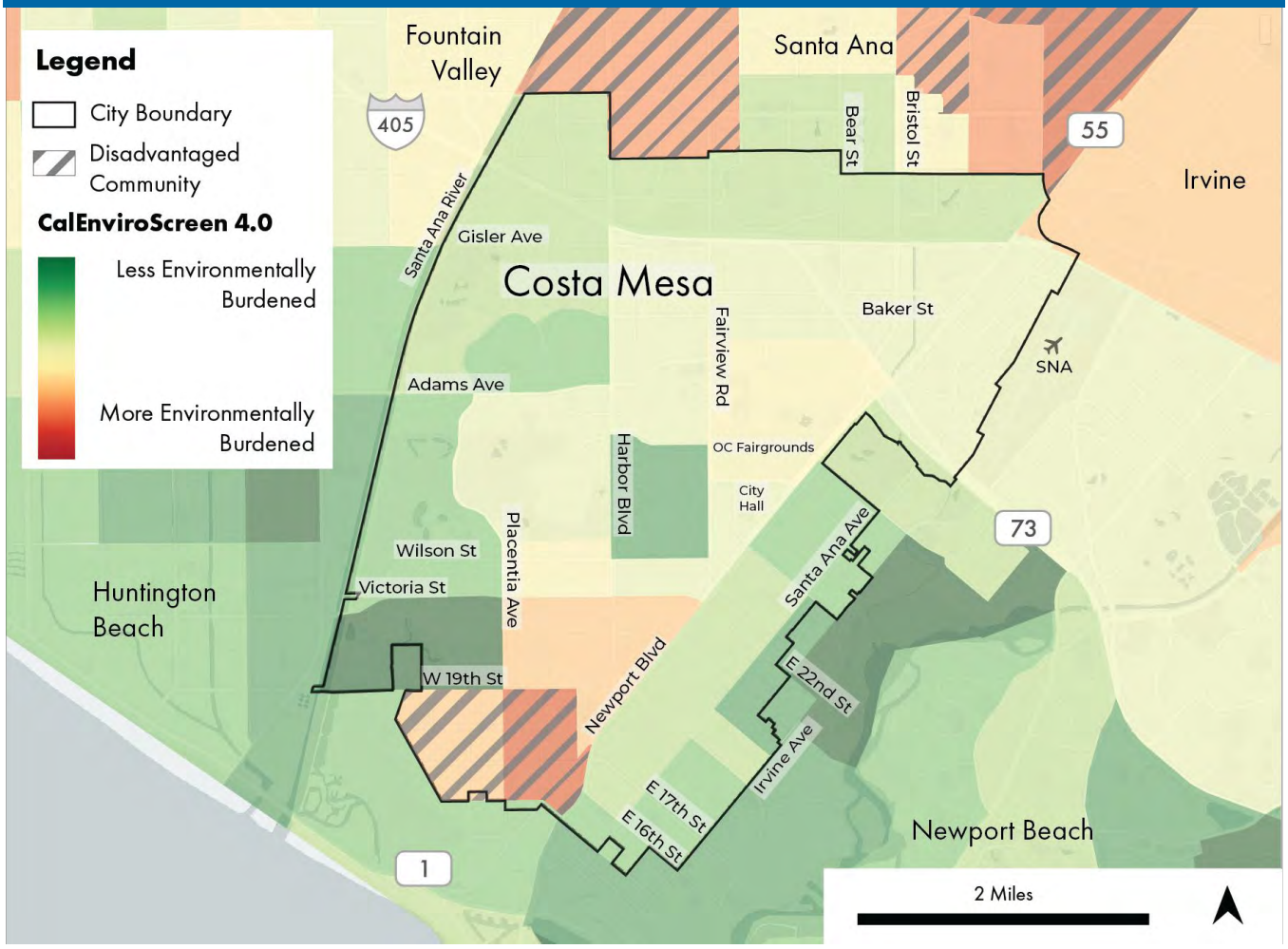
Census tracts that rank in the 75% or higher across California for environmental burden are considered disadvantaged communities (DACs), as are communities considered disadvantaged by the previous state tool, CalEnviroScreen 3.0, and communities that have demographic data gaps but rank in the highest 5% statewide for pollution.

[7] *EPA. 2021. "EPA Report Shows Disproportionate Impacts of Climate Change on Socially Vulnerable Populations in the United States." Accessed July 18, 2025. https://www.epa.gov/newsreleases/epa-report-shows-disproportionate-impacts-climate-change-socially-vulnerable.*

Based on this state definition for DACs, two census tracts in southern Costa Mesa are considered DACs (see Figure 1), bounded approximately by 19th Street to the North, 16th Street to the South, Newport Boulevard to the East, and the City's city limits to the West. Northeast of the identified DACs are some of the next most disadvantaged areas of the City per CalEnviroScreen 4.0. Other tracts throughout the City are generally less environmentally burdened than the average tract in the state.

The City's DACs include a mix of commercial, housing, and industrial land uses. Within the DACs, hazardous waste, cleanup sites, and groundwater threats are the biggest pollution issues present, while poverty and housing burden are the biggest socioeconomic issues.

Figure 1. Disadvantaged Communities per CalEnviroScreen 4.0




*Source: Office of Environmental Health Hazard Assessment. 2021. CalEnviroScreen 4.0: California Communities Environmental Health Screening Tool. California Environmental Protection Agency. https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.*

# Housing

Many climate-related hazards are experienced from home, making certain characteristics of homes important to climate adaptation. For example, when a heat wave is occurring, the cost of electricity may limit a household's choice or ability to run air conditioning. Further, homeownership status is another characteristic that can create limitations or differences for making home retrofits like weatherization upgrades.

## Housing Problems

The City's General Plan Housing Element outlines the following housing problems and severe housing problems:

- Units with physical defects, such as lacking complete kitchen or bathroom, are considered a severe housing problem.
- Overcrowded conditions are a housing problem defined as housing units with more than one person per room excluding bathrooms and kitchens. Severe overcrowding occurs when more than 1.5 people reside per room.
- Housing cost burden is considered a housing problem when housing costs (including utilities) exceed 30% of gross income. Severe housing cost burden occurs when housing costs exceed 50%of gross income.

Nearly half of lower income households in the city (46.5%) experience at least 1 housing problem. Further, just over a quarter of lower income households (28.2%) experience a severe housing problem.[8] The City's Housing Element includes a variety of policies and programs that are intended to address housing problems.

## Renters and Homeowners

Renters and homeowners in the City generally have different experiences with housing problems. Renter-occupied housing units are more commonly overcrowded and severely overcrowded in comparison to owner occupied units. Renters are also more prone to overpayment in the City, with nearly half of renters (48.8%) being housing burdened, while closer to a third of homeowners (31.8%) are housing burdened.[9] These issues are important because nearly 60% of housing units in the City are occupied by renters.

[8] *City of Costa Mesa. 2023. Housing Element. https://www.costamesaca.gov/government/departments-and-divisions/economic-and-development-services/planning/housing-element-update.*

[9] *Ibid.*

## People Experiencing Homelessness

Community members experiencing homelessness can be especially vulnerable to climate-related hazards due to their heightened exposure to the elements. According to the 2024 Point-in-Time count, there were 297 individuals experiencing homelessness in the City, an increase of 43% from the 2022 count. The cause of the increase is difficult to pinpoint, because of the many factors that contribute to a person experiencing homelessness. [10]

The City has created a comprehensive system of care for both those experiencing homelessness and those at risk of homelessness.[11] The City seeks housing for residents, conducts outreach and enforcement throughout the community, and publicizes and coordinates with a network of local and regional organizations offering resources and aid for those in need,.[12] Further, Costa Mesa and Newport Beach jointly fund the Costa Mesa Bridge Shelter, opened in 2021, to serve those experiencing homelessness, sheltering approximately a quarter of community members in the City experiencing homelessness. As of June 30, 2026, Newport Beach exited all their guests from the Bridge Shelter. Additionally, the Costa Mesa Street Medicine Program launched in 2024 and provides comprehensive health care to individuals experiencing homelessness. This program is a collaboration between CalOptima Heath, the City, and community partner Celebrating Life Community Health Center.[13]

In anticipation of moderate to heavy precipitation, the City coordinates in partnership with Lighthouse Church to activate an inclement weather shelter. When activated, the shelter is opened at 8 AM and takes up to 40 individuals at a time, running for 24 hours a day and providing people with accommodations to rest or sleep, three meals per day, and access to restrooms and showers. When available, the Street Medicine vendor is on-site to provide voluntary primary and behavioral health care services, while City Outreach stops by throughout the day to provide case management services.

---

10 *Orange County. 2024. "Everyone Counts: 2024 Point in Time Summary." https://unitedtoendhomelessness.org/wp-content/uploads/2024/05/2024-Point-In-Time-Count-Summary-FINAL.pdf.*

11 *City of Costa Mesa. 2025. "History of Addressing Homelessness in Costa Mesa." https://www.costamesaca.gov/government/departments-and-divisions/city-manager-s-office/network-for-homeless-solutions/frequently-asked-questions-faqs/addressing-homelessness.*

12 *City of Costa Mesa. 2025. "Resources and Getting Help" https://www.costamesaca.gov/government/departments-and-divisions/city-manager-s-office/network-for-homeless-solutions/resources-getting-help.*

13 *CalOptima Health. 2024. "CalOptima Health Launches Street Medicine Program in Costa Mesa with Community Health Center Partner." https://www.caloptima.org/en/about-us/press-releases/caloptima-health-launches-street-medicine-program-in-costa-mesa-with-community-health-center-partner.*

## Physiological Characteristics

Physiological characteristics refer to the physical and biological traits of individuals, which can influence their health and well-being. Many physiological characteristics, such as age or chronic health conditions, can make a person more susceptible to experiencing health issues during hazard events. Table 1, below, shows rates of various conditions and age demographics in the City compared to the County and State. When considering citywide rates, all physiological conditions considered are less prevalent in the City compared to the State average. Rates of these physiological characteristics are generally evenly distributed throughout the City.

Table 1. Physiological Characteristics in Costa Mesa

| Physiological Characteristic | Rate of Physiological Characteristics | | |
|---|---|---|---|
| | Costa Mesa | Orange County | California |
| Heart Disease | 4.44% | 4.84% | 5.16% |
| Asthma | 8.71% | 8.32% | 9.08% |
| Older Adults (age 65 and above) | 11.2% | 14.3% | 14.0% |
| Young Children (age 5 or below) | 5.77% | 5.93% | 6.30% |
| Disability | 3.15% | 3.21% | 4.04% |

*Source: Public Health Alliance of Southern California. 2018. Healthy Places Index. https://map.healthyplacesindex.org/.*

## Socioeconomic Characteristics

Socioeconomic characteristics refer to the social and economic factors that influence and describe the conditions of individuals, households, or communities. These characteristics can impact resident behavior in a variety of ways that alter day-to-day hazard experiences. For example, economic characteristics like job type or income can lead to increased exposure to climate-related hazards or limitations on an individual's ability to respond to climate-related hazards.

### Poverty and Unemployment

Poverty refers to the state in which individuals or households lack adequate income to meet basic needs such as food, housing, and healthcare. Unemployment is the state of actively seeking but being unable to find employment. Both indicators are commonly used to understand a community's economic well-being. When individuals are unemployed or living below the poverty limit they may be unable to adequately respond or recover from climate-related hazards as a result of economic hardship and tradeoffs with other daily necessities.

Unemployment and poverty rates in the City are on par for the region and are better than the State (see Table 2). Higher poverty rates are concentrated in a portion of southern Costa Mesa bounded approximately by Placentia Avenue on the west, 16th Street and Newport Boulevard on the south, Harbor Boulevard on the east, and Wilson Street on the north. Unemployment rates are relatively evenly distributed throughout the City.

- Poverty
  - The federal poverty level in 2025 is $15,650 for an individual, but due to California's high cost of living, poverty rates within this document are defined as 200% of the federal poverty level, or $31,300 for an individual.

## Outdoor Workers

People who work outside regularly experience climate-related hazards like air pollution or extreme heat more often. In the City, outdoor workers are primarily employed in the construction industry. The rate of outdoor workers are relatively similar to the region, and somewhat less than the state (see Table 2).

## Language

Social factors like language proficiency can change the effectiveness of communication methods, which can be especially important for preparedness resources or during emergency response. For the purposes of this Climate Vulnerability Assessment, a person is considered to have limited-English proficiency if they are over age 5 and speak English less than "very well." Overall, the City has a relatively small percentage of people citywide with Limited English Proficiency compared to both Orange County and the State (see Table 2). Lower rates of English proficiency are concentrated in a portion of southern Costa Mesa bounded approximately by Placentia Avenue on the west, 16th Street and Newport Boulevard on the south, Harbor Boulevard on the east, and Wilson Street on the north. In this area, approximately 30% of the population are considered limited-English proficiency. This area includes the previously identified disadvantaged census tract per CalEnviroScreen 4.0. These tracts have a relatively high rate of Spanish speakers.

Table 2. Socioeconomic Characteristics in Costa Mesa

| Health Indicator | Rate of Socioeconomic Characteristics | | |
|---|---|---|---|
| | Costa Mesa | Orange County | California |
| Households Below Poverty Level[1] | 5.8% | 6.2% | 8.5% |
| Unemployment[1] | 2.8% | 2.7% | 3.5% |
| Outdoor Workers[1] | 7.1% | 6.7% | 8.6% |
| Limited English-speaking Households[2] | 4.4% | 8.3% | 8.5% |

*Sources:*

1 *US Census Bureau. 2023. Selected Economic Characteristics. Table DP03.*

2 *US Census Bureau. 2023. Limited English Speaking Households. Table S1602.*

## Community Assets

Community assets refer to public places and key infrastructure throughout the City that fulfill daily needs or are a necessary resource during emergencies. This analysis considers emergency response facilities, public gathering places, and utilities. Understanding these community assets can help to determine how facilities impact adaptive capacity throughout the community, and identify where facilities may be leveraged to provide additional functions.

- Adaptive Capacity
  - A community's ability to withstand, adapt to, and recover from climate-related hazards. City facilities and programs can enhance adaptive capacity by providing more resilient resources for the community.

## Emergency Response Facilities

Emergency response facilities are used by first responders to address hazard events. These facilities include police, fire, and other emergency response services. There are six fire stations distributed throughout the City to allow for uniform response times. The City Police Department is located centrally, and there is a police substation on the westside. There are also two college police or safety departments located on Vanguard University and Orange Coast Community College campuses respectively. During major emergencies, the City activates its Emergency Operations Center (EOC), which is located at adjacent to CMPD headquarters between the police department building and city hall. These facilities play an essential operational role during hazard events, enabling a coordinated response and allowing first responders to reach community members in need. All City facilities described above have backup generators in case power is lost during an emergency.

Hospitals are also essential emergency facilities. During hazard events, life-threatening impacts or injury may occur that require medical attention. College Hospital is located along Victoria Steet and SR-55/Newport Boulevard. There are also nearby hospitals outside the City that can provide emergency services and care to community members, such as Newport Bay Hospital (Newport Beach), Hoag Memorial Hospital Presbyterian (Newport Beach), South Coast Global Medical Center (Santa Ana), Memorial Care Orange Coast Medical Center (Fountain Valley), and Fountain Valley Regional Hospital and Medical Center (Fountain Valley).

All of the facilities discussed above, including those within the City and in adjacent cities, are located outside of hazard zones such as Fire Hazard Severity Zones, FEMA Flood Zones, and Tsunami Hazard Areas. This helps to ensure that these key facilities are able to continue operations during emergencies.

## Gathering Places

Community gathering places (e.g., parks, libraries, etc.) can provide refuge for community members during hazard events. If residents already use these facilities for recreation, social events, education, or other activities in their day-to-day lives, it can make them more welcoming and effective as a cooling center, reception center, or shelter. These locations may also be used to share resources and information to prepare residents for climate-related hazards or assist them with recovery after climate-related hazards occur.

### Parks Facilities

Parks provide places for community gathering, recreation, exercise, habitat for wildlife, and ecosystem services. Greenspace in urban or suburban areas can reduce the heat exposure and promote absorption of stormwater during heavy rain events. Vegetated areas, rain gardens, and bioswales can also absorb rainfall, decreasing stormwater flows.[14]

The City owns and operates a variety of park types with different sizes and purposes, such as:

- Neighborhood Parks – These are smaller parks serving daily needs of local residents.
- Community Parks – These are larger parks offering open space and recreational opportunities like athletic fields or courts.
- Special Use Facilities – These are parks that serve a particular use, such as golf courses. The Costa Mesa Country Club is an example of this type of facility.

[14] *EPA. 2024d. "Performance of Green Infrastructure." https://www.epa.gov/green-infrastructure/performance-green-infrastructure.*

In total, the City owns, operates, and maintains 415 acres of park facilities. Facilities are generally spread throughout the City. Many residents have access to parks and can benefit from them, whether it be their cooling effect on neighborhoods, stormwater management, and ecosystem services. To this point, the City has focused residential development away from areas of the City that have the least access to parks. However, to meet state housing targets, the most recent housing element included a sites inventory that identifies some housing in northern Costa Mesa that would have more limited access to parks compared to much of the residential areas of the City.[15]

The largest contiguous area of parks includes Canyon Park, Fairview Park, Vista Park, Costa Mesa Country Club, and Talbert Regional Park (operated by OC Parks). This portion of western Costa Mesa covers over 500 acres of land.[16] Much of this park space spans along the Santa Ana River, offering potential flood protection.

## Non-City Parks Facilities

In addition to the City's park facilities, there are recreation facilities and open spaces provided within or adjacent to the city but operated and maintained by another jurisdiction. Talbert Regional Park is a major example of this, and offers 244 acres of open space and recreation. Further, the Santa Ana River trail provides recreation and active mobility along it. Orange County Parks and the US Army Corps of Engineers manage the trail. The OC Fair and Event Center, operated by the County, also offers a major hub for recreation, culture, and festivities during the OC Fair and as part of other events that occur there throughout the year.[17] It's 130 acres in total, with 157,000 square feet of event space, a 3-acre working farm, and over 7,500 parking spaces. These facilities and partner agencies have potential to be activated during hazard events. For example, in the past during major hazard events, Orange County has opened up the Equestrian Center at the fairgrounds to house evacuated large animals.

## Water Features

Water features are an important aspect of parks as it relates to extreme heat. Water fountains offer drinking water and water features like pools or splash pads allow for cool recreation during extreme heat events. Most but not all parks have at least one drinking fountain. The Downtown Recreation Center/Lions Park is home to the Downtown Aquatic Center. The

15 *City of Costa Mesa. 2023. "Housing Element Update." https://www.costamesaca.gov/government/departments-and-divisions/economic-and-development-services/planning/housing-element-update.*
16 *City of Costa Mesa. 2018. "Parks, Recreation, and Open Space Master Plan Update." http://ftp.costamesaca.gov/costamesaca/council/agenda/2018/2018-02-13/SS-1-Attach-4.pdf.*
17 *Ibid.*

aquatic center offers youth and adult programming, open lap swimming, and open recreation swimming.[18] No splash pads exist in the City currently.

## Community Centers and Libraries

Community centers are indoor facilities that provide a variety of social and recreational services and programming such as sports, cultural activities, performing arts, youth programs, older adult programs, and human services. The City has four community centers: Balearic Community Center, Downtown Recreation Center, Norma Hertzog Community Center (neighboring the Downtown Recreation Center), and Costa Mesa Senior Center.[19]

The City also has two libraries, the Donald Dungan Library and the Mesa Verde Library. Both are operated by the County.[20]

## Cooling Centers

Cooling centers are publicly available facilities that residents can use to cool off. The City has several facilities that fall under this definition, including the community centers and city hall mentioned above. These spaces act as a place the community can come during normal operating hours to get out of extreme weather. During times of extreme heat which exceed pre-set thresholds, additional services or extended hours for facilities may be made available. For example facilities such as the senior center have been opened on the weekends when they were otherwise closed, and bottled water has been provided at times as well. The City uses social media, 211OC, and the County's website to promote cooling centers. Annually the City coordinates with the County to specify cooling center locations and update business hours.[21]

[18] *Ibid.*
[19] *Ibid.*
[20] *City of Costa Mesa. 2025. "Libraries." https://www.costamesaca.gov/community/libraries.*
[21] *Orange County. 2025. "Cooling Centers." https://www.ocgov.com/cooling-centers.*

# Utilities

Public utilities, such as electricity, water, and natural gas, support daily life and economic activities and provide residents and businesses with day-to-day essentials. Some climate-related hazards can disrupt utilities or cause increased costs for residents. This section describes electricity and water systems present in the City.

## Electricity

### Reliable Power

Reliable power is important to maintain regular daily activities and ensure safe conditions. The City's electricity grid is part of a large network of overhead transmission lines in the Los Angeles Metropolitan Region operated by Southern California Edison (SCE). Three electrical substations within the City connect 33 kilovolt and 92 kilovolt powerlines east to west and north to south through the City.[22] Still, the City is subject to outages as a result of large regional failures from climate-related events such as electricity shortages. Electricity shortages can occur at times of peak demand, such as during extreme heat events when air conditioning usage is highest. Public Safety Power Shutoffs (PSPS) are also a concern in California. However, PSPS are not anticipated to directly impact the City at this time, as there are no identified SCE circuits within the City that could undergo PSPS de-energization.

- Public Safety Power Shutoffs
  - These are power-down events that can be exercised by utilities under high fire threat conditions (dry, warm, high wind events) to prevent potential ignitions.

Grid infrastructure, energy operator actions, and State oversight help to facilitate enhanced regional energy resilience. In addition, the City exercises actions to enhance local energy resilience. The LHMP outlines several energy policies and actions for the City including energy efficiency upgrades, backup power for critical facilities and traffic signals, and infrastructure planning in coordination with SCE.[23]

[22] *California Energy Commission. 2025. "California Electric Transmission Lines." https://cecgis-caenergy.opendata.arcgis.com/search?categories=%252Fcategories%252Fenergy%2520infrastructure.*

[23] *City of Costa Mesa. 2024. "Local Hazard Mitigation Plan." Accessed July 1, 2025. https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/local-hazard-mitigation-plan.*

### Costs

Excessive energy costs can discourage households from utilizing air conditioning. SCE offers several assistance programs for income-qualified households to offset energy costs. These include the California Alternate Rates for Energy (CARE), which provides about a 30% discount on monthly electricity bills for very-low-income households; the Family Electric Rate Assistance (FERA) program, which provides an 18% discount for low-income households; SCE's Energy Assistance Fund (EAF), which provides cash assistance to qualified households once per year; and the Energy Savings Assistance Program (ESAP), which provides qualified households free replacement appliances, weatherization, and LED lightbulbs to conserve energy and thereby lower electricity bills.[24] Altogether, these programs can reduce the burden of energy costs.

## Water

Water supply availability is expected to change in the coming years due to climatic factors discussed later in the Drought section. Water suppliers for the City include Mesa Water District and Irvine Ranch Water District. The City and its suppliers work with several agencies in the area to ensure adequate, reliable, and safe water supplies.

- Water Supplies
  - Water providers can use varying sources to supply their water. This can include using surface water from reservoirs, pumping groundwater, recycling water by treating previously used water to adequate levels (commonly for non-potable uses), or purchasing water from other providers.

### MESA WATER DISTRICT

Approximately 90% of the City's water supplies are provided by the Mesa Water District. All of Mesa Water District's water supply is from local groundwater supplies in the service area. It's also notable that Mesa Water District has instituted permanent water conservation practices and rules for its customers in the City.[25] In an emergency, Municipal Water District of Orange County (MWDOC) provides imported potable water. And in the event of a potential water shortage, Mesa Water District has a Water Shortage Contingency Plan (WSCP) that provides water supply availability assessments, and specific steps to respond to drought or water

[24] *SCE. 2019. "Lower Your Electricity Bill, Increase Energy Efficiency." Energized. Accessed July 16, 2025: https://energized.edison.com/stories/lower-your-electric-bill-increase-energy-efficiency#:~:text=About%20one-third%20of%20SCE%E2%80%99s%20residential%20customers%20are%20enrolled,but%20may%20also%20lower%20the%20amount%20customers%20pay.*

[25] *Mesa Water. 2025. "Water Conservation Ordinance and Watering Rules" https://www.mesawater.org/save-water/conservation-requirements.*

shortage conditions while maintaining reliable water supply. Mesa Water's Drought Risk Assessment concluded that Mesa Water is projected to meet full-service demands through 2045, even for multiple-dry water year scenarios.[26]

## IRVINE RANCH WATER DISTRICT

About 10% of water use in the City is provided by Irvine Ranch Water District (IRWD). IRWD supplies water from a variety of sources, including imported water purchased from the Metropolitan Water District of Southern California (MET) through Municipal Water District of Orange County (MWDOC), groundwater from the Main Orange County Groundwater Basin and Irvine Subbasin, non-potable surface water from Irvine Lake, and recycled non-potable water from IRWD's Michelson and Los Alisos Water Recycling Plants. In 2020, approximately 75% of drinking water was supplied by groundwater sources, while the remaining 25% was purchased or imported. IRWD's 2020 non-potable water supply had a broader mix of sources, including approximately 67% from recycled water, 18% from surface water, 12% from groundwater, and 3% from purchased or imported water.[27]

Similar to Mesa Water District, Irvine Ranch Water District also has a WSCP to address and mitigate water shortage conditions from drought or other issues. IRWD's Drought Risk Assessment projected the District to meet demands through 2040 even under 5-year droughts.[28]

[26] *Mesa Water. 2021. 2020 Urban Water Management Plan. https://www.mesawater.org/sites/default/files/Save%20Water/Documents/Mesa%20Water%202020%20UWMP%20FINAL-2021.06.30.pdf.*

[27] *Irvine Ranch Water District. 2021. 2020 Urban Water Management Plan.*

[28] *Irvine Ranch Water District. 2021. 2020 Water Shortage Contingency Plan. https://www.irwd.com/images/pdf/doing-business/environmental-documents/UWMP/2020_water_shortage_contingency_plan_irwd_adopted_june2021.pdf.*

## GROUNDWATER MANAGEMENT

Due to Mesa Water District and IRWD's reliance on groundwater, sustainable management of groundwater basins are important to ensure water pumping and recharge are balanced. Recharge is how a basin regains water after it is pumped and used. The Orange County Water District (OCWD) manages recharge for the OC basin, and through a variety of projects OCWD has been able to maximize water recharge. Recharge for the basin occurs through multiple sources including natural recharge, recycled water, and imported water.

- Natural recharge occurs when water infiltrates into the basin from precipitation, runoff from the hills and mountains, or groundwater underflows.
- Recycled water is water that has been previously used, treated at a wastewater treatment plant, and injected back into the basin. OCWD currently provides recycled water in north Orange County through their Green Acres Project and Groundwater Replenishment System.
- Imported water is purchased from MWDOC and Metropolitan Water District of Southern California (MET), when available and needed. Untreated imported water can be used to recharge the OC basin through the surface water recharge system.

OCWD has developed a Resilience Plan, which will be relied upon and regularly updated to meet Sustainable Groundwater Management Act compliance, and ensure sustainable management of the groundwater basin.[29]

[29] *Orange County Water District. 2025. "OCWD Resilience Plan." https://www.ocwd.com/wp-content/uploads/WIC.10.a.OCWD_Resilience_Plan-_Final_February-2024.pdf.*

## Hazard Analysis and Impact Assessment

Each City faces their own unique set of climate-related hazards, which are changing differently based on local environmental factors. The following section summarizes information from Federal, State and local data sources to outline historic and future climate-related hazard impacts specific to the City.[30]

The following locally-applicable climate-related hazards were identified and assessed for the City:

- Drought
- Extreme Heat
- Flooding
- Wildfire

For each of these climate-related hazards, there are also unique considerations beyond the direct impacts that are evaluated. For example, several of the climate-related hazards have indirect air pollution impacts, wildfire is impacted by Santa Ana winds, and flooding hazards can be impacted by dam inundation and sea-level rise.

When applicable for each hazard, the following Hazard Criteria are discussed: magnitude, timing, spatial extent. Together these criteria indicate when, where, and how climate-related hazards might impact the City.

- Hazard Criteria
  - Magnitude is the severity or total damage of an impact.
  - Timing describes how often an impact occurs, or when an impact occurs during the year.
  - Spatial extent is the area that is impacted. For applicable climate-related hazards, mapping is used to show areas of more severe or more likely impacts.

Climate-related hazard models and their projections are regularly discussed in the magnitude and timing sections of this assessment to outline hazard trends. These models project hazard events through 2100, and this assessment commonly characterizes projections with mid-century (2035-2064) and end-century (2070-2099) impacts. It's important to understand that climate-related hazard models are heavily impacted by future global GHG emissions and require assumptions to predict future hazard events. To make these assumptions climate

[30] *For more detail on regional climate impacts, refer to California's Fourth Climate Change Assessment Regional Report, which for Orange County is the Los Angeles Region Report.*

models use what are called emissions scenarios, which outline possible pathways for global GHG emissions. These emissions scenarios are discussed or shown on tables, often as it relates to hazard magnitudes.

- Emissions Scenarios
  - The moderate emissions scenario (formally known as representative concentration pathway 4.5 or RCP 4.5) assumes global emissions peak around 2040 and then decline.
  - The high emissions scenario (RCP 8.5) assumes global GHG emissions continue to rise through 2100.
  - By 2050, the two scenarios result in minimal differences so only the high scenario is discussed, in-line with State recommendations. For 2100, both scenarios are discussed to provide a reasonable range of potential outcomes.

For each hazard, the "Impact on Costa Mesa" section describes key City assets most relevant to the specific hazard, and prevalent population groups in the City with heightened potential for impacts from the hazard. While any community member can be impacted by a hazard, some people may be more likely to experience heightened impacts due to physiological, social, economic, or environmental risk factors. For example, age could increase adverse effects from air pollution, a job that's regularly outdoors might cause exposure to extreme heat, or having a fixed or low-income might make recovery from a flood more difficult. These intricacies will be discussed by hazard.

Following the sections on individual climate-related hazards, a section on compounding hazards discusses any outstanding issues where climate-related hazards act in tandem to worsen impacts or create new impacts. Issues like climate migration and debris flows are discussed as compounding hazards.

# Drought

Droughts are periods of time where water supplies become scarce, often as a result of limited precipitation over a number of years. Droughts are relative to long-term averages for precipitation in a region. Local and up-to-date conditions can be viewed online via the U.S. Drought Monitor.[31]

## Magnitude and Timing

For drought, magnitude and timing are discussed concurrently because they are interconnected concepts due to magnitude being tied to length and frequency.

Droughts lasting several years to decades occur naturally in California.[32] Global climate models project significantly drier soils in the future and an 80% chance of a multi-decadal drought during 2050–2099 under a high-emissions scenario. However, the frequency of wet and dry extreme events is also projected to increase between 25% and 100%, with limited changes in mean precipitation totals, indicating both intensified droughts and rainfall events.[33]

## Spatial Extent

Droughts are regional events, though depending on the source of a community's water supply, the region where drought is most impactful to a community may vary. For example, in Southern California water can at times be supplied from the State Water Project or Colorado River, which transport water long distances. In that case, droughts occurring elsewhere can impact local water supply. Given that the City's water is provided primarily from local groundwater, droughts local to the southern California region are most impactful to the City's water supply.

## Impacts on Costa Mesa

### Community Members

Cost is the main implication for community members related to increased drought frequency and intensity. Though poverty rates aren't particularly high in the City, this is still an important impact. Both water providers for the City offer rebate programs to reduce upfront costs for

[31] *National Drought Mitigation Center, National Oceanic and Atmospheric Administration, US Department of Agriculture. 2025. "U.S. Drought Monitor, California" https://www.drought.gov/states/california.*

[32] *Ingram and Malamud-Roam. 2013. "The West without Water: What Past Floods, Droughts, and Other Climatic Clues Tell Us about Tomorrow." Univ of California Press.*

[33] *Swain et. al. 2018. "Increasing precipitation volatility in twenty-first-century California. Nature Climate Change 8: 427-433.*

water efficiency projects, subsequently reducing long-term costs.[34, 35] Home audits and other educational materials are also available to inform residents and businesses about water saving opportunities.

## Infrastructure and City Programs

Drought impacts can vary by region, and understanding how they impact a specific City requires assessment of the utility provider's sources of water supply. As discussed in the earlier Water section, local groundwater is the primary water source for the City's water providers. Drought conditions impact groundwater more slowly than surface water, though recharge of groundwater basins is often reduced during times of drought. With intensified drought paired with more intense rainfall events, adequate groundwater infiltration during storm events will require planning and infrastructure investments. OCWD's Resilience Plan will guide regional efforts for sustainable management of the Orange County groundwater basin, and outlines priority projects that increase stormwater capture, manage sediment at recharge sites for more efficient recharge, and improve seawater intrusion barriers.[36]

[34] *Mesa Water. n.d. "Residential Rebates for Mesa Water Customers." Accessed August 1, 2025. https://www.mesawater.org/Rebates.*

[35] *Irvine Ranch Water District. n.d. "Rebates and Programs." Accessed August 1, 2025. https://www.irwd.com/save-water-money/rebates-programs.*

[36] *Orange County Water District. 2025. "OCWD Resilience Plan." https://www.ocwd.com/wp-content/uploads/WIC.10.a.OCWD_Resilience_Plan-_Final_February-2024.pdf.*

# Extreme Heat

Abnormally high temperatures can cause adverse public health impacts in multiple ways, including through:

- Extreme Heat Days
  - Extreme heat days occur when daily maximum temperatures are abnormally high. For this CAAP we define it as days where the maximum temperatures exceed the 98th percentile in comparison to historical data. In Costa Mesa, this is when temperatures exceed 93° Fahrenheit.
- Heat Waves
  - Heat waves are extended periods of sustained extreme heat. For this CAAP, heat waves are defined as periods of 4 consecutive extreme heat days. Each 4-day period is a separate event, so if extreme heat days persist for 10 straight days, it would be considered 2 heat waves.
- Warm Nights
  - Warm nights are when nighttime temperatures (or the minimum temperature for a day) are abnormally high. Warm nights are often overlooked; however, night is an important time for the human body to cool off and recover from extreme heat experienced during the day. For the purposes of this CAAP, warm nights are defined as nights that exceed 80° Fahrenheit.

## Magnitude

Historically (1961-1990), the City has experienced an average of 3 extreme heat days per year. By mid-century (2035-2064), 11 extreme heat days are projected per year on average. By end-century (2070-2099), under a medium-emissions scenario, 11 extreme heat days per year remain projected, while under a high-emissions scenario that number jumps to 25 extreme heat days per year on average (see Table 3).[37]

Heat waves are also projected to occur more frequently. Historically (1961-1990), in an average year the City did not experience any heat waves. By mid-century (2035-2064), 1 heat wave is expected per year on average. Again, under a medium-emissions scenario for end-century (2070-2099), 1 heat wave remains projected. However, under a high-emissions scenario, 3 heat waves per year on average are projected by end-century (see Table 3).[38]

[37] *Cal-Adapt. 2025. "Extreme Heat Days and Warm Nights for Costa Mesa, Global Climate Models HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5." Cal-Adapt website developed by University of California at Berkeley's Geospatial Innovation Facility under contract with the California Energy Commission. Accessed June 16, 2025. https://cal-adapt.org.*

[38] *Ibid.*

Historically (1961-1990), the City has not experienced warm nights in an average year. So while warm nights may have occurred at some point between 1961 and 1990, less than 15 warm nights occurred in total over that 30-year span. Warm nights are projected to remain uncommon in the City through mid-century and end-century under a medium-emission scenario. However, under a high-emission scenario, by end-century (2070-2099) the City is projected to experience 2 warm nights per year on average, limiting people's ability to recover from extreme heat at night.[39]

Table 3. Extreme Heat Events

| | Historic (1961-1990) | Mid-Century (2035-2064) | End-Century (2070-2099) | |
|---|---|---|---|---|
| | | | Medium-Emission Scenario | High-Emission Scenario |
| Extreme Heat Days | 3 days/year | 11 days/year | 11 days/year | 25 days/year |
| Heat Waves | 0 events/year | 1 event/year | 1 event/year | 3 events/year |
| Warm Nights | 0 days/year | 0 days/year | 0 days/year | 2 days/year |

*Source: Cal-Adapt. 2025. "Extreme Heat Days and Warm Nights for Costa Mesa, Global Climate Models HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5." Cal-Adapt website developed by University of California at Berkeley's Geospatial Innovation Facility under contract with the California Energy Commission. Accessed June 16, 2025. https://cal-adapt.org.*

## Timing

Extreme heat days most commonly occur in the City during the summer months, but they historically (1961-1990) have occurred as early as March or as late as November. By mid-century (2035-2064) the earliest extreme heat day has potential to occur in January, and the latest extreme heat day has potential to occur in December, meaning extreme heat is projected to become a year-round risk.[40]

[39] *Cal-Adapt. 2025. "Extreme Heat Days and Warm Nights for Costa Mesa, Global Climate Models HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5." Cal-Adapt website developed by University of California at Berkeley's Geospatial Innovation Facility under contract with the California Energy Commission. Accessed June 16, 2025. https://cal-adapt.org.*

[40] *State of California. 2018a. "Los Angeles Region Report" In California's Fourth Climate Change Assessment. Accessed July 1, 2025. https://climateassessment.ca.gov/regions/.*

## Spatial Extent

Extreme heat can be experienced differently from one street to another due to the urban heat island effect and other local factors.[41]

- Urban Heat Island Effect
  - Temperatures in urban areas with higher rates of dark and impervious surfaces, like roads, parking lots, and buildings, can be up to 7° F warmer than outlying areas during the day. This is due to these materials absorbing and re-emitting heat more than natural features like trees.

The areas that experience the most severe urban heat islands in the City are large parking lots and turf athletic fields, particularly those located farther inland (See Figure 2).

The urban forest can effectively reduce surface temperatures by providing shade to block the sun's rays. In the City the rate of urban tree canopy cover is near the Statewide level at 11%. The City's urban forest has been growing, and from 2018 to 2022 the tree canopy grew approximately 45 acres citywide.[42] Lower rates of tree canopy in Costa Mesa are seen near Newport Boulevard from the Fairgrounds and Vanguard College south to 16th Street. Commercial and industrial uses are most common in this part of the City though residential is also interspersed.

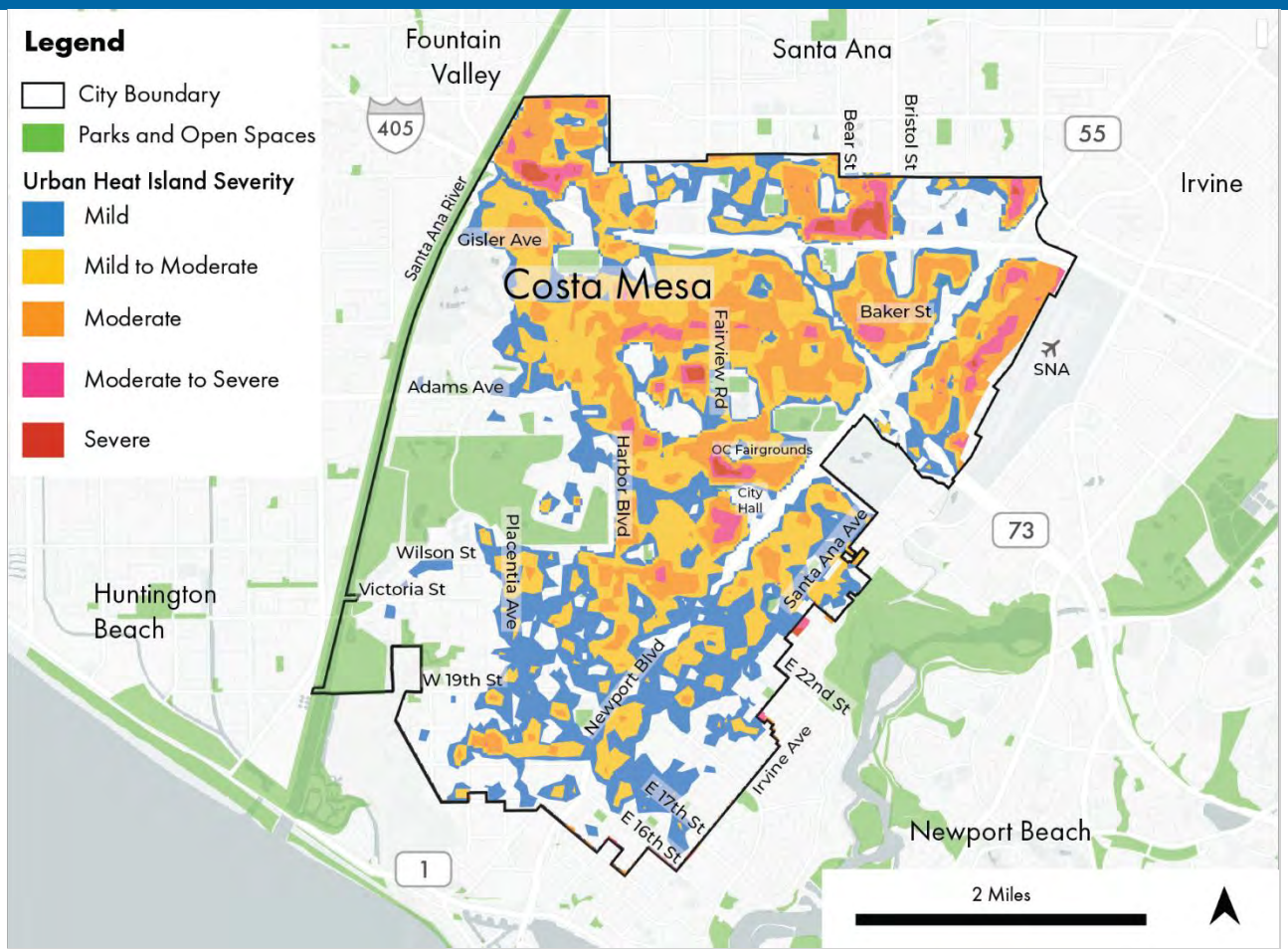
- Urban Tree Canopy Cover
  - This refers to areas directly covered by trees and roughly translates to the amount of available natural shade in the City at midday.

Proximity to the ocean is another major factor that limits the impact of extreme heat in the City. So while portions of Costa Mesa's tree canopy are more limited, proximity to the ocean mitigates temperatures. The inland, northern and eastern parts of the City experience less ocean winds or marine layer fog.

41 *EPA. 2025a. "Heat Island Effect." Accessed June 16, 2025. https://www.epa.gov/heatislands.*

42 *U.S. Department of Agriculture, Forest Service. 2025. "California Urban Canopy Data." Accessed July 1, 2025. https://www.fs.usda.gov/r05/state-tribal-forestry/california-urban-canopy-data.*

## Figure 2. Urban Heat Island Severity in Costa Mesa




*Source: Trust for Public Land. 2023. "Urban Heat Island Severity" https://www.arcgis.com/apps/webappviewer/index.html?id=1b6cad6dd5854d2aa3d215a39a4d372d.*

Note: This data was derived from Landsat 8 imagery band 10 (ground-level thermal sensor) from the summer of 2023. The purpose of this data is to show certain areas of Costa Mesa that are hotter than the average temperature as a whole. Areas that are without color are identified as below the mean temperature for the City.

# Impacts on Costa Mesa

## Community Members

Whereas a heat event can be relatively harmless for those with a reliable means for staying hydrated and cool, it can be deadly for others. Young children, the elderly, or people suffering from serious medical conditions are physiologically more vulnerable to heatstroke. Some senior citizens also take medication that can make it harder for their bodies to maintain a safe internal temperature, creating an additional threat from extreme heat events. Young children may be more vulnerable since they are not aware of the signs of dehydration or ways of protecting themselves from heatstroke.

Homeless people are at a high risk of health complications during heat waves, especially if they are unsheltered. According to the OC Homeless Management Information System data, in 2019, there were approximately 6,860 individuals experiencing homelessness in Orange County, with 57% unsheltered and 42% sheltered.[43] These people are vulnerable to heatstroke during a heatwave, especially if they cannot reach a cooling center.

Sudden spikes in heat can catch people by surprise. Stores can rapidly sell out of fans, air conditioning units, or drinking water during a heatwave. Lower-income households or those with limited mobility may be unable to acquire enough insulation or cooling devices without significant preparations. This can be further compounded by the threat of Public Safety Power Shutoff events. During these events, extreme heat impacts may affect larger portions of the City, as well as populations that would not be viewed as vulnerable under normal circumstances.

Extreme heat can also impact public health through its effects on air quality; higher temperatures can accelerate and trap ground-level ozone, particulate matter, and other air pollutants. Increased exposure to these pollutants can lead to adverse short-term and long-term respiratory, cardiovascular, mental health, and reproductive outcomes.[44] Air pollution in the City is not particularly high compared to much of Southern California, partially due to the proximity to the ocean. Still, there are freeways that pass through the City that will be considered further in CAAP policy.

[43] *OCHMIS.org. 2019. Orange County Point in Time Count 2019: Homelessness in Orange County. http://ochmis.org/wp-content/uploads/2019/08/2019-PIT-Infographic-7.30.2019.pdf.*

[44] *California OEHHA. 2022. "Impacts on Human Health." Indicators of Climate Change in California (2022). https://oehha.ca.gov/media/humanhealthsection2022.pdf.*

Many residents withstand extreme heat events from home, emphasizing the importance of insulation and access to air conditioning. The City has historically experienced limited extreme heat impacts, though that is projected to change in the future. As such, homes may require retrofits to install air conditioning in the future. This is particularly important for inland homes whose temperatures are less moderated by the ocean. Further, if residents already have air conditioning, the costs to run A/C may discourage use. SCE provides a variety of assistance programs that can reduce energy cost burdens for income qualified households. They also offer rebate programs for energy efficiency improvements to reduce up-front costs and provide long-term energy savings, though renters may find it more difficult to utilize the rebate programs due to certain appliances being owned and provided by landlords.[45]

## Infrastructure and City Programs

While SCE is responsible for much of the region's energy infrastructure and resilience, the City can assist SCE with energy resilience by promoting energy efficient development through building code. The City can also continue to develop backup power infrastructure at key city facilities to promote local energy resilience.

[45] *Southern California Edison. n.d. "Income Qualified Programs." Accessed August 1, 2025. https://www.sce.com/save-money/income-qualified-programs.*

# Flooding

Flooding is a key climate hazard where water overwhelms drainage systems and inundates areas in the community, potentially creating public health risks or damaging infrastructure or buildings. The impacts of flooding can endanger human life; damage infrastructure, homes, and other structures; affect water quality through sanitary sewer overflows; and/or disrupt services due to road closures or infrastructure damage.

Flooding primarily occurs during extreme precipitation events when natural drainages and stormwater systems are overwhelmed. Extreme precipitation events in the City are defined as 2-day periods in which there is more than 0.67 inches of rainfall, which historically are 95$^{th}$ percentile events, or events that occur once every 20 years.

Flooding can also occur because of water infrastructure failures, for example a dam or levee failing. This is important to understand for the City due to its proximity to the Santa Ana River, which drains Southern California's largest watershed. To mitigate flood hazard throughout the watershed, major flood control improvements have been implemented along the river course.

Coastal communities may also experience flooding from tidal events, or a combination of storms and tidal events. Although Costa Mesa is not a coastal community, due to its proximity to the coast there is a potential for cascading impacts from coastal flooding such as traffic flow from coastal evacuations, etc.

## Magnitude

### Extreme Precipitation Events

Historically, 1-in-20 year extreme precipitation events in Costa Mesa resulted in 3.41 inches of precipitation. The intensity of extreme precipitation events is projected to increase from historic levels by about 20% by mid-century (2034-3064) to 4.19 inches of precipitation. By end century, intensity is projected to increase from historic levels by about 50% under a high-emissions scenario to 5.1 inches of precipitation. However, under a medium-emissions scenario, extreme precipitation intensity is only projected to increase by about 4% from historic conditions, to 4.52 inches of precipitation.[46]

[46] *Cal-Adapt. 2025. "Extreme Precipitation Events for Costa Mesa, Global Climate Models HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5." Cal-Adapt website developed by University of California at Berkeley's Geospatial Innovation Facility under contract with the California Energy Commission. Accessed June 16, 2025. https://cal-adapt.org.*

That said, atmospheric rivers (regions of water vapor transported from warm water in the tropics) are expected to increase in frequency and intensity. Current global climate models project a nearly 40% increase in precipitation during atmospheric river events in Southern California by 2100 under a high-emissions scenario.[47]

Drought and extreme heat also influence flooding. As both become more frequent and intense (see Drought and Extreme Heat Sections), they can act in tandem to dry out the soil, reducing its ability to absorb moisture, increasing the risk of runoff and subsequent flooding during intense precipitation.

## Dam Failure

Dam failure presents another risk factor for flooding. Major dam and levee infrastructure exists in Orange County to manage stormwater, and that infrastructure is especially applicable to the City due to the Santa Ana River making up the City's western border. The three dams that present flooding potential to Costa Mesa are the Santiago Dam in the unincorporated community of Silverado, the Prado Dam in the City of Corona, and the Villa Park Dam in the City of Orange.

Approximately 33% of dam failures are due to overtopping, which is when water spills over the top of a dam. Overtopping can occur as a result or combination of design issues, maintenance issues, or natural hazards like extreme precipitation. As such, as extreme precipitation events become more intense, the risk of dam failure and subsequent flooding may also increase.

Should dam failure occur, the Santiago Dam could cause flooding for over 5,000 households in the City, the Prado Dam could cause flooding for over 3,000 households in the City, and the Villa Park Dam could cause flooding for over 200 households in the City.[48] Figure 3, Dam Inundation, displays where flooding from dam failure is possible.

## Sea-level Rise

Sea-level rise is a potential issue for coastal communities that can create flooding by increasing the elevation of tidal conditions. While Costa Mesa is not directly on the coast, parts

[47] *State of California. 2018b. "Statewide Summary Report," In California's Fourth Climate Change Assessment. Accessed June 16, 2025. https://climateassessment.ca.gov/state/index.html.*

[48] *City of Costa Mesa. 2024. "Local Hazard Mitigation Plan." Accessed July 1, 202.5 https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/local-hazard-mitigation-plan.*

of the City are within a mile of the ocean. Further, the Santa Ana river runs along the western border of the City and there are estuarine portions of the Randall Preserve (formerly known as Banning Ranch) adjacent to the City that present potential sea-level rise concerns.

