Preliminary

CLIMATE ACTION PLAN | 2024

County of Orange and
Unincorporated County Communities

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ACRONYMS

AB – Assembly Bill

BOS – Board of Supervisors

CalEPA – California Environmental Protection Agency

CAP - Climate Action Plan CAP

CARB – California Air Resources Board

CBO – Community-Based Organization

CEQ – Council on Environmental Quality

CEQA – California Environmental Quality Act

COC – Communities of Concern

CO_2e – Million Tonnes of Carbon Dioxide Equivalent

CPRG – Climate Pollution Reduction Grants

DPM – Diesel Particulate Matter

EJ – Environmental Justice

EPP – Environmentally Preferable Purchasing Policy

EV – Electric Vehicle

JWA - John Wayne Airport

GHG – Greenhouse Gas

LED – Light-emitting Diode

LEED – Leadership in Energy and Environmental Design

LIDACs - Low-Income Development and Disadvantaged Communities

MMRP - Mitigation Monitoring and Reporting Program

MMT CO_2e – Million Tonnes of Carbon Dioxide Equivalent

OC – Orange County

OCTA – Orange County Transit Authority

PCAP – Priority Climate Action Plan

PM2.5 – Particulate Matter

PV - Photovoltaics

RAP – Reclaimed Asphalt Pavement

SCAQMD – South Coast Air Quality Management District

U.S. EPA – U.S. Environmental Protection Agency

VMT – Vehicle Miles Traveled

I. INTRODUCTION

Established in 1889, Orange County spans 793 square miles and ranks as the third-most-populous county in California, the sixth-most-populous in the United States and the ninth largest economy in the nation.

The County of Orange (County), through its 22 departments and respective divisions, functions as a regional service provider and planning agency. Its core businesses include public safety, public health, waste management, regional planning, public assistance, social services and aviation.

Orange County boasts 42 miles of coastline, three harbors, the Orange County Zoo and 25 urban and wilderness parks, including 230 miles of riding and hiking trails. The Orange County Visitors Association estimated 50 million visitors in 2019 and John Wayne Airport accommodated over 11 million passengers in 2022.

As Orange County's popularity grows, developing strategies to address climate change and maintain the pristine natural resources and make the region unique has become more critical than ever. To that end, the County has taken this first step in combatting climate change through this Preliminary Climate Action Plan. The Plan not only serves to reduce greenhouse gases and improve air quality but also to prepare residents and employees for natural disasters, protect our most vulnerable citizens and natural resources and boost funding potential to the County to implement critical programs.