Sea-level rise is different depending on where you are in California due to localized seismic processes, called vertical land motion. This assessment uses Los Angeles projections, which represent the nearest NOAA Tide Guage. It's also important to understand that sea-level rise projections have a wider range of scientifically plausible outcomes than other climate-related hazards discussed in this assessment. By 2050 sea-level rise between 0.5 feet and 1.1 feet is plausible, with an intermediate scenario projecting 0.7 feet of sea-level rise compared to levels in the year 2000. By 2100, between 0.6 and 6.3 feet of sea-level rise is plausible, with an intermediate scenario projecting 2.8 feet of sea-level rise.

Open space in the City starts to become at risk of flooding when sea-level rise reaches 4.9 feet above year 2000 levels under normal tidal conditions, or 3.3 feet of sea-level rise in combination with a 100-year storm. It's also important to note that this projection assumes current infrastructure remains the same into the future. As such, the City is not projected to experience impacts from sea-level rise through 2100 at this time.

## Timing

The majority of precipitation events in California occur between November and March, though extreme precipitation is possible at any point during the year. Historically (1961-1990), the City has experienced 5 extreme precipitation events per year on average. Frequency of extreme precipitation is relatively stable and is only expected to increase to 6 events per year by end of century under a high-emissions scenario. Projections for mid-century (2035-2065) and end of century (2070-2099) under a medium-emissions scenario show no changes from historic frequencies of extreme precipitation events.

## Spatial Extent

### Extreme Precipitation

Federal Emergency Management Agency (FEMA) maps denote areas based on flooding risk, including assumptions about infrastructure like levees (see Figure 3, FEMA Flood Zones). The majority of the City is not within a flood zone. Areas that have a 1% chance of flooding are primarily contained within creeks, or roadways, or are open space. A large portion of northeastern Costa Mesa is within a zone denoting 0.2% chance of flooding, or likelihood of a

flood once every 500-years. Additionally, much of northwestern Costa Mesa is within an area with reduced flood risk due to levees.

### Dam Inundation

The City's proximity to the Santa Ana River and major dams make the levee and dam infrastructure particularly important, as is discussed in the magnitude section of this hazard. The Prado Dam, Santiago Creek Dam, and Villa Park Dam each present risk of flooding in northern and western Costa Mesa should failure occur. Figure 4, Dam Inundation displays potential flooding from dam failure. To learn more information about these dams, refer to the City's Local Hazard Mitigation Plan.[49]

### Sea-level Rise

As indicated previously, sea-level rise is not projected to impact the City through 2100. However, should faster than projected sea-level rise occur in combination with extreme precipitation, only open space within the City (including the Frank and Joan Randall Preserve and Talbert Park) are projected to be impacted, with no homes or infrastructure in the impact area, even under the worst plausible case-scenario of 6.6 feet of sea-level rise in combination with a 100-year storm.[50]

## Impacts on Costa Mesa

### Community Members

Extreme precipitation can damage structures or endanger community members by creating conditions for indoor mold to grow, resulting in increased rates of respiratory infection, including pneumonia.[51] The areas at highest risk of flooding in the City primarily exist outside of residential areas, though 500-year storms could create more widespread flooding, potential for infrastructure failures, and damages.

Repairing damage from flooding differs depending on your homeownership status. The City's significant renter population receives housing maintenance through landlords. Rental

[49] *City of Costa Mesa. 2024. "Local Hazard Mitigation Plan." Accessed July 1, 2025. https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/local-hazard-mitigation-plan.*

[50] *Point Blue Conservation Science and U.S. Geological Survey. n.d. Our Coast Our Future." Accessed August 1, 2025. https://ourcoastourfuture.org/.*

[51] *Kontowicz, E., Brown, G., Torner, J., Carrel, M., Baker, K. K., & Petersen, C. A. 2022. Days of Flooding Associated with Increased Risk of Influenza. Journal of Environmental and Public Health, 8777594. https://doi.org/10.1155/2022/8777594.*

maintenance is regulated by the state, and health and safety issues must be addressed by landlords. Homeowners make their own repairs but may find it difficult if they are housing cost burdened, which is common in the City, though more prevalent with renters than homeowners.

## Infrastructure and City Programs

The City's existing local stormwater system, and regional dams and levees largely protect residents from flooding, though extreme precipitation events or nearby dam failures have potential to result in impacts to upwards of 5,000 households and a variety of City facilities.

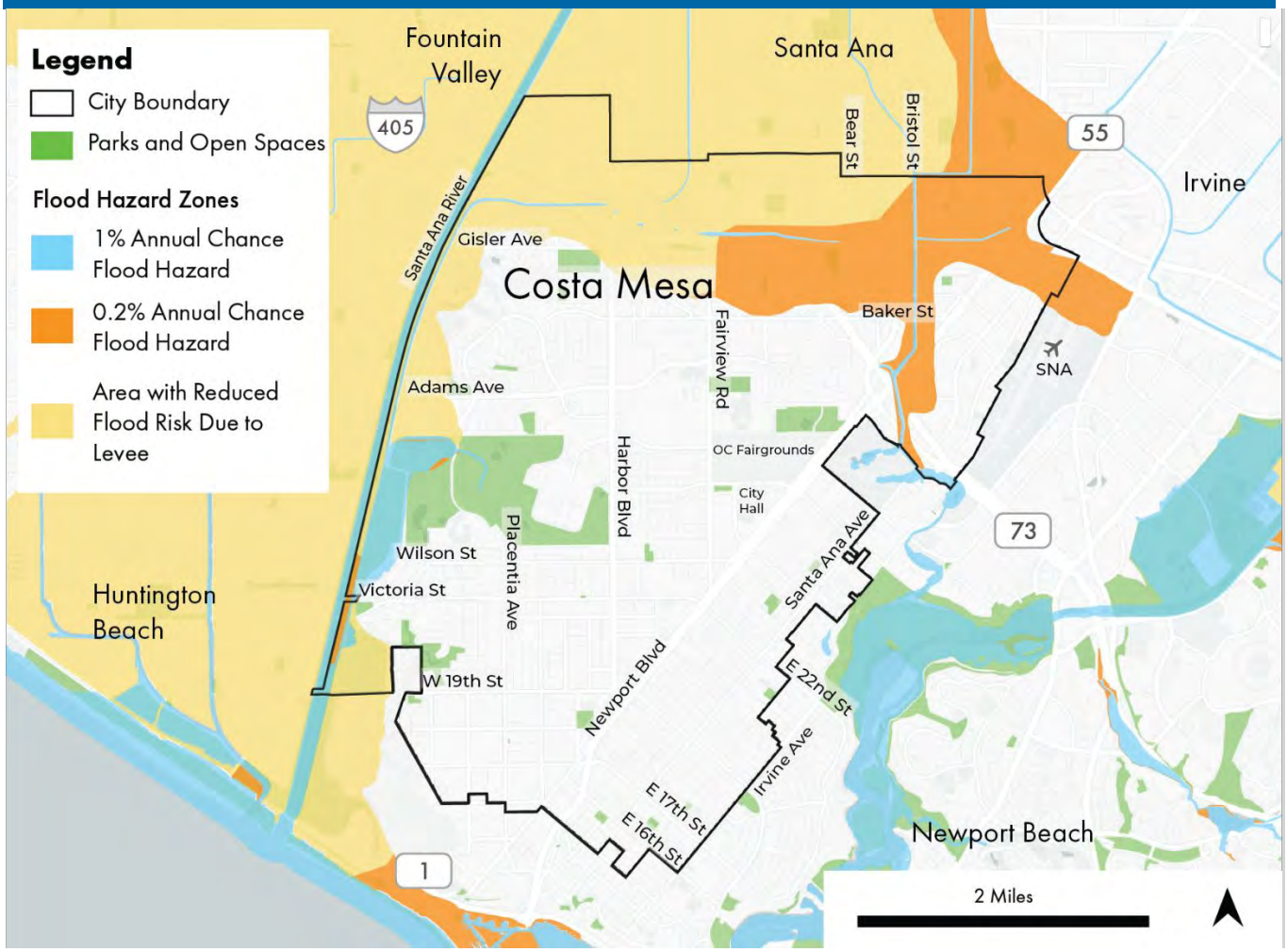
The Army Corps of Engineers (Prado Dam), Irvine Ranch Water District (Santiago Creek Dam), and County of Orange (Villa Park Dam) are the applicable dam owners and operators. Though not always publicly available, operators of dams with significant, high, or extremely high downstream hazard potential must submit an Emergency Action Plan to the California Office of Emergency Services and Department of Water Resources at least every 10 years. These outline responses in the event of a dam failure, including preplanned actions to mitigate damage, notification and coordination procedures, and evacuation routes.[52] Dam operators are also expected to coordinate with the City during testing to ensure readiness in the event of an emergency.

Related to local stormwater infrastructure, the City's Storm Drain Master Plan is periodically updated alongside the LHMP and Capital Improvements Plan to address emerging issues or new data. Further, storm drains are maintained by the City ahead of and during the rainy season.[53]

[52] *Irvine Ranch Water District. n.d. "Dam Emergency Action Plans (EAP)." Accessed August 1, 2025. https://www.irwd.com/construction/dam-emergency-action-plans-eap.*

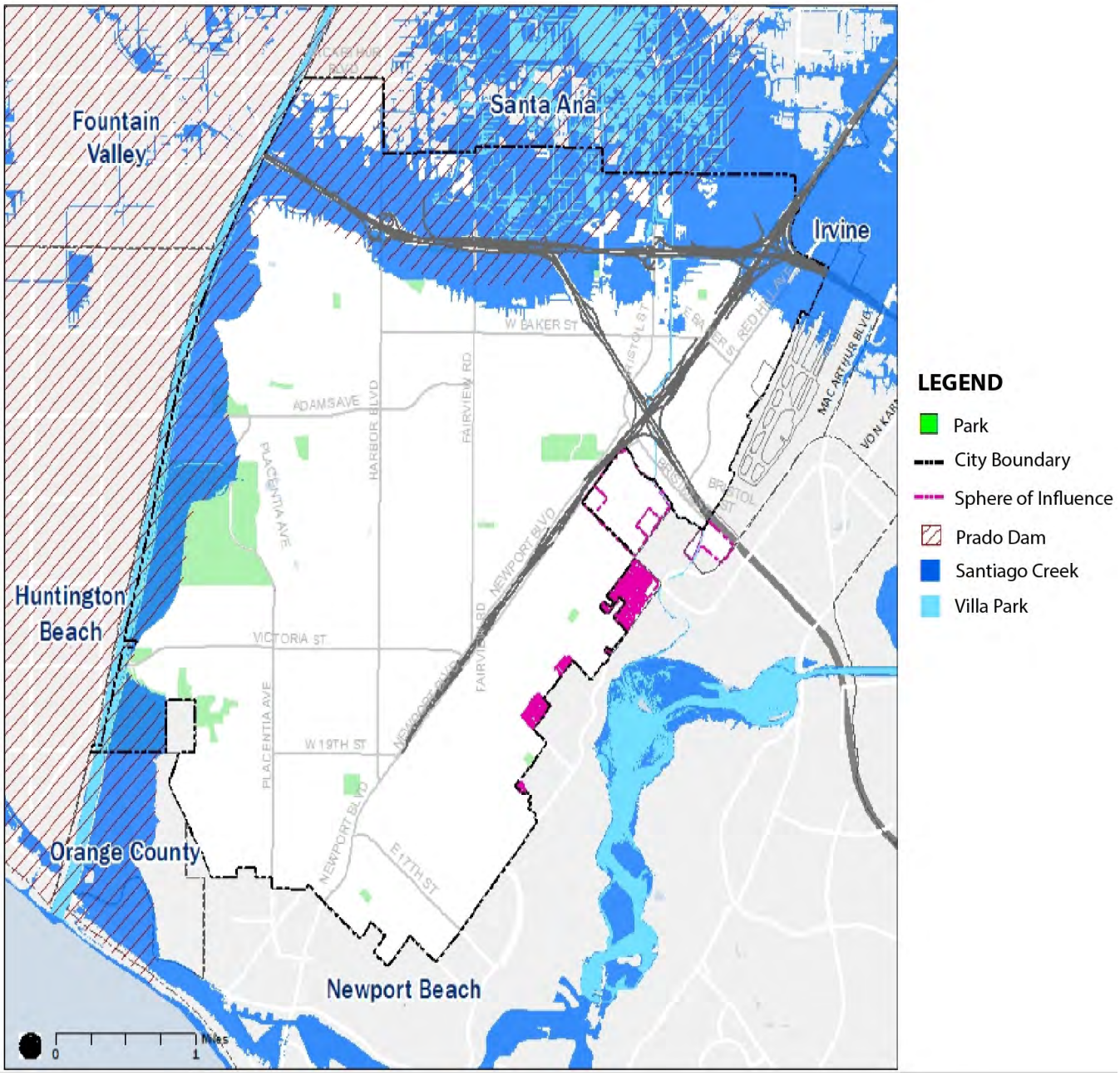
[53] *City of Costa Mesa. 2024. "Local Hazard Mitigation Plan." Accessed July 1, 2025. https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/local-hazard-mitigation-plan.*

## Figure 3. FEMA Flood Hazard Zones




*Source: FEMA. 2025. National Flood Hazard Layer. Accessed June 16, 2025. https://floodmaps.fema.gov/NFHL/status.shtml.*

## Figure 4. Dam Inundation




*Source: California Department of Water Resources, 2020.*

# Wildfire

Wildfires are a type of fire that primarily ignite and burn through wildlands but can spread to developed areas. Often these are large fires that burn over 5 acres in size. Depending on local conditions like wind and topography they can spread quickly, potentially covering thousands of acres in a day.

## Magnitude

Changes in wildfire projections are relatively uncertain, with studies finding between a 12% and 75% increase of burned area by 2050. Studies also find lower increases in burned area by 2100, as continued warming leads to overall fuel declines that limit wildfire intensity over the years.[54]

Santa Ana winds are an important factor that increase the risk of intense and large wildfires. These are a unique climate feature in southern California referring to strong, hot and dry winds that originate inland from high-pressure air masses. These winds carry very dry air that can be catalysts for wildfire outbreaks, such as the 90 mph winds that fueled the 2025 Palisades and Eaton Fires, which burned over 37,000 acres and forced 150,000+ evacuations in Los Angeles County.[55, 56] Orange County has also had major Santa Ana wind fires in recent history, including the Silverado Fire, which occurred in October 2020 during 80 mph winds, burned over 12,000 acres, and forced 70,000 evacuations.[57] In fact, 25% of wildfires in the region occur during Santa Ana events.[58] Projections of the intensity and frequency of Santa Ana wind events are also uncertain at this time. Some global climate models show an increase in future Santa Ana events, but other studies have found that Santa Ana events may decrease by approximately 20% in the future as the weather system that drives the winds weakens due to greater warming over interior land masses.[59]

---

54 *State of California. 2018a. "Los Angeles Region Report." In California's Fourth Climate Change Assessment. Accessed July 1, 2025. https://climateassessment.ca.gov/regions/.*

55 *CAL FIRE. 2025. "Palisades Fire" Accessed June 16, 2025. https://www.fire.ca.gov/incidents/2025/1/7/palisades-fire.*

56 *CAL FIRE. 2025. "Eaton Fire" Accessed June 16, 2025: https://www.fire.ca.gov/incidents/2025/1/7/eaton-fire.*

57 *CAL FIRE. 2022. "Silverado Fire" Accessed June 16, 2025. https://www.fire.ca.gov/incidents/2020/10/26/silverado-fire/.*

58 *State of California. 2018a. "Los Angeles Region Report," In California's Fourth Climate Change Assessment. Accessed July 1, 2025. https://climateassessment.ca.gov/regions/.*

59 *Ibid.*

## Timing

Wildfires can occur at any time in the City, but are most likely to occur during the warm, dry season from April to October. Santa Ana winds blow primarily from October to April and can further increase wildfire risk by exacerbating the spread of fire.[60]

## Spatial Extent

In the City wildfire risk is relatively limited and primarily isolated to the City's overlap with wildlands along Talbert Park. In 2025, Western and Southwestern Costa Mesa were designated as a Fire Hazard Severity Zone (FHSZ), originating in Talbert Park and spreading outward. The City's FHSZ's are primarily open space but also overlap with parcels containing approximately 547 dwelling units, one school, and a religious institution. The City's FHSZ's can be seen on Figure 5. The Talbert Park South fire is the only recorded wildfire within city limits. It occurred in 2018 and burned to 7.5 acres before being contained.[61]

- Fire Hazard Severity Zones
  - These zones are designated by the California Department of Forestry and Fire Protection and adopted by local governments to signify elevated likelihood of fire hazard due to inherent characteristics of the land, like fuel loading, slope, and weather patterns. These zones do not account for mitigation measures such as vegetation management.
  - Areas designated as high or very high fire hazard severity zones are subject to certain Building Code regulations related to ignition resistant building materials for new development, and very high zones are also subject to defensible space vegetation regulations.

## Impacts on Costa Mesa

### Community Members

Wildfires have potential to endanger community members, damage structures, trigger evacuations, and cause poor air quality. As stated above, over 500 dwelling units are located within the City's FHSZ. These homes are most at-risk, but wildfire conditions are variable and can still impact homes outside of the defined hazard zones.

[60] *Cal Matters. 2024. Track California Wildfires. Accessed July 2, 2025. https://calmatters.org/california-wildfire-map-tracker/.*

[61] *CAL FIRE. 2025. Historical Fire Perimeters. Accessed July 1, 2025. https://www.fire.ca.gov/what-we-do/fire-resource-assessment-program/fire-perimeters.*

Although much of is the City is outside of designated FHSZ, wildfire smoke from surrounding regions still poses a relevant public health hazard. Wildfire smoke can exacerbate asthma and increase the risk of heart attack. During California's severe 2015 wildfire season, researchers found a 42% increase in risk of heart attacks 1 day after exposure to dense smoke among adults aged 65 and older.[62]

## Infrastructure and City Programs

To mitigate fire, the City of Costa Mesa Fire Prevention Program includes a comprehensive set of City actions, such as:

- Development and enforcement of local fire, life safety, property, and environmental protection standards;
- Enforcement of State adopted fire & life safety codes;
- Review of building construction plans;
- Inspections of building construction and businesses;
- Investigation of citizen complaints;
- Training of personnel in regard to fire and life safety codes; and
- Public education efforts.

The LHMP outlines other City actions related to vegetation maintenance and landscaping intended to reduce fire hazard in parks, open spaces, and new developments in alignment with state and local recommendations. Following the State's FHSZ designations in the City, Costa Mesa Fire & Rescue Department also developed a Citizen's Guide to answer questions and gather feedback about what it means for residents.[63]

[62] *Wettstein, Z. S., Hoshiko, S., Fahimi, J., Harrison, R. J., Cascio, W. E., Rappold, A. G., & Mott, J. A. 2018. "Cardiovascular and Cerebrovascular Emergency Department Visits Associated with Wildfire Smoke Exposure in California in 2015." Journal of the American Heart Association, 7(8), e007492. http://jaha.ahajournals.org/content/7/8/e007492.long.*

[63] *City of Costa Mesa. 2025. "Wildland Fire Hazard Severity Zones in Costa Mesa." https://apps.costamesaca.gov/gismaps1/apps/storymaps/stories/552b995816f5483dad0825e1954eb874.*

## Figure 5. Fire Hazard Severity Zones




*Source: CAL FIRE. 2025. Fire Hazard Severity Zones. Accessed July 1, 2025. https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones.*

# Compounding Hazards

Compounding hazards occur when multiple climate-related hazards interact, leading to new or more intense impacts than a single hazard in isolation. While some of these impacts have been discussed above where they strongly relate to a specific individual hazard, this section summarizes additional compounding hazards that may be relevant to the City. Understanding these overlapping threats is essential to comprehensively outline potential climate risks in the City.

## Debris Flows

Debris flows, also known as mudslides, are a particularly dangerous type of landslide that moves fast, carrying soil and debris and damaging objects in its path. Wildfire and drought can contribute to conditions that lead to debris flows by burning vegetation or causing vegetation to die off, leading to destabilized hillsides. When extreme precipitation follows these conditions, debris flows are more likely. Landslides have not occurred within the City, but there are deep seated landslide zones identified for the bluffs located in the southwestern portion of the City (See Figure 6, Deep Seated Landslide Zones and Fire Hazard Severity Zones).[64] Approximately 4,149 households, or 10,658 residents, live in the City's deep seated landslide zones.[65] Some of the City's landslide zones overlap with FHSZ's, making the risk of debris flows possible as a result of extreme precipitation following a wildfire in the area.

[64] *City of Costa Mesa. 2024. "Local Hazard Mitigation Plan." Accessed July 1, 202.5 https://www.costamesaca.gov/government/departments-and-divisions/the-office-of-emergency-management/local-hazard-mitigation-plan.*

[65] *Ibid.*

## Figure 6. Deep Seated Landslide Zones and Fire Hazard Severity Zones




*Source: California Department of Conservation. 2019. Deep Seated Landslide. CAL FIRE. 2025. Fire Hazard Severity Zones. Accessed July 1, 2025. https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones.*

## Climate Migration

Climate migration is a phenomenon where people move to a new home as a result of major hazard events. Climate migration in the Southern California region is likely to occur as a result of damage from wildfires or flooding events, and may also occur as a way to avoid chronic issues like extreme heat or regular flooding as a result of sea-level rise. Multiple climate-related hazards may compound to intensify climate migration.

Studies of past climate migration have found the majority of migrants move nearby, often to more resilient nearby cities or neighboring counties.[66] Local economic conditions like unemployment rate and wages of the new location factor into where people choose to move as well; locations with lower unemployment and higher wages are more likely to become permanent resettlements for climate migrants.[67]

Based on the City's fairly limited hazard exposure and favorable economic characteristics, Costa Mesa may be an attractive destination for climate migrants. If and when this climate migration to the City occurs, the housing affordability challenges discussed in the Housing Section may be exacerbated in both the City and across the broader region.

[66] *Eyer, Dinterman, and Miller, Rose. 2018. "The Effect of Disasters on Migration Destinations: Evidence from Hurricane Katrina," Economics of Disasters and Climate Change, Springer, vol. 2(1), pages 91-106, April.*

[67] *Wolsko, C. and Marino E. 2016. "Disasters, Migrations, and the Unintended Consequences of Urbanization: What's the Harm in Getting Out of Harm's Way?" https://www.researchgate.net/publication/282891635.*

# Recommendations

The following section outlines recommended climate adaptation strategies for the City, informed by the Climate Vulnerability Assessment and analysis of climate-related hazards above. These recommendations are intended to complement and build upon or add specificity to the City's existing plans and programs, such as those outlined in the LHMP, and the ongoing work of various City departments. Recommendations are broken down by hazard below.

## Multiple Climate-Related Hazards

### Targeted Outreach and Resources

Community members experiencing homelessness are especially exposed to several climate-related hazards including extreme heat, poor air quality, and precipitation or flooding. The City, neighboring cities like Newport Beach, and homeless service providers should continue to engage community members experiencing homelessness to ensure they are aware of available City resources and partner programs, particularly those that are new or different during hazard events. The City should also work to receive input from people experiencing homelessness if certain resources like cooling centers are not being utilized. Common barriers to cooling center use for people experiencing homelessness, like lack of space for belongings or pets, may be able to be resolved at specific sites.

Renters are another major population in the City that face unique or heightened impacts from certain climate-related hazards. Much of the City's renter population is also housing cost burdened, making things like use of air conditioning less accessible due to the tradeoffs of utility costs. While there are some utility-led rebate programs to reduce long-term costs via water and energy efficient appliances, program participation is often the responsibility of the landlord. To address these issues the City can directly share SCE resources with rental property owners and managers and can promote resources like FAQs about these programs which renters can use to discuss improvements with landlords.

### Regional Collaboration

Regional collaboration is important to address a variety of climate-related hazards that impact not only Costa Mesa, but the broader region, such as dam inundation, water and energy infrastructure, and housing planning for climate migration. Some of the City's risks are tied to infrastructure that is owned and operated by regional agencies or utilities, such as the

electrical grid or levee infrastructure. At times this infrastructure is located within or directly adjacent to the City, though major components are also located throughout the region. As such, the City should regularly coordinate with these agencies to remain apprised of regional efforts and provide input when needed.

Collaboration with applicable regional agencies should include the following:

- For Dam Inundation:
  - The Army Corps of Engineers
  - Irvine Ranch Water District
  - County of Orange
- For Climate Migration:
  - Southern California Association of Governments
  - Orange County Council of Governments
- For Water and Energy Infrastructure:
  - Southern California Edison
  - Mesa Water District
  - Irvine Ranch Water District
  - Orange County Water District

## Extreme Heat

### Shaded and Green Urban Spaces

Extreme heat is an emerging issue that doesn't impact the City evenly. Areas most at-risk are those farther inland with more severe heat islands due to an increase in paved or dark surfaces and fewer trees.

Urban design can be used to reduce extreme heat and strategies should include both quick and affordable public interventions to address urgent needs, and long-term development standards to reduce heat as development occurs. Development code requirements or incentives can address key heat islands like parking lots via additional tree canopy or overhead solar. Where short-term improvements are needed, such as in public places like playgrounds or transit stops, options for immediate relief can include quick-build shade such as shade cloth, and temporary water stations, such as misting tents. These interventions are particularly valuable due to their flexibility, given that they can be deployed specifically during extreme heat events and are not bound to a fixed location.

Landscaping can also address extreme heat through expanded tree canopy citywide or targeted tree shade in important areas. Urban Forest Master Plans or Corridor Master Plans can be developed to identify and manage priority areas. These types of plans can provide the most applicable landscape treatments by aligning landscaping with the existing built environment and balancing other needs such as maintenance, drought and fire concerns, and community desires.

## Cooling Centers

While the City has had a relatively limited need for cooling centers in the past, the projected increase in extreme heat moving forward is expected to heighten community needs. To remain proactive, the City should consider developing a more formalized cooling center approach, or an adaptable suite of options that can be activated as necessary to respond to extreme heat.

Existing community center and senior center facilities, hours of operation, programming, staffing, and marketing through social media, 211, and the County provide a valuable baseline of support and awareness for community members. Several other facilities not run by the City, such as the County libraries, should also be consulted and considered as part of the network of support available to residents, though the City does not have control over operations or improvements.

To increase accessibility, the City can expand or adjust operations during an extreme heat event. Extending hours (i.e. opening facilities over the weekend) has been used in the past at the Senior Center and other Community Centers, and this could be valuable in the future on a case-by-case basis. The CAAP's community survey found that over 30% of survey respondents would be encouraged to go to a cooling center if entertainment or activities were offered, or if there was a space where their pet was allowed to be. Therefore, adaptable facility policies or preplanned programming have potential to encourage resident attendance. Further, nearly 40% of survey respondents said they'd be encouraged if cooling centers were closer to where they live, which may be remedied by promoting where existing cooling centers are available, or may require creative solutions such as partnerships with local organizations or private businesses who might provide cooled, public spaces during extreme heat events.

Long-term resilience improvements should also be considered for key community gathering places. Backup power would help to ensure continuity of operations and access to air conditioning regardless of the potential for blackouts or brownouts during extreme heat events.

### Community Preparedness

Extreme heat exposure outdoors is elevated in certain locations, like turf sports fields or construction sites. While the City does not operate these facilities or directly regulate these companies, staff can coordinate with state agencies and local operators and businesses to share educational resources and facilitate discussion about preventative measures, like access to water, awareness of the signs and symptoms of heat illness, procedural best practices like mandatory breaks and shade availability, and limiting activities during the hottest times of the day. Additionally, promoting "Know Your Rights" resources for outdoor workers can help employees to advocate for themselves if unsafe conditions occur.

## Flooding

### Low Impact Development

Among the climate-related hazards that could affect the City, flooding has the greatest potential to cause widespread and damaging impacts. Much of this is related to the proximity to the Santa Ana River and inland, manmade infrastructure. While the City has a robust stormwater system and enforces state flood mitigation requirements, additional efforts to encourage low-impact development (LID) have potential to reduce flooding hazards and stormwater costs. LID are design elements like bioswales, permeable pavement, or green roofs that mimic natural hydrologic processes, reduce or slow runoff by minimizing impervious surfaces.

There are various ways the City can encourage LID, including fee reductions, low-interest loans or rebates, or permit streamlining. Recognition programs are another option for businesses or homeowners that choose to incorporate LID practices into their properties. Further, some cities require LID practices for development or redevelopment beyond a certain square footage, as part of streetscape standards, or parking lot standards. The City also has landscape standards related to drought-tolerant landscaping that could potentially be integrated with LID practices.

## Wildfire

### Engagement and Education

The City already follows state law and guidance and has engaged with residents regarding the recently designated FHSZs, the required disclosures that come along with High FHSZs, and

the voluntary and recommended actions the State notes. If State regulations regarding FHSZ property requirements change, further engagement will be necessary.

Beyond the City's FHSZs, residents are still impacted by regional fires via smoke. The City can prepare materials ahead of fires that can then be shared when needed to outline the health risks associated with wildfire smoke and offer solutions that reduce exposure and protect public health. At times regional partners like South Coast Air Quality Management District will offer air purifiers, and when those become available for residents, they should be promoted by the City.

## Debris Flows

### Pre-Planning

Debris flows are possible after wildfires in the City due to the City's overlapping wildfire and landslide hazard zones. The City should be proactive in preparation for this risk by conducting pre-planning and outlining best practices to reduce debris flow concerns. Coordination with state partners like the California Office of Emergency Services and California Geologic Survey will help to guide preplanning which may include tailored notification systems, evacuation procedures, or plans for debris flow hazard mapping post-fire.

# Conclusion

This Climate Vulnerability Assessment establishes a clear foundation for Costa Mesa's adaptation policy and actions by synthesizing local hazards, community vulnerabilities, and existing assets. The City faces increasing extreme heat, drought, flooding, and wildfire risks, with more intense heat, drought, and precipitation. Several hazards can also compound to create additional or broader impacts. The assessment highlights that while many Costa Mesa residents and facilities have limited hazard exposure today, projected climate changes will intensify exposures and have potential to amplify inequities throughout the community.

## Key findings

### Hazard Trends:

- Extreme heat days and heat waves are projected to rise substantially throughout the century, with inland portions of Costa Mesa experiencing the most severe exposure.
- Extreme precipitation intensity is projected to increase over time, adding potential for flood exposure emanating from flood zones.
- Drought intensity is projected to increase.
- Wildfire and potential post-fire debris flows remain important localized threats in southwestern Costa Mesa.

### Vulnerable Populations:

Renters, lower-income households, people experiencing homelessness, outdoor workers, and residents in identified disadvantaged census tracts face heightened risk due to heightened hazard exposure, housing characteristics, limited economic resources, or access barriers.

### Community Assets:

The City benefits from well-distributed emergency facilities, parks, and libraries. Water and energy providers plan for long-term resilience for the local water and power supply and infrastructure and offer several programs to lower costs and advance utility resilience for individual community members.

## Recommendations

The following recommendations were developed as a result of the Climate Vulnerability Assessment and will be refined further.

- Advance equitable resilience: Prioritize interventions in disadvantaged tracts and for renters and people experiencing homelessness through outreach, targeted services, and removal of barriers to program participation.
- Regional collaboration: Maintain active coordination with water districts, SCE, OCWD, US Army Corps of Engineers, and regional planning bodies to support and collectively address large-scale needs and migration pressures. Promote partner agency or utility resilience programs to residents to ensure incentives, rebates, or other benefits are received by community members.
- Reduce urban heat: Expand tree canopy and deploy quick-build shade and water features in key community locations and corridors; further integrate shade into development and urban design.
- Preplan for cooling centers: Plan and adjust procedures and infrastructure for cooling centers over time to ensure effectiveness. Consider backup power, amenities to incentivize use, and access and functional improvements to continue to serve diverse needs for a variety of events.
- Strengthen flood resilience: Incentivize low-impact development, bioswales, and permeable surfaces.
- Prepare for compounding events and migration: Incorporate debris-flow planning, post-fire mapping, and regional housing coordination to address potential climate migration and cascading impacts.

To ensure the most effective and impactful adaptation strategy, city actions will need to center equity, incorporate a flexible and phased approach, and establish accountability through clear implementation and monitoring. This assessment provides the background needed to develop the CAAP's adaptation chapter and to guide City decisions that reduce risk, protect public health, and strengthen community resilience.

INTENTIONALLY LEFT BLANK

APPENDIX C

# Outreach and Engagement Materials

# Community Outreach and Engagement

## 1. Overview

To enable participation from a diverse range of community members and interested parties in Costa Mesa, the City took a balanced, multipronged approach to outreach and engagement for the Climate Action and Adaptation Plan (CAAP). Opportunities for engagement included:

- A community open house focusing on CAAP sectors and objectives
- Pop-up outreach activities at well-attended public events
- A community survey to solicit more in-depth feedback
- Internal working group meetings with relevant City departments to facilitate collaboration in the CAAP development process
- An external focus group with key interested parties
- Presentation and workshop with the Coastal Regional Occupation Program Sustainability Cohort
- Site visits to the Mesa Water District Education Center and Orange County Water District
- Public hearing to update the City Council on CAAP progress and outreach
- Digital engagement via social media, the City Hall Snapshot newsletter, and email blasts to the interested parties list
- Flyers posted at City Hall, other City facilities, and coffee shops

Outreach and engagement touchpoints were scheduled to occur throughout key points in the planning process, ensuring lived experiences and local priorities informed each stage of the development of the CAAP, from background analysis to policy development and implementation. Through in-person and online engagement activities, the City heard from more than 340 community members, whose feedback and input were invaluable for shaping each component of the plan.

Descriptions of the various outreach activities, along with their key takeaways, are presented below.

The following attachments are included that provide additional details such as feedback, takeaways, and photos:

- C-1 Community Pop-Up Event #1, Earth Day
- C-2 Community Pop-Up Event #2, Concert in the Park

- C-3 Community Surveys
- C-4 Community Open House

## 2. Community Pop-Ups

Several outreach pop-up/tabling events were conducted between spring 2025 and spring 2026 to build awareness of the CAAP and engage Costa Mesa community members to identify their priorities for a more sustainable future.

The first CAAP pop-up was held at the City of Costa Mesa Earth Day Festival on the City Hall lawn on Saturday, April 26, 2025, from 10:00 a.m. to 2:00 p.m. During this event, attendees interacted with City staff, reviewed educational materials, contributed to an interactive community collage, and learned about the community survey. Over 65 community members provided direct input and more than 150 visited the pop-up.

A second Earth Day pop-up event was held at the same location on Saturday, April 18, 2026, from 10:00 a.m. to 2:00 p.m. This event focused on educating attendees about the CAAP's goals, benefits, and progress. The event additionally promoted the upcoming community open house scheduled for April 30, 2026. Over 200 community members participated.

A community pop-up outreach event was conducted at a Costa Mesa Concert in the Park at Fairview Park on Tuesday, July 29, 2025, from 5:00 p.m. to 7:00 p.m. More than 40 participants engaged with staff, helping to broaden awareness of the City's climate planning efforts and survey. Residents of all ages, representatives of local organizations, and members of the local business community learned about the CAAP while attending the Earth Day Festivals and Concert in the Park.





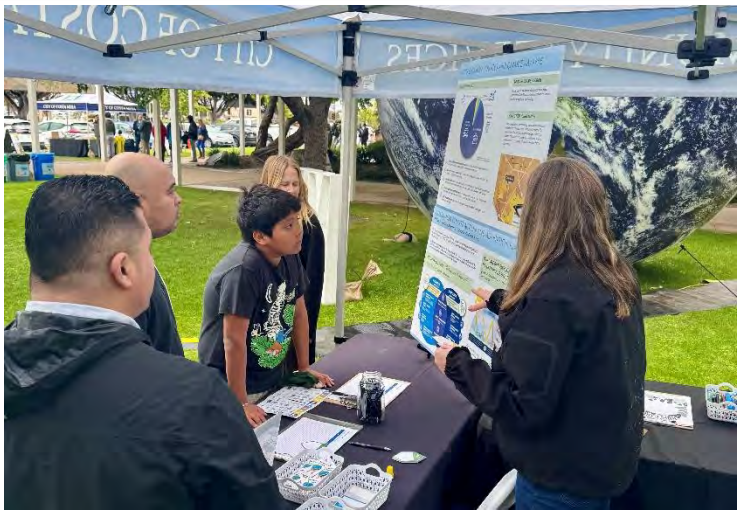








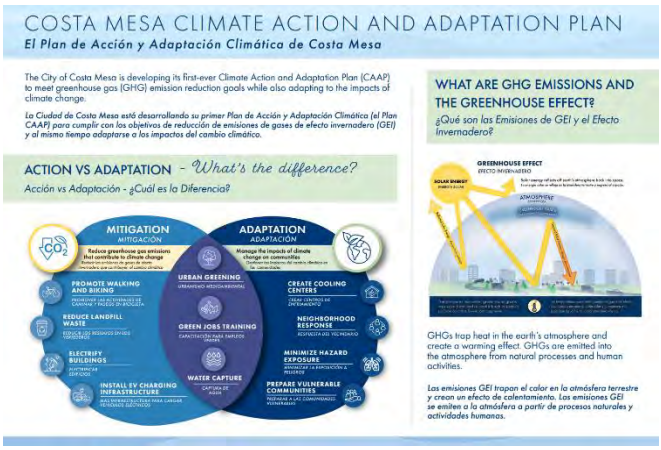


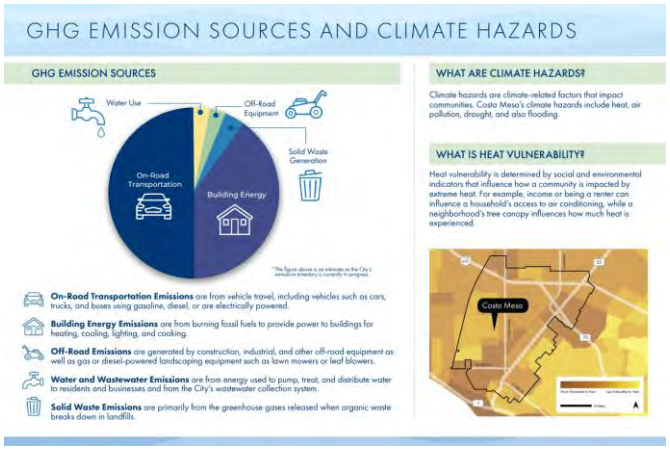


## Outreach Materials

The City utilized educational poster boards at each pop-up event to highlight the purpose and intent of the CAAP, its benefits to the community, emission sectors, the difference between climate mitigation and climate adaptation, the greenhouse gas effect, among other topics. A large, interactive poster board was designed to create a tree-shaped

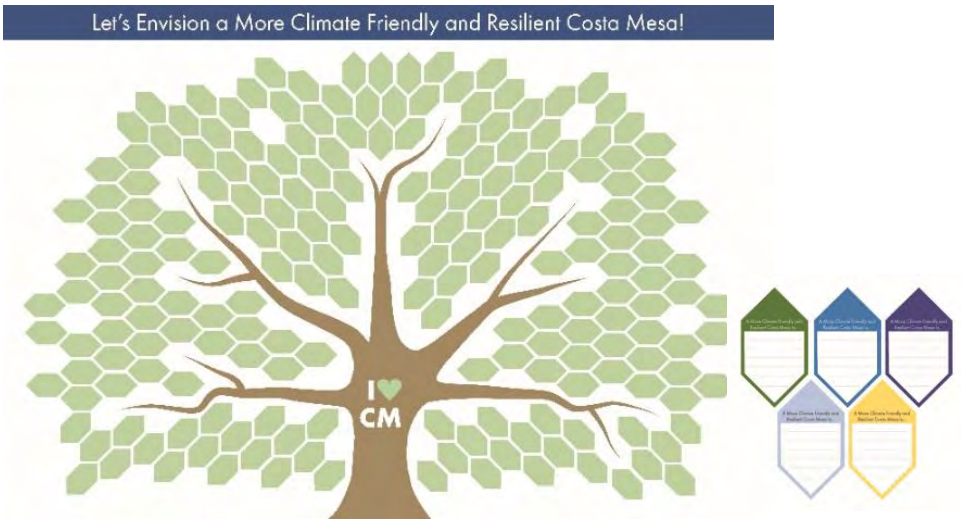
community collage: participants contributed leaf-shaped comment cards with their vision for a more sustainable city, forming a visual tree canopy representing the community's vision.










## Key takeaways:

Community feedback indicated strong support for expanding renewable energy, enhancing green space and urban landscaping, and improving sustainable transportation options as alternatives to car travel. Participants also emphasized the importance of waste reduction, water conservation, and equitable community resilience, particularly for vulnerable populations.

### TRANSPORTATION

- Strong interest in improving bike infrastructure and safety (e.g., protected bike lanes)
- Support for enhancing public transportation options
- Emphasis on accessible, non-car transportation alternatives such as biking and walking

### ENERGY AND THE BUILT ENVIRONMENT

- Strong interest in expanding solar energy use
- Support for increasing electric vehicle (EV) charging infrastructure
- Desire to explore additional renewable sources (e.g., wind)
- Need to make solar more accessible and affordable

### NATURAL AND URBAN LANDS

- Strong interest in planting more trees and using native landscaping
- Desire to expand parks and community gardens

### SOLID WASTE

- Strong support for increasing composting and recycling
- Desire to reduce litter citywide
- Need for more accessible information on electronic waste disposal

### WATER AND WASTEWATER

- Interest in expanding stormwater capture
- Emphasis on water conservation efforts

### PEOPLE AND COMMUNITY

- Interest in developing resiliency centers for extreme heat events
- Emphasis on supporting vulnerable populations, including older adults

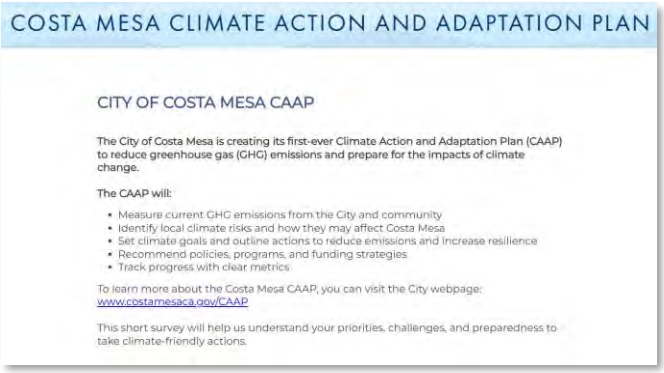
## 3. Community Surveys

A total of 228 community survey responses were received, of which 158 were fully completed. The community survey was provided through two online survey formats (long-form and short-form) designed to understand current behaviors, barriers to adopting more sustainable practices, and priorities for climate-friendly actions. The long-form survey was available from April 22, 2025, to October 3, 2025, while the condensed survey was available from July 29, 2025, to October 3, 2025. There were 31 responses received on the short-form survey during the first Earth Day Festival event, and 62 additional responses were received thereafter; 65 responses were received on the long-form survey.

The survey included questions across key topic areas such as transportation (walking, biking, transit use, and EV ownership), energy (energy efficiency upgrades and opting into alternative

energy providers), water (drought-tolerant landscaping and graywater/ rainwater capture), solid waste (composting), and extreme heat (cooling center use).

Respondents represented a range of connections to Costa Mesa, with 48% identifying as residents who own their homes, 24% as renters, and the remaining participants owning property or businesses in the City (16%) or having another form of affiliation (12%).


COSTA MESA CLIMATE ACTION AND ADAPTATION PLAN

CITY OF COSTA MESA CAAP

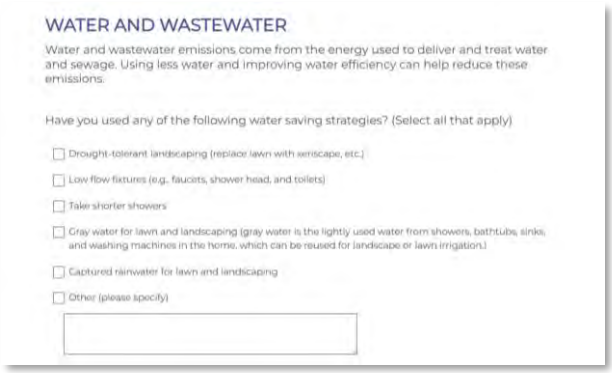
The City of Costa Mesa is creating its first-ever Climate Action and Adaptation Plan (CAAP) to reduce greenhouse gas (GHG) emissions and prepare for the impacts of climate change.

The CAAP will:

- Measure current GHG emissions from the City and community
- Identify local climate risks and how they may affect Costa Mesa
- Set climate goals and outline actions to reduce emissions and increase resilience
- Recommend policies, programs, and funding strategies
- Track progress with clear metrics

To learn more about the Costa Mesa CAAP, you can visit the City webpage: www.costamesaca.gov/CAAP

This short survey will help us understand your priorities, challenges, and preparedness to take climate-friendly actions.


WATER AND WASTEWATER

Water and wastewater emissions come from the energy used to deliver and treat water and sewage. Using less water and improving water efficiency can help reduce these emissions.

Have you used any of the following water saving strategies? (Select all that apply)

- ☐ Drought-tolerant landscaping (replace lawn with xeriscape, etc.)
- ☐ Low flow fixtures (e.g., faucets, shower head, and toilets)
- ☐ Take shorter showers
- ☐ Gray water for lawn and landscaping (gray water is the lightly used water from showers, bathtubs, sinks, and washing machines in the home, which can be reused for landscape or lawn irrigation.)
- ☐ Captured rainwater for lawn and landscaping
- ☐ Other (please specify)

## Key takeaways:

### TRANSPORTATION

- The primary barrier to walking was the distance to everyday destinations
- A lack of bike lanes and safety concerns due to fast/busy car traffic were both cited as primary challenges for biking
- Barriers to utilizing public transit were predominantly inconvenient routes/stops for reaching desired destinations and long wait times for buses due to low frequency
- One-third of survey respondents reported that their household used an EV
- The primary barrier to EV ownership was cost, followed by a preference for non-EVs
- Limited access to home charging was cited as a significant infrastructure-related concern
- Range anxiety remains a key hesitation, reflecting concerns about battery range and charging availability

### ENERGY AND THE BUILT ENVIRONMENT

- The primary barrier to making energy upgrades and to switching from gas to electric appliances was cost
- A preference for gas appliances, such as stoves, further limits adoption of electric alternatives
- Interest in alternative energy suppliers is mixed, with about 30% of respondents willing to opt into a basic (50% renewable) package

- Approximately 20–30% of respondents would opt into a premium (100% renewable) package
- A similar share (20–30%) of respondents indicated they would not opt into an alternative energy supplier

### SOLID WASTE

- More than 55% of respondents currently participate in composting
- The primary barriers to composting include concerns about vermin and odor
- A lack of supplies, such as access to compost bins, is another key obstacle

### WATER AND WASTEWATER

- Taking shorter showers is the most common water-saving strategy, followed by using low-flow fixtures and drought-tolerant landscaping
- Cost and time are primary barriers to adopting drought-tolerant landscaping
- Renters face additional challenges, as tenant status often limits control over landscaping decisions
- A lack of knowledge is the biggest barrier to installing graywater or captured rainwater systems, highlighting the need for education.

### EXTREME HEAT

- Proximity, availability of entertainment or activities, and pet-friendly policies are the most important factors for encouraging the use of cooling centers
- Approximately 30% of respondents indicated a preference for using a business rather than a community center for cooling purposes

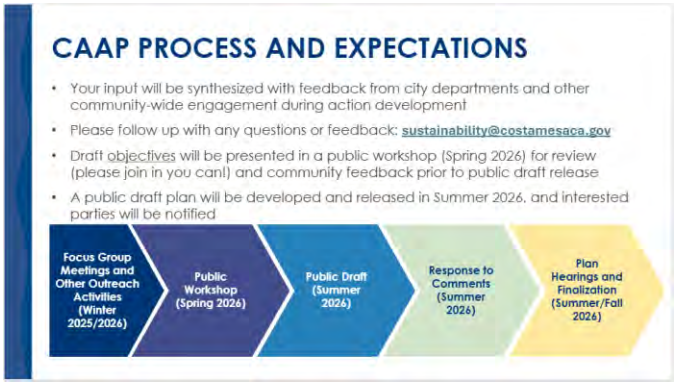
## 4. External Focus Group

The external focus group meeting, held on December 9, 2025, was designed to gather targeted input from businesses and key interested parties to help shape the CAAP. Participants included representatives from the building industry and real estate industry, local nonprofit organizations, an institution of higher education, and a regional electricity utility.

The meeting introduced the CAAP's purpose, scope, and timeline, then invited participants to enter breakout rooms assigned to each participant's sector: land use development, local organizations and advocacy, and utility partners. In these breakout rooms, participants shared their current successes and challenges related to implementing practices to reduce greenhouse gas emissions and/or improve resilience to climate impacts, and they also discussed opportunities for collaboration with the City to realize the goals of the CAAP.

Feedback focused on identifying existing programs, barriers to implementation, and potential incentives that could better support local action.

## Key takeaways:







- Strong interest in partnerships and collaboration with the City to implement CAAP actions
- Identification of cost and funding as major barriers, and the importance of implementation feasibility, including cost, scalability, and real-world usability of proposed actions
- Need for enhanced community engagement, education, and outreach
- Shared emphasis on equity, access, and inclusive implementation of climate strategies

### LOCAL ADVOCACY GROUP: COASTAL CORRIDOR ALLIANCE

- Emphasis on nature-based solutions, including tree preservation, park restoration, and climate resilience strategies
- Advocacy for urban heat island mitigation (e.g., cool streets, rooftop gardens, pop-up cooling strategies)
- Interest in carbon sequestration opportunities through landscaping, parks, and partnerships
- Concern about equity impacts, particularly displacement related to CAAP implementation
- Support for community-oriented spaces and programming to reduce car dependence
- Emphasis on sustained, structural changes (e.g., work schedule shifts, telecommuting)
- Funding-dependent outreach, noting nonprofits can expand outreach significantly if funding is provided
- Empasis on multi-benefit framing, implicitly supporting climate actions that also improve social outcomes

## LOCAL ADVOCACY GROUP: COSTA MESA ALLIANCE FOR BETTER STREETS

- Strong focus on safe, connected, and comfortable active transportation networks
- Identification of infrastructure gaps, including dangerous intersections and incomplete bike networks
- Advocacy for incremental, high-impact improvements
- Focus on unlocking existing assets, including improving access to parks and school facilities rather than only building new infrastructure
- Promotion of bike and pedestrian education programs, especially for youth
- Emphasis on shade trees and greenery in the public right-of-way to improve walkability
- Interest in partnerships with the City and schools, including grant collaboration and outreach
- Raised the need for better institutional coordination, especially between the City and schools

## UTILITIES/ENERGY PROVIDERS: SOUTHERN CALIFORNIA EDISON, SOCAL GAS

- Highlighted availability of technical resources, incentives, and infrastructure support (e.g., EV charging, reach codes)
- Focus on energy demand, load capacity, and infrastructure planning
- Emphasis on cost, reliability, and affordability as key factors for customers
- Support for customer choice and transparency, including awareness of backup energy sources
- Interest in ongoing coordination with the City, including regular check-ins and collaboration
- Willingness to support implementation with funding, programs, and technical expertise

## PRIVATE SECTOR/DEVELOPMENT REPRESENTATIVES: BUILDING INDUSTRY ASSOCIATION OF SOUTHERN CALIFORNIA

- Emphasized that CAAP implementation must balance climate goals with housing delivery, economic feasibility, and infrastructure readiness
- Utility capacity constraints and long interconnection delays (12–18 months) are a major barrier, particularly for EV infrastructure, and are exacerbated by increasing demand and densification
- The Building Industry Association of Southern California emphasized the need for better coordination between cities and utilities, especially to align growth (e.g., RHNA, upzoning) with infrastructure planning
- Strong preference for flexible, performance-based standards rather than prescriptive requirements, allowing developers to meet targets in cost-effective ways
- Concerns that stringent requirements could disproportionately impact smaller builders and slow housing production

- Space and market constraints limit feasibility of certain measures (e.g., bike facilities, reduced parking), particularly in multifamily developments

## 5. Community Open House

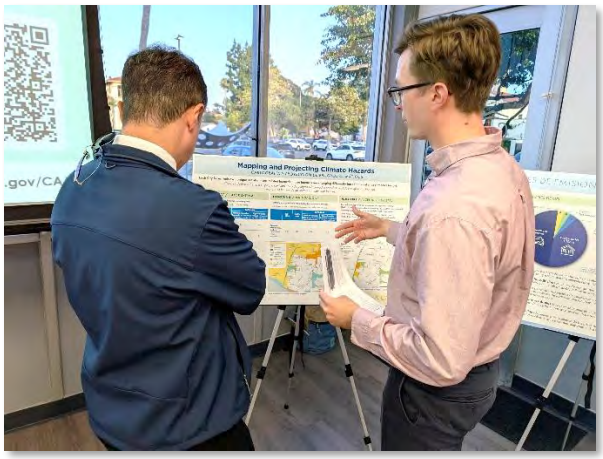
On Thursday, April 30, 2026, approximately 30 community members attended a joint CAAP and Environmental Justice open house held from 6:00 to 8:00 p.m. at City Hall.

The event began with a presentation from City staff and consultants, providing an overview of both efforts and how participants could share feedback. The open house featured a combination of discussions, educational materials, and interactive engagement stations.

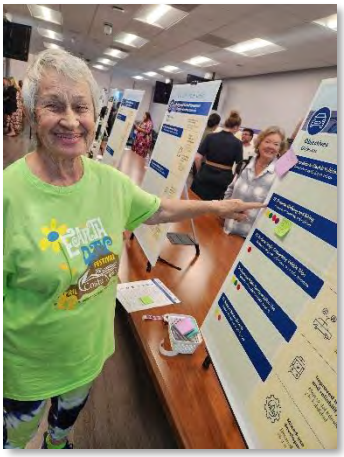
Participants were invited to engage directly with the materials by using dot stickers to indicate priorities and Post-it notes or comment cards to provide more detailed feedback. This format encouraged both quick input and more substantive comments, allowing attendees to share their perspectives on proposed strategies and help inform development of the CAAP. The City received a total of 37 Post-it note comments and 80 prioritization stickers.






Mapping and Projecting Climate Hazards



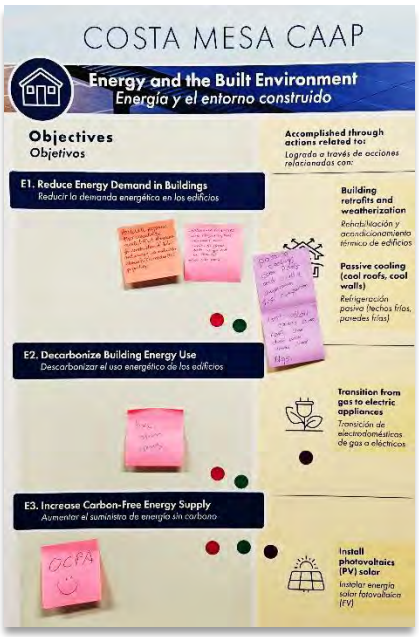






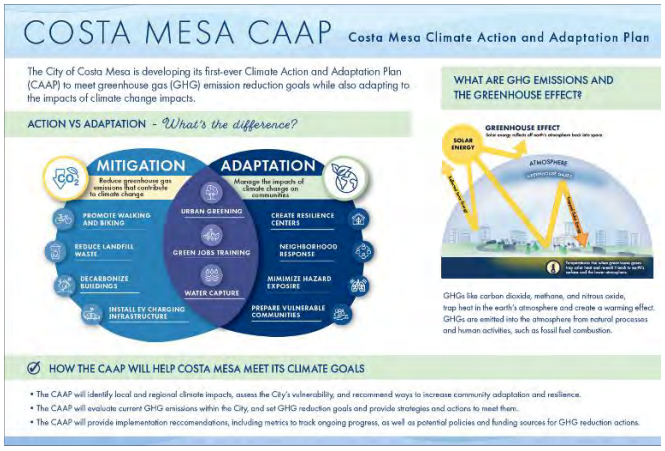

COSTA MESA CAAP
Transportation
Transporte
Objectives
Objetivos
Accomplished through actions related to:
Logrado a través de acciones relacionadas con:
T1. Transition to Electric Vehicles
Transición a vehículos eléctricos
EV Chargers
Cargadores para vehículos eléctricos
T2. Promote Walking and Biking
Promover la caminata y el ciclismo
Sidewalks and bike lanes
Aceras y carriles bici
T3. Reduce Single-Occupancy Vehicle Trips
Reducir los viajes en vehículos con un solo ocupante
Rideshare and carpooling
Viajes compartidos y uso compartido del automóvil
T4. Increase Public Transportation Use
Aumentar el uso del transporte público
Improved transit and reliability
Mejora del tránsito y la fiabilidad
T5. Support Smart Growth
Apoyar el crecimiento inteligente
Mixed-use development
Desarrollo de uso mixto

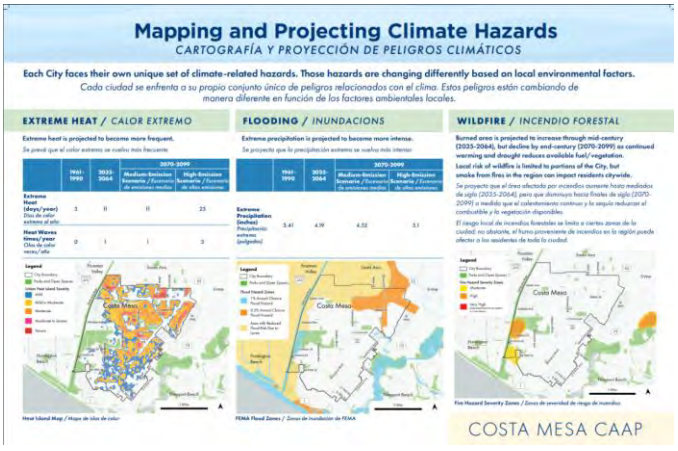

COSTA MESA CAAP
Municipal
Municipal
Objectives
Objetivos
Accomplished through actions related to:
Logrado a través de acciones relacionadas con:
M1. Reduce City Vehicle Emissions
Reducir las emisiones de vehículos en la ciudad
EV Infrastructure
Infraestructura para vehículos eléctricos
M2. Reduce City Energy Use
Reducir el consumo de energía de la ciudad
Energy retrofits and electric appliances in City buildings
Rehabilitaciones energéticas y aparatos eléctricos en los edificios municipales
M3. Zero-emissions Off-Road and Landscaping Equipment
Equipo todoterreno y de jardinería de cero emisiones
Zero-emission landscape equipment
Equipamiento para paisajismo de cero emisiones
M4. Reduce City Facility Water Use
Reducir el uso de agua en las instalaciones de la ciudad
Drought-tolerant landscaping on City property
Paisajismo tolerante a la sequía en propiedades municipales
M5. Reduce City-Generated Solid Waste
Reducir los residuos sólidos generados por la ciudad
Food waste reduction for City operations and events
Reducción del desperdicio de alimentos en las operaciones y eventos de la ciudad


COSTA MESA CAAP
Energy and the Built Environment
Energía y el entorno construido
Objectives
Objetivos
Accomplished through actions related to:
Logrado a través de acciones relacionadas con:
E1. Reduce Energy Demand in Buildings
Reducir la demanda energética en los edificios
Building retrofits and weatherization
Rehabilitación y acondicionamiento térmico de edificios
Passive cooling (cool roofs, cool walls)
Refrigeración pasiva (techos fríos, paredes frías)
E2. Decarbonize Building Energy Use
Descarbonizar el uso energético de los edificios
Transition from gas to electric appliances
Transición de electrodomésticos de gas a eléctricos
E3. Increase Carbon-Free Energy Supply
Aumentar el suministro de energía sin carbono
Install photovoltaics (PV) solar
Instalar energía solar fotovoltaica (FV)

## Outreach Materials

Several poster boards provided educational information on the CAAP, including key concepts such as climate mitigation and adaptation, local climate hazards, and greenhouse gas emissions, as well as the plan's goals and co-benefits, such as improved air quality and cost savings. Strategy boards presented draft objectives and sample actions across the eight sectors of the CAAP.







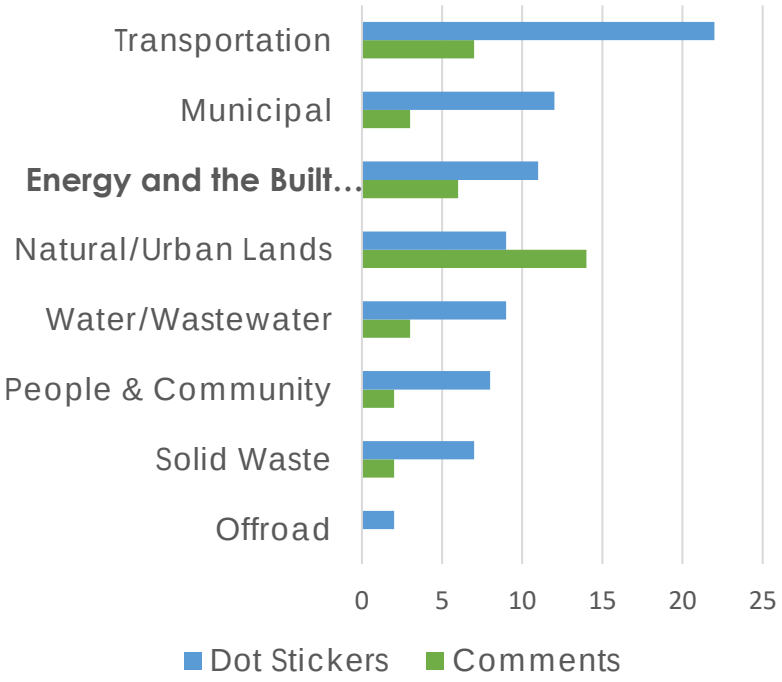






## Key takeaways:

- Participants provided the most feedback on Transportation, Natural/Urban Lands, and Energy and the Built Environment sectors, indicating these are priority topic areas:




- Water-related strategies, including recycled water irrigation systems, were identified as important by participants
- Other key priorities included:
  - Waste reduction efforts, particularly recycling solid waste
  - Resilient urban design to prepare for climate impacts
  - Sustainable business practices and green workforce development to support local economic and environmental goals
  - Expanding green spaces and increasing tree canopy
  - Restoring and enhancing soil

## TRANSPORTATION

- Participants strongly supported expanding walking and biking, with a focus on improving safety and comfort
- Safer and more connected bike infrastructure emerged as a key priority, including closing gaps between neighborhoods and key destinations
  - Improved east–west connectivity was specifically identified as an important need within the bike network
- Participants highlighted interest in making temporary programs permanent fixtures in the community, such as **the Let's Go Costa Mesa** program
- Support for smart growth strategies, such as mixed-use development, was noted as a way to reduce reliance on driving

## ENERGY AND THE BUILT ENVIRONMENT

- Participants expressed strong support for expanding solar panel use, including accelerating programs that incentivize solar installation in new construction
- Participants emphasized the importance of incentive-based approaches to encourage solar development rather than mandates
- Some participants cautioned against certain building strategies, noting that cool roofs may present challenges due to insurance company requirements

## NATURAL/URBAN LANDS

- Expanding green spaces and increasing tree canopy were identified as top priorities for improving environmental quality and cooling
- Participants emphasized the importance of soil restoration and enhancement as a key ecological strategy
- Several community members advocated for urban greening efforts with co-benefits, including planting fruit trees to improve food access and community sustainability
- Participants highlighted the need for stronger conservation efforts to protect and expand natural habitats and biodiversity
- Increased awareness and promotion of existing City programs, such as parkway tree planting, were identified as opportunities
- Participants also called for education and resources to support native and wildlife-friendly landscaping practices

## SOLID WASTE

- Expanding and supporting recycling efforts emerged as a key area of interest
- A community-suggested strategy included launching a free woodchip program tied to tree removal to help reduce outdoor water demand

## WATER AND WASTEWATER

- Support for water reuse strategies emerged as a key priority among participants
- Low-tech, accessible home water conservation methods—such as capturing and reusing water at home—were viewed favorably
- Participants expressed interest in incentives for permeable landscaping and construction to improve water management
- Providing resources such as free or subsidized cisterns was identified as a way to encourage water conservation

### OFF-ROAD EQUIPMENT

- Several community members marked electrification of landscaping and construction equipment as a priority

### PEOPLE AND COMMUNITY

- Participants identified resilient urban design strategies, such as tree canopy and stormwater capture, as key priorities for supporting community climate resilience
- Support for sustainable business practices and green workforce development reflects interest in aligning economic development with climate goals
- Expanding existing City programs, such as the Green Business Program, were highlighted as opportunities to encourage broader participation
- Cooling strategies, including improved cooling center amenities and access, were identified as important for community health and safety
- One community member suggested targeting heat-vulnerable locations, such as school sites, for future cooling and resilience investments

### MUNICIPAL

- Participants supported transitioning to zero-emission landscaping equipment for City operations
- Expanding public EV infrastructure was identified as a key municipal priority
- One participant suggested exploring electrification of emergency vehicles, where feasible
- Energy-efficient upgrades to public infrastructure, such as motion-activated street lighting, were highlighted as opportunities
- Participants expressed interest in enhancing park amenities with sustainable features, including water stations and solar shade structures

## 6. Additional Targeted Outreach

The City conducted targeted outreach to facilitate discussion and input on the CAAP. The following sections summarize outreach efforts to the Coastline Regional Occupational Program Sustainability Cohort and Mesa Water District.

### Coastline Regional Occupational Program

The City conducted targeted outreach to the Coastline Regional Occupational Program Sustainability Cohort to engage younger residents and students in the CAAP process. City staff delivered a presentation introducing the CAAP and its goals and also facilitated an interactive activity in which participants shared their input, via leaf-shaped comment cards tied to the

community collage begun at the community open house, on what the CAAP's analysis and actions should address. The session included 10 participants, consisting of both high school students and young adults, who were highly engaged and interested in sustainability topics. Key themes from their feedback included the importance of improving public transportation, enhancing walkability, and expanding green space.

## Mesa Water District

The City conducted a site visit and tour of Mesa Water District Educational Facility to better understand the agency's ongoing sustainability initiatives and coordinate efforts for the CAAP. During the tour, district staff highlighted a range of programs and practices, including water conservation initiatives, public outreach and education programs, use of recycled water, system efficiency improvements, and efforts to reduce energy use in operations.

City staff also provided an overview of the CAAP's purpose and scope, facilitating a collaborative discussion on how water-related strategies could align with existing district efforts. This coordination helped ensure that the CAAP's proposed actions related to water conservation and wastewater management are realistic, complementary, and reflective of practices already being implemented by Mesa Water District.

## Orange County Water District

City staff toured the Orange County Water District's Groundwater Replenishment System (GWRS) facility on Marh 25th, 2026. The GWRS is a joint project of Orange County Water District (OCWD) and the Orange County Sanitation District (OC San). The facility provides enough new water for up to one million residents, making it the largest advanced water purification system for potable reuse in the world.




*Groundwater Replenishment System (GWRS)*

During the facility tour, City staff learned about the role of the GWRS facility in replenishing groundwater resources, received detailed information about the treatment process, and were guided through the facility to observe operations and water quality monitoring. This site

visit informed the City about current regional efforts to conserve water supply and reduce reliance on imported water.

## Estancia High School Community E-Bike Skills Workshop



*E-Bike Skills Workshop Poster*

On August 7, 2025, City staff hosted a pop-up at the Estancia High School Community E-Bike Skills Workshop to engage students and their families on climate action and sustainable transportation. The event provided an opportunity to share information about the CAAP's goals, key focus areas, and anticipated strategies.

During the workshop, participants learned about the benefits of e-bikes as a clean transportation alternative, while City staff facilitated informal discussions to gather input on community priorities, barriers to adopting active transportation, and ideas for improving bike infrastructure and safety. Attendees were encouraged to take the community survey.

## Building Industry Association of Southern California

Following the external focus group meeting, the City held a follow-up discussion with the Building Industry Association of Southern California on January 14, 2025. The purpose of the meeting was to gain a better understanding of the building industry's experience with current development practices and the feasibility of common greenhouse gas reduction and adaptation measures, including implementation challenges, technological considerations, and other barriers, as well as areas where they have been able to advance sustainable goals and practices. Discussion topics included EV charging infrastructure, energy performance standards, renewable energy generation and storage, zero-emission off-road equipment, end-of-trip bicycle facilities, indoor and outdoor water conservation strategies, and nature-based climate solutions. The meeting provided an opportunity for open dialogue, allowing Building Industry Association representatives to ask questions, share perspectives, and provide feedback on their experience with industry-standard climate action and adaptation strategies, as well as finding ways to collaborate on sustainable efforts now and in the future.

# 7. Digital Engagement

To build awareness of and encourage meaningful participation in the CAAP, the City developed a dedicated project webpage to serves as a central hub for information and engagement opportunities. The webpage includes detailed content such as the project timeline, key milestones, and clear explanations of how community members can get involved at each stage of the process. It also features frequently asked questions to address common inquiries, along with summaries of engagement activities and input gathered to date, helping to keep the public informed.



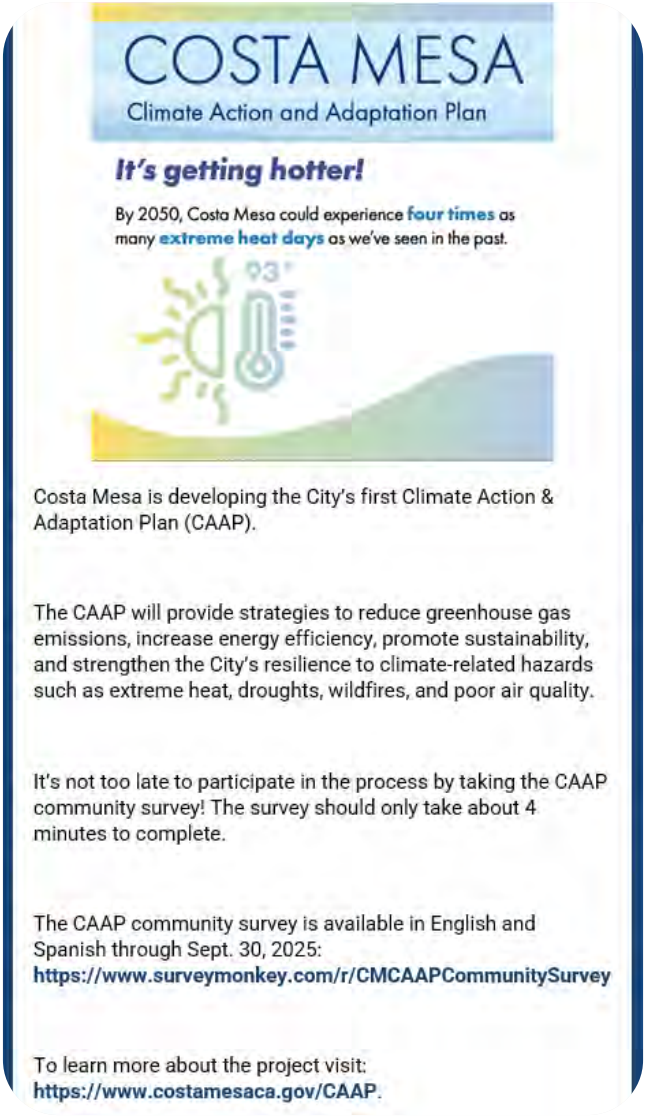

*Screenshot of City's CAAP webpage*

To ensure broad and inclusive outreach, the City created and distributed materials in both English and Spanish. These materials were shared through multiple communication channels and formats, including content on the City's official website, City Hall Snapshot articles, email blasts, and posts and reels on the City's social media platforms. Flyers were also posted around City Hall, other City facilities, and at local coffee shops. This coordinated outreach effort was intended to increase visibility of the CAAP process, provide information, and encourage community members to participate.




*Let's Talk! Costa Mesa Feature*

Social media outreach included Instagram stories and reels (approximately 7,000 views), a Let's Talk Costa Mesa interview feature on the City's YouTube channel and social media (approximately 2,200 views), and reminder stories to boost engagement leading up to major events, such as Earth Day, the close of the community survey, and the community open house. Cumulatively, social media content reached more than 9,000 people.




*City Hall Snapshot*







*Event Flyers*

APPENDIX C-1

# C-1 COMMUNITY POP-UP EVENT #1, EARTH DAY




# COSTA MESA CAAP

## Earth Day Event and Community Survey Feedback Overview and Takeaways

# Event and Survey Feedback Overview

Community Event:

- At the community event, over 65 participants shared a vision for a more sustainable Costa Mesa that emphasized the following:
  - Increased renewable energy sources
  - Additional trees and access to accessible green space
  - Improved transportation options as alternatives to car travel, such biking, walking, and public transit.

Community Feedback Survey:

- Through the feedback survey, 31 community members expressed an interest in:
  - More sustainable transportation options (biking, walking, public transit, EVs)
  - Energy efficiency upgrades
  - Composting and Recycling Efforts
  - Water Conservation
- Participants cited a number obstacles that they face when implementing these options (lack of infrastructure, safety concerns, need for economic incentives)

# Community Pop-Up #1: Earth Day Event

The Event was held on Saturday, April 26th from 10:00 am – 2:00 pm at the City Hall Lawn. Over 65 community members visited the booth and shared their feedback about the Costa Mesa CAAP.

Event Goals:

- Raise awareness for the City's climate planning efforts and share opportunities to participate in CAAP development.
- Educate the community on common terms and topics that will be discussed during the planning process, such as greenhouse gas emissions, emission sources, CAAP, adaptation, etc.
- Identify the current barriers faced by the community for individual behavioral changes to reduce community-based emissions.
- Accessible and interactive outreach that meets the community "where they are," and build consensus relative to a sustainable vision for Costa Mesa.



# Community Pop-Up #1: Earth Day Event




















# Community Pop-Up #1: Earth Day Event







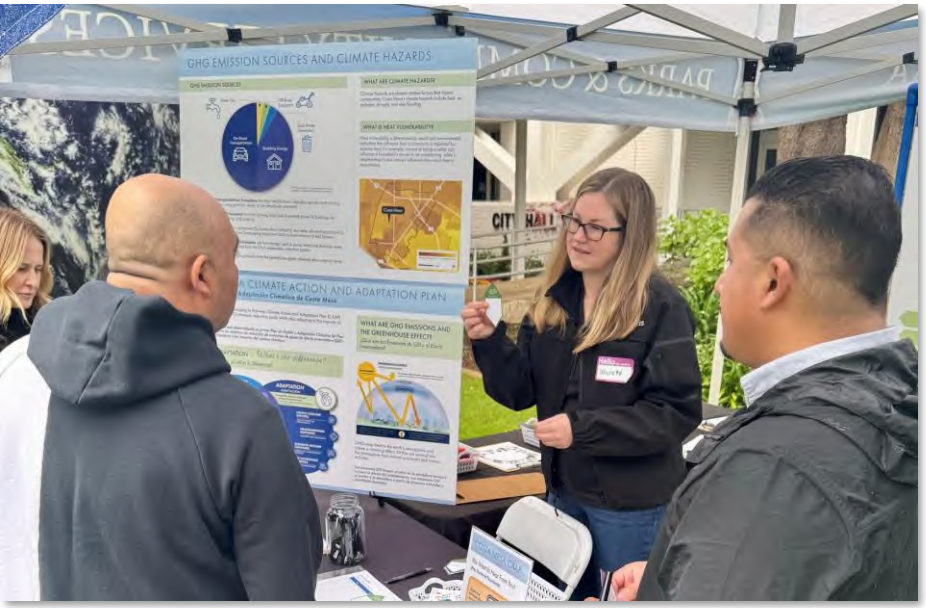








# Community Pop-Up #1: Earth Day Event













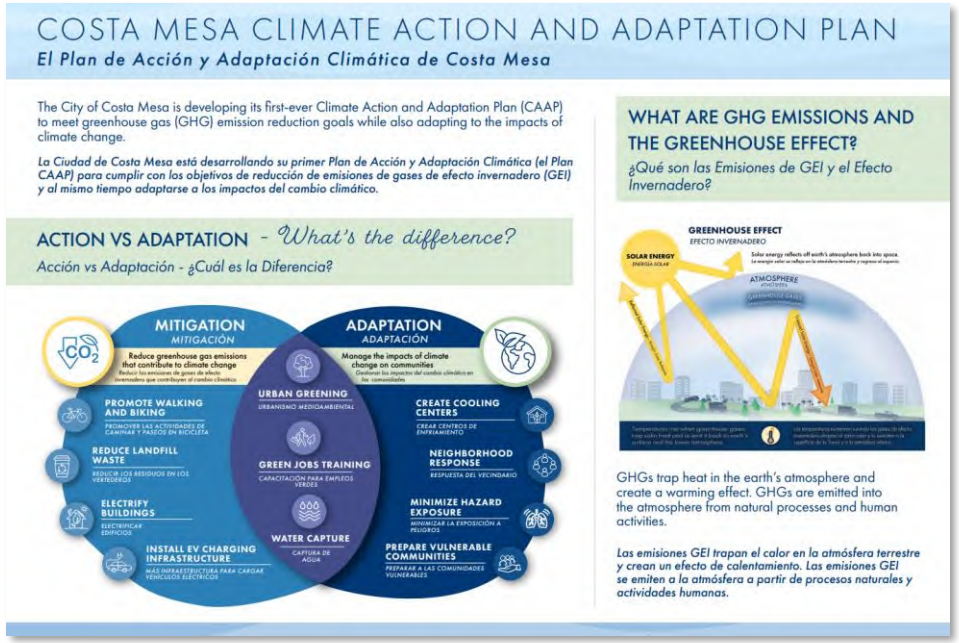


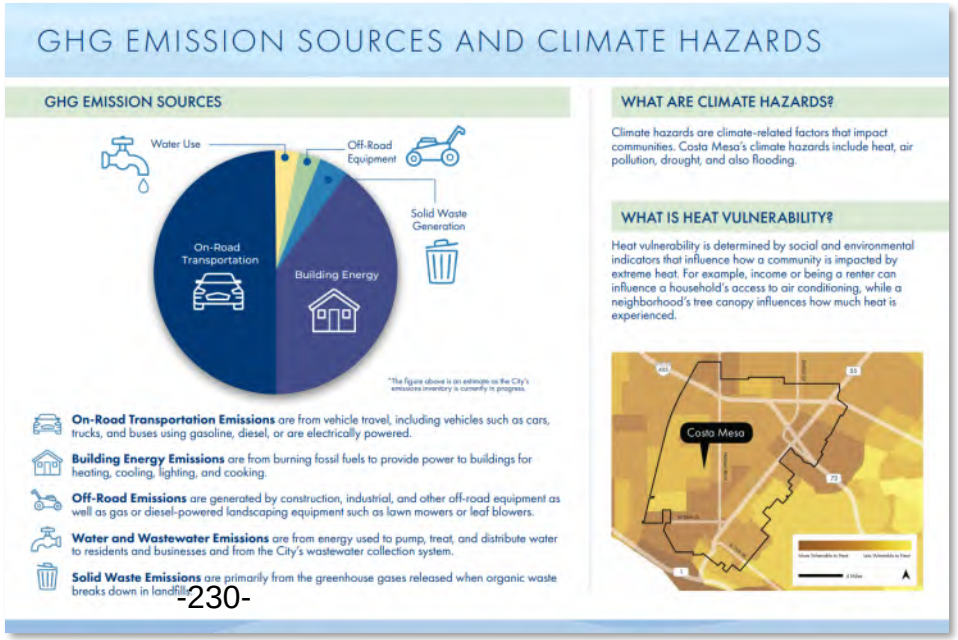

# Education Focused Materials

The event featured education-focused boards with the following objectives:

- Introducing the community to common terms and topics that will be used during the planning process
- Sharing the goals and benefits of the Climate Action and Adaptation Plan
- Informing participants about additional opportunities to provide feedback

Outreach materials were provided in both English and Spanish.



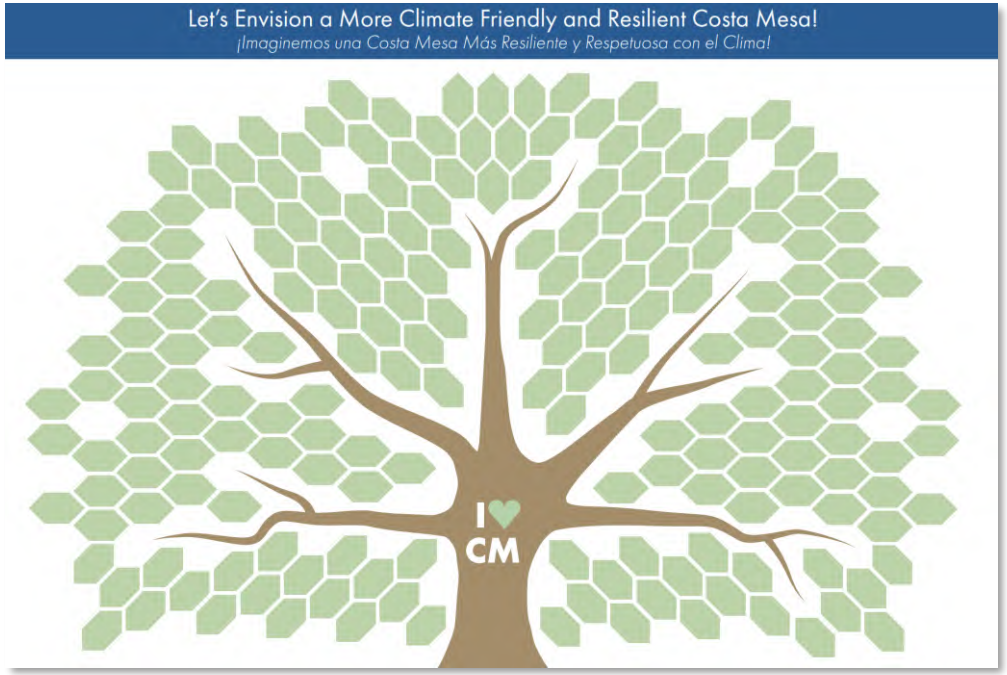






# Sustainable Costa Mesa Visioning

Through a community collage exercise, community members contributed to a shared vision for Costa Mesa's sustainable future. Participants answered the following question:

"A More Climate Friendly and Resilient Costa Mesa Is…"









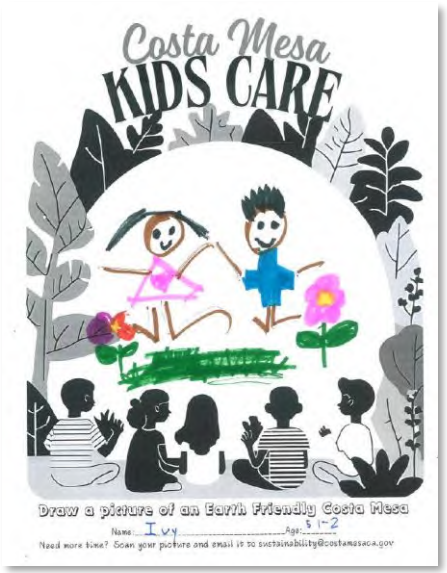
# Kids Activity

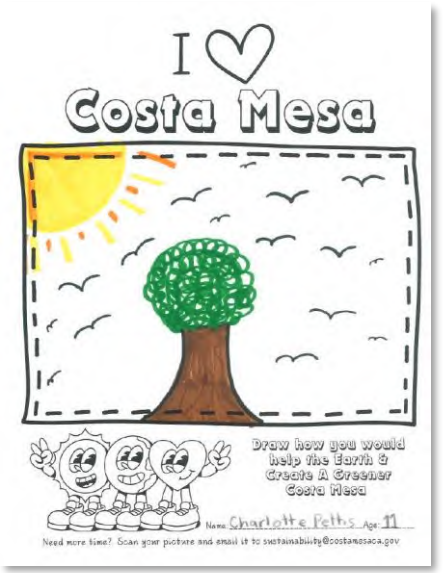
The event included a kid-friendly activity where kids could draw their vision for a sustainable Costa Mesa. Over 50 children responded to the following prompts :

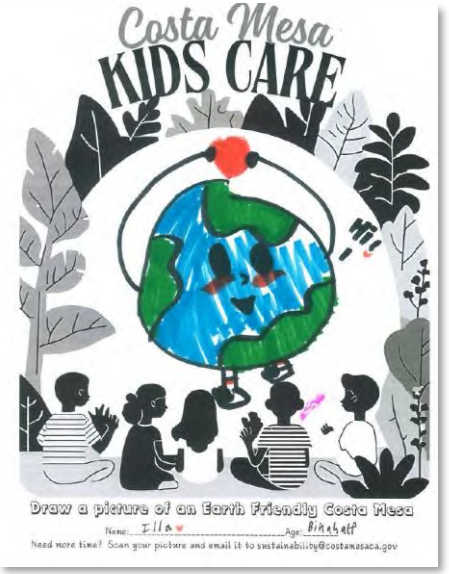
- **"Draw a picture of an Earth Friendly Costa Mesa"**

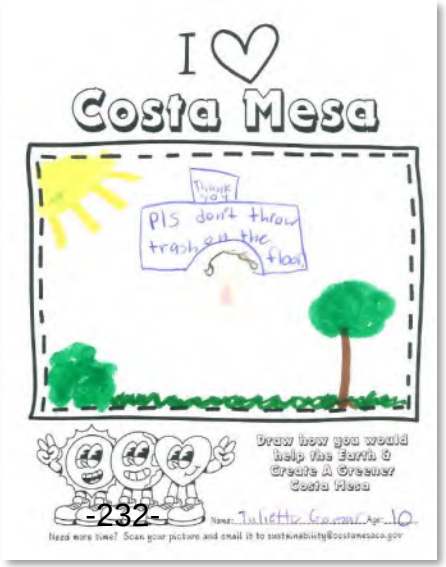
- **"Draw how you would help the Earth and create a greener Costa Mesa"**

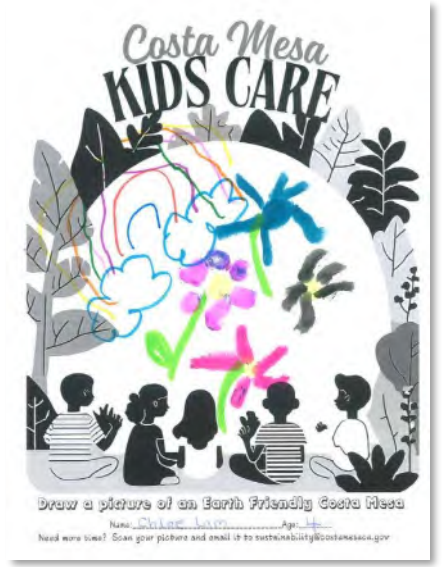
Various artistic mediums were provided: markers, paint sticks, colored pencils, etc.

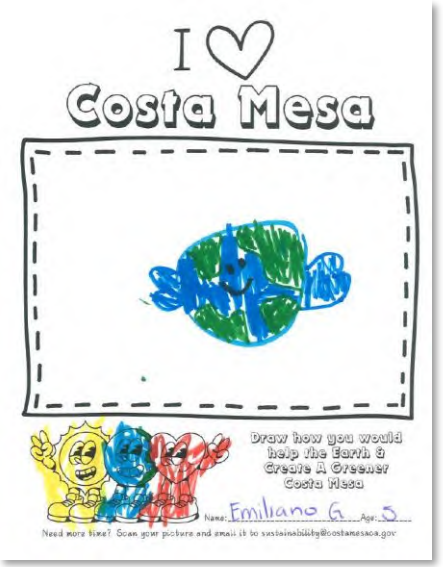


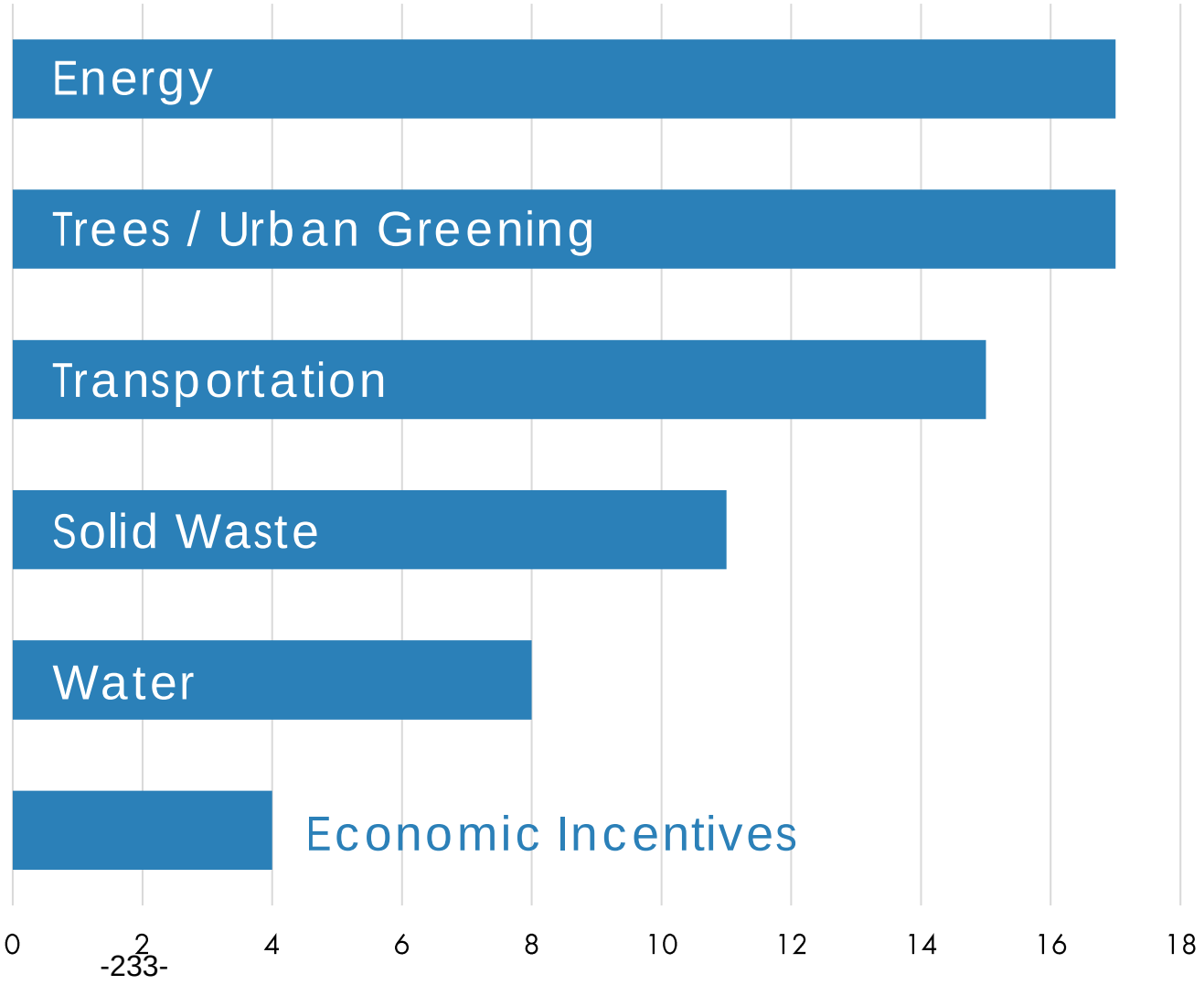



# What We Heard

Many participants shared a vision for a more sustainable Costa Mesa that included the following:

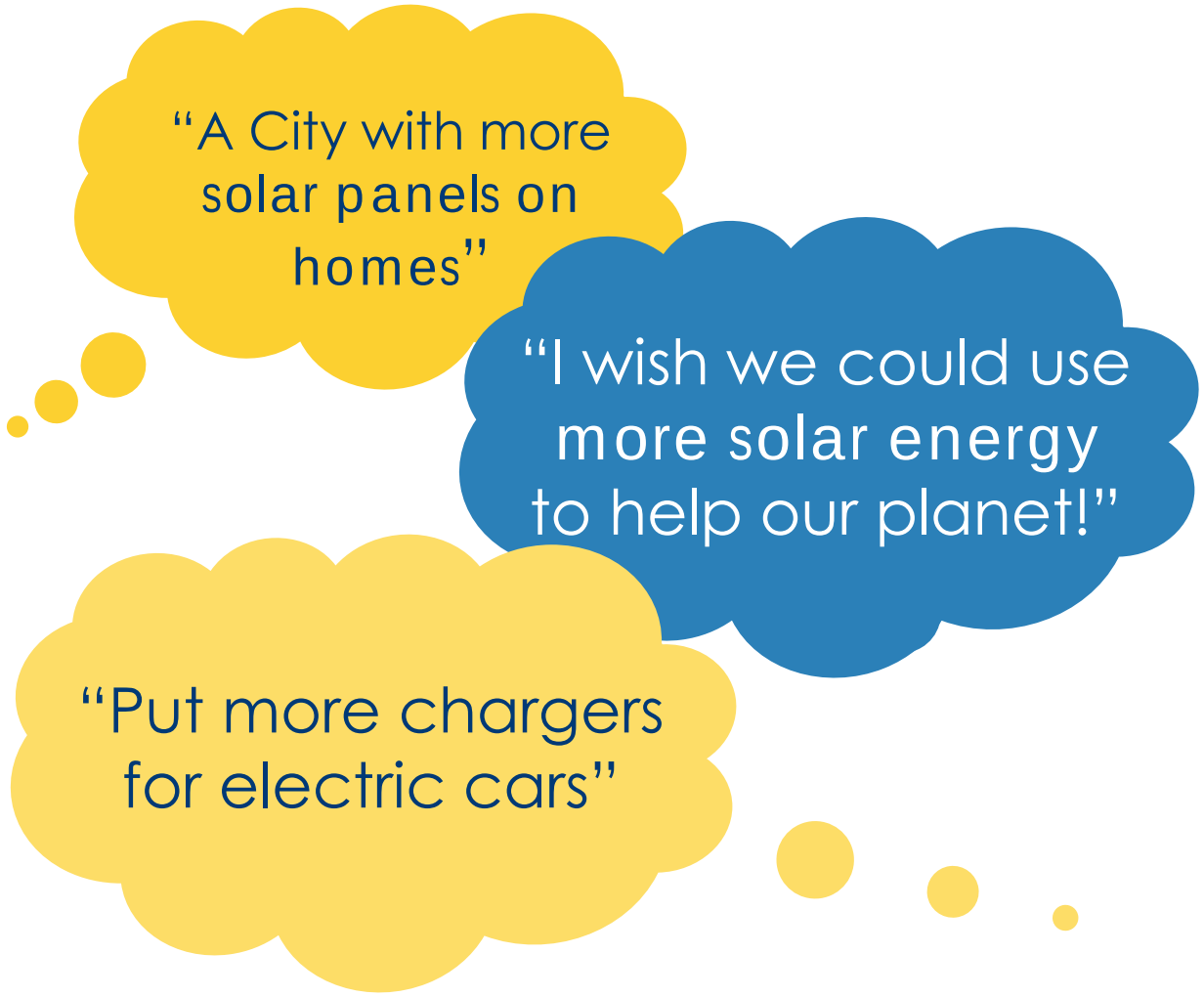
- Increased renewable energy sources such as solar.
- Additional trees and access to accessible green space.
- Improved transportation options as alternatives to car travel, such biking, walking, and public transit.



# Community Priorities for Energy

Key Takeaways:

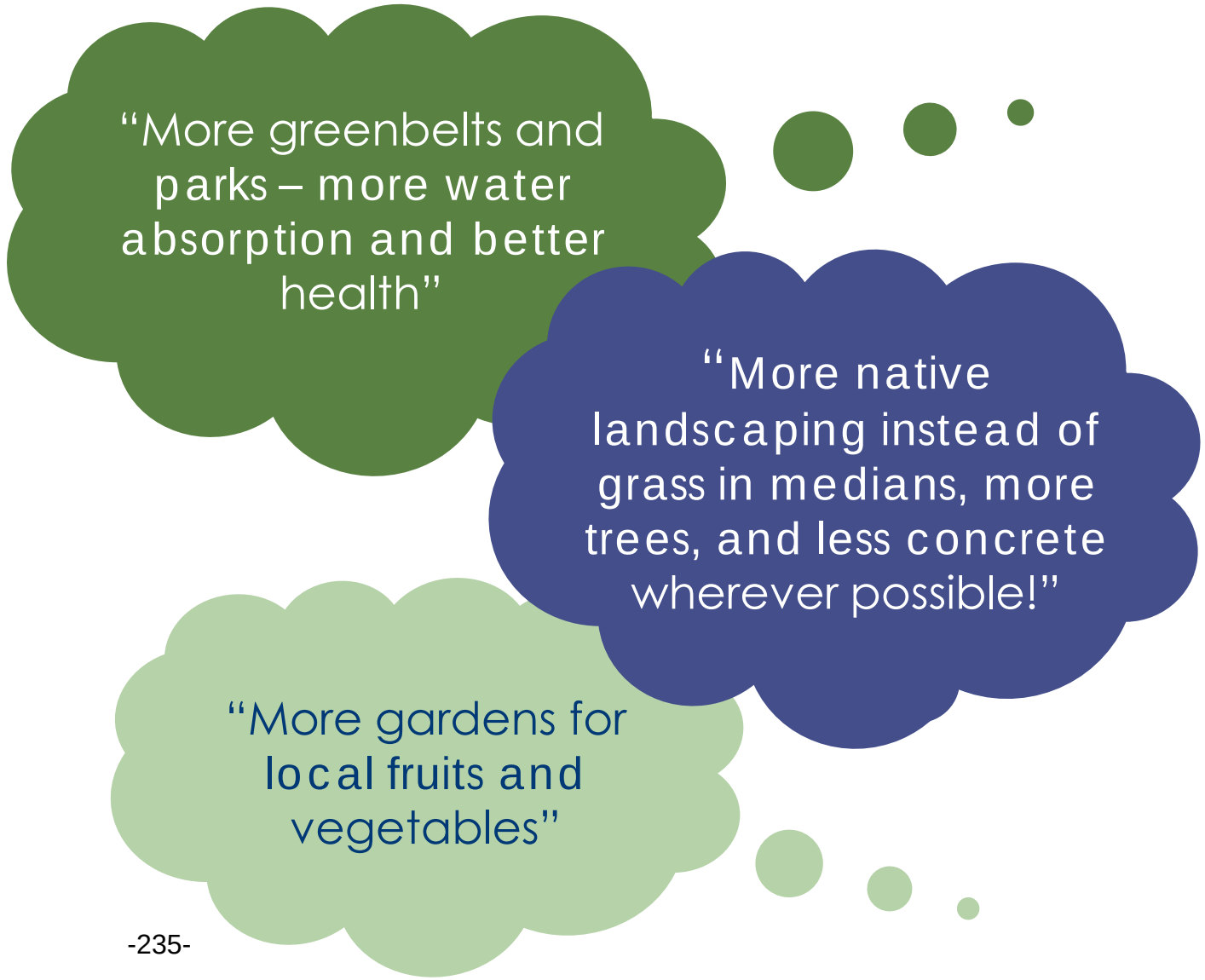
- Community members were especially interested in solar energy.
- Other energy-related comments included more chargers for electric vehicles and other alternative energy sources like wind.



# Trees / Urban Greening

Key Takeaways:

- Participants showed a strong interest more new trees and native landscaping, as well as more parks and community gardens.



# Transportation

Key Takeaways:

- There was a strong interest in improved bike infrastructure and safety such as protected bike lanes.
- Community members also showed support for improved public transportation.
- Community members emphasized a desire for accessible modes of transportation as alternatives to car travel.



# Solid Waste

Key Takeaways:

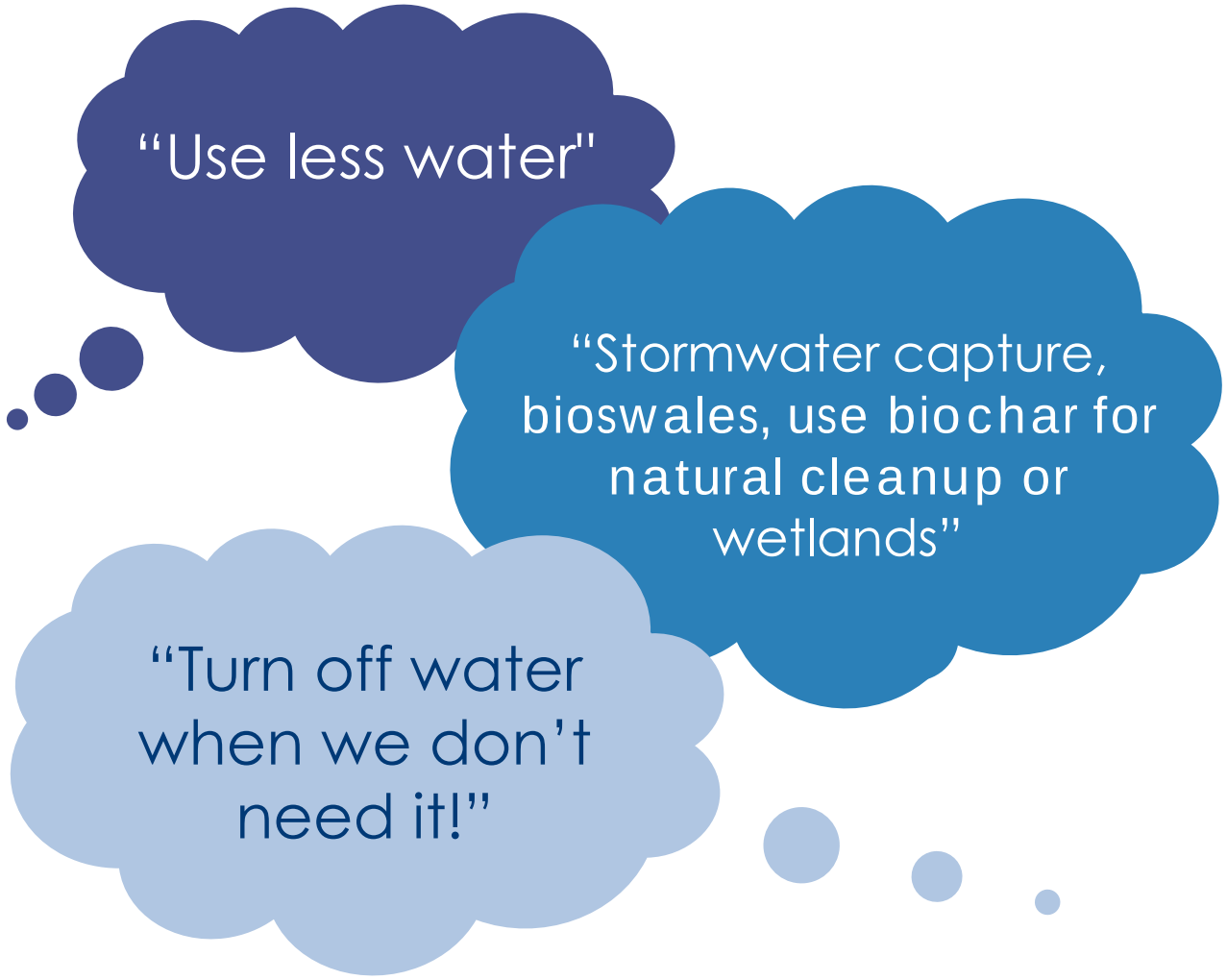
- Participants showed a strong interest in increasing compost and recycling efforts in the City, as well as reducing litter.



# Water

Key Takeaways:

- Community members showed an interest in stormwater capture.
- They also emphasized the importance of conserving water.



# Feedback Summary

The first Costa Mesa CAAP outreach event was a success, effectively engaging the Costa Mesa community in the planning process. The event's inclusion of a kid-friendly activity ensured that community members of all ages could participate in the City's sustainability initiatives. Through both the in-person event and the online survey, more than 96 community members learned about the CAAP and shared their feedback and vision for a more sustainable and resilient Costa Mesa.

Opportunities for the July Pop-up Event:

- Continue to build awareness for the CAAP and its project benefits
- Solicit additional feedback about challenges that participants face when reducing their GHG emissions
- Learn more about the incentives that community members would be interested in to change their behaviors
- Gain a deeper understanding of the **community's priorities** for a more sustainable and resilient Costa Mesa

APPENDIX C-2

# C-2 COMMUNITY POP-UP EVENT #2, CONCERT IN THE PARK




# COSTA MESA CAAP

## Concerts in the Park Event Feedback Takeaways

# Community Pop-Up #2: Concerts in the Park

The Event was held on Tuesday, July 29th from 5:00 pm – 7:00 pm at the Fairview Park. The purpose of the event was to:

- Raise awareness for the City's climate action planning efforts
- Communicate the objectives of the Costa Mesa CAAP and highlight its benefits
- Prioritize feedback on the online survey to understand current barriers faced by the community
- Build consensus on a sustainable vision for Costa Mesa

At the community event, over 40 participants shared a vision for a more sustainable Costa Mesa that emphasized the following:

- Enhanced landscaping and access to parks and green space
- Improved transportation options as alternatives to car travels, such as biking, walking, and public transit
- Increase efforts to compost and recycle to reduce waste in the community



# Community Pop-Up #2: Concerts in the Park





















# Community Pop-Up #2: Concerts in the Park















# Community Pop-Up #2: Concerts in the Park











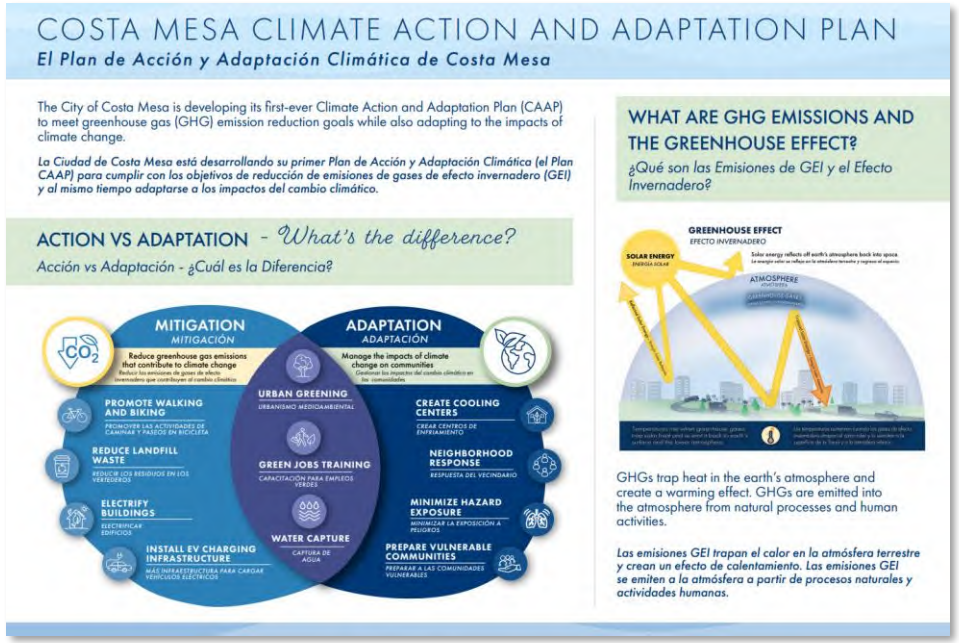


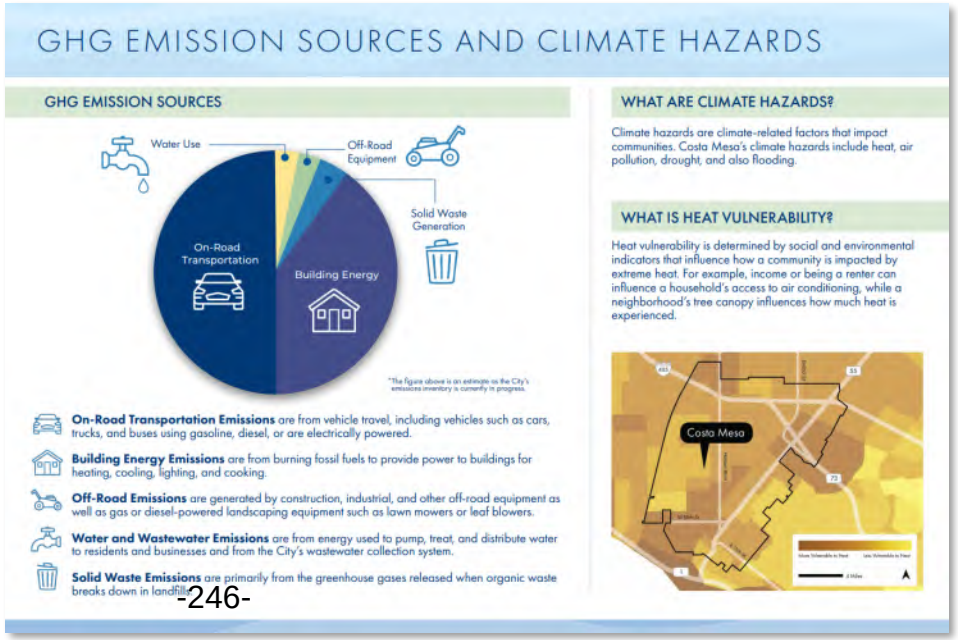
# Education Focused Materials

The event featured education-focused boards with the following objectives:

- Introducing the community to common terms and topics that will be used during the planning process
- Sharing the goals and benefits of the Climate Action and Adaptation Plan
- Informing participants about additional opportunities to provide feedback

Outreach materials were provided in both English and Spanish.



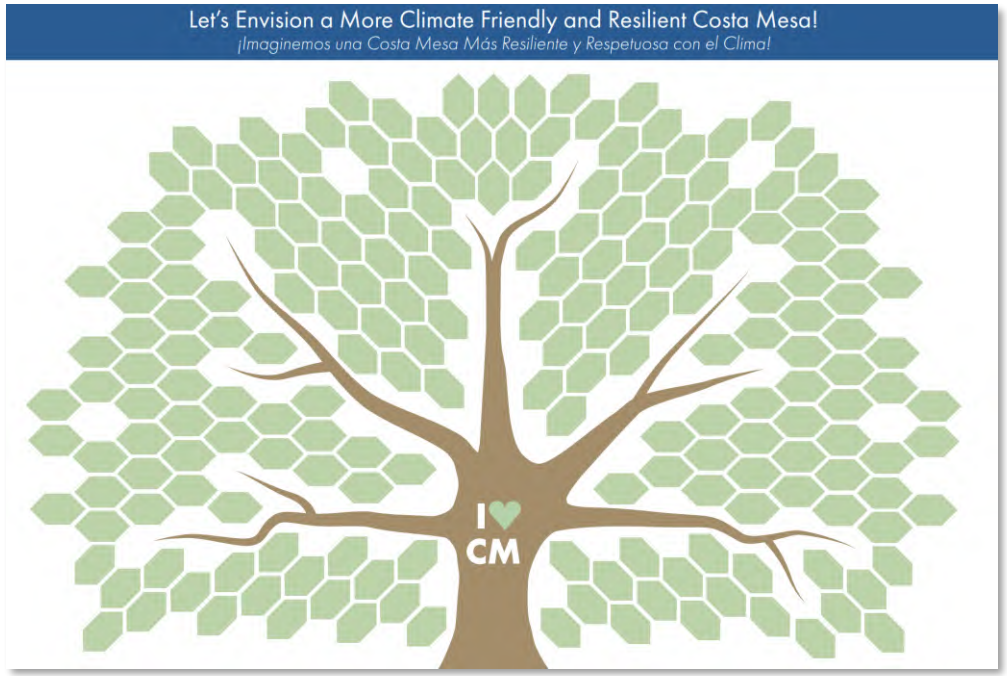






# Sustainable Costa Mesa Visioning

Through a community collage exercise, community members contributed to a shared vision for Costa Mesa's sustainable future. Participants answered the following question:

"A More Climate Friendly and Resilient Costa Mesa Is…"









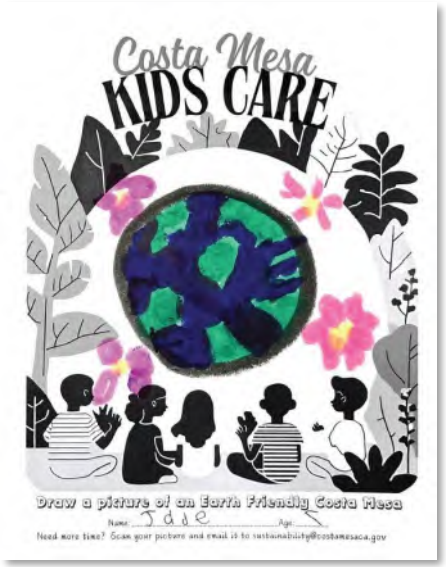
# Kids Activity

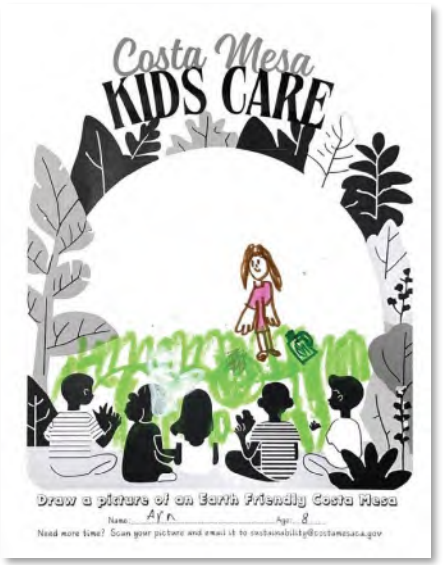
The event included a kid-friendly activity where kids could draw their vision for a sustainable Costa Mesa. Over 40 children responded to the following prompts :

- **"Draw a picture of an Earth Friendly Costa Mesa"**

- **"Draw how you would help the Earth and create a greener Costa Mesa"**

Various artistic mediums were provided: markers, paint sticks, colored pencils, etc.



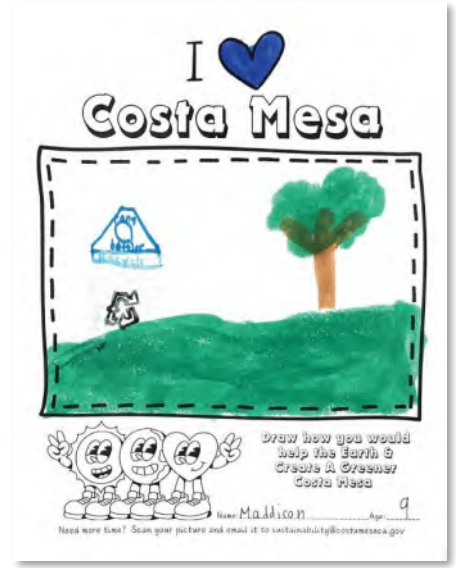




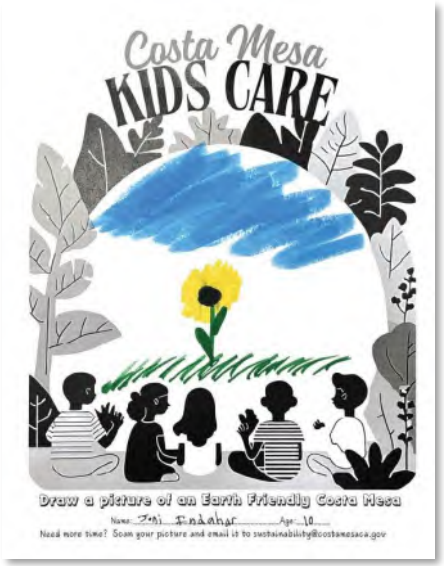


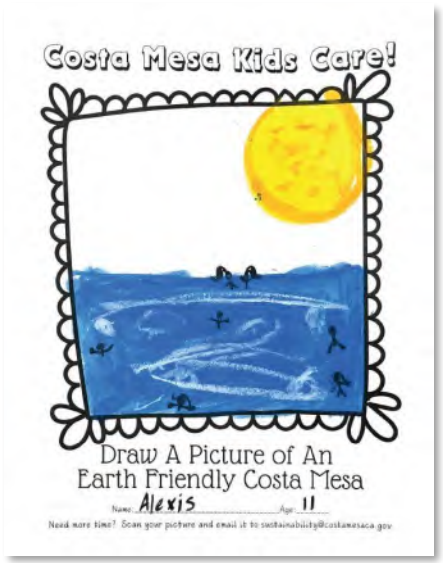


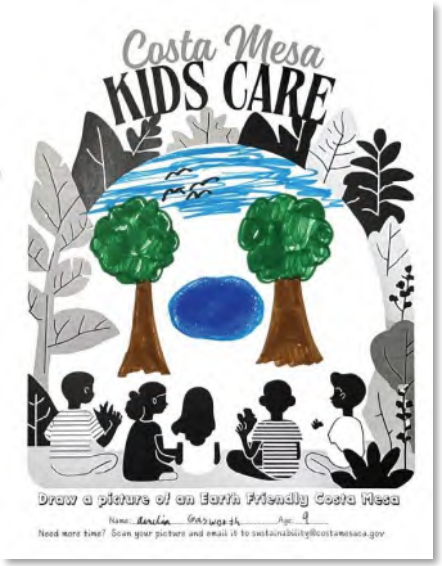




# Kids Activity



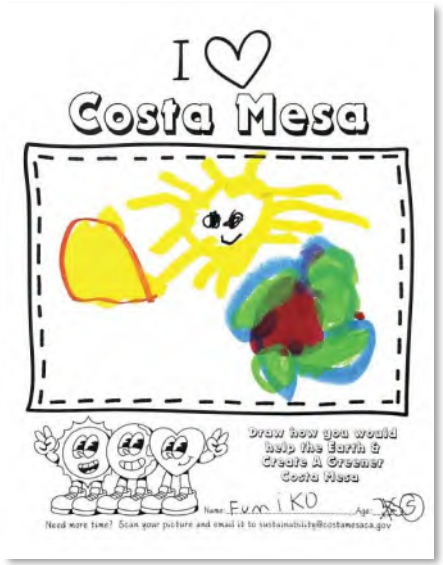



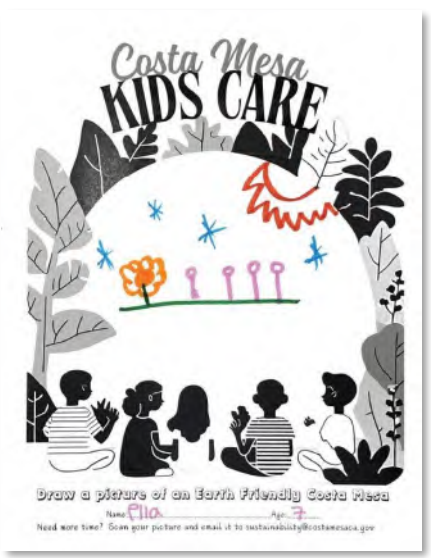







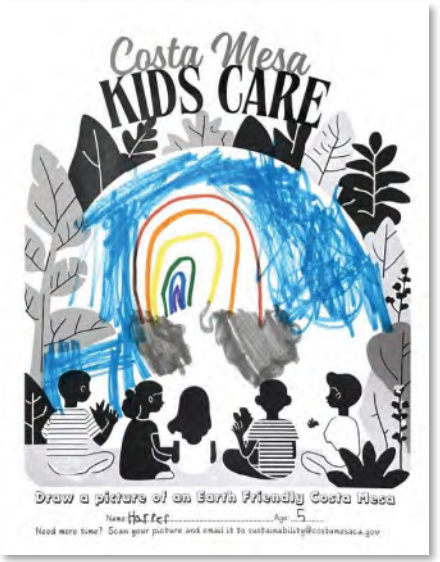






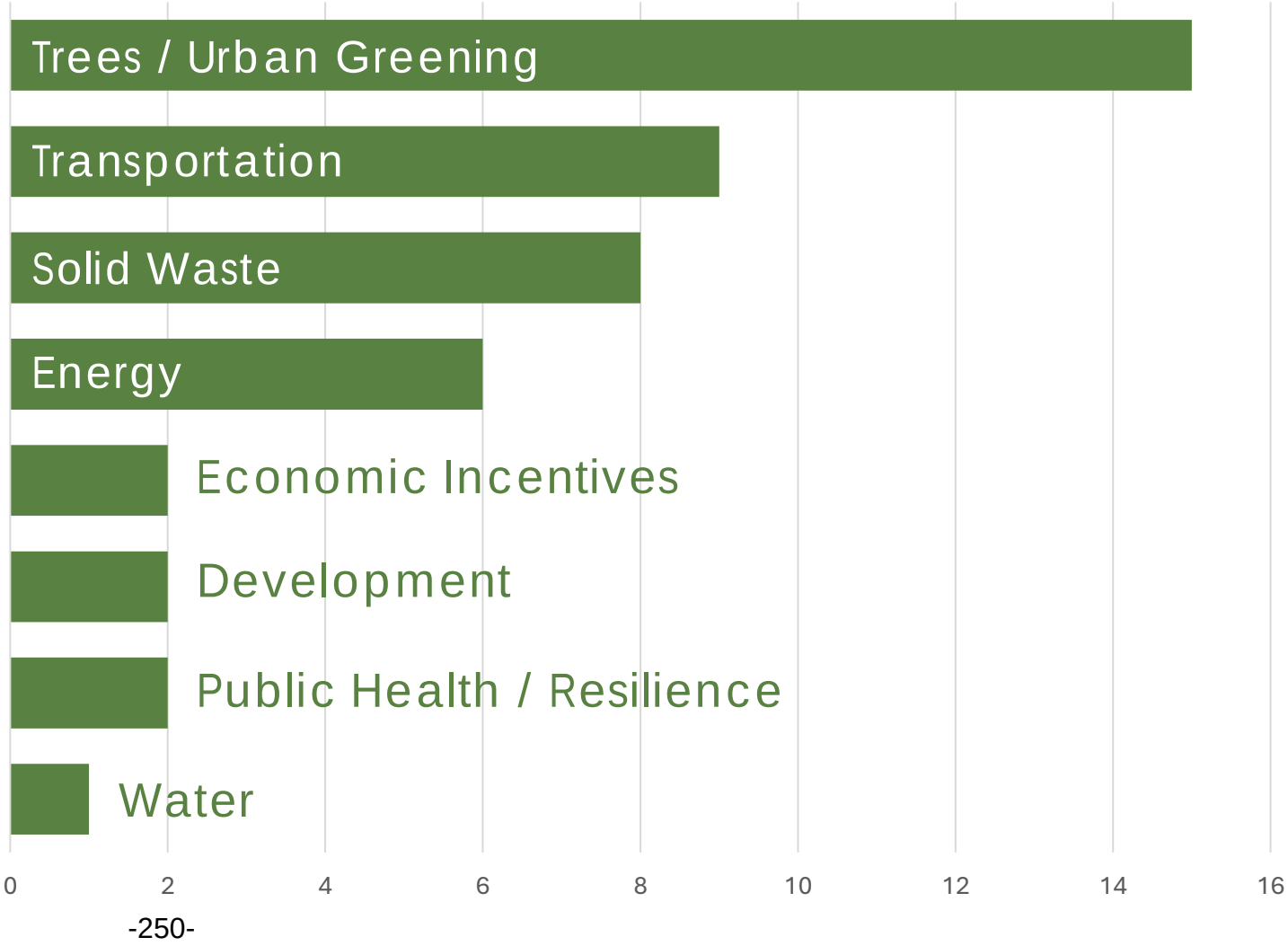





# What We Heard

Many participants shared a vision for a more sustainable Costa Mesa that included the following:

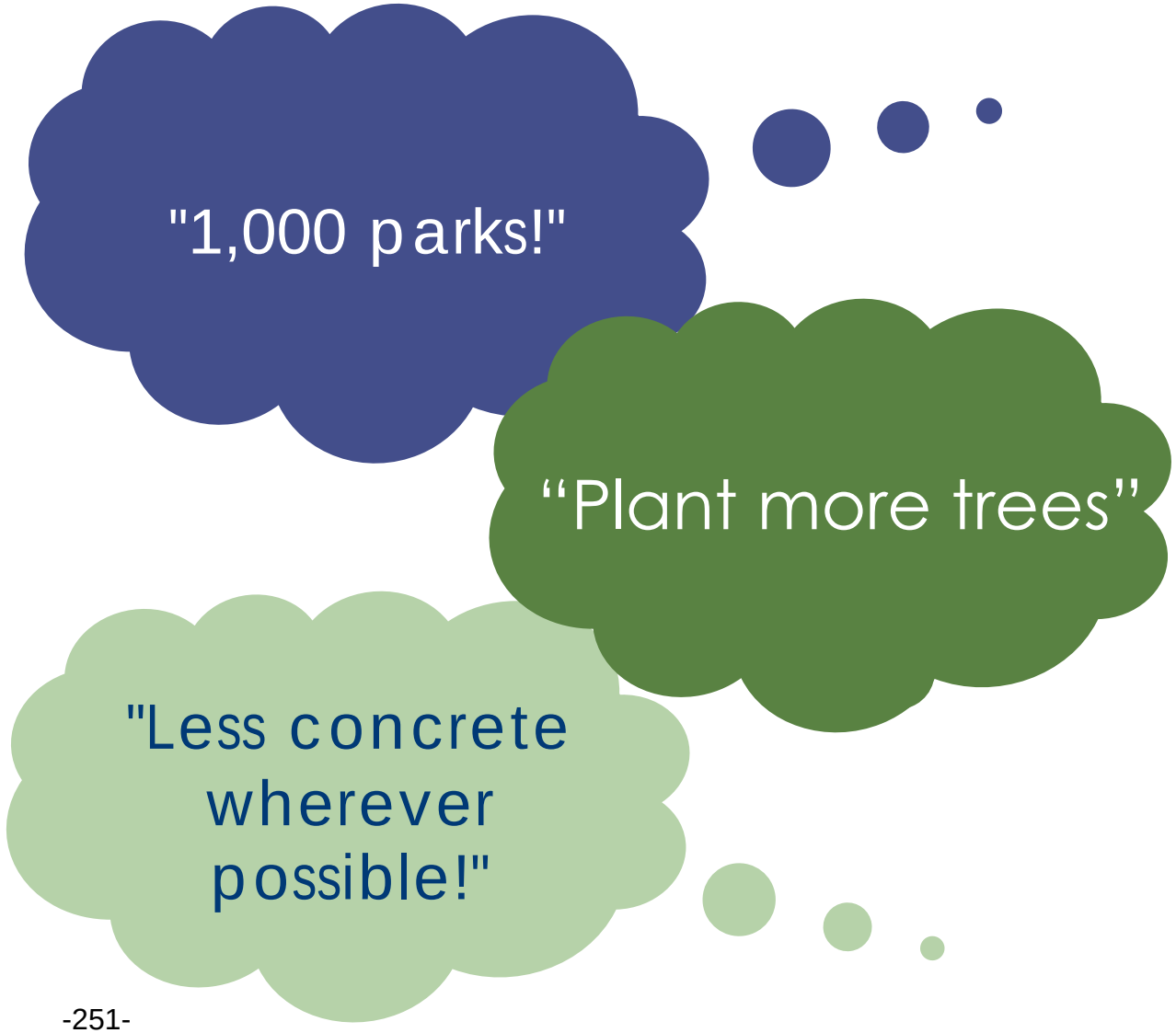
- Expand access to green spaces, such as parks, playgrounds and community gardens
- Improved transportation options as alternatives to car travels, such as biking, walking, and public transit
- Increase efforts to compost and recycle to reduce waste in the community



# Trees / Urban Greening

Key Takeaways:

- Participants showed a strong interest in more new trees and native landscaping, as well as more parks and community gardens.



# Transportation

Key Takeaways:

- There was a strong interest in improved bike infrastructure and safety such as protected bike lanes.
- Community members also showed support for improved public transportation.
- Community members emphasized a desire for accessible modes of transportation as alternatives to car travel.



# Solid Waste

Key Takeaways:

- Participants showed a strong interest in increasing compost and recycling efforts in the City, as well as reducing litter.
- Community members also expressed a desire for more accessible information on electronic waste disposal.



# Community Priorities for Energy

Key Takeaways:

- Community members were interested in solar energy.
- Other energy-related comments emphasized the need to make solar infrastructure more accessible and affordable.



# Public Health and Resilience

Key Takeaways:

- Community members showed an interest in resiliency centers to protect during extreme heat events.
- They also emphasized more vulnerable groups, such as older adults.



# Feedback Summary

The second Costa Mesa CAAP outreach successfully builds upon the previous effort to engage the Costa Mesa community in the planning process. The visioning activity provided clear feedback on community sustainability priorities while the kids station allowed community member of all ages to join the conversation on how to build a sustainable and resilient Costa Mesa.

Opportunities for the GHG Strategies Event:

- Emphasize multiple outreach touchpoints and how community feedback is shaping the CAAP
- Identify solutions to address challenges in reducing GHG emissions
    - Share municipal measures and actions for City emission sectors.
    - Present measures and actions for community emissions sectors for feedback and refinement.

APPENDIX C-3

# C-3 COMMUNITY SURVEYS

# Online Community Survey Summary of Responses

## CITY OF COSTA MESA CLIMATE ACTION AND ADAPTATION PLAN (CAAP)

# Community Survey Overview

A total of 158 surveys were completed by community members where they shared their feedback through two online surveys*, designed to better understand the community's current behavior, as well as current barriers to adopting more sustainable behaviors.

To support participating, both a long-form version and condensed version were offered.

- The long survey was available from 22nd of April to 3rd of October
- The condensed version was available from 29th of July to 3rd of October

Surveys were marketed through multiple channels, including in-person pop-up events, the project webpage, posters at City facilities, existing City communication channels such as the City's Newsletter, and social media campaign.







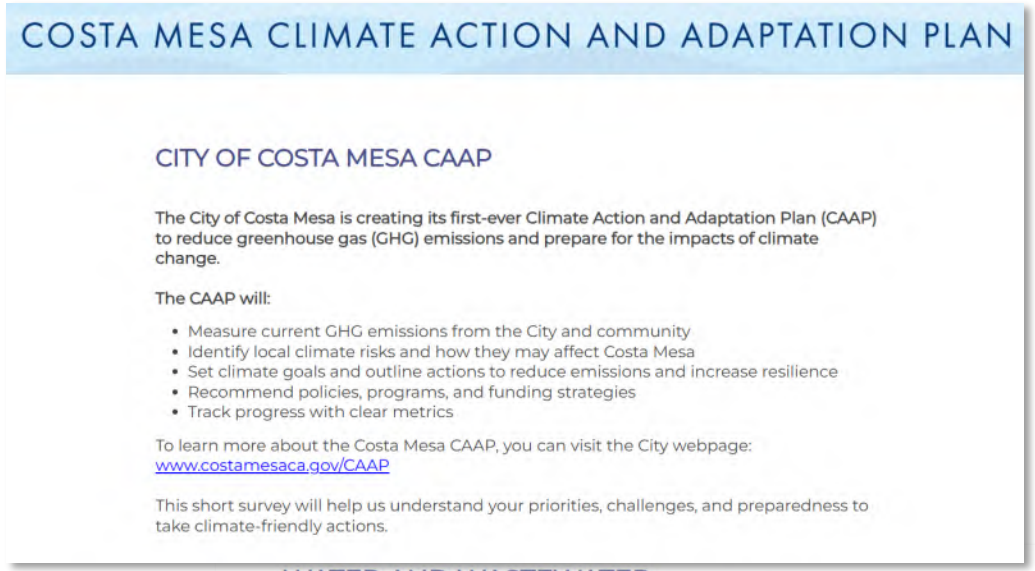
*A total of 226 survey responses were received, of which 158 were fully completed.

# Purpose and Topics

Survey Purpose: Understand community members' barriers to behavioral change and their priorities to take climate-friendly actions.

Sector Question Topics:

- Transportation - Walking, biking, transit use, EV ownership
- Energy - Energy efficiency upgrades, opt-in to alternative energy supplier
- Water - Drought-tolerant landscaping, graywater/rainwater capture
- Solid Waste - Composting
- Extreme Heat - Cooling center use



COSTA MESA CLIMATE ACTION AND ADAPTATION PLAN

CITY OF COSTA MESA CAAP

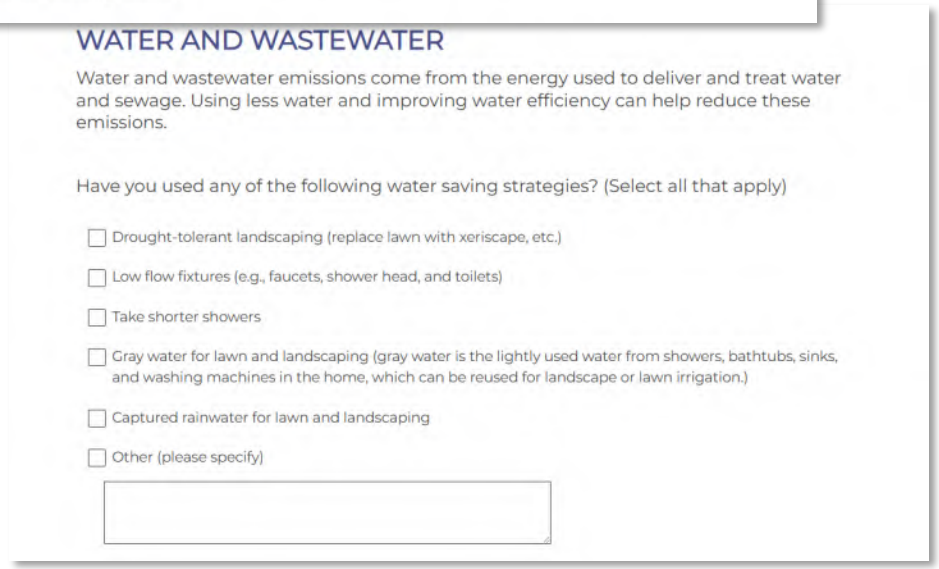
The City of Costa Mesa is creating its first-ever Climate Action and Adaptation Plan (CAAP) to reduce greenhouse gas (GHG) emissions and prepare for the impacts of climate change.

The CAAP will:

- Measure current GHG emissions from the City and community
- Identify local climate risks and how they may affect Costa Mesa
- Set climate goals and outline actions to reduce emissions and increase resilience
- Recommend policies, programs, and funding strategies
- Track progress with clear metrics

To learn more about the Costa Mesa CAAP, you can visit the City webpage: www.costamesaca.gov/CAAP

This short survey will help us understand your priorities, challenges, and preparedness to take climate-friendly actions.



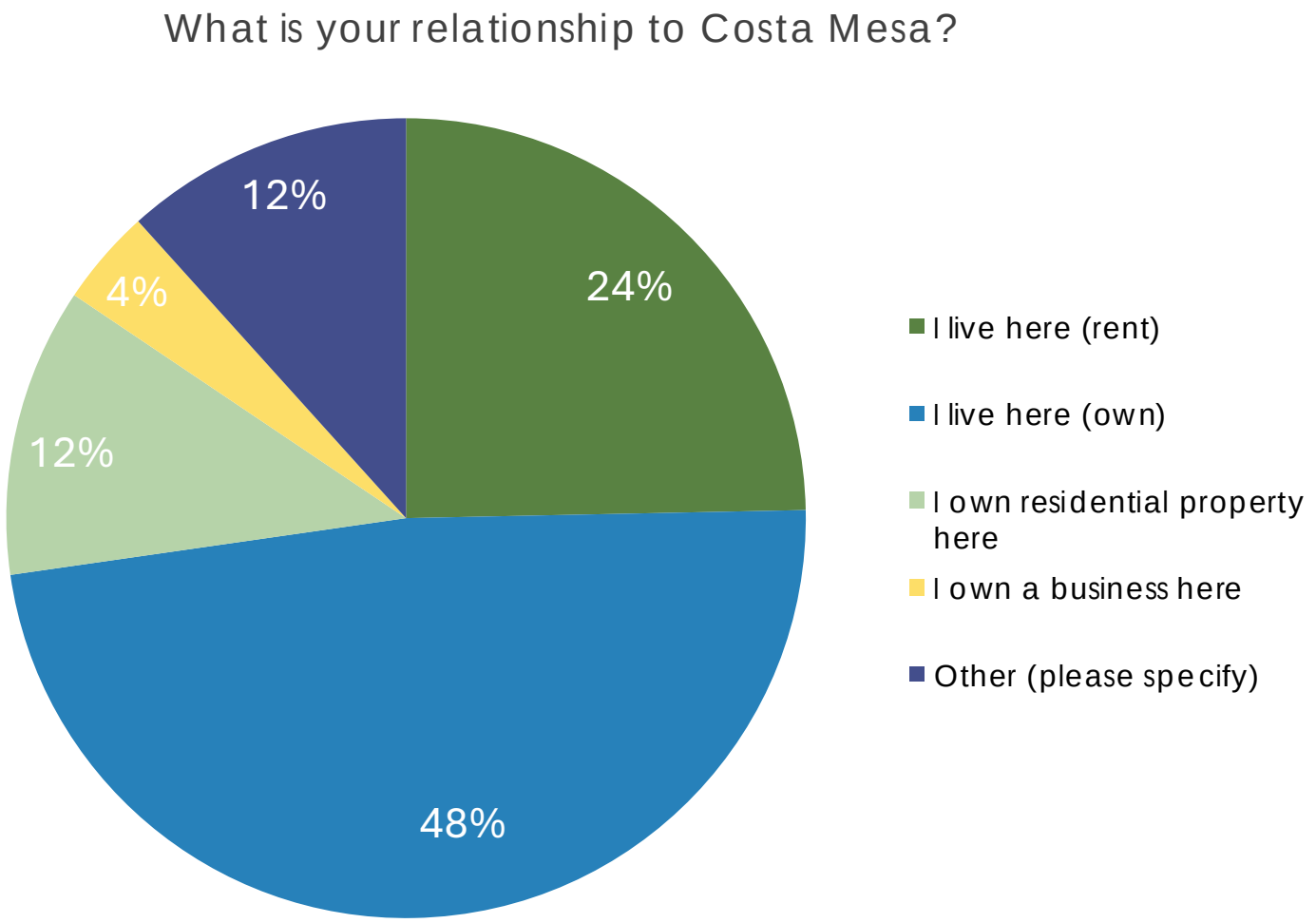
WATER AND WASTEWATER

Water and wastewater emissions come from the energy used to deliver and treat water and sewage. Using less water and improving water efficiency can help reduce these emissions.

Have you used any of the following water saving strategies? (Select all that apply)

- ☐ Drought-tolerant landscaping (replace lawn with xeriscape, etc.)
- ☐ Low flow fixtures (e.g., faucets, shower head, and toilets)
- ☐ Take shorter showers
- ☐ Gray water for lawn and landscaping (gray water is the lightly used water from showers, bathtubs, sinks, and washing machines in the home, which can be reused for landscape or lawn irrigation.)
- ☐ Captured rainwater for lawn and landscaping
- ☐ Other (please specify)

# Who Responded?

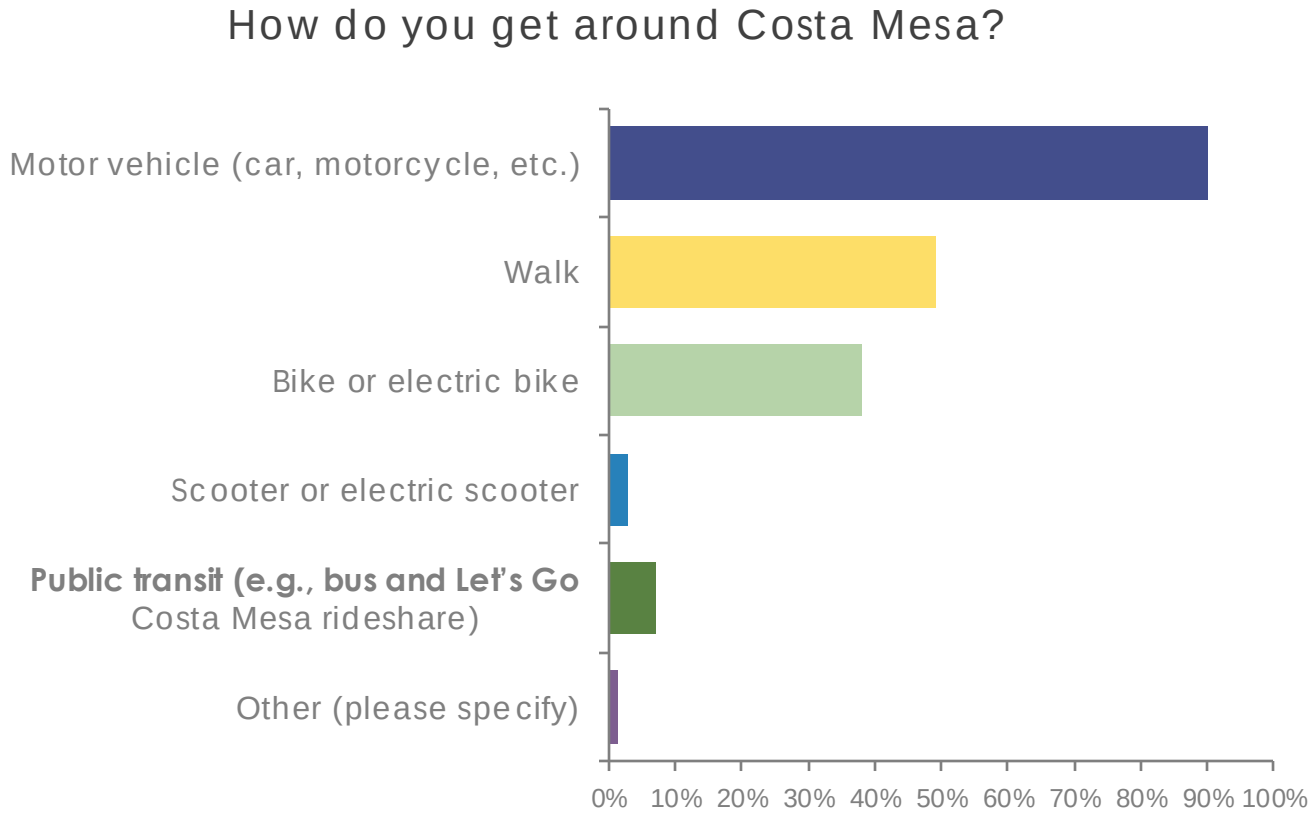



- Almost all those who responded are residents of Costa Mesa
- More than 60% of survey respondents own their home in Costa Mesa, while about 30% rent
- About 15% own a property (but do not live in the city)

# Transportation Sector - Key Takeaways

The primary challenges to each mode of transportation were:

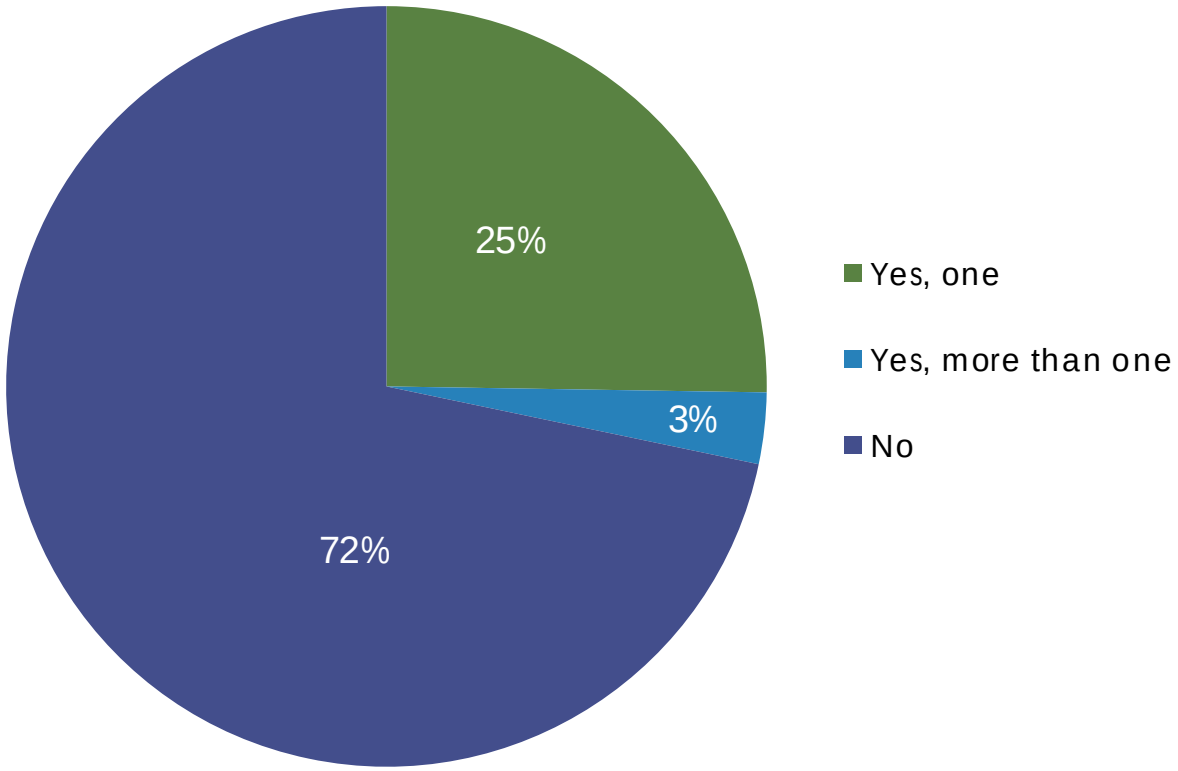
- *Walking* destinations are too far
- *Biking* lack of bike lanes, fast/busy car traffic
- *Public transit* inconvenient routes/stops, long wait times




A total of 71 participants responded to this question.

# Transportation Sector - Key Takeaways

Does your household have an electric vehicle?




A total of 170 participants responded to this question.

One-**third of respondents' households** have an electric vehicle.

For those that do not, the biggest barrier to EV ownership is cost followed by preference for non-electric vehicles.

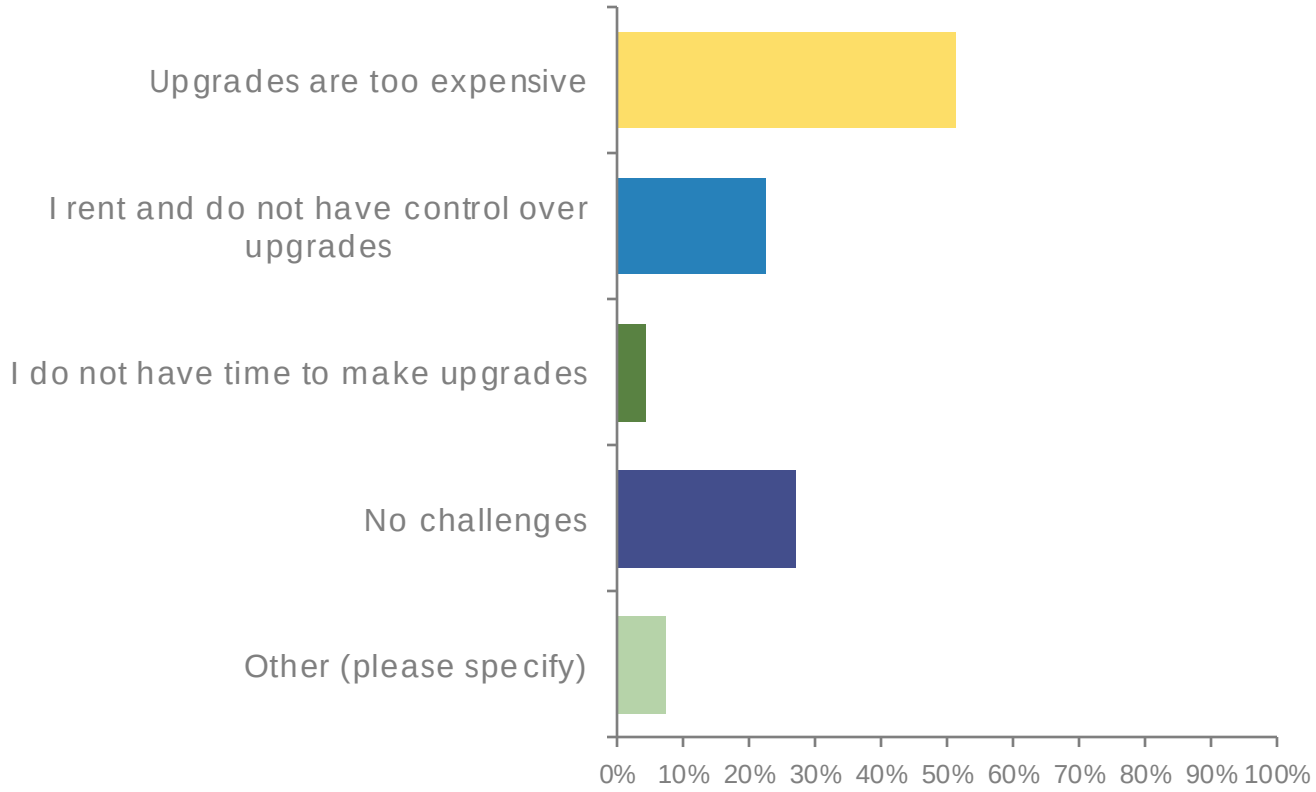
Lack of access to a charger at home and range anxiety are two other major concerns.

# Energy Sector - Key Takeaways

Cost is the biggest challenge for making energy upgrades.

Similarly, for switching from gas to electric appliances, cost is a major factor, along with preference for gas appliances (e.g., stoves)

What challenges do you face with making energy upgrades?




A total of 66 participants responded to this question.

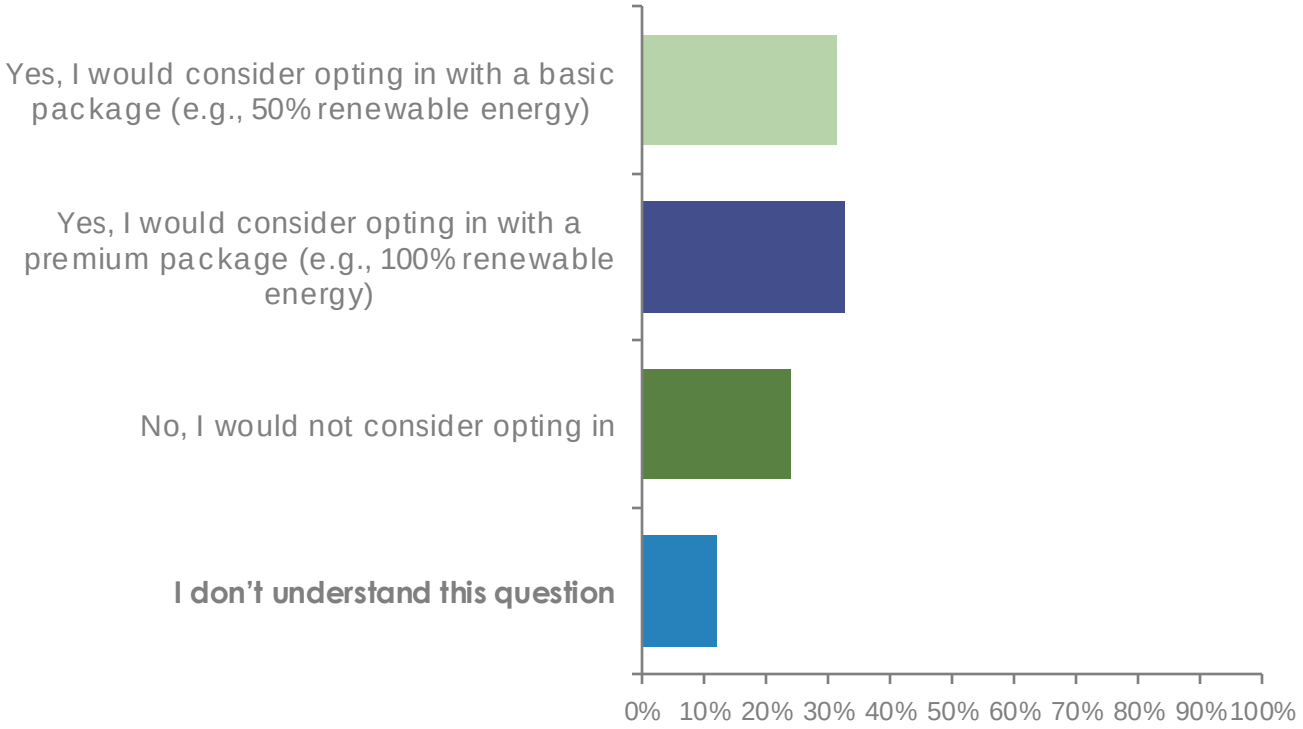
# Energy Sector - Key Takeaways

When asked if they would opt into an alternative energy supplier, responses were mixed:

- About 30% would opt into a basic (50% renewable) package *on both surveys*
- 20-30% would opt into a premium (100% renewable) package
- 20-30% would not opt in*

* *Responses varied between short- and long-form surveys*

Would you consider opting into an alternative energy supplier if cost is similar?




A total of 67 participants responded to this question.

# Water Sector - Key Takeaways

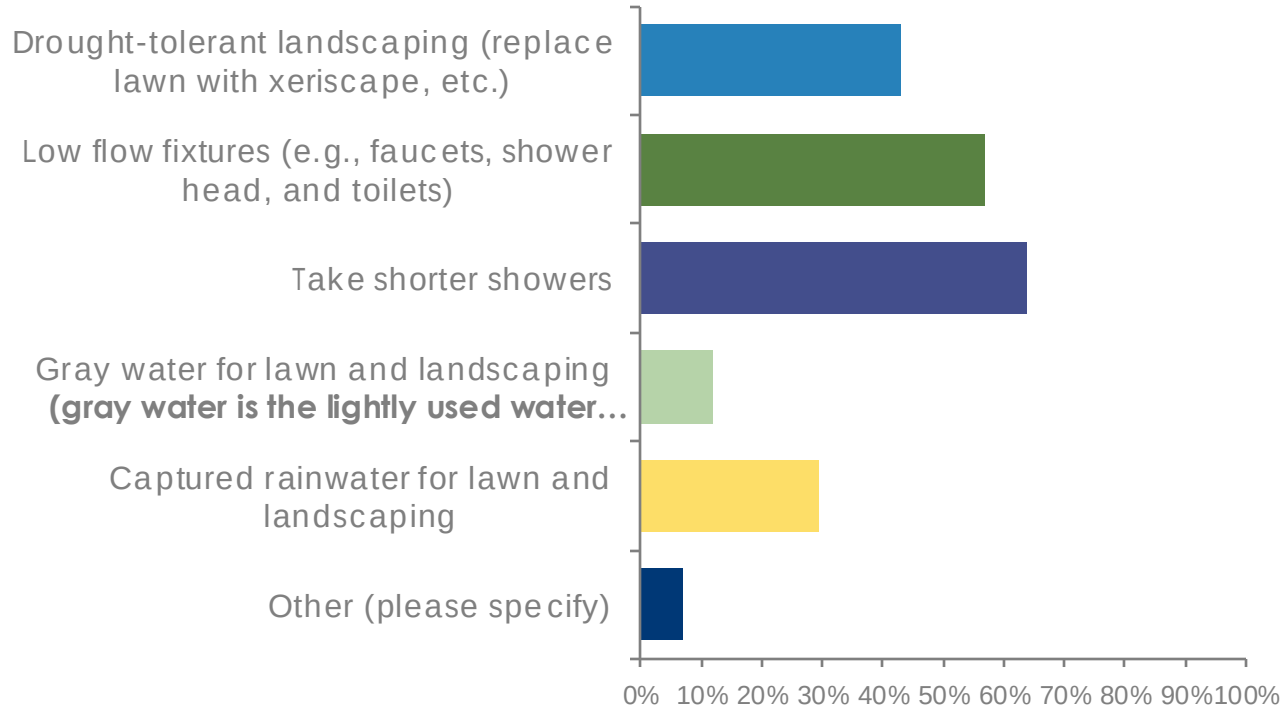
The most common strategy respondents use to save water is taking shorter showers followed by using low-flow fixtures and drought-tolerant landscaping.

However, several barriers exist for draught-tolerant landscaping, including:

- Cost and time
- Tenant status (renter) with no control over landscaping

For graywater or captured rainwater systems, lack of knowledge is the biggest challenge.

Which of these water saving strategies have you used?



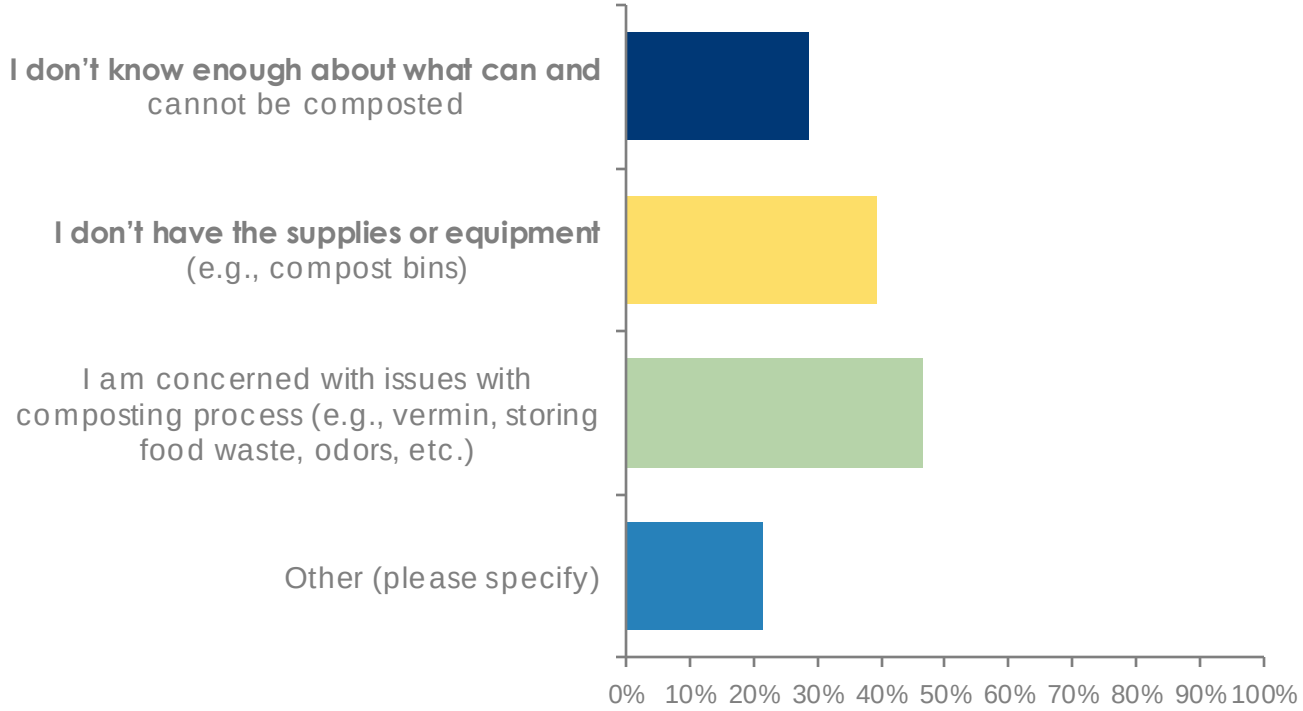

A total of 58 participants responded to this question.

# Solid Waste Sector - Key Takeaways

More than 55% of respondents compost.

The greatest barriers to composting are concerns about vermin, odor, and food waste storage and lack of supplies, like compost bins.

Do you compost your food scraps and yard waste into the green organics bin?



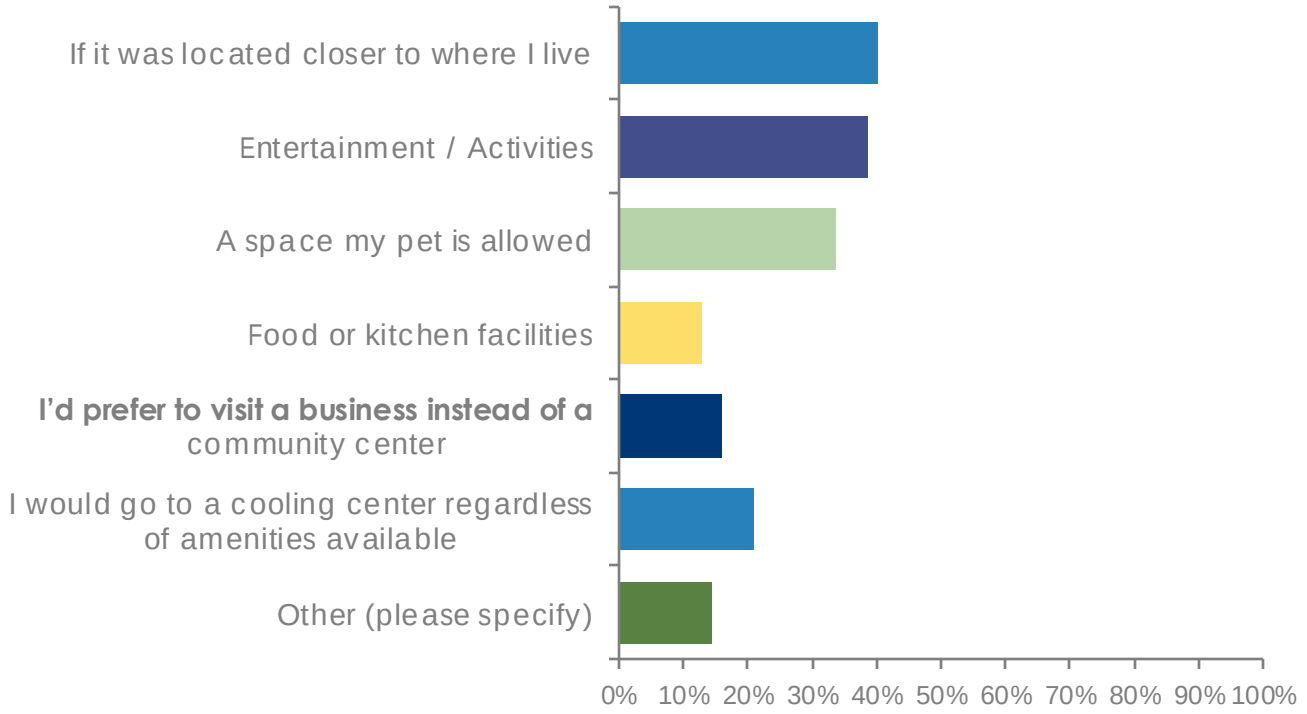

A total of 65 participants responded to this question.

# Extreme Heat- Key Takeaways

Proximity, entertainment/ activities, and a place where pets are allowed are the most important factors for cooling center use.

Additionally, on the short-form survey a larger percent of respondents (almost 30%) would prefer a business instead of a community center.

What would encourage you to go to a cooling center?




A total of 158 participants responded to this question.

APPENDIX C-4

# C-4 COMMUNITY OPEN HOUSE



# COSTA MESA CAAP

## Community Open House Overview and Takeaways

# Open House Overview

- On Thursday, April 30, 2026, from 6:00 p.m. to 8:00 p.m. approximately 30 community members participated in feedback-sharing activities at a joint community open house for the Climate Action and Adaptation Plan (CAAP) and the Environmental Justice Element update.
- The event began with a presentation from City staff and consultants, which provided an overview of each project and instructions for sharing feedback. The CAAP stations of the open house included six educational poster boards, with information on the benefits and goals of the CAAP, climate hazards, and the difference between mitigation and adaptation, and seven strategies boards, which listed draft objectives and sample actions for each of eight sectors.







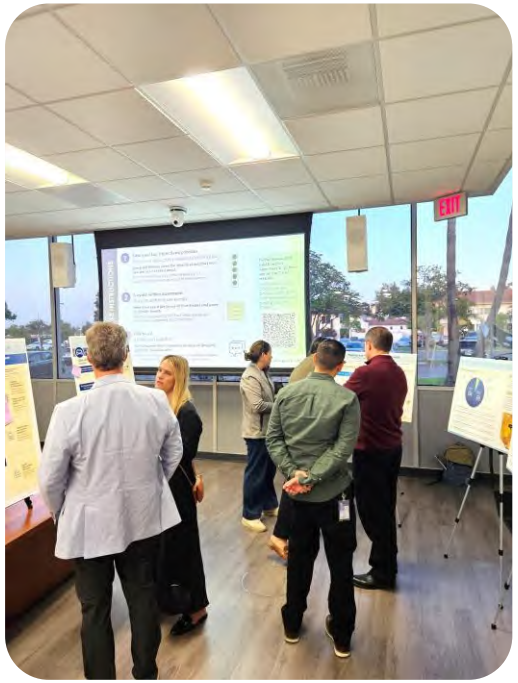
# Open House Overview





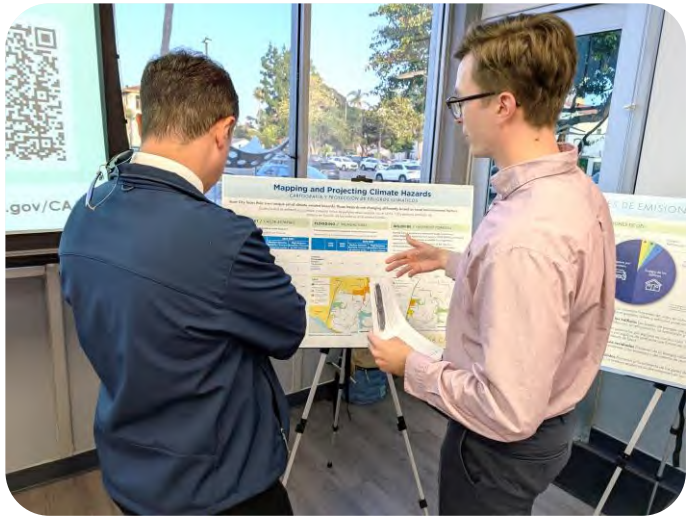






# Feedback Overview



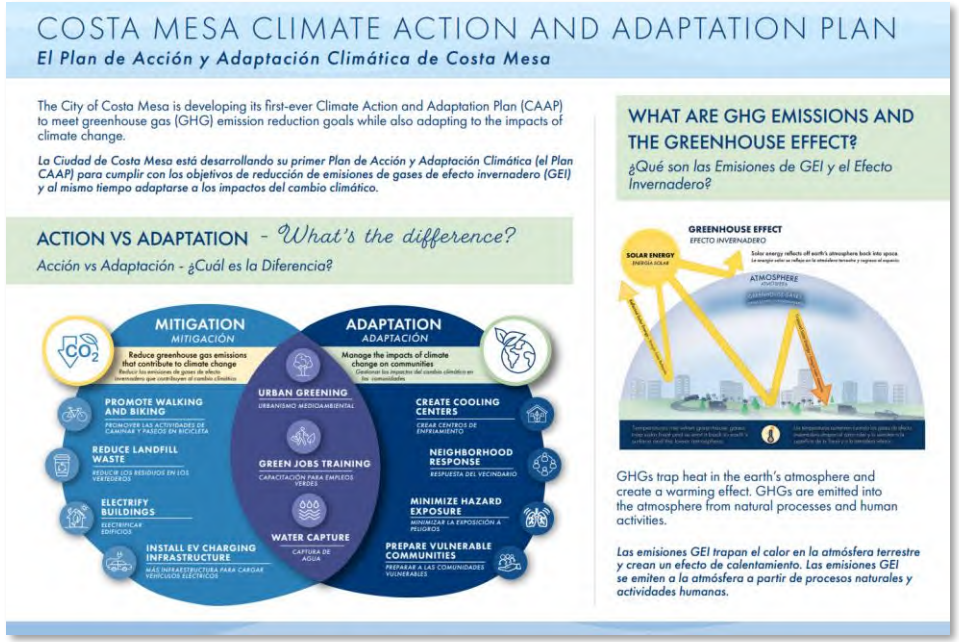



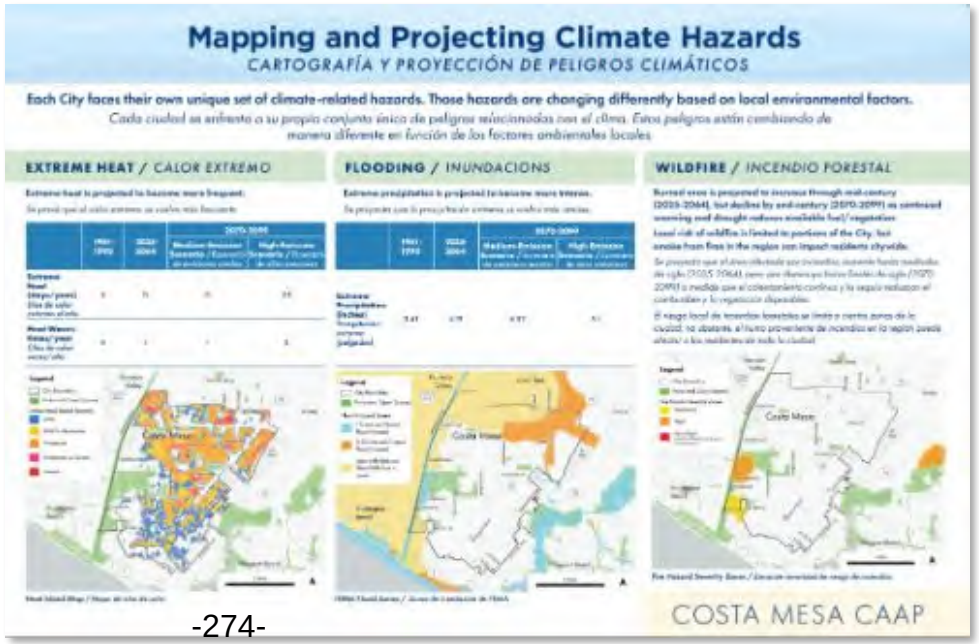

- Participants were invited to leave feedback in two forms on the strategies boards:
  - Dot stickers to indicate an objective or sample action is a priority, or important, to them;
  - Post-it notes to share substantive input. (Participants also had the option to leave more detailed feedback via larger comment cards.)
- The largest number of comments were received on the transportation, energy and the built environment, and natural and urban lands sectors. Furthermore, several objectives and sample actions were indicated as a priority, as summarized in the "What We Heard" section.

# Education-focused Materials

Education-focused poster boards summarized key information about the CAAP, climate mitigation and adaptation, and climate hazards that could affect the Costa Mesa community. Specifically, the boards:

- Introduced common terms and topics pertinent to the CAAP, such as climate mitigation, adaptation, climate hazards, and greenhouse gas emissions;
- Outlined the goals and ancillary benefits of the CAAP (e.g., improved air quality, cost-savings)
- Informed participants about the project webpage and how to stay updated on the project.






# CAAP Strategies Boards

Strategy boards listed draft objectives and sample actions for each of the eight CAAP sectors. Space was provided below each objective for participants to place comments and dot stickers.

- Introduced common terms and topics pertinent to the CAAP, such as climate mitigation, adaptation, climate hazards, and greenhouse gas emissions;
- Outlined the goals and ancillary benefits of the CAAP (e.g., improved air quality, cost-savings)
- Informed participants about the project webpage and ways to get involved.







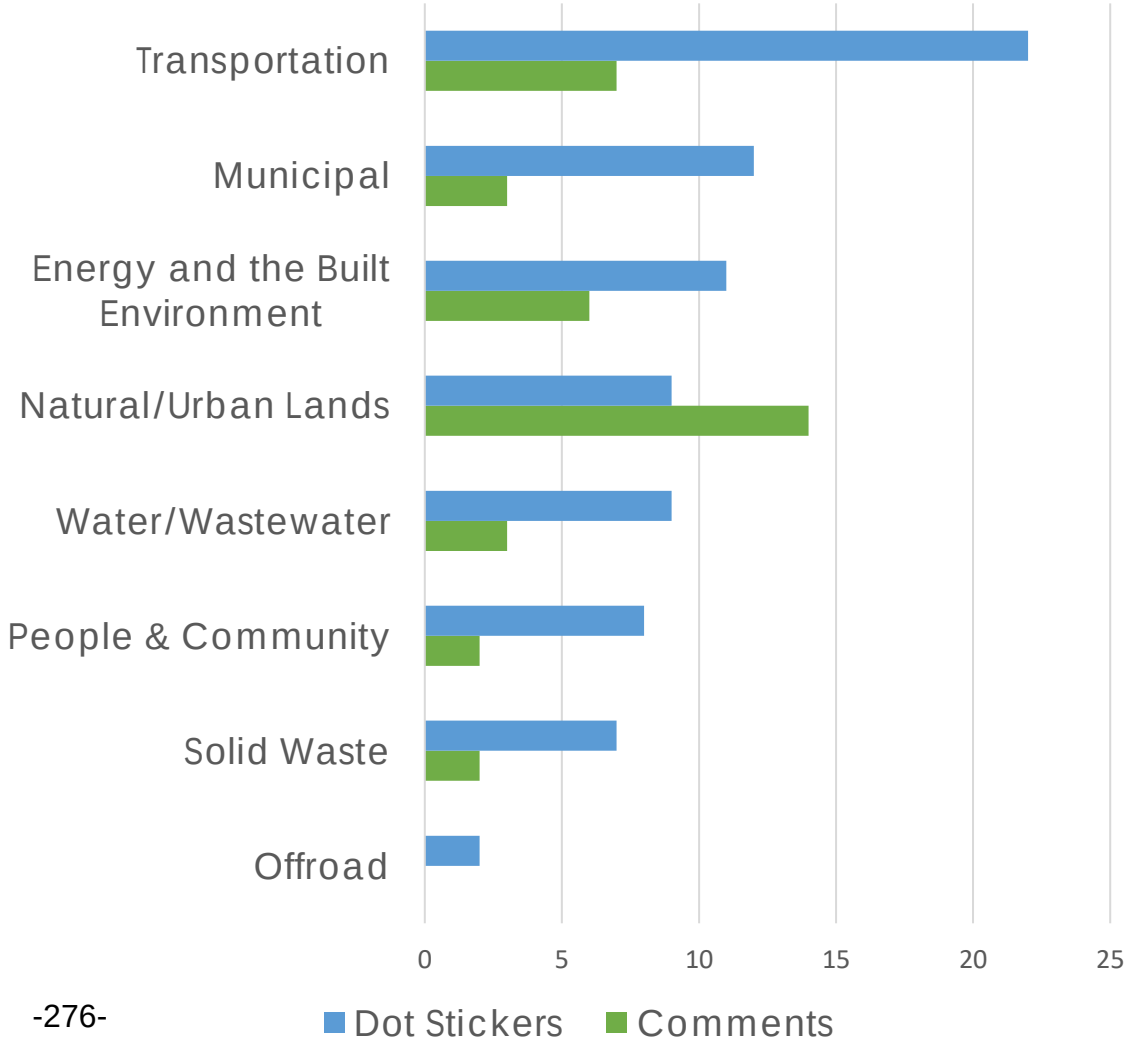


# What We Heard

Participants shared the most feedback on Transportation, Natural/Urban Lands, and Energy and the Built Environment.

Objectives and sample actions with at least three dot stickers included:

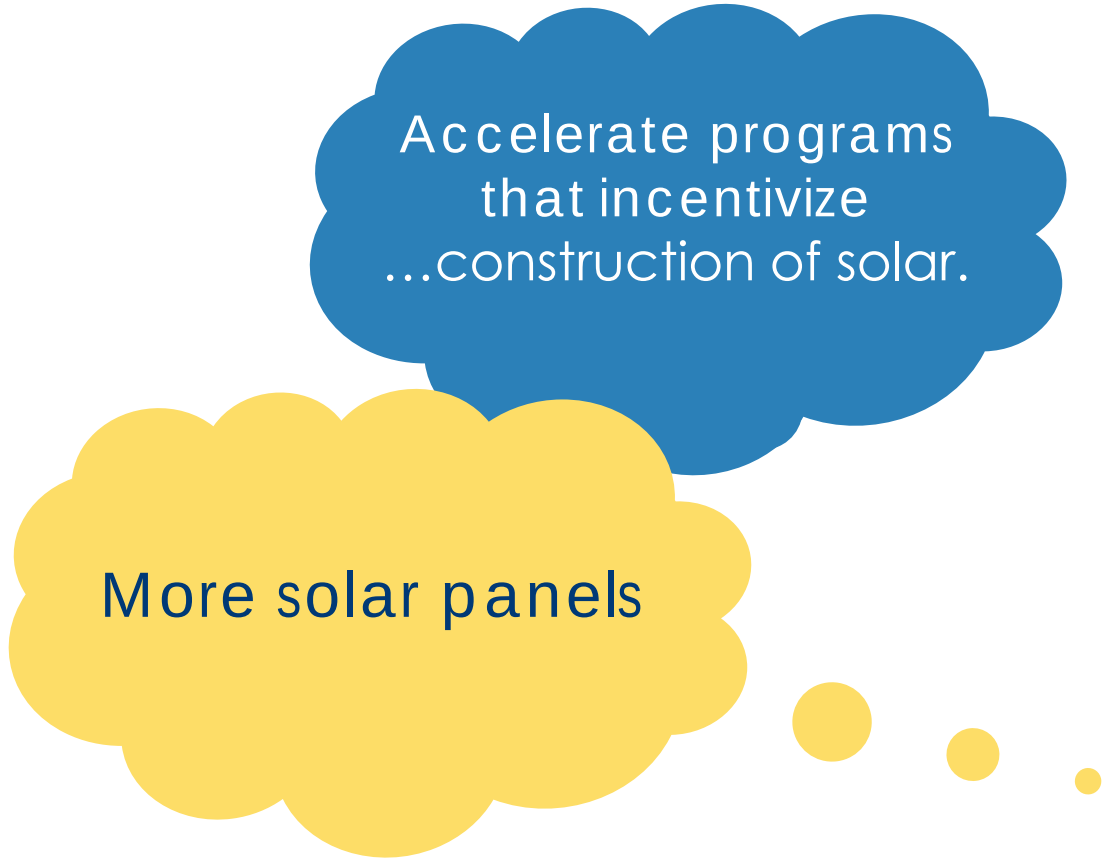
- Recycled water irrigation systems
- Recycling solid waste
- Resilient urban design
- Sustainable business practices and green workforce development
- Green spaces and tree canopy, and
- Restoring and enhancing soil



# What We Heard: Energy & the Built Environment

Key Takeaways:

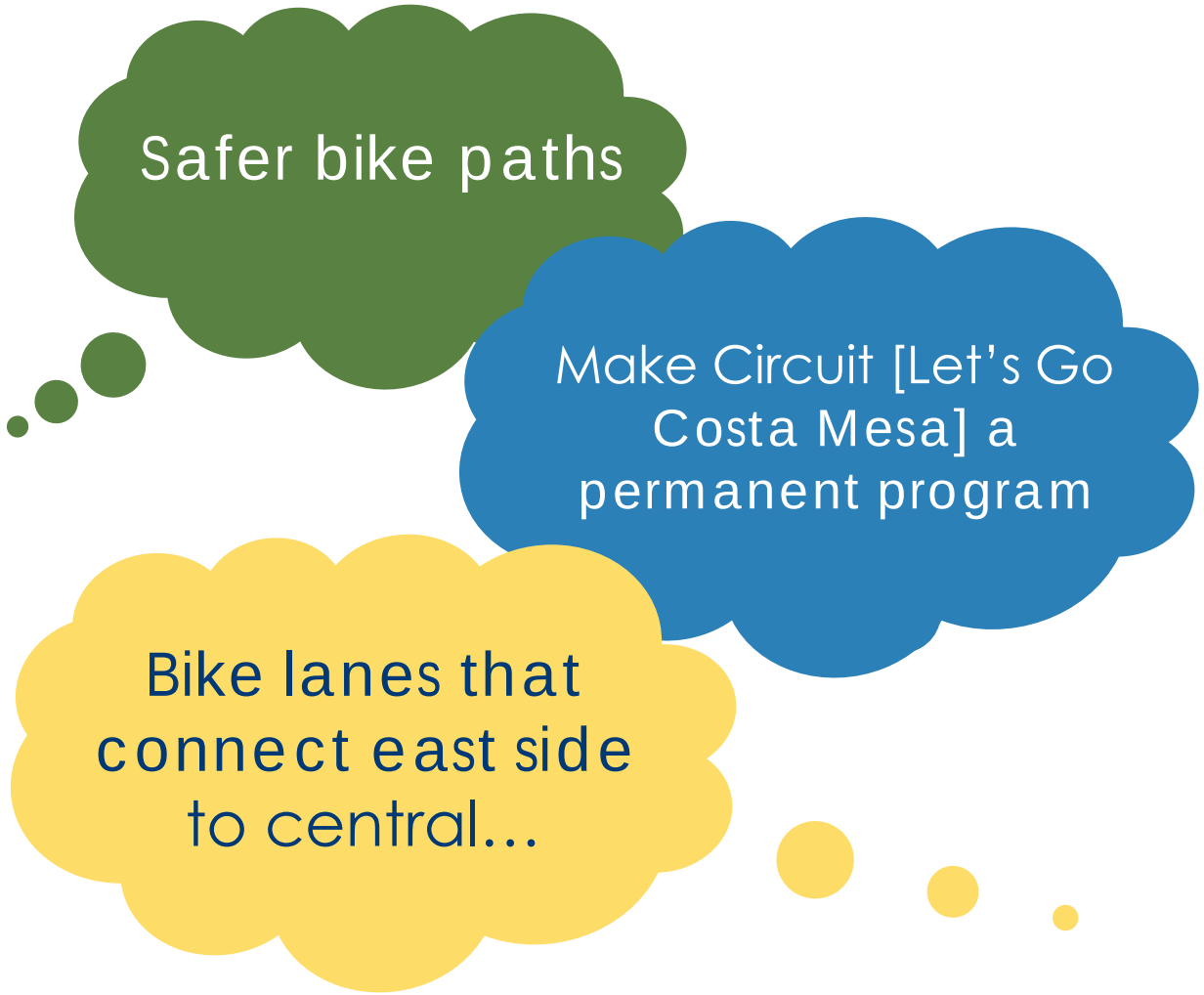
- Several participants were in favor of expanding solar panel use and incentives for new construction w/ solar
- At least two community members cautioned against cool roofs due to insurance company requirements



# What We Heard: Transportation

Key Takeaways:

- Participants were strongly in favor of promoting walking and biking (e.g., safer and expanded bike lanes) and supporting smart growth (e.g., mixed-use development)
- At least one community member suggested Let's Go Costa Mesa should be expanded and made into a permanent program



# What We Heard: Water/Wastewater

Key Takeaways:

- Several community members were in favor of water re-use
- Some participants advocated for low-tech water conservation methods, such as collecting water at home



# What We Heard: Off-road Equipment/Solid Waste

Key Takeaways:

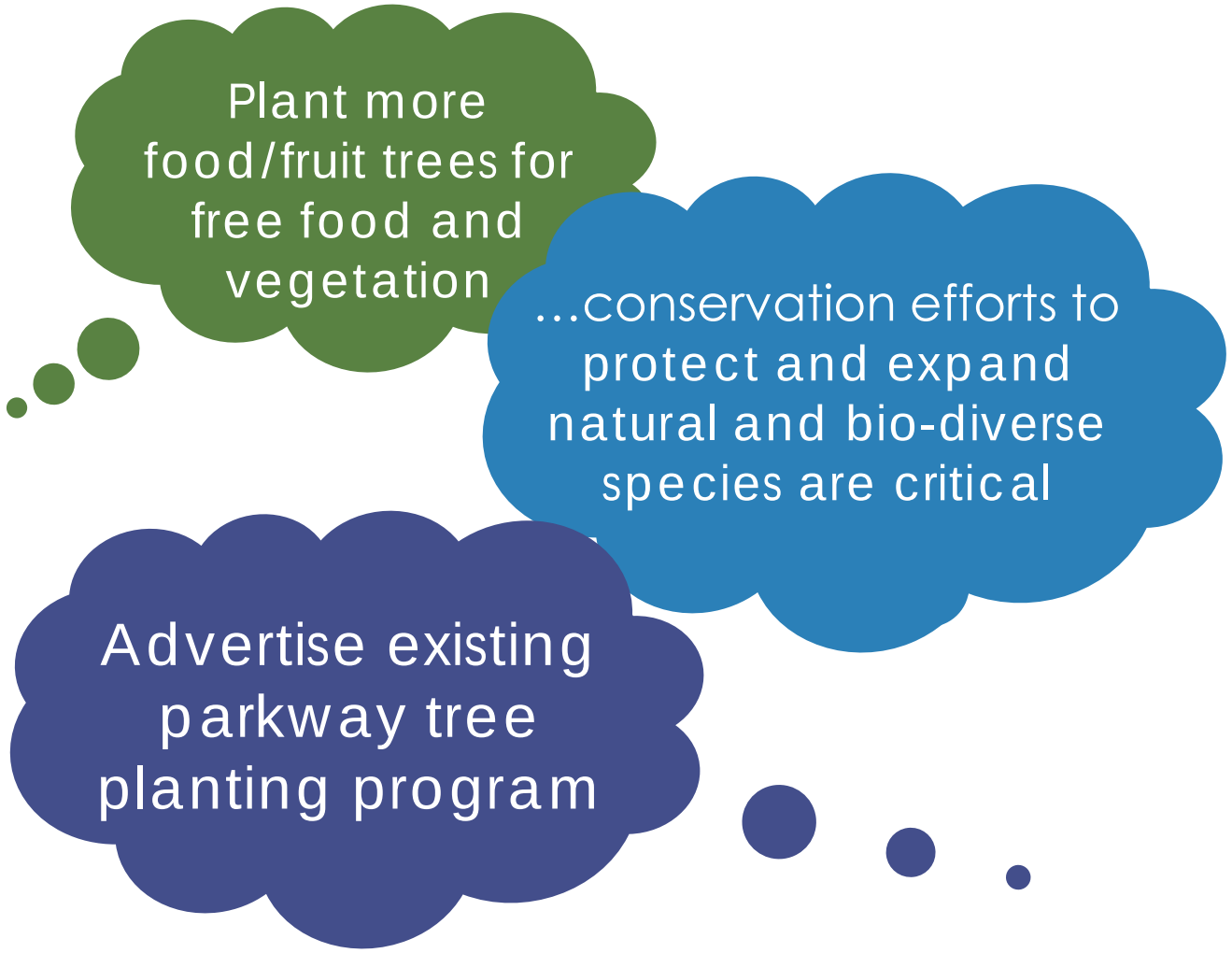
- At least two community members marked electrification of landscaping and construction equipment as a priority
- Participants indicated that actions to support or expand recycling were a priority
- One community member suggested the City launch a free woodchip program tied to tree removal to reduce water demand for yards



# What We Heard: Natural & Urban Lands

Key Takeaways:

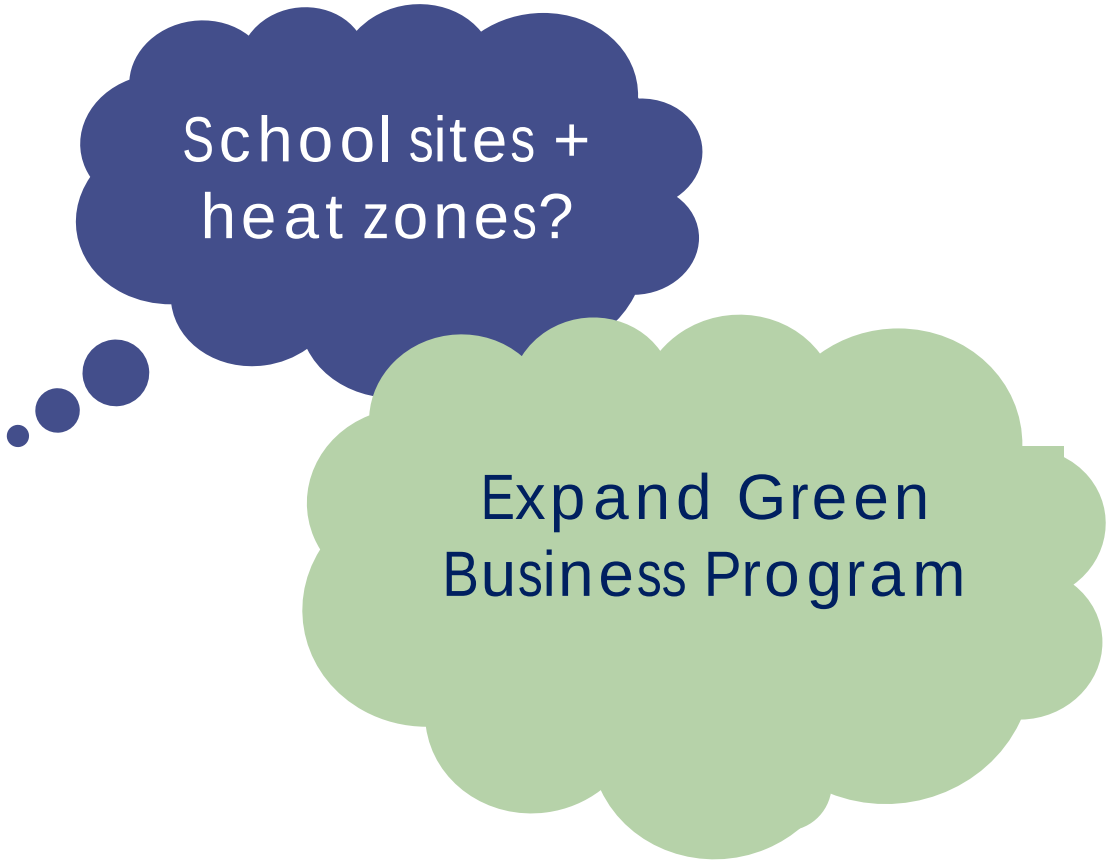
- Several community members indicated the following actions were a priority:
  - Expand green spaces and tree canopy
  - Restore and enhance soil
- Some participants requested stronger promotion of tree programs and expanded tree planting (including fruit trees),
- Advocates for education/support for native, wildlife-friendly planting.



# What We Heard: People & Community

Key Takeaways:

- Resilient urban design (e.g., tree canopy, stormwater capture) and sustainable business practices/green workforce development were high-priority
- Two participants indicated cooling center amenities were a priority, too



# What We Heard: Municipal

Key Takeaways:

- Community members were in favor of
  - Zero-emission landscape equipment for public landscaping
  - Public EV infrastructure
- One participant suggested that emergency vehicles should transition to EV if feasible



# Feedback Recap & Key Takeaways

The Community Open House successfully engaged approximately 30 community members, who shared feedback through 37 Post-it notes and 80 prioritization stickers to inform revisions to draft CAAP objectives and actions.

Community feedback showed support for:

- Expanding solar
- Water reuse
- Recycling
- Green infrastructure
- Rainwater capture
- Drought-tolerant landscaping
- Safer, connected biking and walking
- Smart growth
- Expanded urban greening
- Education and awareness of City programs
- Shade and cooling features
- Municipal electrification
- EV infrastructure

APPENDIX D

# GREENHOUSE GAS REDUCTION SUPPORTING MATERIAL

# Appendix D – Greenhouse Gas Reduction Supporting Material

To address the local emissions gap within the City of Costa Mesa (City or Costa Mesa) and achieve the action and adaptation goals for 2030 and 2045, a suite of 8 sectors, 23 objectives, and 106 actions were identified. Where possible, greenhouse gas (GHG) emissions reductions were quantified using industry-standard methods and assumptions, as outlined below. Some actions were not quantified in the Climate Action and Adaptation Plan due to limitations in data availability or calculation methodologies. However, future improvements in data and methods may enable the quantification of these actions at a later date. This appendix discusses only those objectives and actions for which emissions reductions have been quantified.

## On-Road Transportation

The methodology and assumptions for estimating emissions reductions from the on-road transportation sector are provided below for all objectives and quantified actions, as appropriate. Except for Objective T1 (Transition to Electric Vehicles (EVs), the GHG reductions associated with the on-road transportation actions were estimated using the associated vehicle miles traveled (VMT) reductions. VMT reductions were quantified using the projected VMT estimates in conjunction with calculation methodologies detailed in the California Air Pollution Control Officers Association (CAPCOA) Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report,[1] which provides a statewide standard for quantifying VMT and GHG reductions from general mitigation strategies. A weighted average emissions factor calculated using EMFAC2025 was then applied to the reduced VMT to estimate total GHG emissions reductions for 2030 and 2045. Duplicative dampening was calculated using TDM+, a tool developed by Fehr & Peers that leverages regional data to estimate percent reductions in VMT from mitigation measures while accounting for decreased effectiveness when similar measures are implemented together. Relevant assumptions used are provided below by objective and action.

[1] *California Air Pollution Control Officers Association (CAPCOA). 2024. Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. October 2024. https://www.caleemod.com/documents/handbook/full_handbook.pdf.*

## T1: Transition to Electric Vehicles

The goal of Objective T1 is to encourage the community to transition to EVs. Collectively, the actions to support Objective T1 are anticipated to facilitate and encourage car owners in Costa Mesa to transition to EVs, increasing the total amount of vehicles in Costa Mesa that are zero-emission vehicles (ZEVs) to 25% by 2030 and 30% by 2045. To estimate the ZEV portion of the fleet under this objective, the ZEV performance goals for each future year were applied to the total citywide VMT apportioned to battery EVs and plug-in hybrid electric vehicles (PHEVs) based on the projected ratios from EMFAC2021 and EMFAC2025. Emission factors for battery EVs and PHEVs were estimated for future years and account for the increasing renewables in the carbon intensity of the local electricity provider (Southern California Edison). The average GHG emission factor for non-EVs was calculated in terms of carbon dioxide equivalent ($CO_2e$) per mile using EMFAC2021 and EMFAC2025. The GHG emissions reduction was then estimated for each analysis year by determining the GHG benefit of shifting VMT from non-EVs to ZEVs.

The percentage of PHEVs and battery EVs was obtained using an average portion for Orange County in EMFAC2021 and EMFAC2025. The Costa Mesa VMT was provided by Fehr & Peers, consistent with the adjusted business-as-usual (ABAU) forecasts for 2030 and 2045.[2] The percentage of PHEV miles in electric mode was consistent with findings from the California Air Resources Board Advanced Clean Cars Mid-Term Report, which indicates that PHEV owners can reach 80% electric VMT with access to adequate supportive charging infrastructure.[3] The fuel efficiency of a PHEV in gasoline mode was calculated as 66.7% of the fuel consumption rate of a gasoline vehicle, based on the assumption that a gasoline hybrid vehicle has 50% higher fuel economy than a comparable gasoline vehicle, based on a comparison of the gasoline and hybrid Toyota Camry and Corolla models.[4] Energy efficiency of EVs in electric mode was scaled from a light-duty automobile gasoline equivalent fuel economy of 30.3 miles per gallon,[5] an energy efficiency ratio of 2.5,[6] and an assumption of 33.7 kilowatt-hours (kWh) of electricity per gallon of gasoline.[4]

---

2 *Fehr & Peers. 2026. "Costa Mesa Climate Action Plan VMT Methodology Memorandum."*
3 *California Air Resources Board (CARB). 2017. California's Advanced Clean Cars Midterm Review. January 18, 2017. https://ww2.arb.ca.gov/sites/default/files/2020-01/ACC%20MTR%20Summary_Ac.pdf.*
4 *U.S. Department of Energy. 2021. "Download Fuel Economy Data." January 2021. https://www.fueleconomy.gov/feg/download.shtml.*
5 *CARB. 2020. EMFAC2017 v1.0.3. August 2020. https://arb.ca.gov/emfac/emissions-inventory.*
6 *CARB. 2020. Unofficial Electronic Version of the Low Carbon Fuel Standard Regulation. https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf.*

## T2: Promote Walking and Biking

The goal of Objective T2 is to encourage the use of alternative modes of travel throughout Costa Mesa to reduce VMT. Relevant assumptions used are provided below.

- VMT reductions related to the installation of enhanced end-of-trip bike facilities were calculated using the T-10: Provide End-of-Trip Bicycle Facilities equation provided by CAPCOA. The bike mode adjustment factor for facilities with showers, lockers, and bike parking was used, which assumes commuters are 4.86 times more likely to commute by bike with these amenities.[7] The average one-way bicycle and vehicle trip lengths (in miles) for the Los Angeles–Long Beach–Anaheim region were assumed for existing bicycle and vehicle trip lengths.[8] The average bicycle and vehicle mode share for work trips in the Los Angeles–Long Beach–Anaheim core-based statistical area were assumed for existing bicycle and vehicle mode share for work trips.[9]
- VMT reductions related to expanding Costa Mesa's sidewalk network were calculated using the T-18: Provide Pedestrian Network Improvement equation provided by CAPCOA, which assumes a 0.05% decrease in vehicle travel occurs for each 1% increase in sidewalk to street ratio.[10] Land coverage of pedestrian opportunity zones was assumed to be 22% of Costa Mesa's area, as detailed in the City's Pedestrian Master Plan.[11] The proportion of vehicle trips in the Pacific region that are less than 0.5 miles was assumed to be 4%, consistent with National Household Travel Survey data.[12]
- VMT reductions related to the construction of new bike facilities were calculated using the T-20: Expand Bikeway Network equation provided by CAPCOA. Bicycle and vehicle mode share (%) in Costa Mesa was estimated using 2024 American Survey 1-Year Estimate data.[13] Average one-way bicycle and vehicle trip length (miles per trip) for the Los Angeles–Long Beach–Anaheim core-based statistical area were assumed.[14] Existing and planned bikeway miles within Costa Mesa were obtained from the Costa Mesa Active Transportation Plan.[15] GHG reductions assume 15% of proposed bicycle facility

---

7 *Buehler, R. 2012. "Determinants of Bicycle Commuting in the Washington, DC Region: The Role of Bicycle Parking, Cyclist Showers, and Free Car Parking at Work." Transportation Research Part D, 17, 525–531. http://www.pedbikeinfo.org/cms/downloads/DeterminantsofBicycleCommuting.pdf.*

8 *Federal Highway Administration (FHWA). 2017. "National Household Travel Survey." 2017 Table Designer. Travel Day PT by TRPTRANS by HH_CBSA. https://nhts.ornl.gov/.*

9 *FHWA 2017.*

10 *Frank, L., M. Greenwald, S. Kavage, and A. Devlin. 2011. An Assessment of Urban Form and Pedestrian and Transit Improvements as an Integrated GHG Reduction Strategy. WSDOT Research Report WA-RD 765.1, Washington State Department of Transportation. April 2011. www.wsdot.wa.gov/research/reports/fullreports/765.1.pdf.*

11 *City of Costa Mesa. 2024. Pedestrian Master Plan. Accessed May 2026. https://www.costamesaca.gov/home/showpublisheddocument/57278/638548232589530000.*

12 *U.S. Department of Transportation and FHWA. 2022. National Household Travel Survey (NHTS), Version 2.1. https://nhts.ornl.gov.*

13 *U.S. Census Bureau and U.S. Department of Commerce. "Commuting Characteristics by Sex." 2024. American Community Survey, 2024: ACS 1-Year Estimates Subject Tables, Table S0801. Accessed May 2026. https://data.census.gov/table?q=S0801:+Commuting+Characteristics+by+Sex&g=160XX00US0616532.*

14 *FHWA 2017.*

15 *City of Costa Mesa. 2018. Active Transportation Plan. April 2018. http://ftp.costamesaca.gov/costamesaca/council/agenda/2018/2018-06-05/PH-3-Attach-3.pdf.*

length in Costa Mesa by 2030 (approximately 8 miles) and 50% by 2045 (approximately 27 miles) from the Active Transportation Plan.

## T3: Reduce Single-Occupancy Vehicle Trips

The goal of Objective T3 is to encourage the use of shared vehicles and transition away from long-distance single-occupancy vehicles. Relevant assumptions used are provided below.

- VMT reductions related to a voluntary citywide commute trip reduction program were calculated using the T-5: Implement Commute Trip Reduction Program (Voluntary) equation provided by CAPCOA. Reductions are based on the goal of providing voluntary commute trip reduction programs for 2% of employees in Costa Mesa. A 4% reduction in commute VMT from eligible employees was assumed per CAPCOA.[16]
- VMT reductions related to educating commuters on travel options to reduce trips were calculated using the T-7: Implement Commute Trip Reduction Marketing equation provided by CAPCOA. Reductions are based on the goal of implementing commute trip reduction marketing that targets 2% of employees in Costa Mesa. A 4% reduction in employee commute vehicle trips was assumed per CAPCOA.[17]
- VMT reductions related to an employer program to facilitate ridesharing were calculated using the T-8: Provide Ridesharing Program equation provided by CAPCOA. For the rideshare program, the reduction in employee commute VMT was assumed to be 4%, consistent with the suburban place type default provided by the San Diego Association of Governments.[18] Reductions are based on the goal of providing the rideshare program for 2% of employees in Costa Mesa.

## T4: Increase Public Transportation Use

The goal of Objective T4 is to improve Costa Mesa's public transit to encourage transit use and decrease vehicle trips. Relevant assumptions used are provided below.

- VMT reductions resulting from the enhancement of school bus programs were calculated using the T-40: Establish a School Bus Program equation provided by CAPCOA. Because the City does not have direct control over school bus operations, a conservative reduction was assumed to reflect a collaborative approach with the school district. The percentage of student school bus mode share was obtained from

[16] *Boarnet, M., H. Hsu, and S. Handy. 2014. Impacts of Employer-Based Trip Reduction Programs and Vanpools on Passenger Vehicle Use and Greenhouse Gas Emissions. September 2014. Available: https://ww2.arb.ca.gov/sites/default/files/2020-06/Impacts_of_Employer-Based_Trip_Reduction_Programs_and_Vanpools_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Technical_Background_Document.pdf*

[17] *Transportation Research Board (TRB). 2010. "Chapter 19, Employer and Institutional TDM Strategies." In Traveler Response to Transportation System Changes Handbook, Third Edition. June 2010. http://www.trb.org/Publications/Blurbs/163781.aspx.*

[18] *San Diego Association of Governments (SANDAG). 2019. Mobility Management VMT Reduction Calculator Tool–Design Document. June 2019. https://www.icommutesd.com/docs/defaultsource/planning/tool-design-document_final_7-17-19.pdf?sfvrsn=ec39eb3b_2.*

the Costa Mesa Safe Routes to School Modal Tally data.[19] The average distance to school was assumed to be 4.14 miles (round trip), consistent with National Household Travel Survey data.[20] The percentage of the population enrolled in a K–12 public school was assumed to be 14.9%, estimated using 2024 American Survey 1-Year Estimate data.[21]

- VMT reductions resulting from expanding local transit coverage were calculated using the T-25: Extend Transit Network Coverage or Hours equation provided by CAPCOA. Because the City does not have direct control over OC Bus operations, a conservative reduction is based on the goal of increasing transit route coverage in Costa Mesa by 10% (6.2 miles). CAPCOA default assumptions for elasticity of transit demand[22] and statewide mode shift factor[23] were assumed. Total existing transit service miles in Costa Mesa were obtained from the Orange County Transportation Authority (OCTA) GIS Open Data Portal.[24]
- VMT reductions resulting from increased transit frequency were calculated using the T-26: Increase Transit Service Frequency equation provided by CAPCOA. Reductions are based on the goal of increasing transit frequency by 20% across 50% of route/service hours. The CAPCOA default assumption for elasticity of transit demand[25] was assumed. Transit and vehicle commute mode share (%) in Costa Mesa was estimated using 2024 American Survey 1-Year Estimate data,[26] and statewide mode shift factor was provided by the Federal Highway Administration.[27]
- VMT reductions resulting from roadway improvements to improve transit service and reliability were calculated using the T-27: Implement Transit-Supportive Roadway Treatments equation provided by CAPCOA. Reductions are based on the goal of implementing roadway improvements to 15% of transit routes throughout Costa Mesa. CAPCOA default assumptions for change in transit travel time, elasticity of ridership,[28] and statewide mode shift factor[29] were assumed. The percentage of transit and vehicle mode share in Costa Mesa were based on the 2024 American Survey 1-Year Estimate data.[30]

---

19 *City of Costa Mesa. Safe Routes to School Student Modal Tally. December 18, 2025.*
20 *U.S. Department of Transportation and FHWA 2022.*
21 *U.S. Census Bureau and U.S. Department of Commerce 2024.*
22 *Handy, S., K. Lovejoy, M. Boarnet, and S. Spears. 2013. "Impacts of Transit Service Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions." October 2013. https://ww2.arb.ca.gov/sites/default/files/2020-06/Impacts_of_Transit_Service_Strategies_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Technical_Background_Document.pdf.*
23 *FHWA. 2017. National Household Travel Survey – 2017 Table Designer. Average Vehicle Occupancy by HHSTFIPS. https://nhts.ornl.gov/.*
24 *Orange County Transportation Authority (OCTA). 2023. OCTA GIS Open Data Portal. https://data-octagis.opendata.arcgis.com/.*
25 *Handy et al. 2013.*
26 *U.S. Census Bureau and U.S. Department of Commerce 2024.*
27 *FHWA 2017.*
28 *TRB. 2007. Transit Cooperative Research Program Report 118: Bus Rapid Transit Practitioner's Guide. https://ssti.us/wp-content/uploads/sites/1303/2012/04/tcrp118_BRT_Practitioners_Guide.pdf.*
29 *FHWA 2017.*
30 *U.S. Census Bureau and U.S. Department of Commerce 2024.*

- VMT reductions resulting from implementing a subsidized transit pass program were calculated using the T-9: Implement Subsidized or Discounted Transit Program equation provided by CAPCOA. Reductions are based on the goal of providing subsidized transit passes to 2.5% of residents by 2030 and 5% of residents by 2045. CAPCOA default assumptions for elasticity of transit boardings[31] and percentage of transit trips that would otherwise be in a vehicle[32] were assumed. The percentage of transit mode share in Costa Mesa was based on default average mode share percentages for the Los Angeles–Long Beach–Anaheim core-based statistical area.[33] Average transit fare with and without the subsidy was assumed to be the cost of an OCTA Wave monthly pass.[34]

### T5: Support Smart Growth

The goal of Objective T5 is to reduce travel distances and overall VMT through higher-density development. The associated reductions in VMT and GHG emissions from T5-related actions are already reflected in the ABAU forecast scenarios. These scenarios incorporate the City's current upzoning initiatives, including Neighborhoods Where We All Belong, with resulting growth assumptions embedded in the demographic and VMT projections used to estimate future emissions. Accordingly, any GHG reductions attributable to these efforts are captured within the City's 2030 and 2045 ABAU forecasts. As a result, no additional emissions reductions are attributed specifically to Objective T5.

## Energy and Buildings

The methodology and assumptions for estimating emissions reductions from the energy and the buildings sector are provided below for the quantified objectives and actions.

### E1: Reduce Energy Demand in Buildings

The goal of Objective E1 is to reduce the overall energy use of residential and commercial buildings, thereby reducing energy-related GHG emissions. The GHG emissions reductions associated with Objective E1 actions were quantified using calculation methodologies detailed in CAPCOA's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report.[35] For the installation

[31] *Taylor, B., D. Miller, H. Iseki, and C. Fink. 2008. "Nature and/or Nurture? Analyzing the Determinants of Transit Ridership Across U.S. Urbanized Areas." Transportation Research Part A: Policy and Practice 43(1): 60–77. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.367.5311&rep=rep1&type=pdf.*

[32] *Handy, L. and S. Boarnet. 2013. "Impacts of Transit Service Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions." https://ww2.arb.ca.gov/sites/default/files/2020-06/Impacts_of_Transit_Service_Strategies_on_Passenger_Vehicle_Use_and_Greenhouse_Gas_Emissions_Technical_Background_Document.pdf.*

[33] *FHWA 2017.*

[34] *OCTA. 2026. "Regular Fare." https://www.octa.net/getting-around/bus/oc-bus/fares-and-passes/overview.*

[35] *CAPCOA 2024.*

of energy-efficient appliances, guidance and methodology for the E-2: Require Energy Efficient Appliances equation was used. Reductions were based on the goal of encouraging the replacement of existing appliances (i.e., refrigerator, clothes washer, dishwasher, and ceiling fan) with ENERGY STAR alternatives in single-family and multifamily residential units within Costa Mesa. The percent reduction in electricity for ENERGY STAR appliance use compared to conventional appliances was provided by ENERGY STAR, whereas the percentage of total building electricity by appliance was based on average default values from the California Energy Commission's 2019 Residential Appliance Saturation Study for the City's Electricity Demand Forecast Zone of 7.[36]

For cool roof installation, the methodology associated with Objective E-4: Install Cool Roofs and/or Cool Walls in Residential Development was applied. Annual fractional building energy savings were estimated using the Lawrence Berkeley National Laboratory's Cool Surface Savings Explorer.[37] Results were developed for both multifamily (apartment) and single-family residences, using weighted averages by building vintage based on Costa Mesa's housing stock. Model assumptions included default roof areas (669.2 $m^2$ for multifamily and 111.5 $m^2$ for single-family), a base roof albedo of 0.1, base wall albedo of 0.25, and mean building orientation. Housing stock age distributions for each residential type were derived from the American Community Survey "Year Structure Built" dataset for Costa Mesa.[38]

## E2: Decarbonize Building Energy Use

The goal of Objective E2 is to encourage the adoption of appliances powered by lower-emission energy sources. The GHG emissions reductions associated with Objective E2 actions were quantified using calculation methodologies detailed in CAPCOA's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report,[39] specifically, guidance and methodology for the E-15: Require All-Electric Development equation. Reductions are based on the goal of electrifying 20% of new development by 2030, 30% of new development by 2045, 20% of existing buildings by 2030, and 30% of existing buildings by 2045.

[36] *California Energy Commission (CEC). 2020. Excel database with the 2019 Residential Appliance Saturation Study, provided to ICF. November 13, 2020.*

[37] *Lawrence Berkeley National Laboratory. 2018. "Cool Surfaces Savings Explorer" [web tool]. Accessed May 2026. https://basc.pnnl.gov/library/cool-surfaces-savings-explorer.*

[38] *U.S. Census Bureau and U.S. Department of Commerce. 2023. "Physical Housing Characteristics for Occupied Housing Units." American Community Survey, ACS 5-Year Estimates Subject Tables, Table S2504. Accessed May 2026. https://data.census.gov/table/ACSST5Y2023.S2504?t=Year+Structure+Built&g=160XX00US0616532.*

[39] *CAPCOA 2024.*

Existing fuel consumption for natural gas end uses (therms per year) was consistent with the 2030 and 2045 natural gas projections used for the ABAU forecasts. The carbon intensity of the local electricity provider (pounds $CO_2e$ per megawatt-hour) was consistent with the 2030 and 2045 values for Southern California Edison used for the ABAU forecasts. The additional electricity use for equivalent electrified end uses for residential land use types was based on average default values from the California Energy Commission Residential Appliance Saturation Study for the City's Electricity Demand Forecast Zone of 7.[40] The additional electricity use for equivalent electrified end uses for commercial land use types was based on average default values from the California Energy Commission's Uncalibrated Commercial Sector Forecast for the City's Electricity Demand Forecast Zone of 7.[41]

## E3: Increase Carbon-Free Energy Supply

The goal of Objective E3 is to increase the electricity generation from on-site solar photovoltaic (PV) systems to reduce demand from local electricity providers and to increase community participation in electricity options that provide 100% renewably sourced energy. The GHG emissions reductions associated with Objective E3 actions were quantified using calculation methodologies detailed in CAPCOA's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report.[42] Guidance and methodology for estimating GHG reductions from PV solar installation was obtained from the E10-B: Establish On-Site Renewable Energy Systems—Solar Power, equation. Reductions are based on the goal of installing solar PV on 2,850 rooftops by 2030 (10% of the total existing installation potential) and 8,550 rooftops by 2045 (30% of the total existing installation potential).

Existing rooftop solar arrays in Costa Mesa and potential additional rooftop solar PV capacity were estimated using satellite imagery, 3D modeling, shade calculations from Google, and weather data from the National Renewable Energy Laboratory. Installed solar PV systems were assumed to be 400 watts with 20.3% efficiency, a 30-year lifetime, and a 0.5% annual degradation rate. Electricity provided by the installed rooftop solar PV systems was estimated by assuming each panel receives at least 75% of the maximum annual sunlight in Costa Mesa.[43] Total electricity demand per year for 2030 and 2045 reflects the ABAU projected

[40] *CEC 2020.*
[41] *CEC 2020.*
[42] *CAPCOA 2024.*
[43] *Google Environmental Insights Explorer. 2026. "City of Costa Mesa Rooftop Solar Potential." https://insights.sustainability.google/places/ChIJK11gE_Qr3YARJf7ozeXun80.*

consumption, accounting for the increased kWh usage with implementation of all-electric development, consistent with Objective E2.

GHG reductions associated with switching to an energy provider that offers 100% renewable energy were estimated for each land use type as the difference between ABAU electricity GHG emissions and adjusted GHG emissions, assuming achievement of the percentage enrollment goals for 2030. GHG emissions associated with the remaining energy consumption not sourced from a 100% renewable option (i.e., the residual energy usage) and the average energy intensity factor of the existing energy mix were assumed. ABAU GHG emissions used to calculate Objective E3 reductions reflect the increased kWh usage with the implementation of all-electric development, consistent with Objective E2.

## Off-Road Equipment

The methodology and assumptions for estimating emissions reductions from the off-road equipment sector are provided below for Objective OR1: Accelerate Zero-Emission Off-Road Equipment Adoption.

### OR1: Accelerate Zero-Emission Off-Road Equipment Adoption

The goal of Objective OR1 is to increase the adoption of electric and zero-emission off-road and landscaping equipment, thereby displacing fossil-fuel powered equipment use in Costa Mesa. The GHG emissions reductions were estimated for each off-road equipment type as the difference between ABAU off-road GHG emissions and the adjusted GHG emissions, assuming achievement of the percentage electrification goals for 2030 and 2045. Electricity consumption for the zero-emission equipment was estimated using default fossil fuel energy densities[44] to convert to kWh equivalent usage. GHG emissions from electric equipment usage were calculated using the estimated kWh consumption and the GHG emissions intensity factors for the forecasted ABAU Southern California Edison power mix in 2030 and 2045.

## Water and Wastewater

The methodology and assumptions for estimating emissions reductions from the water and wastewater sector are provided below for the quantified objective (W1: Reduce Water Use).

[44] *CARB. 2020. "Table 4: Energy Densities and Conversion Factors for LCFS Fuels and Blendstocks." In Low Carbon Fuel Standard Regulation. June 2020. https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf.*

## W1: Reduce Water Use

The goal of Objective W1 is to reduce the community's use of water by encouraging the use of low-flow appliances and drought-tolerant landscaping. GHG emissions reductions associated with Objective W1 actions were quantified using calculation methodologies detailed in CAPCOA's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report,[45] specifically, guidance and methodology for the W-4: Require Low-Flow Water Fixtures equation. Reductions are based on the goal of installing low-flow water fixtures in 50% of new and existing development in 2030 and 2045.

Existing indoor water use was consistent with the 2030 and 2045 indoor water use projections used for the ABAU forecasts and the ratio of indoor to outdoor water use for residential uses in the region.[46] The carbon intensity of the local electricity provider (pounds $CO_2e$ per megawatt-hour) was consistent with the 2030 and 2045 values for Southern California Edison used for the ABAU forecasts. The percentage of indoor water used for each end use (i.e., toilets, faucets, clothes washers, and dishwashers) was based on default values provided by the Water Research Foundation[47] and Pacific Institute[48] for residential and nonresidential land uses. The current State standard water flow rate for each end use was based on default values provided by the California Green Building Code[49] and EnergyStar[50] for residential and nonresidential land uses. Reduced flow rate for each end use was consistent with CAPCOA default values for residential and nonresidential uses.

# Solid Waste

The methodology and assumptions for estimating emissions reductions from the solid waste sector are provided below for Objective SW1: Reduce Waste Generation.

45 *CAPCOA 2024.*

46 *Next 10. 2021. The Future of California's Water-Energy Climate Nexus. September 2021. https://www.next10.org/sites/default/files/2021-09/Next10-Water-Energy-Report_v2.pdf.*

47 *The Water Research Foundation. 2016. "Residential End Uses of Water, Version 2." https://www.waterrf.org/research/projects/residential-end-uses-water-version-2.*

48 *Pacific Institute. 2003. Waste Not, Want Not: The Potential for Urban Water Conservation in California. November 2003. https://pacinst.org/wp-content/uploads/2003/11/waste_not_want_not_full_report.pdf.*

49 *California Building Standards Commission. 2019. California Green Building Standards Code. Title 24, Part 11. https://codes.iccsafe.org/.content/CAGBSC2019.*

50 *ENERGY STAR. "Clothes Washers Key Product Criteria." https://www.energystar.gov/products/appliances/clothes_washers/key_product_criteria.*

### SW1: Reduce Waste Generation

The goal of Objective SW1 is to reduce the community's waste generation (e.g., through reuse and repair programs) and diversion of material (e.g., recycling and composting). Collectively, the actions to support Objective SW1 are anticipated to reduce landfill waste by 25% in 2030 and 50% in 2045. GHG emissions reductions associated with Objective SW1 actions were quantified using calculation methodologies detailed in CAPCOA's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report,[51] specifically, guidance and methodology for the S1: Institute or Extend Recycling Services equation. Annual waste disposal rates were consistent with the 2030 and 2045 ABAU forecasts for residential and commercial uses. GHG reductions from recycling were calculated using landfill emission factors for each waste type provided by the U.S. Environmental Protection Agency Waste Reduction Model.[52] The landfill gas collection efficiency and oxidation rates were assumed to be 75% and 10%, respectively, consistent with the U.S. Community Protocol assumptions.[53]

## Natural and Urban Lands

The methodology and assumptions for estimating emissions reductions from the natural and urban lands sector are provided below for Objective NU1: Increase Carbon Sequestration through Urban Greening.

### NU1: Increase Carbon Sequestration through Urban Greening

The goal of Objective NU1 is to enhance sequestration through support for urban greening, tree planting, and nature-based solutions in Costa Mesa's natural and urban spaces. GHG emissions reductions are based on the City's goal for tree planting in suitable areas of Costa Mesa, which was obtained from the City's Urban Canopy and Land Assessment.[54] The maximum number of possible tree plantings within Costa Mesa's suitable acreage was estimated using average canopy cover for the recommended trees listed in the City's list of

[51] *CAPCOA 2024.*

[52] *U.S. Environmental Protection Agency. 2023. "Documentation Chapters for Greenhouse Gas Emission, Energy and Economic Factors Used in the Waste Reduction Model." December 2023. https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste.*

[53] *International Council for Local Environmental Initiatives. 2019. U.S. Community Protocol for Accounting and Reporting of GHG Emissions. July 2019.*

[54] *City of Costa Mesa. Urban Canopy and Land Assessment. https://www.costamesaca.gov/home/showdocument?id=62998&t=639120334753200070.*

approved trees for the Parkway Tree Planting Program.[55] The total suitable acreage, maximum number of possible trees, and target plantings for 2030 and 2045 by land use type are provided in Table 1.

Table 1. Tree Planting Goals

| Land Use Type | Suitable Acreage | Possible Trees | Goal by 2045 | Total Trees | |
|---|---|---|---|---|---|
| | | | | 2030 | 2045 |
| City | 78 | 13,412 | 25% | 671 | 2,682 |
| Residential | 279 | 47,933 | 10% | 959 | 3,835 |
| School | 16 | 2,743 | 10% | 55 | 220 |
| Commercial | 37 | 6,277 | 10% | 126 | 502 |
| Other | 38 | 6,498 | 10% | 130 | 520 |
| Total | 448 | 76,863 | 13% | 1,940 | 7,760 |

Reductions were quantified as sequestered carbon dioxide using average rates obtained from the iTree Planting Calculator (Version v2.8.4).[56] Tree species from the City's approved trees for the Parkway Tree Planting Program were used to calculate the average sequestration rate. Default assumptions for project parameters were used for iTree inputs assuming Costa Mesa as the project location. All species were assumed to have an initial diameter at standard height of 1 inch and a tree condition of "good," and crown light exposure was assumed to be partial sun. The average sequestration rate was divided by 40 years (project lifetime) for an average annual rate per tree planted.

## Community Emissions Reduction Summary

Table 2 presents a summary of the City's objectives, underlying performance assumptions, and corresponding GHG reduction outcomes for 2030 and 2045. Under the assumed achievement levels for each objective, Costa Mesa is projected to achieve the necessary GHG emissions reductions of 154,711 metric tons (MT) $CO_2e$ in 2030 and 198,642 MT $CO_2e$ in 2045 to achieve the State-aligned targets.

[55] *City of Costa Mesa. "Appendix A: Recommended Tree & Plant List." https://www.costamesaca.gov/home/showpublisheddocument/53420/638308123496870000.*

[56] *iTree. 2026. iTree Planting Calculator. v2.8.4. Accessed May 2026. https://planting.itreetools.org/.*

## Table 2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| **On-Road Transportation Sector** | | | | | |
| T1: Transition to Electric Vehicles | Targeted BEV/PHEV population % | 25% | 30% | 84,970 | 115,216 |
| T2: Promote Walking and Biking | Provide secure bike parking and repair stations | At all new workplaces | At all new workplaces | 99 | 64 |
| | Fill sidewalk gap identified in Pedestrian Master Plan Opportunity Zones | 25% of sidewalk gaps | 50% of sidewalk gaps | | |
| | Fill proposed bicycle facility length identified in Active Transportation Plan | 15% of bicycle facility length | 50% of bicycle facility length | | |
| T3: Reduce Single-Occupancy Vehicle Trips | Provide voluntary commute trip reduction programs for employees in City | 2% of employees in City | 2% employees in City | 258 | 114 |
| | Implement commute trip reduction marketing | 2% of employees in City | 2% of employees in City | | |
| | Provide rideshare program for employees in City | 2% of employees in City | 2% of employees in City | | |

## Table 2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| T4: Increase Public Transportation Use | Implement subsidized transit voucher | For 2.5% of residents in City | For 2.5% of residents in City | 398 | 158 |
| | Increase school bus neighborhood coverage | By 10% | By 10% | | |
| | Increase transit route coverage in Costa Mesa | By 10% (6.2 miles) | By 10% (6.2 miles) | | |
| | Increase transit frequency | By 20% across 50% of routes/ service hours | By 20% across 50% of routes/ service hours | | |
| | Implement transit-supportive roadway improvements | On 15% of transit routes in Costa Mesa | On 15% of transit routes in Costa Mesa | | |
| T5: Support Smart Growth | Reductions accounted for in ABAU forecasted emissions | | | | |
| **Energy and the Built Environment Sector** | | | | | |
| E1: Reduce Energy Demand in Buildings | % of households replacing appliances with ENERGY STAR | 50% | — | 1,633 | — |
| | % of households that install cool roofs | 50% single family<br>25% multifamily | — | | |
| E2: Decarbonize Building Energy Use | % of new development all-electric | 20% | 30% | 25,331 | 52,655 |

## Table 2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| | % of existing development all-electric | 20% | 30% | | |
| E3: Increase Carbon-Free Energy Supply | % of available existing roof space installed with PV solar | 10% | 30% | 33 | — |
| | % of accounts enrolled in 100% renewable choice plan | 75% single-family<br>50% multifamily<br>30% commercial<br>30% industrial | — | 38,893 | — |
| **Off-Road Equipment Sector** | | | | | |
| OR1: Accelerate Zero-Emission Off-Road Equipment Adoption | % of equipment electrified | 50% | 60% | 3,692 | 24,742 |
| **Water and Wastewater Sector** | | | | | |
| W1: Reduce Water Use | % of development install low-flow appliances | 50% | — | 1,253 | — |
| W2: Increase Water Reuse | Supporting measure | | | | |
| **Solid Waste Sector** | | | | | |
| SW1: Reduce Waste Generation | % reduction in waste to landfill | 25% | 50% | 2,697 | 5,448 |
| **Natural and Urban Lands Sector** | | | | | |
| NU1: Increase Carbon Sequestration | Number of trees planted | 1,940 | 7,760 | 63 | 317 |

Table 2. Community Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| through Urban Greening | | | | | |
| | | | Total Reductions[a] | 159,173 | 198,646 |
| | | | Target Reductions | 154,711 | 198,642 |
| | | | Remaining Gap | −4,462 | −5 |

*Note: GHG = greenhouse gas; MT CO2e = metric tons carbon dioxide equivalent; BEV = battery electric vehicles; PHEV = plug-in hybrid electric vehicles; ABAU = adjusted business-as-usual, PV = photovoltaic.*
*[a] Because multiple VMT reduction measures may influence the same travel behavior, the total reduction value accounts for overlapping effects and is less than the absolute sum of the individual action reductions.*

# Municipal

GHG emissions reductions from municipal operations were calculated following the methodology outlined in the Local Government Operations Protocol, developed by the California Air Resources Board and The Climate Registry. Where applicable, additional methodologies from the CAPCOA Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity were applied. The following sections detail the assumptions and methods used to quantify emissions reductions from municipal objectives and actions.

## M1: Reduce City Vehicle Emissions

The goal of Objective M1 is to reduce transportation-related GHG emissions by transitioning the municipal fleet to EVs and encouraging commute trip reductions. VMT reductions were quantified using forecasted VMT estimates in conjunction with calculation methodologies detailed in the CAPCOA Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity report.[57] A weighted average emissions factor calculated using EMFAC2025 was then applied to the reduced VMT to estimate total GHG emissions reductions for 2030 and 2045. Duplicative dampening was calculated using TDM+, a tool developed by Fehr & Peers that leverages regional data to estimate percent reductions in VMT from mitigation measures while accounting for decreased

[57] *CAPCOA 2024.*

effectiveness when similar measures are implemented together. Relevant assumptions used are provided below.

The transition of City light-duty gasoline- and diesel-fueled vehicles to EVs assumes that the City will transition to EVs as part of its regular vehicle replacement schedule. The GHG reduction calculations assume that 31 gasoline- or diesel-fueled light-duty vehicles will be replaced with EVs by 2030, and 61 light-duty passenger cars and trucks will be replaced with EVs by 2045. The 2030 and 2045 emissions reduction estimates are based on the annual fuel consumption of the oldest light-duty vehicles recommended for retirement based on age, odometer mileage, and ease of replacement. Emissions calculations were performed using default vehicle emission factors from EMFAC.[58]

VMT reductions related to a City employee program to facilitate ridesharing were calculated using the T-8: Provide Ridesharing Program equation provided by CAPCOA. For the rideshare program, the reduction in employee commute VMT was assumed to be −7.28%, with an additional −4% VMT reduction associated with program marketing.[59] Average one-way vehicle commute trip length was estimated based on the results of the employee commute survey.

The City will offer incentives to employees who commute using EVs, primarily by granting access to City-owned EV charging stations at City facilities. Participation rates were estimated using EV market trends and the influence of City-provided EV charging infrastructure. Reductions from the employee EV incentive program were based on the goal of 5% of employees switched to EVs by 2030 and 20% switched by 2045.

## M2: Reduce City Energy Use

The goal of Objective M2 is to reduce GHG emissions associated with municipal energy use in City-owned buildings, facilities, and operations. Emissions reductions were quantified using projected changes in electricity and natural gas consumption based on the ABAU forecast, combined with emissions factors consistent with the municipal GHG inventory. Electricity emissions reductions reflect both reductions in energy demand and changes in electricity procurement, including increased reliance on renewable energy sources. Consistent with statewide policy, electricity emissions are assumed to decline to zero by 2045 due to

[58] *CARB. 2025. EMFAC2025 (v2.0.0) Emission Inventory. https://arb.ca.gov/emfac/.*
[59] *SANDAG 2019.*

compliance with the Renewables Portfolio Standard. Relevant assumptions used are provided below.

Energy efficiency improvements in existing City-owned buildings were estimated based on the results of recurring energy audits, which are assumed to identify opportunities to reduce energy use by at least 5% by 2030 and approximately 20% by 2045. Reductions were applied to forecasted electricity consumption to estimate associated GHG reductions.

Reductions associated with new City-owned buildings were based on the assumption that all new construction will be all-electric (i.e., no natural gas), with limited exceptions for essential emergency operations. Avoided emissions were calculated using projected growth in municipal building energy demand in the ABAU 2030 and 2045 forecasts.

Electrification of existing City-owned buildings was assumed to occur over time through major renovations and equipment replacement cycles. GHG reduction calculations assume that 10% of facilities will be fully electrified by 2030 and that all eligible facilities will be electrified by 2045, resulting in the elimination of most natural gas consumption in municipal operations.

Solar PV installations at City-owned facilities were quantified assuming a total of 600 kilowatts (kW) of installed capacity across parking areas and building rooftops. Electricity generation was estimated using the National Renewable Energy Laboratory's PVWatts Calculator,[60] and emissions reductions were calculated based on avoided grid electricity use through 2030. By 2045, electricity emissions are assumed to be zero due to compliance with the Renewables Portfolio Standard, at which point benefits of PV solar will be cost savings and energy reliability.

Battery energy storage system installations were assumed to total 4,800 kW of capacity at key City facilities. Emissions reductions were estimated based on the ability of a battery energy storage system to shift electricity demand and increase use of on-site renewable energy, thereby reducing reliance on grid electricity during peak-demand periods.

Finally, emissions reductions from renewable electricity procurement were calculated based on the City's participation in Orange County Power Authority or a similar Community Choice Aggregation program. The analysis assumes that all municipal electricity accounts will be enrolled in a 100% renewable electricity program by 2030. Reductions were estimated using the difference between the forecasted blended utility emission factor and the emissions intensity associated with 100% renewable electricity.

[60] *National Renewable Energy Laboratory (NREL). 2026. PVWatts Calculator. https://pvwatts.nlr.gov/.*

## M3: Zero-Emissions Off-Road and Landscaping Equipment

The goal of Objective M3 is to reduce GHG emissions associated with City-owned and contracted off-road equipment by transitioning to zero-emission alternatives. Emissions reductions were quantified based on avoided gasoline and diesel consumption from the replacement of fossil fuel–powered landscaping equipment, construction equipment, and backup generators. Reductions were estimated using equipment-level fuel consumption data and emissions factors for off-road sources consistent with the municipal GHG inventory. The relevant assumptions used are provided below.

Reductions associated with landscaping equipment were estimated using representative equipment-level fuel consumption and emissions factors. Based on the City's inventory, a typical gasoline-powered landscaping unit was assumed to consume approximately 187 gallons of fuel annually, reflecting 208 operating hours and a fuel efficiency of 0.075 gallons per hour. Emissions reductions were calculated using California Air Resources Board off-road emission factors applied to the ABAU forecasted emissions for 2030 and 2045.

Reductions associated with off-road construction and operational equipment were estimated using a detailed inventory of City-owned equipment, including loaders, excavators, tractors, trenchers, and other machinery. Total annual fuel consumption across the City's equipment inventory was estimated at approximately 1,584 gallons of gasoline and 666 gallons of diesel, based on equipment-specific horsepower ratings, fuel efficiencies, and operating assumptions. Emissions reductions were calculated using off-road emissions factors consistent with the forecasted ABAU inventory compared with an equipment fleet that is fully transitioned to zero-emission alternatives. Consistent with implementation assumptions, this transition is assumed to occur primarily during the 2030–2045 period, resulting in no quantified reductions by 2030 and full reductions realized by 2045.

Reductions associated with backup generators were estimated using the inventory of eight diesel-powered generators located at City facilities, with individual unit capacities ranging from approximately 25–600 kW. Annual fuel consumption across all generators was estimated at approximately 1,269 gallons of diesel, reflecting limited operational hours that would be used primarily for maintenance testing and emergency preparedness. Emissions reductions were calculated using off-road diesel emission factors consistent with the forecasted ABAU inventory compared with generators that are fully transitioned to zero-emission alternatives. Similar to other off-road equipment categories, generator replacements are assumed to occur primarily during the 2030–2045 timeframe, resulting in no quantified reductions by 2030 and full

reductions realized by 2045. Actual emissions reductions could be higher in years with extended generator use during emergency events.

### M4: Reduce City Facility Water Use

The goal of Objective M4 is to reduce GHG emissions associated with municipal water use by improving water efficiency in City-owned buildings and facilities. Emissions reductions were quantified based on decreased energy required for water conveyance, treatment, and distribution, using the ABAU forecast and emissions factors consistent with the municipal GHG inventory. Consistent with statewide policy, electricity emissions associated with water use are assumed to decline over time and reach zero by 2045 due to compliance with the Renewables Portfolio Standard. The relevant assumptions used are provided below.

Reductions associated with water-efficient appliances in new City-owned buildings are assumed to be achieved through compliance with Title 24 building standards, which already require installation of water-efficient fixtures. As such, these reductions are accounted for in the ABAU forecast and are not separately quantified in the GHG reduction analysis.

Reductions associated with retrofitting existing City-owned buildings and facilities were estimated based on the installation of water-efficient appliances during renovations or as funding becomes available. GHG reduction calculations assume indoor water use reductions consistent with WaterSense- and ENERGY STAR-certified appliances, resulting in an approximately 45% improvement in water efficiency relative to baseline conditions.

### M5: Reduce City-Generated Solid Waste

The goal of Objective M5 is to reduce GHG emissions associated with solid waste generated by City operations through waste prevention, sustainable purchasing practices, and improved materials management. Because these actions primarily influence upstream waste generation and procurement decisions, GHG reductions were not directly quantified. However, these actions are expected to reduce landfill disposal and associated methane emissions over time.

## Municipal Emissions Reduction Summary

Table 3 presents a summary of the City's municipal objectives, underlying performance assumptions, and corresponding GHG reduction outcomes for 2030 and 2045. Under the assumed achievement levels for each objective, Costa Mesa is projected to achieve the necessary GHG emissions reductions of 911 MT $CO_2e$ in 2030 and 1,516 MT $CO_2e$ in 2045 to achieve the State-aligned targets.

## Table 3. Municipal Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| M1: Reduce City Vehicle Emissions | Replace fleet vehicles with EVs | 31 vehicles | 61 vehicles | 341 | 1,130 |
| | Implement a voluntary commute trip reduction program | All employees | All employees | | |
| | Employees purchase EVs | 5% | 20% | | |
| M2: Reduce City Energy Use | Energy retrofits, energy use reductions | 5% | 20% | 1,045 | 345 |
| | Buildings all-electric | All new buildings, 10% of existing | All new buildings, all existing | | |
| | PV solar shade structures | 800 kW capacity | — | | |
| | PV solar roof top installation | 800 kW capacity new buildings,<br>600 kW capacity existing buildings | — | | |
| | Battery energy storage system installation | 4,800 kW capacity | — | | |
| | Enrollment in 100% renewable choice plan | All City accounts | — | | |

### Table 3. Municipal Greenhouse Gas Reduction Summary

| Objective | Performance Indicators | | | GHG Reductions (MT $CO_2e$) | |
|---|---|---|---|---|---|
| | Metric | 2030 | 2045 | 2030 | 2045 |
| M3: Zero-Emissions Off-Road and Landscaping Equipment | % of equipment electrified | — | All off-road equipment | — | 37 |
| M4: Reduce City Facility Water Use | Upgrade existing City buildings with water-efficient appliances | All buildings or as funding allows | All buildings or as funding allows | 20 | 16 |
| M5: Reduce City-Generated Solid Waste | Supporting measure | | | | |
| | | | Total Reductions | 1,408 | 1,528 |
| | | | Target Reductions | 911 | 1,516 |
| | | | Remaining Gap | -497 | -12 |

*Note: GHG = greenhouse gas; MT $CO_2e$ = metric tons carbon dioxide equivalent; EV = electric vehicle; PV = photovoltaic; kW = kilowatt.*

APPENDIX E

# Implementation Plan

# Acronyms and Abbreviations

| Acronym/Abbreviation | Definition |
|---|---|
| AB 2766 | Motor Vehicle Subvention Fund Program |
| AFV | Alternative Fuel Infrastructure Tax Credit |
| AHSC | Affordable Housing and Sustainable Communities |
| ATP | Active Transportation Program |
| BIA | Building Industry Association |
| BRIC | Building Resilient Infrastructure and Communities Program |
| BUILD-CA | Building Initiative for Low-Emissions Development Program |
| BUILD-US | Better Utilizing Investments to Leverage Development |
| C-BEST | Commercial Building Energy Solutions and Technologies Program |
| CAAP | Climate Action and Adaptation Plan |
| CACE | Community Assistance for Climate Equity |
| CAL FIRE | California Department of Forestry and Fire Protection |
| CALGreen | California Green Building Standards |
| CALeVIP | California Electric Vehicle Infrastructure Project |
| CalRecycle | California Department of Resources Recycling and Recovery |
| Caltrans | California Department of Transportation |
| CAP | Consumer Assistance Program |
| CARB | California Air Resources Board |
| CARE | California Alternate Rates for Energy |
| CC4A | Clean Cars 4 All |
| CCA | Coastal Corridor Alliance |
| CEDA | California Energy Design Assistance |
| CFI | Charging and Fueling Infrastructure Discretionary Grant Program |
| City | City of Costa Mesa |
| CHEEF | California Hub for Energy Efficiency Financing |
| CMABS | Costa Mesa Alliance for Better Streets |
| CMAQ | Congestion Mitigation and Air Quality Improvement Program |
| CMO | Clean Mobility Options Voucher Program |
| CMSD | Costa Mesa Sanitary District |
| CoMFI | Comprehensive Multifamily Incentive Program |
| Commercial SEM | Commercial Strategic Energy Management Program |
| CORE | Clean Off-Road Equipment Voucher Incentive Project |
| CRC | Community Resilience Centers |
| CWDG | Community Wildfire Defense Grants |
| CWSRF | Clean Water State Revolving Fund |
| DAC-GT | Disadvantaged Communities – Green-Tariff |
| DAC-SASH | Disadvantaged Communities – Single-Family Solar Homes |
| EBD | Equitable Building Decarbonization Program |
| ECAA | Energy Conservation Assistance Account |

| Acronym/Abbreviation | Definition |
|---|---|
| ECJ | Environmental and Climate Justice Program |
| EECBG | Energy Efficiency and Conservation Block Grant Program |
| EECBP | Energy Efficient Commercial Building Deduction |
| EEHIC | Energy Efficient Home Improvement Credit |
| EE&R | Energy Efficiency & Rehabilitation Program |
| EJ | environmental justice |
| EMSD | Enhanced Mobility for Seniors and Individuals with Disabilities Grant Program |
| EV | electric vehicle |
| EV HOME | Electric Vehicle Hub, Outreach, Messaging, and Equipment |
| GRRP | Green and Resilient Retrofit Program |
| HEEHRA | Home Electrification and Appliance Rebates |
| HMGP | Hazard Mitigation Grant Program |
| HOMES | Home Efficiency Rebates |
| INVEST CLEAN | INVEST CLEAN Project |
| IRWD | Irvine Ranch Water District |
| ISEF | Innovative Small e-Fleet Pilot Program |
| ISTAR | Industrial Savings, Training, Assistance, Rebate Program |
| kW | kilowatt |
| LIHEAP | Low Income Home Energy Assistance Program |
| LIWP | Low-Income Weatherization Program |
| LPS | Large Public Section Program |
| MEA | Multifamily Energy Alliance Program |
| MFES | Multifamily Energy Savings Program |
| MIP | Microgrid Incentive Program |
| MWD | Metropolitan Water District |
| NEVI | National Electric Vehicle Infrastructure Formula Program |
| NGO | non-governmental organization |
| OBF | On-Bill Financing |
| OCCF | Orange County Community Foundation |
| OCPA | Orange County Power Authority |
| OCTA | Orange County Transportation Authority |
| PACE | Property Assessed Clean Energy |
| PDIP | Public Direct Install Program |
| PDM | Pre-Disaster Mitigation Grant Program |
| Prop 1B | Goods Movement Emission Reduction Projects |
| PROTECT | Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation |
| PV | photovoltaic |
| RACE | Residential Advanced Clean Energy Program |
| RCC | Regional Climate Collaboratives Program |
| RCP | Reconnecting Communities Pilot Grant Program |

| Acronym/Abbreviation | Definition |
|---|---|
| REAP | Regional Early Action Planning Grants |
| RECI | Resilient and Efficient Codes Implementation |
| RES-BCT | Renewable Generation Self-Generation Bill Credit Transfer |
| RMDZ | Recycling Market Development Zone |
| RRGP | Regional Resilience Planning and Implementation Grant |
| RSF | Revolving Savings Fund |
| RYR | Replace Your Ride Program |
| SCAG | Southern California Association of Governments |
| SCAQMD | Southern California Air Quality Management District |
| SCE | Southern California Edison |
| SGC | Strategic Growth Council |
| SCP | Sustainable Communities Program |
| SGIP | Self-Generation Incentive Program |
| SMART | Strengthening Mobility and Revolutionizing Transportation |
| SoCalGas | Southern California Gas Company |
| SoCalREN | Southern California Regional Energy Network |
| SRTS | Safe Routes to School Program |
| STBG | Surface Transportation Block Grant |
| STIP | State Transportation Improvement Program |
| TA | Transportation Alternatives Set-Aside Program |
| TCC | Transformative Climate Communities |
| UCF | Urban and Community Forestry Program |
| VIP | Voucher Incentive Program |
| WAP | Weatherization Assistance Program |
| WRFP | Water Recycling Funding Program |
| WSIP | Water Savings Incentive Program |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| On-Road Transportation | T1. Transition to Electric Vehicles | a. Develop a citywide education program that educates residents and businesses on the advantages of EVs. | Education/ Marketing | City Manager's Office, Sustainability Manager | CALSTART, SCE | 2 | Targeted BEV/PHEV population % | 25% | 30% | CAP, CC4A, Charge Ready Program, Charge Ready Home Program, Charge Smart, EV HOME, EV Rebates Program, RYR, SCP, Sustainable Transportation Planning Grants, VIP |
| On-Road Transportation | T1. Transition to Electric Vehicles | b. Install EV charging stations at non-residential public parking areas. | Infrastructure | Public Works | SCE | 1 | | | | AB 2766, AFV, Alternative Fuel Vehicle Refueling Property Credit, CALeVIP, Charge Ready Program, CFI, Clean Transportation Program, Clean Vehicle and Energy Credits, CMAQ, ECAA, Fast and Available Charging for All Californians, GoGreen Financing, NEVI, Sustainable Transportation Planning Grants |
| On-Road Transportation | T1. Transition to Electric Vehicles | c. Partner with regional agencies (e.g., Orange County Transportation Authority, South Coast Air Quality Management District) to co-promote EV infrastructure incentives for buildings. | Partnerships | Building Division | OCTA, SCAQMD | 2 | | | | AB 2766, AFV, Alternative Fuel Vehicle Refueling Property Credit, Charge Ready Program, Clean Vehicle and Energy Credits, CMAQ, Communities in Charge, EV Rebates Program, Fast and Available Charging for All Californians, GoGreen Financing, OBF, Residential EV Charging Incentive Program |
| On-Road Transportation | T1. Transition to Electric Vehicles | d. Host EV-Ready Building Roundtables with local builders, architects, and contractors to highlight best practices and available funding sources. | Education/ Marketing | City Manager's Office, Sustainability Manager | CALSTART, SCE | 3 | | | | Charge Ready Program, Charge Ready Home Program, Charge Smart, EV HOME, OBF, Residential EV Charging Incentive Program, SCP, Sustainable Transportation Planning Grants |
| On-Road Transportation | T1. Transition to Electric Vehicles | e. Develop and implement a communitywide zero-emission vehicle action plan to guide strategic EV charging deployment, assess grid capacity and upgrade needs, evaluate public charging corridors, support the transition of | Plan/Program | City Manager's Office, Sustainability Manager, Public Works | CALSTART | 1 | | | | AB 2766, Charge Ready Program, CMAQ, SCP, Sustainable Transportation Planning Grants |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | light, medium, and heavy-duty fleets, and expand equitable access to zero-emission-vehicle transportation. | | | | | | | | |
| On-Road Transportation | T1. Transition to Electric Vehicles | f. Apply for state grants to fund the installation of EV chargers. | Investment/ Funding | City Manager's Office, Sustainability Manager, Public Works | CALSTART | 2 | | | | AB 2766, AFV, Alternative Fuel Vehicle Refueling Property Credit, CALeVIP, Carl Moyer Program, Charge Ready Program, CFI, Clean Vehicle and Energy Credits, CMAQ, Communities in Charge, ECAA, EV HOME, Fast and Available Charging for All Californians, GoGreen Financing, NEVI, SCP, Sustainable Transportation Planning Grants |
| On-Road Transportation | T1. Transition to Electric Vehicles | g. Promote voluntary upgrades of electric plug-in infrastructure for Transport Refrigeration Units and Auxiliary Power Units at loading docks through incentives, technical assistance, pilot projects, and/or partnerships with utilities and regional agencies. | Plan/Program | Community Development | SCE, SCAQMD | 3 | | | | AFV, Alternative Fuel Vehicle Refueling Property Credit, Carl Moyer Program, CORE, Clean Vehicle and Energy Credits, GoGreen Financing, ISEF, INVEST CLEAN, Prop 1B |
| On-Road Transportation | T2. Promote Walking and Biking | a. Explore bicycle parking requirements that incentivize or allow for shared bicycle parking hubs. | Partnerships | Community Development | CMABS, OCTA, SCAG | 2 | Provide secure bike parking and repair stations | At all new workplaces | At all new workplaces | ATP, AHSC, BUILD-US, CMO, CACE, Low Carbon Transportation Incentives and Air Quality Improvement Program, Planning and Capacity Building Grants, RCP, RCC, SMART, SCP, Sustainable Transportation Planning Grants |
| On-Road Transportation | T2. Promote Walking and Biking | b. Implement the Pedestrian Master Plan and Active Transportation Plan to identify pedestrian, bicycle, and roadway circulation gaps and opportunities; update existing plans and the zoning code as needed to support active transportation, including | Infrastructure | Public Works | Caltrans, CMABS, SCAG | 1 | Fill sidewalk gap identified in Pedestrian Master Plan Opportunity Zones | 25% of sidewalk gaps | 50% of sidewalk gaps | AB 2766, ATP, AHSC, BUILD-US, CMAQ, CMO, Planning and Capacity Building Grants, RCP, SCP, SMART, SRTS, STBG, STIP, Sustainable Transportation Planning Grants, TCC, TA |
| | | | | | | | Fill proposed bicycle facility length identified in Active Transportation Plan | 15% of bicycle facility length | 50% of bicycle facility length | |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | tiered bike facilities and amenities on private property based on development scale. | | | | | | | | |
| On-Road Transportation | T2. Promote Walking and Biking | c. Continue to explore feasibility and identification of corridors with excess roadway capacity, such as South Coast Drive, and consider reducing the number of vehicle lanes to improve safety, and provide space for bicyclists, pedestrians, transit amenities, landscaping, or parklets. | Plan/Program | Public Works | Caltrans, CMABS, SCAG | Ongoing | Supporting | Supporting | Supporting | AB 2766, ATP, AHSC, BUILD-US, CMAQ, RCP, STBG, STIP |
| On-Road Transportation | T3. Reduce Single-Occupancy Vehicle Trips | a. Develop voluntary citywide commute trip reduction program for employers to opt into that provides active travel options to/from work (e.g., carpool, transit, walking/biking). | Plan/Program | City Manager's Office, Sustainability Manager | Costa Mesa Chamber of Commerce | 3 | Provide voluntary commute trip reduction programs for employees in City | 2% of employees in City | 2% of employees in City | CMO, CACE, SMART, SCP |
| On-Road Transportation | T3. Reduce Single-Occupancy Vehicle Trips | b. Via marketing campaigns building on current efforts, continue to educate the community on travel options for commuters to reduce commute trips. | Education/ Marketing | City Manager's Office, Sustainability Manager | CMABS, OCTA, SCAG | Ongoing | Implement commute trip reduction marketing | Targeting 2% of employees in City | Targeting 2% of employees in City. | CMO, OCCF Environment Fund, SRTS, SCP |
| On-Road Transportation | T3. Reduce Single-Occupancy Vehicle Trips | c. Develop program to facilitate ridesharing/ carpooling for employees. | Plan/Program | City Manager's Office, Sustainability Manager | Costa Mesa Chamber of Commerce | 3 | Provide rideshare program for employees in City | 2% of employees in City | 2% of employees in City | CMO, CACE |
| On-Road Transportation | T3. Reduce Single-Occupancy Vehicle Trips | d. Review and explore reducing parking minimums, consistent with Assembly Bill 2097, while maintaining City flexibility to manage parking impacts through tools such as shared | Regulations | Community Development, Public Works | SCAG | 2 | Supporting | Supporting | Supporting | SCP |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | parking, valet parking, and other parking management strategies. | | | | | | | | |
| On-Road Transportation | T3. Reduce Single-Occupancy Vehicle Trips | e. Offer impact-fee credits for multifamily residential projects that voluntarily unbundle residential parking costs from property costs. | Incentives | Community Development | SCAG | 2 | Supporting | Supporting | Supporting | SCP |
| On-Road Transportation | T4. Increase Public Transportation Use | a. Develop program for residents and/or employees to receive subsidized/discounted transit passes. | Plan/Program | City Manager's Office, Sustainability Manager | OCTA, SCAG | 2 | Implement subsidized transit voucher | For 2.5% of residents in City | For 2.5% of residents in City | AHSC, EMSD |
| On-Road Transportation | T4. Increase Public Transportation Use | b. Expand the Let's Go Costa Mesa voucher program to support local transit services. | Plan/Program | Public Works | SCAG | 2 | Supporting | Supporting | Supporting | AHSC, EMSD, Community Based Circulators Program |
| On-Road Transportation | T4. Increase Public Transportation Use | c. Continue working with OCTA to monitor ridership and focus available resources for efficient frequency of transit service. | Partnerships | Public Works | OCTA | Ongoing | Increase transit frequency | By 20% across 50% of routes/ service hours | By 20% across 50% of routes/ service hours | CMAQ, EMSD, STBG, STIP |
| On-Road Transportation | T4. Increase Public Transportation Use | d. Continue to construct roadway improvements to improve transit service and reliability, including boarding islands, queue jump lanes, transit signal priority, dedicated transit lanes, business access or transit lanes, and enhanced bus stops, and work with OCTA to pursue support of capital projects, where feasible. | Infrastructure | Public Works | OCTA | 1 | Increase transit route coverage in Costa Mesa | By 10% (6.2 miles) | By 10% (6.2 miles) | AB 2766, AHSC, BUILD-US, CMAQ, EMSD, Regional Capacity Program, Regional Traffic Signal Synchronization, Community Based Circulators Program, RCP, Rubberized Pavement Grant Program, STBG, STIP |
| | | | | | | | Implement transit-supportive roadway improvements | On 15% of transit routes in the City | On 15% of transit routes in the City | |
| On-Road Transportation | T4. Increase Public Transportation Use | e. Work with the Newport–Mesa Unified School District to enhance and coordinate school bus programs within the | Partnerships | Public Works | Newport-Mesa Unified School District | 3 | Increase school bus neighborhood coverage | By 10% | By 10% | Reliable Electric Charging for Eligible School-Bus Sites, STBG |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | school districts serving Costa Mesa, as feasible, with a focus on providing service for middle and high school students living in low-income neighborhoods. | | | | | | | | |
| On-Road Transportation | T5. Support Smart Growth | a. Implement rezoning efforts, such as the Neighborhoods Where We All Belong plan, that allow for increased residential and job density. | Regulations | Community Development | SCAG | 2 | * | * | * | AHSC, REAP, SCP |
| On-Road Transportation | T5. Support Smart Growth | b. Explore potential incentives for mixed-use development within 0.5 miles of major transit stations and priority transit-oriented development corridors, especially the Fairview Road corridor, by examining benefits such as expedited permitting, height incentives, density/floor area ratio bonuses, and targeted infrastructure improvements that support walkability and transit access. | Incentives | Community Development | SCAG, SGC | 2 | * | * | * | AHSC, REAP, SCP |
| On-Road Transportation | T5. Support Smart Growth | c. Continue to implement the City's Inclusionary Housing Ordinance, which incentivizes and/or requires the inclusion of below-market-rate or affordable units. | Incentives | Community Development | SCAG, SGC | Ongoing | * | * | * | AHSC, Factory-Built Housing Regional Pilot Program, REAP, SCP |
| Energy and Buildings | E1. Reduce Energy Demand in Buildings | a. Support energy audits for homes and businesses through partnership with the Green Business Program, | Education/ Marketing | Community Development | SCE, SoCalGas, SoCalREN | 2 | Supporting | Supporting | Supporting | Building Codes Implementation for Efficiency and Resilience, C-BEST, CEDA, CoMFI, EECBG, EE&R, Home Energy Tax Credits, Home Performance Plus, IEP, ISTAR, ITI SEM, |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | providing resources, technical assistance, and targeted social media outreach and collateral. | | | | | | | | LIHEAP, MEA, Multifamily Program, Multifamily Residential Direct Install Program, RACE, SoCalREN, TECH Clean California, WAP |
| Energy and Buildings | E1. Reduce Energy Demand in Buildings | b. Partner with utilities to connect property owners with available rebates and discounted energy-efficient appliances, supported by targeted social media outreach and collateral. | Partnerships | City Manager's Office, Sustainability Manager | SCE, SoCalGas, SoCalREN | 2 | % households replace appliances with ENERGY STAR | 50% | — | Business Energy Efficiency Surveys Program, C-BEST, CARE, CEDA, CHEEF, Clean Vehicle and Energy Credits, CoMFI, Commercial SEM, Comprehensive Manufactured Homes Program, Energy Assistance Fund, EBD, Energy Efficiency Financing, EECBP, EEHIC, EE&R, Energy Savings Assistance Program, Family Electric Rate Assistance Program, Food Desert Energy Efficiency Equity Program, GoGreen Financing, Golden State Rebates Program, GRRP, Hard-To-Reach Commercial Direct Install, HEEHRA, Home Energy Tax Credits, Home Performance Plus, IEP, ISTAR, ITI SEM, LIHEAP, LIWP, MEA, MFES, Midstream Water Heating Program, Multifamily Program, Multifamily Residential Direct Install Program, OBF, PACE, RACE, Smart Energy Program, SoCalREN, TECH Clean California, WAP |
| Energy and Buildings | E1. Reduce Energy Demand in Buildings | c. Seek grants to offer incentives for passive cooling and heating systems (such as cool roofs and walls) during roof replacements or renovations. | Investment/ Funding | City Manager's Office, Sustainability Manager, Building Division | SCE, SoCalGas, SoCalREN | 2 | % of households that install cool roofs | 50% single family 25% multifamily | — | CEDA, CHEEF, Clean Vehicle and Energy Credits, CoMFI, Commercial SEM, EBD, Electric Homes Program, Extreme Heat and Community Resilience Program, GRRP, Home Performance Plus, MEA, MFES, Multifamily Program, RACE |
| Energy and Buildings | E2. Decarbonize Building Energy Use | a. Explore providing incentives for projects that commit to installing all zero-emission appliances, such as expedited plan review (e.g., accelerated 10-day timeline). | Incentives | Community Development | BIA | 1 | % of new development all-electric | 20% | 30% | BUILD-US, Building Codes Implementation for Efficiency and Resilience, BUILD-CA, Building Electrification Program, California Electric Homes Program, CEDA, Clean Vehicle and Energy Credits, EBD, Electric Homes Program, GoGreen Financing, HEEHRA, |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | HOMES, Home Energy Tax Credits, EEHIC, RECI |
| Energy and Buildings | E2. Decarbonize Building Energy Use | b. Promote and facilitate existing rebate vouchers for gas-to-electric swaps during permitted remodels. | Incentives | Community Development | SCE, SoCalREN | 2 | % of existing development all-electric | 20% | 30% | Building Electrification Program, Bright Futures Grant Program, CEDA, CHEEF, EBD, EECBG, LIHEAP, TECH Clean California |
| Energy and Buildings | E2. Decarbonize Building Energy Use | c. Provide education and technical assistance on gas-to-electric appliance swaps, highlighting economic and health benefits and addressing common concerns through demonstrations. | Education/ Marketing | Community Development | SCE, SoCalREN | 2 | Supporting | Supporting | Supporting | Building Electrification Program, Bright Futures Grant Program, CEDA, EECBG, Electric Homes Program, LIHEAP, OCCF Environment Fund, TECH Clean California |
| Energy and Buildings | E2. Decarbonize Building Energy Use | d. Develop and implement a Green Builder Program to highlight and honor green builders in the community. | Plan/Program | City Manager's Office, Sustainability Manager | BIA | 2 | Supporting | Supporting | Supporting | Building Electrification Program, CEDA, SoCalREN, TECH Clean California |
| Energy and Buildings | E3. Increase Carbon-Free Energy Supply | a. Offer voluntary development incentives (e.g., fee reductions, dedicated staff review, expedited processing) for projects that incorporate on-site renewable energy systems capable of producing at least 95% of total annual load. | Incentives | Community Development | BIA | 1 | % of available existing roof space installed with PV | 10% | 30% | Clean Electricity Low-Income Communities Bonus Credit Amount Program, DAC-GT, DAC-SASH, EECBG, GoGreen Financing, HOMES, Home Energy Tax Credits, INVEST CLEAN, LIWP, Renewable Electricity Production Tax Credit, RES-BCT, SGIP, Solar for All |
| Energy and Buildings | E3. Increase Carbon-Free Energy Supply | b. Provide education and technical assistance for paired solar and battery systems. | Education/ Marketing | Community Development | SCE, SoCalREN | 2 | Supporting | Supporting | Supporting | Bright Futures Grant Program, MIP, SGIP |
| Energy and Buildings | E3. Increase Carbon-Free Energy Supply | c. Consider joining OCPA, or other clean energy provider or program, and launch a voluntary Clean Energy Enrollment Support Program that uses | Partnerships | City Manager's Office, Sustainability Manager, Finance, Community Development | OCPA | 1 | % of accounts enrolled in 100% renewable choice plan | 75% single-family 50% multifamily 30% commercial 30% industrial | — | Bright Futures Grant Program |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | targeted outreach, community partnerships, and incentives such as bill savings comparisons, enrollment assistance, and recognition or rebate style perks to encourage households and businesses to opt into the 100% renewable energy tier. | | | | | | | | |
| Energy and Buildings | E3. Increase Carbon-Free Energy Supply | d. Identify areas where grid infrastructure upgrades are needed to meet the City's existing and future decarbonization, transportation, and building electrification needs in coordination with Southern California Edison and other potential future electric utilities. | Infrastructure | Community Development | SCE | 2 | Supporting | Supporting | Supporting | CACE, EECBG, REAP, Regional Climate Collaboratives Program, SoCalREN |
| Water and Wastewater | W1. Reduce Water Use | a. Continue to establish drought-tolerant landscape demonstration sites in public rights-of-way. Promote these practices with an educational campaign using virtual tours to showcase locally appropriate designs, plant combinations, and irrigation best practices. | Plan/Program | City Manager's Office, Public Works | IRWD, MWD | Ongoing | Supporting | Supporting | Supporting | Community Partnering Program, OCCF Environment Fund, WSIP |
| Water and Wastewater | W1. Reduce Water Use | b. Promote existing MWD and IRWD rebates for water-efficient appliances across new and existing development by training City staff and using City | Education/ Marketing | Community Development | IRWD, MWD | 2 | % of development install low-flow appliances | 50% | — | GRRP, PACE, RECI, WSIP |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | communication channels, including the website, social media, utility bills, and permitting touchpoints, to direct residents and developers to available MWD and IRWD programs. | | | | | | | | |
| Water and Wastewater | W1. Reduce Water Use | c. Develop and promote a voluntary drought-tolerant landscape resource program that provides design templates, native plant palettes, and irrigation best practice guidance tailored to the City's climate to support residents, landlords, and businesses in transitioning to low-water landscapes. | Plan/Program | City Manager's Office, Sustainability Manager, Community Development, Public Works | IRWD, MWD | 2 | Supporting | Supporting | Supporting | Community Partnering Program, OCCF Environment Fund, WSIP |
| Water and Wastewater | W2. Increase Water Reuse | a. Educate residents on the benefits and practical application of rain barrels and gray-water systems for landscape irrigation through hands on workshops, step-by-step installation guides, and demonstrations of appropriate plants, irrigation layouts, maintenance practices, and pest management. | Education/ Marketing | City Manager's Office, Sustainability Manager | IRWD, MWD | 3 | Supporting | Supporting | Supporting | Community Partnering Program, OCCF Environment Fund, WRFP, WSIP |
| Water and Wastewater | W2. Increase Water Reuse | b. Promote rebates or provide financial assistance for homeowners to install rain barrels and gray-water systems by offering rebates for | Investment/ Funding | Community Development | IRWD, MWD | 3 | Supporting | Supporting | Supporting | CWSRF, Community Partnering Program, On-Site Retrofit Program, WSIP |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | system design and installation. | | | | | | | | |
| Water and Wastewater | W2. Increase Water Reuse | c. Evaluate feasibility of recycled water for residential and commercial irrigation in partnership with MWD and IRWD. | Plan/Program | City Manager's Office, Sustainability Manager | IRWD, MWD | 3 | Supporting | Supporting | Supporting | On-Site Retrofit Program, WRFP, WSIP |
| Solid Waste | SW1. Reduce Waste Generation | a. Maintain construction and demolition waste diversion per CALGreen. During annual budgeting, consider anticipated development and adjust staffing and/or cross-train staff accordingly to respond to increased need for construction and demolition inspections. | Incentives | Public Works | CalRecycle, CMSD | Ongoing | % reduction in waste to landfill | 25% | 50% | Solid Waste Infrastructure for Recycling Grant Program, Rubberized Pavement Grant Program |
| Solid Waste | SW1. Reduce Waste Generation | b. Develop a facilitation program that connects local reuse yards and nonprofits with contractors interested in building deconstruction, helping coordinate the collection, sorting, and resale of salvaged materials. | Plan/Program | Public Works | CalRecycle, CMSD | 3 | | | | CACE, Culture of Repair, RMDZ, RCC |
| Solid Waste | SW1. Reduce Waste Generation | c. Evaluate the potential to offer cost-effective bulk composting to residents. | Incentives | Public Works | CalRecycle, CMSD | 2 | | | | CACE, Community Composting for Green Spaces Grant Program, Consumer Recycling Education and Outreach Grant Program, Food Waste Prevention and Rescue Grants |
| Solid Waste | SW1. Reduce Waste Generation | d. As part of Parks and Community Services afterschool program, teach students proper waste sorting and composting. | Partnerships | City Manager's Office, Sustainability Manager, Public Works, Parks and Community Services | CMSD, Newport-Mesa Unified School District | 2 | | | | CACE, Community Composting for Green Spaces Grant Program, Consumer Recycling Education and Outreach Grant Program, Food Waste Prevention and Rescue Grants |
| Solid Waste | SW1. Reduce Waste Generation | e. In conjunction with franchise waste haulers, | Education/ Marketing | Public Works | CMSD | Ongoing | | | | Consumer Recycling Education and Outreach Grant Program, Food |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tracking Metrics | | | |
| | | continue to provide multiunit and commercial properties with clear waste sorting guidance. | | | | | | | | Waste Prevention and Rescue Grants |
| Solid Waste | SW1. Reduce Waste Generation | f. Build partnerships and assess the feasibility of an urban wood-reuse program. | Partnerships | Public Works | CalRecycle | 3 | | | | CACE, Culture of Repair, RMDZ, RCC |
| Solid Waste | SW1. Reduce Waste Generation | g. Share information with the community, including through the City's website, on proper e-waste disposal, reuse and repair resources, donation and material exchange programs, community swap events, and other waste reduction programs and resources, as available. | Education/ Marketing | City Manager's Office, Sustainability Manager | CMSD | 2 | | | | CACE, Community Composting for Green Spaces Grant Program, Consumer Recycling Education and Outreach Grant Program, Food Waste Prevention and Rescue Grants |
| Off-Road Equipment | OR1. Accelerate Zero-Emission Off-Road Equipment Adoption | a. Promote the transition from gas- and diesel-powered landscaping equipment to zero-emission models among residents and businesses by providing resources on the City's website, including information about the South Coast Air Quality Management District Residential Electric Lawn Mower Rebate Program and the Commercial Electric Lawn and Garden Equipment Exchange Program. | Education/ Marketing | Community Development | SCAQMD | 1 | % of equipment electrified | 50% | 60% | Carl Moyer Program, Commercial Electric Lawn & Garden Equipment, HEEHRA, INVEST CLEAN, Residential Electric Lawn & Garden Rebate Program |
| Off-Road Equipment | OR1. Accelerate Zero-Emission Off-Road Equipment Adoption | b. Support adoption of zero-emission off-road equipment during construction by promoting contractors | Incentives | Community Development | CARB, SCAQMD | 2 | | | | Carl Moyer Program, Commercial Electric Lawn & Garden Equipment, INVEST CLEAN, Prop 1B |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tracking Metrics | | | |
| | | who have zero-emission off-road equipment within their fleet. | | | | | | | | |
| Off-Road Equipment | OR1. Accelerate Zero-Emission Off-Road Equipment Adoption | c. Establish a voluntary zero-emission off-road equipment transition program that helps contractors and landscaping companies evaluate electric equipment, access available incentives, and participate in field testing or demonstration events. | Plan/Program | Community Development | CARB, SCAQMD | 2 | | | | Carl Moyer Program, CORE, INVEST CLEAN, Prop 1B |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | a. Build upon and implement the City's Urban Canopy and Land Assessment to encourage equitable tree canopy expansions and native plantings. | Infrastructure | Public Works | CAL FIRE, CCA, TreePeople | 1 | Trees planted | 1,940 | 7,760 | Extreme Heat and Community Resilience Program, UCF, Urban Greening Grant Program |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | b. Educate the community on carbon sequestration and on native and drought-tolerant landscaping through informative materials and exposure to ongoing campaigns and organizations. | Education/ Marketing | City Manager's Office, Sustainability Manager | CCA, IRWD, MWD, TreePeople | 3 | Supporting | Supporting | Supporting | Community Partnering Program, OCCF Environment Fund, WSIP |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | c. Continue to offer the parkway tree planting program. | Plan/Program | Public Works | — | Ongoing | Supporting | Supporting | Supporting | CWSRF, Community Partnering Program, UCF, WSIP |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | d. Promote Low Impact Development and nature-based solutions such as bioswales, shaded parking, permeable surfaces, and green roofs. | Education/ Marketing | Community Development | CCA, TreePeople | 1 | Supporting | Supporting | Supporting | CWSRF, Community Partnering Program, UCF, Urban Greening Grant Program, WSIP |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | e. Partner with schools and community organizations to implement green schoolyards, urban farms, rain gardens, and tree plantings. Provide urban greening education as part of Parks and Community Services afterschool programs. | Partnerships | City Manager's Office, Sustainability Manager, Parks and Community Services | Newport-Mesa Unified School District, NGOs | 2 | Supporting | Supporting | Supporting | Community Partnering Program, Extreme Heat and Community Resilience Program, OCCF Environment Fund, Urban Greening Grant Program |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | f. Consider demand for additional community garden plots. If new plots are desired, prioritize sites in disadvantaged neighborhoods. | Infrastructure | Parks and Community Services | Solutions for Urban Agriculture | 3 | Supporting | Supporting | Supporting | Community Partnering Program, Extreme Heat and Community Resilience Program, UCF, Urban Greening Grant Program |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | g. Establish a voluntary urban greening incentive program that offers rebates or grants for tree planting, shade-creating vegetation, and climate-appropriate landscaping on private property, prioritizing multifamily residences and heat-vulnerable neighborhoods. | Incentives | Community Development | CAL FIRE, CCA, TreePeople | 2 | Supporting | Supporting | Supporting | Extreme Heat and Community Resilience Program, UCF |
| Natural and Urban Lands | NU1. Increase Carbon Sequestration through Urban Greening | h. Amend the municipal code to limit the removal of mature trees and incorporate tree and landscaping replacement standards. | Regulations | Community Development | — | 2 | Supporting | Supporting | Supporting | Extreme Heat and Community Resilience Program, UCF |
| People and Community | PC1. Prepare Community Members for Hazards | a. Educate community members about the health risks of extreme heat and wildfire smoke and the resources available during these hazard events. Use | Education/ Marketing | City Manager's Office, Sustainability Manager, Office of Emergency Management | — | 1 | Supporting | Supporting | Supporting | BRIC, Critical Care Backup Battery Program, EJ Action Grants Program, ECJ, Extreme Heat and Community Resilience Program, HMGP, OCCF Environment Fund |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | communication methods, such as social media, that reach a broad audience in addition to targeted campaigns that reach older adults and people experiencing homelessness, such as handouts at key locations like the Senior Center or Bridge Shelter. | | | | | | | | |
| People and Community | PC1. Prepare Community Members for Hazards | b. Share resources and facilitate discussions with local landscaping and construction businesses and outdoor sports leagues to prevent heat illness. | Education/ Marketing | Office of Emergency Management | Landscaping and construction businesses | 3 | Supporting | Supporting | Supporting | BRIC, Critical Care Backup Battery Program, EJ Action Grants Program, ECJ, Extreme Heat and Community Resilience Program, HMGP, OCCF Environment Fund |
| People and Community | PC1. Prepare Community Members for Hazards | c. Continue to educate property owners on fire hazard severity zone requirements and regulations. | Education/ Marketing | Fire and Rescue | CAL FIRE | Ongoing | Supporting | Supporting | Supporting | CWDG, EJ Action Grants Program, HMGP, PDM, PROTECT, RRGP, Wildfire Prevention Grants |
| People and Community | PC1. Prepare Community Members for Hazards | d. Promote agency cost assistance programs for utilities, air purifiers, or similar programs as they become available. | Education/ Marketing | City Manager's Office, Sustainability Manager | SCAQMD, SCE, SoCalGas, | Ongoing | Supporting | Supporting | Supporting | Adaptation Planning Grant, Community Air Protection Incentives, On-Site Retrofit Program |
| People and Community | PC2. Limit Hazard Impacts | a. Develop facility plans to increase the accessibility of public spaces as cooling centers when necessary. Consider the potential for pre-planned programming, expanded hours, and temporary spaces for pets. | Plan/Program | Parks and Community Services | — | 1 | Supporting | Supporting | Supporting | Extreme Heat and Community Resilience Program, BRIC, Community Development Block Grant, CRC, TCC |
| People and Community | PC2. Limit Hazard Impacts | b. Consider the incorporation of recreational water features, such as splash pads, during park | Infrastructure | Public Works | — | 3 | Supporting | Supporting | Supporting | Extreme Heat and Community Resilience Program |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | master planning and infrastructure updates. | | | | | | | | |
| People and Community | PC2. Limit Hazard Impacts | c. Continue to conduct feasibility assessments for solar and battery backup systems at key critical facilities within the City, prioritizing public facilities that do not already have backup power, such as the City community centers and Senior Center. | Infrastructure | Public Works | — | 2 | Supporting | Supporting | Supporting | BRIC, CRC, Critical Care Backup Battery Program, TCC |
| People and Community | PC2. Limit Hazard Impacts | d. Continue to regularly review cool and permeable pavement technology effectiveness and consider incorporating pilot programs into City maintenance and Capital Improvement Plan programs. | Infrastructure | Public Works | — | Ongoing | Supporting | Supporting | Supporting | CACE, EECBG, Extreme Heat and Community Resilience Program |
| People and Community | PC2. Limit Hazard Impacts | e. Continue to coordinate with the Costa Mesa Fire Department for development plan review. | Plan/Program | Community Development, Fire and Rescue | — | Ongoing | Supporting | Supporting | Supporting | — |
| People and Community | PC2. Limit Hazard Impacts | f. Continue to conduct regular vegetation management activities to reduce fire hazard risks in parks, open spaces, rights-of-way, and other areas where vegetation could become fuel for fires. | Infrastructure | Public Works | — | Ongoing | Supporting | Supporting | Supporting | CACE, CWDG, HMGP, PDM, PROTECT, RRGP |
| People and Community | PC2. Limit Hazard Impacts | g. Preplan for post-wildfire debris flow potential. | Plan/Program | Office of Emergency Management | — | 3 | Supporting | Supporting | Supporting | CACE, CWDG, HMGP, PDM, PROTECT, RRGP |
| People and Community | PC3. Build City and Regional Capacity | a. Hold quarterly working meetings with | Investment/ Funding | City Manager's Office, Sustainability Manager | — | 1 | Supporting | Supporting | Supporting | — |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | for CAAP Implementation | City staff to facilitate CAAP implementation. | | | | | | | | |
| People and Community | PC3. Build City and Regional Capacity for CAAP Implementation | b. Include staff time in annual budgets for CAAP funding pursuits. | Investment/ Funding | City Manager's Office, Sustainability Manager, Finance | — | 1 | Supporting | Supporting | Supporting | — |
| People and Community | PC3. Build City and Regional Capacity for CAAP Implementation | c. Prioritize grant pursuits that benefit low-income households, small local businesses, and the City's disadvantaged communities. | Investment/ Funding | City Manager's Office, Sustainability Manager | — | Ongoing | Supporting | Supporting | Supporting | — |
| People and Community | PC3. Build City and Regional Capacity for CAAP Implementation | d. Coordinate with the following agencies on dam operational planning and related flood risks:<br>▪ U.S. Army Corps of Engineers Los Angeles District<br>▪ Irvine Ranch Water District<br>▪ County of Orange | Partnerships | Office of Emergency Management | County of Orange, IRWD, US Army Corps of Engineers Los Angeles District | Ongoing | Supporting | Supporting | Supporting | — |
| People and Community | PC3. Build City and Regional Capacity for CAAP Implementation | e. Communicate with the County of Orange and City of Newport Beach during their sea-level rise planning and mitigation efforts and contribute public comments when appropriate. | Partnerships | Community Development, Office of Emergency Management | City of Newport Beach, County of Orange | Ongoing | Supporting | Supporting | Supporting | — |
| People and Community | PC3. Build City and Regional Capacity for CAAP Implementation | f. Continue to provide support and planning input for the City's water and energy providers' efforts to provide safe, cost-effective, and reliable water and energy. | Partnerships | City Manager's Office, Sustainability Manager | IRWD, MWD, SCE, SoCalGas | Ongoing | Supporting | Supporting | Supporting | — |
| People and Community | PC3. Build City and Regional Capacity for CAAP Implementation | g. Participate in discussions with the Southern California Association of | Partnerships | City Council SCAG Representative, City Manager | Orange County Council of Governments, SCAG | 3 | Supporting | Supporting | Supporting | — |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Governments and the Orange County Council of Governments regarding regional climate migration planning. | | | | | | | | |
| People and Community | PC4. Foster Local Sustainable Practices | a. Market less-carbon-intensive practices and resources, including natural and sustainably sourced building materials (when feasible), to residents and promote responsible consumption. | Education/ Marketing | City Manager's Office, Sustainability Manager | — | 2 | Supporting | Supporting | Supporting | — |
| People and Community | PC4. Foster Local Sustainable Practices | b. Reassess the City's Green Business Program, outlining the existing process and benefits; considering adjustments to the marketing, certification process, or incentives offered; weighing the benefits of possible expansions to the program; and identifying staff and budgetary needs. | Incentives | City Manager's Office, Sustainability Manager, Community Development | Costa Mesa Chamber of Commerce | 1 | Supporting | Supporting | Supporting | RMDZ, One Water Awards |
| People and Community | PC4. Foster Local Sustainable Practices | c. Assess the feasibility and desire for cooling centers hosted by businesses and local organizations. Feasibility considerations should include legal implications, existing city programs that could incorporate this initiative (such as the Green Business Program), and incentives for participating organizations. If determined to be | Plan/Program | City Manager's Office, Sustainability Manager | NGOs, local businesses | 3 | Supporting | Supporting | Supporting | Extreme Heat and Community Resilience Program |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | feasible, develop the initiative. | | | | | | | | |
| People and Community | PC4. Foster Local Sustainable Practices | d. Engage with education providers such as Coastline Regional Occupation Program and the Newport-Mesa Unified School District to advance local green industry workforce opportunities. | Partnerships | City Manager's Office, Sustainability Manager | Coastline Regional Occupation Program, Newport-Mesa Unified School District, SoCalREN, Orange Coast College, Vanguard University | 1 | Supporting | Supporting | Supporting | California Climate Investments Workforce Training and Development |
| People and Community | PC4. Foster Local Sustainable Practices | e. Engage local Non-Governmental Organizations and compile a list relative to their interests and capabilities on a variety of topics related to climate action and adaptation, such as distributing related news or grant opportunities, or participating in or facilitating volunteer events such as clean ups or tree plantings. | Partnerships | City Manager's Office, Sustainability Manager | NGOs | 2 | Supporting | Supporting | Supporting | — |
| Municipal | M1. Reduce City Vehicle Emissions | a. Develop and implement a municipal fleet zero-emission transition plan that evaluates the implications for vehicle transition and prioritizes purchasing, phasing, EV charging infrastructure appropriately based on feasibility and availability, , and considers other electric vehicles like e-bikes and e-scooters. | Plan/Program | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalREN | 2 | Supporting | Supporting | Supporting | AB 2766, AFV, Alternative Fuel Vehicle Refueling Property Credit, CALeVIP, Carl Moyer Program, Charge Ready Program, Charge Ready Transport Program, Clean Transportation Program, Clean Vehicle and Energy Credits, Communities in Charge, ECAA, Fast and Available Charging for All Californians, GoGreen Financing, INVEST CLEAN, VIP |
| Municipal | M1. Reduce City Vehicle Emissions | b. Transition the City's non-emergency light-duty gasoline- and | Infrastructure | Public Works, Police, Fire and Rescue | City Manager | 1 | Replace fleet vehicles with EVs | 31 vehicles | 61 vehicles | AB 2766, AFV, Carl Moyer Program, Clean Transportation Program, Clean Vehicle and Energy Credits, |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | diesel-powered fleet to EVs, with exceptions for emergency and life safety vehicles. | | | | | | | | Climate Incentives Bridge Loans, Commercial Clean Vehicle Credit, Grants for Buses and Bus Facilities Program, ISEF, Low Carbon Transportation Incentives and Air Quality Improvement Program, VIP |
| Municipal | M1. Reduce City Vehicle Emissions | c. Install EV charging stations at City facilities to facilitate the use of City-owned EVs. | Infrastructure | Public Works | SCE, SoCalREN | 2 | Supporting | Supporting | Supporting | AB 2766, AFV, Alternative Fuel Vehicle Refueling Property Credit, CALeVIP, Carl Moyer Program, Charge Ready Program, Charge Ready Transport Program, Clean Transportation Program, Clean Vehicle and Energy Credits, Climate Incentives Bridge Loans, Communities in Charge, ECAA, Fast and Available Charging for All Californians, GoGreen Financing, INVEST CLEAN |
| Municipal | M1. Reduce City Vehicle Emissions | d. Implement a voluntary commute trip reduction program, including providing commute trip reduction marketing materials to City employees. | Plan/Program | City Manager's Office, Human Resources | SCAG | 1 | Implement a voluntary commute trip reduction program | All employees | All employees | ATP, CMAQ, Community Based Circulators Program, Low Carbon Transportation Incentives and Air Quality Improvement Program |
| Municipal | M1. Reduce City Vehicle Emissions | f. Continue to promote employee use of the Let's Go Costa Mesa rideshare service and consider expansions or regional partnerships. | Plan/Program | City Manager's Office, Human Resources | SCAG | Ongoing | Supporting | Supporting | Supporting | CMO |
| Municipal | M1. Reduce City Vehicle Emissions | g. Implement an employee EV incentive program. | Plan/Program | City Manager's Office, Human Resources | SCAG | 2 | Employees purchase EVs | 5% | 20% | CAP, CC4a, EV Rebates Program, RYR |
| Municipal | M2. Reduce City Energy Use | a. Continue to conduct energy audits of existing City buildings and facilities at regular intervals to determine energy-saving opportunities. | Plan/Program | Public Works | SCE, SoCalGas, SoCalREN | Ongoing | Supporting | Supporting | Supporting | C-BEST, Commercial SEM, EECBG, EE&R, LPS, Local Government Challenge, Long-term Energy Planning |
| Municipal | M2. Reduce City Energy Use | b. Implement energy-efficiency retrofits of existing City-owned buildings and facilities | Infrastructure | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 2 | Energy retrofits, energy use reductions | 5% | 20% | Building Codes Implementation for Efficiency and Resilience, CHEEF, Clean Vehicle and Energy Credits, Climate Incentives Bridge Loans, |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | based on the results of energy audits. | | | | | | | | Commercial SEM, ECAA, EECBG, EE&R, GoGreen Financing, Infrastructure State Revolving Loan Fund, LPS, Local Government Challenge, Long-term Energy Planning, Midstream Water Heating Program, PDIP, RSF, TECH Clean California |
| Municipal | M2. Reduce City Energy Use | c. Require new City facilities to be all-electric (i.e., no natural gas) where feasible. Coordinate with the Office of Emergency Management to incorporate fail-safe measures for electrical outages, such as backup power. | Infrastructure | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 2 | Buildings all-electric | All new buildings, 10% of existing | All new buildings, all existing | Building Codes Implementation for Efficiency and Resilience, Clean Vehicle and Energy Credits, Climate Incentives Bridge Loans, GoGreen Financing, Infrastructure State Revolving Loan Fund, Long-term Energy Planning, RECI, RSF, TECH Clean California |
| Municipal | M2. Reduce City Energy Use | d. During major redevelopment of existing City-owned buildings, retrofit facilities to remove natural gas and install all-electric end uses (where feasible). Coordinate with the Office of Emergency Management to incorporate fail-safe measures for electrical outages, such as backup power. | Regulations | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 1 | Supporting | Supporting | Supporting | Building Codes Implementation for Efficiency and Resilience, CHEEF, Clean Vehicle and Energy Credits, Climate Incentives Bridge Loans, ECAA, GoGreen Financing, Infrastructure State Revolving Loan Fund, Long-term Energy Planning, PDIP, RECI, RSF, TECH Clean California |
| Municipal | M2. Reduce City Energy Use | e. Install PV systems as shade structures at City-owned parking lots and facilities. | Infrastructure | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 1 | PV solar shade structures | 800 kW capacity | — | Climate Incentives Bridge Loans, ECAA, Extreme Heat and Community Resilience Program, GoGreen Financing, Infrastructure State Revolving Loan Fund, Local Government Challenge, RES-BCT, SGIP |
| Municipal | M2. Reduce City Energy Use | f. Include solar panel installation and cool roofs in the design of all | Infrastructure | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 2 | PV solar roof top installation new buildings | 800 kW capacity | Supporting | Building Codes Implementation for Efficiency and Resilience, Climate Incentives Bridge Loans, ECAA, GoGreen Financing, Infrastructure |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | new City-owned buildings where feasible. | | | | | | | | State Revolving Loan Fund, Local Government Challenge, RES-BCT, RECI, SGIP |
| Municipal | M2. Reduce City Energy Use | g. During roof replacements, retrofit City-owned buildings and facilities to include PV solar and cool roofs where feasible. | Regulations | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 2 | PV solar roof top installation existing buildings | 600 kW capacity | — | Building Codes Implementation for Efficiency and Resilience, Climate Incentives Bridge Loans, ECAA, GoGreen Financing, Infrastructure State Revolving Loan Fund, Local Government Challenge, RES-BCT, SGIP |
| Municipal | M2. Reduce City Energy Use | h. Install battery energy storage systems at key City facilities to supplement PV solar. | Infrastructure | City Manager's Office, Sustainability Manager, Public Works | SCE, SoCalGas, SoCalREN | 3 | Battery energy storage system installation | 4,800 kW capacity | — | Climate Incentives Bridge Loans, ECAA, GoGreen Financing, Infrastructure State Revolving Loan Fund, Local Government Challenge, MIP, RES-BCT, SGIP |
| Municipal | M2. Reduce City Energy Use | i. Pursue participation in OCPA or another available Community Choice Aggregator to enroll municipal energy accounts in a 100% renewable energy procurement program. | Partnerships | City Manager's Office, Sustainability Manager | OCPA or other CCA | 2 | Enrollment in 100% renewable choice plan | All City accounts | — | Bright Futures Grant Program |
| Municipal | M2. Reduce City Energy Use | j. Develop a Microgrid Feasibility Plan for City-owned emergency response and critical facilities. | Plan/Program | Public Works, Office of Emergency Management, Police, Fire and Rescue | City Manager | 3 | Supporting | Supporting | Supporting | BRIC, ECAA, HMGP, Local Government Challenge, MIP, RRGP, SGIP |
| Municipal | M3. Zero-Emission Off-Road and Landscaping Equipment | a. Transition City-owned landscaping equipment to zero-emission, as feasible. Continue to contract with landscape maintenance contractors who use zero-emission equipment, as feasible. | Infrastructure | City Manager's Office, Sustainability Manager, Public Works | CARB, SCAQMD | 2 | % of equipment electrified | — | All off-road equipment | Carl Moyer Program, Commercial Electric Lawn & Garden Equipment |
| Municipal | M3. Zero-Emission Off-Road and Landscaping Equipment | b. At replacement and as commercially available, transition City-owned and -contracted fossil-fueled off-road equipment used during construction or | Infrastructure | Public Works, Police, Fire and Rescue | CARB, SCAQMD | 3 | | | | Carl Moyer Program, CORE, Commercial Electric Lawn & Garden Equipment, INVEST CLEAN |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Tracking Metrics | | | |
| | | operation to zero-emission. | | | | | | | | |
| Municipal | M3. Zero-Emission Off-Road and Landscaping Equipment | c. Accelerate replacement of diesel- or natural-gas-powered backup generators at City facilities to zero-emission options. | Infrastructure | Public Works | CARB, SCAQMD | 3 | | | | Carl Moyer Program, ECAA, Local Government Challenge, SGIP |
| Municipal | M4. Reduce City Facility Water Use | a. Continue to require use of water-efficient appliances in new City buildings. | Regulations | Public Works | IRWD, MWD, SCE, SoCalREN | Ongoing | Supporting | Supporting | Supporting | Building Codes Implementation for Efficiency and Resilience, ECAA, EECBG, RSF, WSIP |
| Municipal | M4. Reduce City Facility Water Use | b. Upgrade existing City buildings with water-efficient appliances during renovations or when funding allows. | Infrastructure | Public Works | IRWD, MWD, SCE, SoCalREN | 2 | Upgrade existing City buildings with water-efficient appliances | All buildings or as funding allows | All buildings or as funding allows | CHEEF, Clean Vehicle and Energy Credits, ECAA, EECBG, Infrastructure State Revolving Loan Fund, RSF, WRFP, WSIP |
| Municipal | M4. Reduce City Facility Water Use | c. When funding allows, replace non-programmed turf at City-owned buildings and facilities with native, drought-tolerant landscaping. Consider creative opportunities for turf replacement, such as volunteer events and local organization partnerships. | Infrastructure | Public Works | IRWD, MWD, SCE, SoCalREN | 2 | Supporting | Supporting | Supporting | WSIP |
| Municipal | M4. Reduce City Facility Water Use | d. When available, pursue grants to install gray-water systems at City-owned buildings and facilities. | Infrastructure | Public Works | IRWD, MWD, SCE, SoCalREN | 3 | Supporting | Supporting | Supporting | CWSRF, Infrastructure State Revolving Loan Fund, On-Site Retrofit Program, WRFP, WSIP |
| Municipal | M5. Reduce City-Generated Solid Waste | a. Develop guidelines for food waste prevention planning for City food service operations and large events at City facilities. | Plan/Program | City Manager's Office, Sustainability Manager, Public Works, Parks and Community Services | CalRecycle | 2 | Supporting | Supporting | Supporting | Food Waste Prevention and Rescue Grants |
| Municipal | M5. Reduce City-Generated Solid Waste | b. Evaluate opportunities to revise and expand the City's Sustainable Purchasing | Plan/Program | City Manager's Office, Sustainability Manager | CalRecycle | 2 | Supporting | Supporting | Supporting | Consumer Recycling Education and Outreach Grant Program, Culture of Repair, OCCF Environment Fund, RMDZ |

## Implementation Matrix

| Sector | Objective | Action | Type | Lead City Department | Partners | Phase | Performance Indicators: Tracking Metrics | 2030 | 2045 | Funding/ Financing Opportunities |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Policy to minimize waste, including the use of single-use plastics, paper, and other disposable or non-recyclable materials. | | | | | | | | |

*Notes:*

* *The associated reductions in vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions from Objective T5–related actions are already reflected in the adjusted business-as-usual (ABAU) forecast scenarios. These scenarios incorporate the City's current upzoning initiatives, including Neighborhoods Where We All Belong, with resulting growth assumptions embedded in the demographic and VMT projections used to estimate future emissions. Accordingly, any GHG reductions attributable to these efforts are captured within the City's 2030 and 2045 ABAU forecasts. As a result, no additional performance indicators or tracking metrics are attributed specifically to the Objective T5 actions.*

APPENDIX F

# Cost-Effectiveness Analysis

August 2026




Prepared by

James Fine and Richard McCann

M.Cubed

# Contents

**EXECUTIVE SUMMARY ..... 3**

FINDINGS ..... 3

**INTRODUCTION ..... ERROR! BOOKMARK NOT DEFINED.**

**SCREENING OF CAAP ACTIONS FOR COST-EFFECTIVENESS ANALYSIS ..... 4**

COST-EFFECTIVENESS ANALYSIS INFORMATION COLLECTION ..... 4

**DESCRIPTION OF COSTS, BENEFITS, AND EXTERNALITIES ..... 5**

LIMITATIONS OF COST-EFFECTIVENESS ANALYSIS ..... 6

COST-EFFECTIVENESS ANALYSIS METHOD ..... 8

Transportation Objectives and Actions ..... 9

Energy Objectives and Actions ..... 10

Landscaping Equipment Objective and Action ..... 11

Carbon Sequestration Objective and Action ..... 12

**SUMMARY OF RESULTS ..... 12**

ENERGY ..... 15

TRANSPORTATION ..... 16

**APPENDIX A: COMMON DATA AND FORECAST SOURCES AND METHODOLOGICAL APPROACHES ..... 17**

**CAPITAL COSTS AND FINANCIAL INDICATORS ..... 17**

**UTILITY RATES FORECASTS ..... 18**

**SOLAR POWER AND MICROGRID COSTS ..... 18**

**BUILDING ELECTRIFICATION AND ENERGY EFFICIENCY ..... 18**

**VALUATION OF EXTERNALITIES ..... 19**

SOCIAL COST OF CARBON ..... 19

# EXECUTIVE SUMMARY

This City of Costa Mesa Climate Action and Adaptation Plan (CAAP) Cost-effectiveness Analysis describes at a high level the estimated costs and benefits to City residents, businesses, community organizations, and government agencies associated with implementing climate actions in the CAAP. CAAP identifies greenhouse gas (GHG) emission reduction targets and details a list of sectors, objectives, and actions that could be implemented to achieve GHG emission reduction goals. The Cost-effectiveness Analysis provides information to help to prioritize CAAP actions and pursue State, federal, and regional funding to that might be paired with local funds to implement priority actions.

## Findings

The CAAP Cost-effectiveness Analysis estimates the GHG emissions and total social cost per metric ton of carbon dioxide equivalent[1] emissions ($/MT $CO_2e$) for a short list of priority CAAP actions. Findings are summarized as both qualitative cost-effectiveness and as high and low-cost ranges for thirteen CAAP actions. Our findings about each action include estimated GHG reduction or carbon sequestration, payback rapidity, net lifetime benefit or cost, and societal cost-effectiveness. We can also refer to this analysis as cost-benefit study because it encompasses costs and benefits to arrive at net cost-effectiveness estimates.

The cost-effectiveness estimates include the total direct financial costs and benefits of GHG emissions reductions as well as the total social value of benefits of avoiding GHG emissions. The total social cost per ton of GHG reductions gives an indication of the cost effectiveness of each climate action from a social perspective.[2] That is, the total social cost per ton of GHG reductions includes all costs and benefits, even those that accrue to society at large and cannot be assigned to participating residents, businesses, community organizations, and government agencies. For example, the value of avoided health impacts from reduced emissions would reduce the total social cost per ton of GHG reductions. When the overall cost of reductions is *negative*, it indicates that climate action results in a *net benefit* to society. Many actions have net benefits rather than costs, sometimes dependent on the range of forecasted energy prices that determine the value of future expenses and savings. For actions with cost-effectiveness ranges that span from negative to positive, this is due to the wide range of factors that determine both reductions achieved and associated costs.

Each of these terms are described as follows:

- **GHG reduction** is the quantified projected reductions for 2030 and 2045.[3] Actions with potential for large reductions are highlighted in green, whereas moderate and low potential reductions are highlighted in yellow and blue, respectively.

[1] The equivalence is used as a standard unit of measure to be inclusive of all global warming emissions, including carbon dioxide, methane and nitrous oxide.

[2] All values are presented in 2026 dollars.

[3] These projections are shown in Appendix D of the CAAP.

- **Rapid payback net benefits** refer to the relative likelihood the action will result in both private and public net savings, because benefits exceed costs, resulting in a net benefit to Costa Mesa while recovering initial investment costs quickly. The net benefit is calculated to be greater than $1,000 per MT $CO_2e$ ton.
- **Lifetime benefit** refers to the relative likelihood that the action will result in both private and social net savings and benefits per ton of GHG reduction, resulting in a net benefit to the City over the life of the action. The net benefit is expected to range between $100 to $1,000 per MT $CO_2e$ ton.
- **Societally cost-effective** refers to the likelihood the action will result in positive net private costs that are offset by the collection of social benefits identified in the analysis. The private costs are typically less than $100 per $CO_2e$ MT $CO_2e$ and the social value benefits are larger than $100 per MT $CO_2e$.
- **Moderate net cost** refers to the likelihood the action will result in positive net private costs that are not offset by the collection of social benefits identified in the analysis. The net costs range from $100 to $1,000 per MT $CO_2e$.
- **High net cost** refers to the likelihood the action will result in substantial private costs well beyond the collection of social benefits identified in the analysis. The costs for these actions exceed $1,000 per MT $CO_2e$. However, actions such as reducing emissions from vehicles and off-road equipment considered in this cost range are mandated by State regulations and the City has little or no discretion regarding implementation.

Table ES-1 summarizes the results of the cost effectiveness analysis. Actions specific to City of Costa Mesa operations are denoted with black font and community-wide actions are denoted in blue font. The costs per MT $CO_2e$ are categorized as ranges to account for inherent uncertainties related to initial costs, energy price forecasts, technology performance and adoption rates, emission impacts, and various public policies. The 2030 and 2045 estimated GHG emissions reductions or sequestration are from Tables 2 and 3 in CAAP Appendix D, Greenhouse Gas Reduction Supporting Material.

The legend below describes the symbols in Table ES-1 for each of the definitions provided above.

**Table ES-1 Legend**

| | |
|---|---|
| Rapid Payback Net Benefit >$1,000/ton | $$- |
| Lifetime Net Benefit $100-$1,000/ton | $- |
| Societally Cost-Effective | $=/= |
| Moderate Net Cost $100-$1,000/ton | $+ |
| High Net Cost >$1,000/ton | $$+ |

**Table ES-1: Costa Mesa CAAP Objectives and Actions Cost Effectiveness Avoided or Sequestered Greenhouse Gas Emissions**

| Climate Action and Adaptation Plan Objective | Action | Rapid Payback Net Benefit >$1,000/MTCO$_2$e | Lifetime Net Benefit $100-$1,000/MTCO$_2$e | Societally Cost-Effective | Moderate Net Cost $100-$1,000/MTCO$_2$e | High Net Cost >$1,000/MTCO$_2$e | 2030 GHG Reduction | 2045 GHG Reduction |
|---|---|---|---|---|---|---|---|---|
| T1. Transition to Electric Vehicles | T1.b. Transition City's non-emergency light duty fleet to electric | $$- | | | | | **84,970** | **115,216** |
| T2. Promote Walking and Biking | T2.b. Implement Pedestrian Master Plan & Active Transportation Plan to support active transportation | | $- | $=/= | $+ | $$+ | **70** | **64** |
| T4. Increase Public Transportation Use | T4.d. Roadway improvements for transit service and reliability | $$- | $- | | | | **398** | **158** |
| E2. Decarbonize New Building Energy Use | E2.a. Incentives for new projects to install zero-emission appliances | | $- | $=/= | $+ | | **1,633** | **0** |
| E2. Decarbonize Retrofit Building Energy Use | E2.b Incentives for retrofit projects to install zero-emission appliances | | | | $+ | | **25,331** | **52,655** |
| E3. Increase Carbon-Free Energy Supply | E3.a. Incentives for on-site renewable energy systems | | | | $+ | | **33** | **0** |
| E3. Increase Carbon-Free Energy Supply | E3.c. Join OCPA and launch Clean Energy Enrollment Support Program to encourage opting into the 100% renewable energy | | | | $+ | | **38,893** | **0** |
| OR1. Accelerate Zero-Emission Off-Road Equipment Adoption | OR1.a. Promote the transition from gas- and diesel-powered landscaping equipment to zero-emission models | | $- | $=/= | $+ | | **1,524** | **2,825** |
| NU1. Increase Carbon Sequestration through Urban Greening | NU1.a. Build on Urban Canopy & Land Assessment equitable tree canopy | $$- | $- | $=/= | $+ | | **63** | **317** |
| M1. Reduce City Vehicle Emissions | M1.b. Transition City's non-emergency light duty fleet to electric | $$- | | | | | **341** | **1,130** |

| Climate Action and Adaptation Plan Objective | Action | Rapid Payback Net Benefit >$1,000/MTCO$_2$e | Lifetime Net Benefit $100-$1,000/MTCO$_2$e | Societally Cost-Effective | Moderate Net Cost $100-$1,000/MTCO$_2$e | High Net Cost >$1,000/MTCO$_2$e | 2030 GHG Reduction | 2045 GHG Reduction |
|---|---|---|---|---|---|---|---|---|
| M1. Reduce City Vehicle Emissions | M1.d. Commute trip reduction program for City employees | | $- | | | | **See M1.b** | **See M1.b** |
| M2. Reduce City Energy Use | M2.d. Retrofit City-owned buildings to all-electric end uses and fail-safe backup power | $$- | $- | | | | **1,045** | **345** |
| M2. Reduce City Energy Use | M2.e. Install solar photovoltaic as shade structures on City parking lots and facilities | $$- | | | | | **See M2.d** | **See M2.d** |

# INTRODUCTION

This CAAP Cost-effectiveness Analysis describes high-level, estimated costs and benefits accrued to City residents, businesses, community organizations, and government agencies by implementing a subset of the most promising actions in the City of Cost Mesa CAAP. The CAAP identifies GHG emission reduction targets and describes the hierarchy of sectors, objectives, and actions the City and partners could implement to achieve GHG emission reduction goals for 2030 to 2045. In addition to informing decisionmakers about the economic consequences of climate actions for which there is sufficient information, helping to prioritize climate actions, and guiding budgeting processes, the City can use the CAAP Cost-effectiveness Analysis as a baseline to manage and measure economic and financial performance of CAAP implementation.

The analysis provides information about the financial impact each climate action may have on local jurisdictions and private individuals, business, organizations or agencies. The findings can help to inform priority setting and the policy designs. Most actions will require further analysis to identify the preferred policy option to facilitate implementation through financial incentives or other programs.

The State's climate action programs and Proposition 4 (2024) climate action bond create opportunities to leverage local funding with other funding sources to implement priority CAAP actions.[4] A separate report on funding opportunities discusses these and other options in more detail.[5]

The CAAP identifies over 100 actions to reduce GHG emissions, sequester carbon, or increase resilience to the impacts of climate change. The strategies span eight sectors: this CAAP Cost-effectiveness Analysis Study is intended to report at a high level on the estimated costs, benefits, and externalities (positive and negative)[6] of implementing 13 of the identified CAAP actions. Many of the actions have great potential to reduce significant GHG emissions and/or are net economically beneficial. However, those actions require private or public financial investments, including new and improved infrastructure and vehicle fleet turnover, switching to less GHG-intensive technologies, and associated government agency staff time and resources. Each CAAP climate action has the potential to achieve GHG emission reductions while some actions create ancillary benefits, such as lower fuel costs and reduced criteria and toxic air pollutant emissions. When beneficial externalities are included in the accounting of benefits it improves the cost-effectiveness balance, thereby providing more economic support for the action.

The total social cost is usually measured in metric tons of carbon dioxide equivalence (MT $CO_2e$) and is an estimate of cost effectiveness from a social perspective. That is, it includes all costs and benefits,

[4] The federal government has rescinded or hastened the expiration of many of the funding opportunities and incentives that had been previously available for many of these actions.

[5] See the accompanying *Costa Mesa Environmental Funding Landscape* that describes the funding situation in more detail

[6] Market transactions have prices associated with them that allow a monetary value to be easily assessed. An externality is an economic cost or benefit that occurs outside of market transactions and can be either positive or negative; it is an unpriced consequence of market transactions. Without a clear market price, placing a value on an externality is a complex and uncertain process. However, the lack of a market price does not mean that the externality has a value of zero—in fact the value might be infinite, such as presence of oxygen in our atmosphere.

even those that accrue to society at large and cannot be assigned to individual actors or government agencies. Example values include avoided asthma cases, agricultural productivity effects, or reduced haze.

When the overall cost of $CO_2e$ reductions in *negative*, it indicates that the action results in a *net benefit* to society. The community net cost of reductions reflects the costs and benefits absorbed by private individuals and businesses in the City, excluding costs or benefits to government agencies, or broadly to society. Again, a negative cost per ton indicates the action results in a net benefit to community interests.

The following climate actions, ordered as they appear in the CAAP, are analyzed in this cost-effectiveness study.

1. **Objective T1: Transition to Electric Vehicles:** The CAAP **Action T1.b.** is "Install EV charging stations at non-residential public parking areas."

   Installing EV charging stations at non-residential public parking areas supports private adoption of electric vehicles. It also aligns with the City action M1.b, replacing non-emergency City fleet vehicles with electric. To the extent that Federal or State funds can be paired with local investment, this action becomes more attractive economically.

2. **Objective T2: Promote Walking and Biking:** The CAAP **Action T2.b** is "Implement the Pedestrian Master Plan and Active Transportation Plan to identify pedestrian, bicycle, and roadway circulation gaps and opportunities; update existing plans and the zoning code as needed to support active transportation, including tiered bike facilities and amenities on private property based on development scale."

   Implementing the City's Pedestrian Master Plan and Active Transportation Plan to support active transportation can be a low cost or very costly action, depending on the activity. For example, marketing and education can provide small reductions at low net cost, while options such as changing four-way intersections into roundabouts can be very costly in terms of GHG reductions although this change can make traffic flow more efficient. The cost range can be narrowed as more specificity and details are provided on the exact actions that will be undertaken.

3. **Objective T4: Increase Public Transportation Use**: The CAAP **Action T4.d.** is "Construct roadway improvements to improve transit service and reliability, including queue jump lanes, transit signal priority, dedicated transit lanes, business access or transit lanes, and enhanced bus stops, and work with OCTA to pursue support of capital projects, where feasible."

   Roadway improvements for transit service and reliability enhancements can be low cost and can provide significant social benefits. Public transit use displaces vehicle use but the displacement is a small fraction of all transportation-related GHG emissions.

4. **Objective E2: Decarbonize Building Energy Use:** The CAAP **Action E2.a.** is "Explore providing incentives for projects that commit to installing all zero-emission appliances, such as expedited plan review (e.g., accelerated 10-day timeline)."

   Incentives for new projects to install zero-emission appliances are a set of the actions with moderate potential for reductions but a very wide cost-effectiveness range. Projects that design

zero-emissions appliances from the outset and paired with, for example, low-cost on-site generation, will have negative net cost, i.e., net benefit. At the other end of the range, projects with site-specific challenges (e.g., power delivery constraints, major redesign requirements) will have net costs that exceed benefits.

5. **Objective E2: Decarbonize Building Energy Use:** The CAAP **Action E2.b** is "Promote and facilitate existing rebate vouchers for gas-to-electric swaps during permitted remodels."

   Incentives for retrofit projects to install zero-emission appliances have a tighter net benefit range that remains positive at the low-cost end. Retrofit projects that can incorporate zero-emissions appliances without significant additional design or installation costs and the appliances will be lower to operate over their lifetime compared to conventional options.

6. **Objective E3: Increase Carbon-Free Energy Supply:** The CAAP **Action E3.a** is "Offer voluntary development incentives (e.g., fee reductions, dedicated staff review, expedited processing) for projects that incorporate on-site renewable energy systems capable of producing at least 95% of total annual load."

   This is an actionable step to be taken by private individuals or companies who will get net economic benefits over the long run. Site-specific constraints, such as shading or need for distribution system upgrades, can increase costs and reduce net benefits of on-site renewable energy systems. While state law (SB 100) requires 60% of delivered electricity in 2030 to come from generation qualified under the renewable portfolio standard (RPS), the California Public Utilities Commission has adopted a policy to reach 85% carbon-free electricity by 2030.[7] This accelerated schedule creates uncertainty around the cost effectiveness, which also may be limited due to the short duration of the likely emission reductions given the 100% carbon-free goal in 2045.

7. **Objective E3: Increase Carbon-Free Energy Supply:** The CAAP **Action E3.c.** is "Consider joining OCPA and launch a voluntary Clean Energy Enrollment Support Program that uses targeted outreach, community partnerships, and incentives such as bill savings comparisons, enrollment assistance, and recognition or rebate style perks to encourage households and businesses to opt into the 100% renewable energy tier."

   Joining the Orange County Power Authority (OCPA) and launching Clean Energy Enrollment Support Program to encourage opting into 100% renewable energy is moderately cost-effective. As with Action E3.a, the cost effectiveness may be limited due to projected rapid reductions in emissions to meet the 2045 goal.

8. **Objective OR1: Accelerate Zero-Emission Off-Road Equipment Adoption:** The CAAP **Action OR1.a** is "Promote the transition from gas-and diesel-powered off-road and landscaping equipment to zero-emission models among residents and businesses by providing resources on

[7] "CPUC Advances Clean and Affordable Electricity with New Procurement Decision," https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-advances-clean-and-affordable-electricity-with-new-procurement-decision, March 2, 2026. The CPUC is proposing that all load serving entities (LSEs) including Southern California Edison exceed the SB 100 target for 2030. Whether that target is achieved is uncertain.

the City's website, including information about the South Coast Air Quality Management District Residential Electric Lawn Mower Rebate Program and the Commercial Electric Lawn and Garden Equipment Exchange Program."

For landscaping equipment, the state has banned the sale of new gasoline-powered equipment, so the net reductions will be short-lived with only electric-powered equipment operating by 2045.[8] This action can provide significant co-benefits of cleaner air and less noise pollution that are captured in the societal benefits which makes this measure moderately cost-effective.

9. **Objective NU1: Increase Carbon Sequestration through Urban Greening:** The CAAP **Action NU1.a.** is "Build upon and implement the Urban Canopy and Land Assessment to encourage equitable tree canopy expansions."

   Building upon and implementing the Urban Canopy and Land Assessment to encourage an equitable tree canopy has high social net benefits that include helping to support clean air, reducing urban heat island effects, and providing shade. It is a potentially very low cost or net beneficial GHG mitigation strategy.

10. **Objective M1: Reduce City Vehicle Emissions:** The CAAP **Action M1.b.** is "Transition the City's non-emergency light duty gasoline- and diesel-powered fleet to electric vehicles, with exceptions for emergency and life safety vehicles."

    Transitioning Costa Mesa's non-emergency light duty fleet to electric vehicles is a highly beneficial action because operating electric cars is lower cost than gasoline or diesel. It takes time to recoup the higher initial upfront cost, and there is a need for charging infrastructure and access to low-cost, renewable electricity. The charging infrastructure costs [Action T.1.b] are included in the overall fleet conversion costs. Furthermore, electrifying the City on-road, and off-road is required under State regulation.[9]

11. **Objective M1: Reduce City Vehicle Emissions:** The CAAP **Action M1.d.** is "Implement a voluntary commute trip reduction program including providing commute trip reduction marketing materials to City employees."

    A voluntary commute trip reduction program for City employees has merit as a net beneficial option. This action is well-worth doing, as both a symbol of commitment and a financially rewarding program for participants.

12. **Objective M2: Reduce City Energy Use:** The CAAP **Action M2.d.** is "During major redevelopment of existing City-owned buildings, retrofit facilities to remove natural gas and install all-electric end uses. Coordinate with the Office of Emergency Management to incorporate fail-safe measures for electrical outages, such as backup power."

    Retrofitting City-owned buildings to all-electric end uses with fail-safe backup power is a net beneficial action with potentially large financial payback if the end use replacements are add-

[8] CARB, Lawn, Garden & Landscape Equipment, https://ww2.arb.ca.gov/our-work/topics/lawn-garden-landscape-equipment.

[9] CARB, Advanced Clean Fleets, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets.

ons to existing retrofit projects and designed into future retrofits. Net benefits are lower where site-specific costs, such as upgrades to electrical service and rewiring, are higher.

13. **Objective M2: Reduce City Energy Use:** The CAAP **Action M2.e.** is "Install solar photovoltaic (PV) systems as shade structures at City-owned parking lots and facilities."

    Installing solar photovoltaic as shade structures on City parking lots and facilities can be economically attractive when paired with the appropriate rate structures. The addition of electric vehicle charging infrastructure can increase the cost effectiveness and enhance the adoption and use of EVs for further emission reductions.

Cost effectiveness findings for each action can help decision makers select preferred policy approaches. For example, where the externalities show large social benefits, but the community net costs are significant, actions would best be enabled through public incentives such as grants, subsidies, fees or taxes that compensate for those net costs. Where both the social and community benefits are positive, yet the action is not widely adopted, the action may require a market transformation that changes the apparent relative attractiveness of the choice among other market options. For example, energy efficiency in rental housing presents a case where the market decisionmaker (the landlord) is separate from the beneficiary (the tenant), so the beneficial investment may not occur. During implementation, decisionmakers can match the appropriate incentives and financing mechanisms with each action to reflect social and community benefits balanced with private interests.

All of these cost-effectiveness estimates have significant uncertainties that arise both from ranges in commodity and product forecasts and performance, and unknowns about housing and vehicle stocks and new technology characteristics and evolutions. The values here are for comparative purposes: an action that has a very high cost is unlikely to deliver strong economic benefits and vice versa. Perhaps the most interesting result of this exercise is that a significant proportion of these actions show potential to both decrease direct financial costs and to deliver positive environmental benefits.

# SCREENING OF CAAP ACTIONS FOR COST-EFFECTIVENESS ANALYSIS

## Cost-Effectiveness Analysis Information Collection

A cost-effectiveness analysis requires an inventory of potential climate actions for each sector, estimates of current and forecasted sectoral emissions, estimated emission reductions or carbon sequestration and the net cost (or benefit) of each action. Additional information is desirable on (1) the expected costs of actions the City will implement within municipal government operations, (2) the scale of action, such as the number of either units acquired or constructed (e.g., vehicles, number of EV charging stations) or households and businesses acting on the measure. The 13 actions evaluated in this analysis have sufficient information in the literature to develop cost-effectiveness results. M.Cubed developed other data and forecast inputs for climate actions, such as baseline and reduced energy consumption per unit or household/business, technology and energy price forecasts, and projected consumers' responses to actions such as government incentives or informational campaigns. These inputs and analyses are described in more detail in Appendix A. The City can use the cost-effectiveness findings as a decision-making tool for staff and elected officials during the implementation phase of the plan.

Based on the information requirements and the stage of development for each action, these actions were then rated through professional judgement and available analyses from previous CAAPs on a five-tier hierarchy of relative cost-effectiveness on a cost per metric ton of $CO_2e$: Rapid Payback Net Benefits, Lifetime Net Benefits, Societally Cost-Effective, Moderate Net Costs, and High Net Costs.

# DESCRIPTION OF COSTS, BENEFITS, AND EXTERNALITIES

The three main types of values considered in this analysis are costs, benefits, and externalities. In examining GHG reductions from CAAP actions, the analysis incorporates broad societal costs that EPA defines in a metric "social cost of carbon" as

> "a comprehensive estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning" [10]

For specific CAAP measures, "private" costs of implementation are compared against benefits for the individuals who take actions (e.g., building owners). Similarly, community-scale costs include CAAP action implementation costs incurred by government agencies. Private and community costs and benefits are carried by residents or businesses, such as the financial cost of performing energy efficiency upgrades or the benefit of a reduced electricity bill from installing solar generation on commercial buildings. The analysis uses the following definitions:

> ***Costs*** generally include implementation expenditures, both for private investment and operations, and government staffing, incentive payments, infrastructure or purchasing. Also included are any additional energy costs in the case of switching from one fuel or energy source to another. In some cases, these are presented at the net costs of the difference between conventional technology and lower or zero emission options. For example, the net costs of building electrification and electric vehicles are presented in this analysis. These net costs are often negative, meaning they are economically beneficial because in the long run they save homeowners or drivers money. Often new technology has a higher initial investment cost than conventional technology (e.g., heat pumps versus furnaces or electric versus gasoline cars).
>
> ***Benefits*** include any costs (e.g., energy, fuel or other) that are avoided or reduced with implementation of the action. The benefits occur during operations when new technologies use less or lower cost fuels. The lifetime operational savings from fuel switching and lower maintenance costs (compared to the conventional alternatives) depend on anticipated prices for electricity, natural gas, and petroleum products, as well as use intensities. Other benefits included the avoided societal costs associated with GHG emissions impacts. Reducing the risks of changes in weather affecting agricultural production or extreme weather is a benefit that has

[10] The US EPA defines the social cost of greenhouse gas emissions as "a comprehensive estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning". https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon.html

been quantified by US EPA.[11] We use EPA's estimate to determine the economic benefits of each metric ton of avoided or sequestered GHG.

***Externalities*** include benefits or costs that do not accrue to particular or identifiable individuals but may impact on the community and society at large. These include the avoided social cost of carbon and the avoided health impacts of air pollution caused by the same activities that produce GHG emissions. For example, burning gasoline in cars produces gases that cause urban smog and regional haze and carcinogens such as benzene, in addition to GHG emissions. In addition to cancer, health impacts from companion pollutants include higher rates of premature death, onset of asthma or other illnesses. This report has not quantified these additional environmental benefits from reduced pollutants, but they provide additional economic value not included here.

The social cost of carbon is a value used by the U.S. Environmental Protection Agency (U.S. EPA) and other federal agencies to estimate the value to society of GHG reductions based on the impacts of human-induced climate change on agricultural productivity, human health, and flood risk.[12] Not all externalities are included in this analysis, though the most significant are identified and quantified where possible.

Operational savings recoup upfront costs over time. To reflect the difference in the timing of costs and benefits, a common metric of net present values is developed. Future values are discounted to reflect present values and enable comparison of cost-effectiveness metrics for actions with different timelines. This study uses a range of cost-effectiveness results to reflect inherent uncertainties, and they are shown as high and low cost-effectiveness.

This analysis depends in large part on the data and assumptions for each action developed in the CAAP. Following the methodology developed in that analysis, costs, benefits, and externalities are estimated on an annualized basis for the years 2030 through 2050.

## Limitations of Cost-Effectiveness Analysis

The results of the cost-effectiveness analysis should be used to inform decision-making with consideration of limitation. Cost-effectiveness is intended to be indicative, not definitive, of relative costs across proposed climate actions. The following list provides some of the most important aspects limiting the accuracy of the analysis.

1. **The cost-effectiveness metrics are for comparison among actions on a relative basis— they do not represent the expected absolute costs and benefits per se.**

Most of the actions are directed toward sectors that have a wide variety of characteristics. For example, this is a diversity of housing in Costa Mesa, ranging by number of occupants, building age and attributes, and activities within the home. Such diversity is not easily captured in an economic analysis. Available

[11] Ibid 12, US EPA, Social Cost of Carbon.

[12] The social cost of carbon is an estimate of the cost translated to a monetary value of the damage done by each additional MT $CO_2e$ emissions. Conversely, it also is an estimate of the benefit of any action taken to reduce a MT $CO_2e$ of emissions.

economic studies are not tailored with specific local characteristics for Costa Mesa. Some studies use archetypes or prototypes (e.g., particular building configuration or vehicle type) and averages to estimate the costs and benefits of certain actions. For example, the assumptions for decarbonization strategies for new home construction are based on studies of standard house configurations and estimated costs to build and operate that house, adjusted for the City's Climate Zone.[13] The extent to which Costa Mesa's actual housing stock deviates from these configurations will impact the expected absolute costs for the specified actions.

2. **Net cost estimates exclude 2021 through 2023 federal and State incentives and funds recently made available.**

Significant State incentive funding is available for a host of household, business, and public sector climate-related investments. The Fiscal Year 2022-2023 State of California Budget allocated $39 billion over five years toward climate resilience and integrated climate, equity, and economic opportunities. However, the FY 2023-2024 budget scaled back State spending by $2.9 billion.[14] The FY 2025-2026 budget incorporated further budget reductions for climate actions.[15] The accompanying report *Costa Mesa Environmental Funding Landscape* describes the funding situation in more detail.

At the federal level, the Investment and Recovery Act (IRA) adopted by the Biden Administration would have directed between $390 billion and $1 trillion to renewable energy assets primarily through tax credits and grants. Though not cancelled, the Trump administration has gutted and defunded the IRA so it is no longer a significant reliable funding source.

Eligibility rules and implementation guidelines are frequently updated and revised for a number of the state and federal incentives and programs. Further, many funding programs set income eligibility standards that require more detailed socio-economic data on a geographic basis than is readily available for this study. There is little or no research estimating how many people or businesses would adopt particular technologies in response to the available incentives.

**3. Total cost assessments rely on estimated equipment and building populations and the assumed effectiveness of the actions both to be implemented and to change the emission profiles of those populations.**

The most salient example is building electrification that replaces natural gas stoves with induction cooktop and convection ovens, as well as furnaces and air conditioners with heat pumps. The rate of building retrofits could vary widely in both numbers and timing. It is also largely unknown how automobile drivers might respond to the option of switching from gasoline-fueled to electric vehicles given changed circumstances.

---

[13] California Energy Commission, California Building Climate Zones, https://cecgis-caenergy.opendata.arcgis.com/datasets/CAEnergy::california-building-climate-zones/explore

[14] "2023–24 California State Budget Finalized—At Least for Now," *JD Supra*, https://www.jdsupra.com/legalnews/2023-24-california-state-budget-1576852/, July 5, 2023.

[15] Legislative Analyst's Office, "The 2025-26 Budget: Overview of the Spending Plan," https://lao.ca.gov/Publications/Report/5079, October 16, 2025.

Given uncertainties about the rates of adoption for each action, policymakers and stakeholders should focus their attention on the relative costs of actions and not the cost of a single action in isolation. Uncertainties worsen as policy adoption forecasts span further into the future as it is hard to predict game-changing technology introduction and innovation, energy prices and utility electricity rates, and sources and magnitudes of government funding and incentives.[16]

## Cost-Effectiveness Analysis Method

In this section, we summarize the analytical tools and techniques used for the cost-effectiveness analysis, including data inputs and other information necessary to replicate the results and findings. M.Cubed developed a range of cost-effectiveness estimates for each CAAP action. Economic values used include initial investments, ongoing expenditures, and non-market costs such as environmental and transaction costs.

Cost-effectiveness analysis measures the net costs (i.e., gross costs minus gross benefits) per unit of provided service or benefit.[17] In this case, it measures the cost per ton of GHG emission reductions. Standard practice is to present results in the cost-effectiveness format because it allows for direct comparison among actions. Cost-effectiveness analysis typically presents net benefits on a per unit basis, in this context dollars per metric ton of carbon dioxide equivalent emissions ($/MT $CO_2e$).

Cost-effectiveness can be examined at two levels, the first based on direct market transaction values that represent private financial values, such as an individual's purchase of an EV instead of a conventional car. The second level encompasses a wider array of impacts cannot be observed as market transactions (a.k.a., non-market) and are often interpreted as societal externalities, benefits and costs. These non-market benefits can include air quality and other environmental quality improvements that are savings compared to the presumed baseline activity. Monetary values can also be included where sufficient information is available.

Climate actions may have cost-effectiveness values that are very low or negative (i.e., benefits are less than costs). That does not diminish the need to achieve such reductions; instead, it highlights the likelihood that households and businesses may need subsidies to cover the excess costs. The underlying analysis includes both direct private and broader societal costs and benefits. The City can compare the relative net costs of its portfolio of actions using these values.

M.Cubed estimated the costs of the 13 CAAP actions based on several components as follows:

1. Upfront cost for new or replacement technology.
2. Upfront cost for supporting infrastructure such as electric vehicle charging stations.
3. Comparative ongoing costs of new or replacement technology versus the current conventional technology, which often results in net benefits because of lower energy prices and maintenance requirements. Ongoing costs are usually dominated by fuel and energy prices, and M.Cubed

[16] William Ascher. *Forecasting: An Appraisal for Policy-Makers and Planners*. Johns Hopkins University Press. 1978.

[17] Cost-benefit and cost-effectiveness analyses are closely related with different perspectives on the same question, so the terms are often used interchangeably.

applied forecasts for those prices. Where available, M.Cubed included other ongoing costs such as maintenance.

For benefits, M.Cubed estimated the social benefit of GHG emissions reductions. We based the valuation on the US EPA's estimate of the long-term damage done by a ton of carbon dioxide and other global warming emissions (known as the "social cost of carbon") and projected reductions in GHG emissions for individual CAAP actions.[18]

Benefit estimates for GHG reductions are drawn from peer-reviewed literature. While valuation of other environmental benefits are available, reductions in criteria and toxic air pollutants and use other resources have not been calculated for this study. This causes overall benefits to be conservatively underestimated.

M.Cubed calculated the net present value of a range of costs and benefits of each climate action included in the analysis, meaning M.Cubed converted all future costs and benefits to a chosen year value by adjusting for the time value of money with a discount rate.[19] M.Cubed then divided the high and low estimates of the net present value of the cost of implementing the climate action by the high and low estimates of net present value of the emission reductions, to arrive at a range of dollars per ton for each climate action. These cost-effectiveness ranges can inform the City's decisions to prioritize investment of resources in the most cost-effective CAAP actions.

## *Transportation Objectives and Actions*

M.Cubed referred to studies by CARB (2007) and Fowlie & Holt (2025) plus additional analysis by M.Cubed to identify the cost-effectiveness range for the three transportation-related actions:

- Objective T1: Transition to Electric Vehicles. Action T1.b. Install EV charging Stations at non-residential public parking areas
- Objective T2: Promote Walking and Biking. Action T2.b. Implement the Pedestrian Master Plan and Active Transportation Plan to identify pedestrian, bicycle, and roadway circulation gaps and opportunities; update existing plans and the zoning code as needed to support active transportation, including tiered bike facilities and amenities on private property based on development scale
- Objective T4: Increase Public Transit Use. T4.d Construct roadway improvements to improve transit service and reliability, including queue jump lanes, transit signal priority, dedicated transit lanes, business access or transit lanes, and enhanced bus stops, and work with OCTA to pursue support of capital projects, where feasible.

---

[18] US EPA, *Supplementary Material for the Regulatory Impact Analysis for the Final Rulemaking, "Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review": EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances*, Docket ID No. EPA-HQ-OAR-2021-0317, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf, November 2023.

[19] The discount rate is an interest rate at which an individual or society is indifferent between accepting a payment today or accepting a payment in the future or over a series of years.

The City is required by State Advanced Clean Fleet regulations to purchase only electric vehicles for its fleet and equipment by 2027.[20]

M.Cubed relied on a study that estimated the net cost of converting a local government's fleet to electric vehicles compared to conventional internal combustion engine vehicles.[21] The study included vehicle purchase and charging infrastructure costs, the relative energy/fuel efficiency of each with the price of each energy/fuel type, the relative maintenance costs per mile (ongoing costs), and the net upfront cost of new charging station infrastructure per electric vehicle. M.Cubed also estimated a range of benefits using projected GHG.[22]

## *Energy Objectives and Actions*

Categorizing actions by objective because individual actions can serve several objectives. Five of the actions analyzed in this cost-effectiveness study have objectives to decarbonize building energy use and reduce city energy use and increase the supply of carbon-free energy.

For example, Action M2.e – installing PV systems as shade structures on City-owned property – supports both reducing city energy use (Objective M2) and increasing the supply of carbon free energy (Objective E3).

Two actions for private parties and the City focus on upgrading buildings and appliances. By replacing or displacing appliances and heating, ventilation, and air conditioning systems which use fossil fuels in new and existing buildings with electric alternatives, both the City and private actors can contribute to CAAP objectives:

- Objective E2. Decarbonize Building Energy Use. Action E2.a Explore providing incentives for projects that commit to installing all zero-emission appliances, such as expedited plan review.
- Objective M2. Reduce City Energy Use: M2.d. During major redevelopment of existing City-owned buildings, retrofit facilities to remove natural gas and install all-electric end uses. Coordinate with the Office of Emergency Management to incorporate fail-safe measures for electrical outages.

M.Cubed estimated a range of net upfront costs for building and appliance electrification based on the Local Energy Codes Reach Code reports and calculated operating costs and net benefits of ownership compared to conventional alternatives.[23] The cost-effectiveness analysis assumes homeowners or

---

[20] CARB, Advanced Clean Fleets Regulation, https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-state-local-government-agency-fleet; and CARB, Small Off-Road Engines (SORE) Regulations. https://ww2.arb.ca.gov/our-work/programs/small-road-engines-sore/2021-amendments-small-road-engine-regulations

[21] EV Refleet Inc. Fleet Electrification Assessment, Prepared for the County of Sonoma Public Infrastructure Department, January 9, 2024.

[22] CARB, "Staff Report: Initial Statement Of Reasons For Proposed Rulemaking--Proposed Regulation For In-Use Off-Road Diesel Vehicles," Mobile Source Control Division, https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2007/ordiesl07/isor.pdf, April 2007, and Fowlie, M. and Holt, B., "Cap-and-Trade and Cost Containment in California," Table 3-11, IEMAC Discussion Draft (January 2025).

[23] The sources for these analyses are listed in Appendix A.

organizations will replace the appliances and heating, ventilation, and air conditioning systems at the end of their useful life. For example, for replacing natural gas heating system with an electric version, energy used by the original and new appliance is multiplied by the utility rate for natural gas and electricity, respectively, to ascertain the savings (or cost). New appliance or home ventilation system attributes were obtained from county appliance audit reports, and energy price forecasts are from the California Public Utility Commission.[24]

Three measures will increase the City's carbon fee energy supply per Objective E3, as well as reducing city energy use:

- Objective E3. Increase Carbon Free Energy Supply. E3.a. Offer voluntary development incentives (e.g., fee reductions, dedicated staff review, expedited processing) for projects that incorporate on-site renewable energy systems capable of producing at least 95% of total annual load.
- Objective M2. Reduce City Energy Use. Action M2.e Install solar photovoltaic (PV) systems as shade structures at City-owned parking lots and facilities.
- Objective E3. Increase Carbon Free Energy Supply. E3.c. Consider joining OCPA and launch a voluntary Clean Energy Enrollment Support Program that uses targeted outreach, community partnerships, and incentives such as bill savings comparisons, enrollment assistance, and recognition or rebate-style perks to encourage households and businesses to opt into the 100% renewable energy tier.

For Actions E3.a and M2.e, M.Cubed estimated a range of net upfront and ongoing costs for on-site solar PV generation and compared them to continued electric service from a grid connected utility.[25] The community-scale action, E3.a, has high potential for wide adoption and is Measure M2.c would install solar photovoltaic (PV) generation on City-owned parking and facilities. M.Cubed based the net benefits range on a Wildan (2024) study.[26]

For Action E3.c, M.Cubed compared the potential for carbon-free electricity Southern California Edison and from Orange County Power Authority (OCPA), is projected to achieve 100% renewable energy by 2030. Therefore, increasing on-site solar generation will be displacing renewable generation from OCPA that is already zero emissions. Consequently, the cost-effectiveness based on emission reductions from these actions is expected to be low.

## *Landscaping Equipment Objective and Action*

The Objective OR, Accelerate Zero-Emission Off-Road Equipment Adoption is supported by OR1.a. - transitioning landscaping equipment to zero-emissions via education about rebate opportunities to take advantage of the state regulation that has ended the sale of gasoline powered equipment in California. M.Cubed relied on information provided by CARB in developing the Small Off Road Engines rules to

[24] Willdan, "Sonoma County Energy Project: Investment Grade Audit Report," https://sonoma-county.legistar.com/LegislationDetail.aspx?From=RSS&ID=6664595&GUID=43C2B4AD-CBEB-45E1-9EE7-5B69E414FD03 , March 15, 2024.

[25] Sources for this analysis are listed in Appendix A.

[26] Willdan, "Sonoma County Energy Project: Investment Grade Audit Report," March 15, 2024.

develop economic comparisons of conventional versus zero-emissions (electric) equipment.[27] When the air quality benefits that were the basis of the CARB rule are included, this action provides a net societal benefit.

### *Carbon Sequestration Objective and Action*

Action NU1 is to build upon and implement the Urban Canopy and Land Assessment to encourage equitable tree canopy expansions in support of Objective NU, Increased Carbon Sequestration through Urban Greening, M.Cubed estimated the costs and benefits of urban tree planting that build on the Urban Canopy & Land Assessment. Focusing on areas that encourage an equitable tree canopy provides a high social net benefit by improving local air quality, reducing urban heat island effects, providing shade and aesthetic values.

## SUMMARY OF RESULTS

M. Cubed estimated the GHG and total social cost per ton of emissions reductions for 13 local actions. For each action, Table 1 summarizes the magnitude of expected emission reductions and sequestration relative to the overall community inventory, and net cost effectiveness, which is measured in dollars per metric ton of carbon dioxide equivalent (MT $CO_2e$) GHG emissions. The cost-effectiveness results include the total direct financial costs and benefits of emissions reductions as well as total social value of benefits per ton of GHG reductions.[28] The costs per ton are categorized as ranges due to the inherent uncertainty in many dimensions including initial costs, energy price forecasts, technology performance and adoption rates, emission impacts and various public policies. This table shows the actions grouped by sector and objective.

[27] CARB, Amendments to the Small Off-Road Engine Regulations: Transition to Zero Emissions, Attachment D: Updated Emissions and Economic Analysis Results for the Proposed Amendments to the Small Off-Road Engine Regulations https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/sore21/sorefsorattd.pdf, August 2, 2022.

[28] Appendix A contains summaries of the calculations for most of these actions.

**Table 1 – City of Costa Mesa Climate Action and Adaptation Plan Objectives Cost Effectiveness per Metric Ton $CO_2e$**

| Climate Action and Adaptation Plan Objective | Climate Action and Adaptation Plan Action | Type of Action | 2030 GHG Reduction | 2045 GHG Reduction | Low Estimate Net Cost per MT CO2e | High Estimate Net Cost per MT CO2e | Rapid Payback Net Benefit >$1,000/ MT CO2e | Lifetime Net Benefit $100-$1,000/ MT CO2e | Societally Cost-Effective | Moderate Net Cost $100-$1,000/ MT CO2e | High Net Cost $100-$1,000/ MT CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T1. Transition to Electric Vehicles | T1.b. Transition City's non-emergency light duty fleet to electric | Infrastructure | **84,970** | **115,216** | ($1,400) | ($1,300) | $$- | | | | |
| T2. Promote Walking and Biking | T2.b. Implement Pedestrian Master Plan & Active Transportation Plan to support active transportation | Infrastructure | **70** | **64** | ($200) | $26,000 | | $- | $=/= | $+ | $$+ |
| T4. Increase Public Transportation Use | T4.d. Roadway improvements for transit service and reliability | Infrastructure | **398** | **158** | ($200) | ($100) | $$- | $- | | | |
| E2. Decarbonize New Building Energy Use | E2.a. Incentives for new projects to install zero-emission appliances | Incentives | **1,633** | **0** | ($300) | $650 | | $- | $=/= | $+ | |
| E2.Decarbonize Retrofit Building Energy Use | E2.b Incentives for retrofit projects to install zero-emission appliances | Incentives | **25,331** | **52,655** | $100 | $250 | | | | $+ | |
| E3. Increase Carbon-Free Energy Supply | E3.a. Incentives for on-site renewable energy systems | Incentives | **33** | **0** | $100 | $250 | | | | $+ | |
| E3. Increase Carbon-Free Energy Supply | E3.c. Join OCPA and launch Clean Energy Enrollment Support Program to encourage opting into the 100% renewable energy | Partnerships | **See E3.a** | **0** | $100 | $150 | | | | $+ | |
| OR1. Accelerate Zero-Emission Off-Road Equipment Adoption | OR1.a. Promote the transition from gas- and diesel-powered landscaping equipment to zero-emission models | Education/ Marketing | **1,524** | **2,825** | ($200) | $400 | | $- | $=/= | $+ | |
| NU1. Increase Carbon Sequestration through Urban Greening | NU1.a. Build on Urban Canopy & Land Assessment equitable tree canopy | Infrastructure | **63** | **317** | ($1,300) | $200 | $$- | $- | $=/= | $+ | |
| M1. Reduce City Vehicle Emissions | M1.b.Transition City's non-emergency light duty fleet to electric | Infrastructure | **341** | **1,130** | ($1,400) | ($1,300) | $$- | | | | |

| Climate Action and Adaptation Plan Objective | Climate Action and Adaptation Plan Action | Type of Action | 2030 GHG Reduction | 2045 GHG Reduction | Low Estimate Net Cost per MT CO2e | High Estimate Net Cost per MT CO2e | Rapid Payback Net Benefit >$1,000/ MT CO2e | Lifetime Net Benefit $100-$1,000/ MT CO2e | Societally Cost-Effective | Moderate Net Cost $100-$1,000/ MT CO2e | High Net Cost $100-$1,000/ MT CO2e |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M1. Reduce City Vehicle Emissions | M1.d. Commute trip reduction program for City employees | Plan/Program | **See M1.b** | **See M1.b** | ($1,000) | ($100) | | $- | | | |
| M2. Reduce City Energy Use | M2.d. Retrofit City-owned buildings to all-electric end uses and fail-safe backup power | Regulations | **1,045** | **345** | ($1,300) | ($150) | $$- | $- | | | |
| M2. Reduce City Energy Use | M2.e. Install solar photovoltaic as shade structures on City parking lots and facilities | Infrastructure | **See M2.d** | **See M2.d** | ($2,900) | ($3,700) | $$- | | | | |

Note: GHG Reduction cost effectiveness = $/metric ton $CO_2$ equivalent

**Table 1 Legend**

| | |
|---|---|
| Rapid Payback Net Benefit >$1,000/ton | $$- |
| Lifetime Net Benefit $100-$1,000/ton | $- |
| Societally Cost-Effective | $=/= |
| Moderate Net Cost $100-$1,000/ton | $+ |
| High Net Cost >$1,000/ton | $$+ |

t

## Energy

The energy-related climate actions aimed at upgrading and electrifying City facilities (M2.d) show a mix of net benefits and costs. By comparison, on-site clean electricity generation actions (M2.e, E3.a) are moderate net cost and reduce a small amount of GHGs. The small benefit is attributable to the small gain achieved by switching away from Southern California Edison supply that, at times during the day when there is ample renewable generation, is 100% clean.[29] According to their Sustainability Report, SCE has a goal of increasing the percentage of carbon-free delivered electricity from 60% in 2025 to 80% and 100% in 2030 and 2045, respectively.[30] Overall, energy actions have moderate net costs when compared to the array of available actions.

Building electrification can provide important affordability benefits in addition to reducing GHG emissions.[31] Efficiency improvements to buildings, such as insulation or roof replacement, can have very long paybacks because upfront costs are high while annual savings are low. Also, buildings are retrofitted at a slow rate because fixtures, such as rooftop shingles or heating systems, can last several decades.[32]

Upgrading to more energy efficient appliances is more cost effective and expedient than actions aimed at electrification of buildings. Appliance replacement cost-effectiveness can range from rapid payback with a large net benefit (e.g., replace an old refrigerator) to high cost with lengthy paybacks (e.g., replacing efficient new gas heater with a heat pump). All-electric appliances in new and retrofitted buildings could yield moderate and large GHG reductions, respectively, at a range of cost-effectiveness. However, it will take a long time for the existing building stock to be upgraded entirely because some appliances can last longer than a decade, such as heating and cooling systems, clothing dryers and refrigerators.[33]

Multi-family electrification retrofits show the largest net benefits because they tend to have older, less efficient appliances and building shells (roofing, windows) ripe for replacement. New construction of

---

[29] California Energy Commission, "Tracking Progress Toward 100% Clean Energy," https://www.energy.ca.gov/data-reports/clean-energy-serving-california/tracking-progress-toward-100-clean-energy, retrieved June 2026.

[30] SCE Sustainability Report, 2025, pg. 81, https://download.edison.com/406/files/20266/4adb13a89648fb7507f95eb511350540/2025%20Sustainability%20Report.pdf?Signature=t5%2Fj0YnOMikiwrjH%2FB3DfNa%2BFrQ%3D&Expires=1784419329&AWSAccessKeyId=AKIATACLJRQCWOP6ZJOW&versionId=eN4w1BnjQ_x2e4hSYkPhabVMzhRkdEOw&response-content-disposition=attachment

[31] Dunlap, L., Sheinberg, R., Callan, W., Smithies, S., and Pierce, G. 2025. Impacts of Household Electrification on Energy Affordability in Los Angeles: Energy Spending and Burden Projections from the L.A. Residential Energy Transition Tool." escholarship.org/uc/item/602136rz

[32] Victor Franco, Youness Bennani, Jing Ke, Edward Cubero, Alex Lekov. Estimating Residential Appliance Lifetime for Energy Efficient Policy Analysis, Energy Analysis and Environmental Impacts Division, Lawrence Berkeley National Laboratory, Energy Efficiency Standards Group, August 2018.

[33] James D. Lutz, Asa Hopkins, Virginie Letschert, Victor H. Franco, and Andy Sturges, Using National Survey Data to Estimate Lifetimes of Residential Appliances Energy Analysis Department Environmental Energy Technologies Division Lawrence Berkeley National Laboratory, October 2011.

certain types of commercial space is the costliest option because State building codes already require a high level of energy efficiency.[34]

The net costs also are highly dependent on how much electricity and gas rates increase over the next several decades. New construction could provide a moderate emission reduction while widespread retrofits could result in a large reduction.

## Transportation

As noted, electrifying the City's vehicle fleet is required under State regulation. Converting the City's vehicle fleet to electric can be highly beneficial for light-duty cars (M1.b Reduce City Vehicle Emissions). The charging infrastructure costs are included in the over fleet conversion costs. The total emission reductions would be moderate on the community scale.

[34] See California Energy Commission Building Codes at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2028-building-energy-efficiency.

# APPENDIX A: COMMON DATA AND FORECAST SOURCES AND METHODOLOGICAL APPROACHES

This appendix discusses data, forecasts and methodological approaches that are commonly applied across economic analyses. In general, where a source or approach is not specified, the analysis relies on inputs from the workpapers used to assess the GHG emission reductions for individual actions in the CAAP. Calculating the economic costs, benefits and externalities relies on additional data and forecasts described below that are common across actions (e.g., energy price forecasts.)

## CAPITAL COSTS AND FINANCIAL INDICATORS

Capital costs for an asset are typically incurred when the asset is acquired. To be comparable to other costs that occur repeatedly, capital costs are converted to an annual basis.[35] Other annual costs include operations and maintenance costs, utility bill impacts and social cost of carbon estimates.

Adjustments to costs and benefits associated with a specific year are adjusted to common year values using consumer and producer price indices reported by the Federal Reserve Bank of St. Louis.[36]

Debt and loan rates are drawn from data reported by the Federal Reserve Bank.[37] Data used includes personal and automobile loan rates, house mortgage rates and Moody's 20-year average annual seasoned Baa corporate bond yield.

Housing and population data are sources from the U.S. Census American Community Survey.[38] Petroleum product price forecasts are from the U.S Energy Information Administration. Current gasoline prices are based on EIA weekly Los Angeles retail gasoline prices.[39] That price is then escalated based on the motor gasoline price forecast in the EIA's *Annual Energy Outlook*.[40]

---

[35] A common type of levelized annual payment is a mortgage payment on a house loan.

[36] St Louis Fed. Consumer Price Index for All Urban Consumers: All items in Los Angeles, CA (CBSA). Federal Reserve Economic Data | FRED | St. Louis Fed. https://fred.stlouisfed.org/

[37] St. Louis Fed. 30-Year Fixed Rate Mortgage Average in the United States, Finance Rate on Personal Loans at Commercial Banks, 24-Month Loan, Finance Rate on Consumer Installment Loans at Commercial Banks, New Autos 48 Month Loan, Moody's Seasoned Baa Corporate Bond Yield, Percent, Annual, Not Seasonally Adjusted. Federal Reserve Economic Data | FRED | St. Louis Fed. https://fred.stlouisfed.org.

[38] U.S. Census Bureau. (2022). American Community Survey Data. Census.gov. https://www.census.gov/programs-surveys/acs/data.html

[39] EIA. Weekly Los Angeles Regular All Formulations Retail Gasoline Prices (Dollars per gallon). U.S. Energy Information Administration (EIA). https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_Y05LA_DPG&f=W

[40] EIA. Annual Energy Outlook. Table 12. Petroleum and Other Liquids Prices. U.S. Energy Information Administration (EIA). https://www.eia.gov/outlooks/aeo/data/browser/#/?id=12-AEO2023&cases=ref2023&sourcekey=0

## UTILITY RATES FORECASTS

Initial investments are weighed against the discounted net present value of the operational and energy costs for a future period. The discounted net present value is heavily dependent on the price forecasts for each energy source, be it electricity, natural gas, diesel, or gasoline. Electricity and natural gas are provided by regulated utilities for which underlying future costs can be well understood and the forecasts can be made with a fair amount of certainty.

SCE is the distribution utility for electricity in the City, and it also provides generation services to most customers in the City. Southern California Gas is the natural gas utility for the City's residents. The benefits of energy efficiency climate actions include the current and forecasted electricity rates for SCE service and natural gas rates for SCG.

## SOLAR POWER AND MICROGRID COSTS

The National Renewable Energy Laboratory prepared analyses of individual household and community microgrids which are used to calculate distributed energy resources (DER) average costs for residential and community-scale deployments.[41] These include the installation costs after applicable tax credits as of 2021 and are translated to annualized cents per kilowatt-hour for comparison to the alternatives.

## BUILDING ELECTRIFICATION AND ENERGY EFFICIENCY

Studies prepared by California Energy Codes and Standards calculated changes in customer costs for Reach Code standards for new and existing residential and non-residential construction.[42] The cases used in the CAAP analysis are all-electric efficiency and mixed fuel efficiency.

[41] Vignesh Ramasamy, et al, U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks: Q1 2021, National Renewable Energy Laboratory, Technical Report NREL/TP-7A40-80694, https://www.nrel.gov/docs/fy22osti/80694.pdf, November 2021; and Vignesh Ramasamy, et al, U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks: Q1 2020, National Renewable Energy Laboratory, Technical Report NREL/TP- 6A20-77324, https://www.nrel.gov/docs/fy21osti/77324.pdf, January 2021.

[42] California Energy Codes and Standards. (2026). "Cost-Effectiveness Explorer: Results for City of Costa Mesa." Updated 2025. https://explorer.localenergycodes.com/jurisdiction/costa-mesa-city/study-results/6-SCE?only_study_type=existing-buildings&exclude_study_ids=48,25,22,19,1,27,54,49,46,45,43,38,2,33 and https://explorer.localenergycodes.com/jurisdiction/costa-mesa-city/study-results/6-SCE?only_study_type=new-buildings&exclude_study_ids=48,25,22,19,1,27,54,49,46,45,43,38,2,33.

# VALUATION OF EXTERNALITIES

## Social Cost of Carbon

The social cost of carbon is a metric used by the US EPA and other federal agencies to estimate the value to society of greenhouse gas emissions reductions based on the impacts of climate change on agricultural productivity, human health, and flood risk.[43] It is a dollar-based assessment of the negative impact that carbon dioxide emissions have in a given year. Conversely, it represents the benefit of avoided damages from an incremental reduction in carbon dioxide. This study relies on values developed by the EPA for 2030 through 2050, under their 3% average discount rate scenario, representing a mid-range value of the impact.[44] The social cost of carbon value used in this analysis is $72 per ton in 2030 and $94 in 2045, in 2022 dollars.

[43] Interagency Working Group on Social Cost of Greenhouse Gases, United States Government. Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. February 2021. https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

[44] US EPA. (2017). The Social Cost of Carbon, US EPA. United States Environmental Protection Agency. https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html; and Executive Order 12866 (May 2013, Revised August 2016).

# Costa Mesa Environmental Funding Landscape

M.Cubed

June 8, 2026

# INTRODUCTION

This funding scan identifies potential grants, incentives, rebates, financing tools, and technical assistance programs that may support environmental projects in Costa Mesa. The accompanying Costa Mesa Grants Excel workbook is intended as a working inventory, not a final application plan. It screens programs by administering agency, government level, action area, and notes on the nature of each opportunity.

The grant landscape is fragmented. Funding is spread across state agencies, regional planning bodies, utilities, air districts, water agencies, transportation agencies, federal pass-through programs, and more. Many programs are not traditional grants. Some are rebates, tax credits, loan programs, technical assistance resources, utility incentives, or regulatory mechanisms.

A key constraint is timing. This scan assumes Costa Mesa would need at least six months, and likely more, to identify a project concept and submit a competitive application. Programs with near-term deadlines should generally be treated as monitoring items unless a project is already mature. The Excel file uses this lens to distinguish between active opportunities, future-cycle monitoring items, and programs that are not a good fit.

## Funding Landscape

California maintains substantial environmental related funding for buildings, ecosystems, energy finance, housing, resilience, technical assistance, waste, water, and workforce development. Regional agencies are especially important for Costa Mesa. Southern California Association of Governments (SCAG), Orange County Transportation Authority (OCTA), South Coast Air Quality Management District (SCAQMD), Southern California Regional Energy Network (SoCalREN), Southern California Edison (SCE), Southern California Gas (SoCalGas), Metropolitan Water District of Southern California (MWDSC), and regional water agencies are closer to the city's implementation needs and may provide more practical pathways for financial assistance. Utility and ratepayer-funded programs also remain important California Public Utilities Commission (CPUC)-regulated programs, SCE, SoCalGas, and SoCalREN can provide incentives even though they are not traditional grants. State funding sources come from the Strategic Growth Council (SGC) that administers proceeds to from the Greenhouse Gas Reduction Fund, California Air Resources Board (CARB), California Energy Commission (CEC) and the Integrated Climate Adaptation and Resiliency Program (ICARP) administered by the Office of Land Use and Climate Innovation that receive appropriations from the State Legislature, and the California Infrastructure and Economic Development Bank (I Bank) run by the State Treasurer, and the 2024 Proposition 4 Climate Bond.

Federal funding should be treated with caution. Much of the Bipartisan Infrastructure Law money, authorized in 2021, has already moved through funding rounds. Inflation Reduction Act funding, authorized in 2022, also has been largely expended and further allotments are questionable with the change of administration. Some IRA programs are legally uncertain, some have accelerated deadlines,

and some expected downstream financing pathways have not fully materialized. The Greenhouse Gas Reduction Fund within the IRA is especially unlikely for future Costa Mesa planning because it is politically and legally contested and probably not likely to function as a simple, reliable municipal grant source.

This uncertainty is broader than climate funding. The Trump administration has pursued a more centralized federal grantmaking approach, including proposed rules that would require discretionary grants to advance presidential policy priorities and give political appointees greater authority over grant approval.

For Costa Mesa, federal opportunities should not be ignored, but they should be screened conservatively. Programs are most useful when funding is already awarded, formula-based, contractually obligated, administered through a state or regional agency, or part of a long-running program with a clear implementation pathway. For forward-looking planning, Costa Mesa should prioritize recurring California programs, regional funding sources, utility incentives, and established local implementation partners over uncertain future federal discretionary grants.

# HOW TO USE THE COSTA MESA GRANTS WORKBOOK

The Excel workbook is organized as a first-pass funding inventory. Each row identifies a program or funding pathway, the administering agency, the government level, a simplified action area, and notes on the specific opportunity. The intent is to help Costa Mesa staff or consultants quickly filter potential opportunities by project type.

The workbook should be used in three ways. First, it can support early project matching. When Costa Mesa is considering a new project, the workbook can identify agencies and programs that may be worth checking. Second, it can serve as a monitoring tool. Some programs are relevant but not currently open, have uncertain future rounds, or have deadlines that are too soon. These should not be treated as immediate opportunities, but they may justify future tracking. Third, it can help remove poor-fit programs. Programs that are geographically ineligible, too tribal- or agriculture-specific, recreation-focused, expired, or not meaningfully environmental should be deleted or deprioritized. The goal is not to list every possible funding source but to maintain a focused list of realistic environmental funding pathways for Costa Mesa.

## Key Monitoring Sources

Because individual grant deadlines change frequently, the most useful long-term tool is a short list of agency-wide grant portals. These portals should be checked periodically for new rounds, especially when Costa Mesa has a project concept that needs funding.

Table 1: Grant Monitoring Table

| Agency | Website | Notes |
|---|---|---|
| Caltrans | Local Assistance | Caltrans' Local Assistance Program oversees more than one billion dollars annually available to over 600 cities, counties and regional agencies for the purpose of improving their transportation infrastructure or providing transportation services. |

| Agency | Website | Notes |
|---|---|---|
| CARB | CARB Funding Opportunities | Includes CARB funding opportunities for clean transportation, air quality, climate, freight, and community-scale decarbonization programs. |
| CEC | CEC Solicitations | Includes most CEC funding opportunities across energy, buildings, EVs, transportation, and energy research. |
| CPUC | Financial Assistance, Savings, and Discounts | Includes utility bill assistance, rebates, appliance incentives, low-income programs, and customer energy savings resources. |
| I Bank | Financing Options | IBank's lending products enable organizations to access the low-cost capital they need for their climate solutions. |
| ICARP | Grant Programs | The ICARP Grant Programs provide funding to help fill local, regional, and tribal adaptation planning and resilience needs, provide resources, and support the development of a pipeline of climate resilient projects. |
| OCTA | OCTA Funding Programs | Includes OCTA transportation, active transportation, and Measure M funding programs and calls for projects. |
| Prop 4 | Climate Bond Programs | The 2024 Climate Bond invests $10 billion in local projects that enhance the environment. About 40% of funds remain uncommitted. |
| SCAG | SCAG Grant Opportunities | Includes regional grant opportunities relevant to Southern California local governments, transportation, planning, housing, and sustainability projects. |
| SCAQMD | Grants & Bids | Includes incentive programs, grant opportunities, and technology funding focused on air quality and emissions reductions. |
| SCE | SCE Rebates & Financial Assistance | Includes SCE rebates, financial assistance, electrification incentives, and customer energy-saving programs. |
| SGC | SGC Grant Programs | Includes climate resilience, affordable housing, community development, and sustainable infrastructure grant programs. |
| SoCalGas | Energy Efficiency Contracted Programs | Includes SoCalGas energy efficiency, contractor-delivered incentive, financing, and technical assistance programs. |
| SoCalREN | SoCalREN Services | Includes public agency, multifamily, financing, workforce, and regional energy efficiency support programs. |
| State of California | California Grants Portal | Statewide California grant and loan portal aggregating funding opportunities across agencies and sectors. |

## Priority Areas by Agency

First, some of these funding sources focus on grants and loans to local jurisdictions and others make direct contributions to consumers and taxpayers through rebates, bill credits and tax credits. The City can become an administrator for community funding for the first set of sources or tap those for its own

needs, but its options for directing financing from the latter group are limited. In those cases, a consumer or taxpayer must directly apply for the financial benefit.

Buildings and energy opportunities include energy efficiency, electrification, heat pump incentives, benchmarking, technical assistance, low-income programs, and utility rebates. CEC, CPUC, SCE, SoCalGas, and SoCalREN are the major agencies to monitor. Most often these are direct bill credit and rebate programs from those entities and the City educates its residents about the opportunities. Certain municipal energy efficiency improvements can be funded and financed through these offerings.

Housing-related opportunities should be included only when they have a clear sustainability nexus, such as affordable housing paired with transit, electrification, resilience, infill, energy efficiency, or VMT reduction. Generic housing funds should not be emphasized unless they can be tied directly to environmental outcomes. The Strategic Growth Council funds income-qualified deed-restricted subsidized affordable housing projects based on a sustainability scorecard.

Transportation opportunities include active transportation, EV charging, clean fleets, safe streets, congestion reduction, and air-quality programs. OCTA, SCAG, Caltrans, CARB, and South Coast AQMD are especially important for this category. Most often these programs are community-wide funding sources that are to be administered by the City. Municipal operation improvements can be funded through some of these sources.

## RECOMMENDED NEXT STEPS

Costa Mesa can use the Excel workbook as a living funding tracker. This version contains opportunities that match with priorities identified in the Climate Action and Adaptation Plan. For each priority project, staff can identify the likely lead agency, project maturity, match availability, implementation partner, and minimum application timeline.

Near-term deadlines should not drive the strategy unless a project is “shovel ready.” Instead, the city should identify likely future-cycle programs and prepare project concepts in advance. This is especially important for competitive grants, where successful applications might require scoped projects, cost estimates, maps, community benefits, partnerships, and internal approvals before the solicitation is released.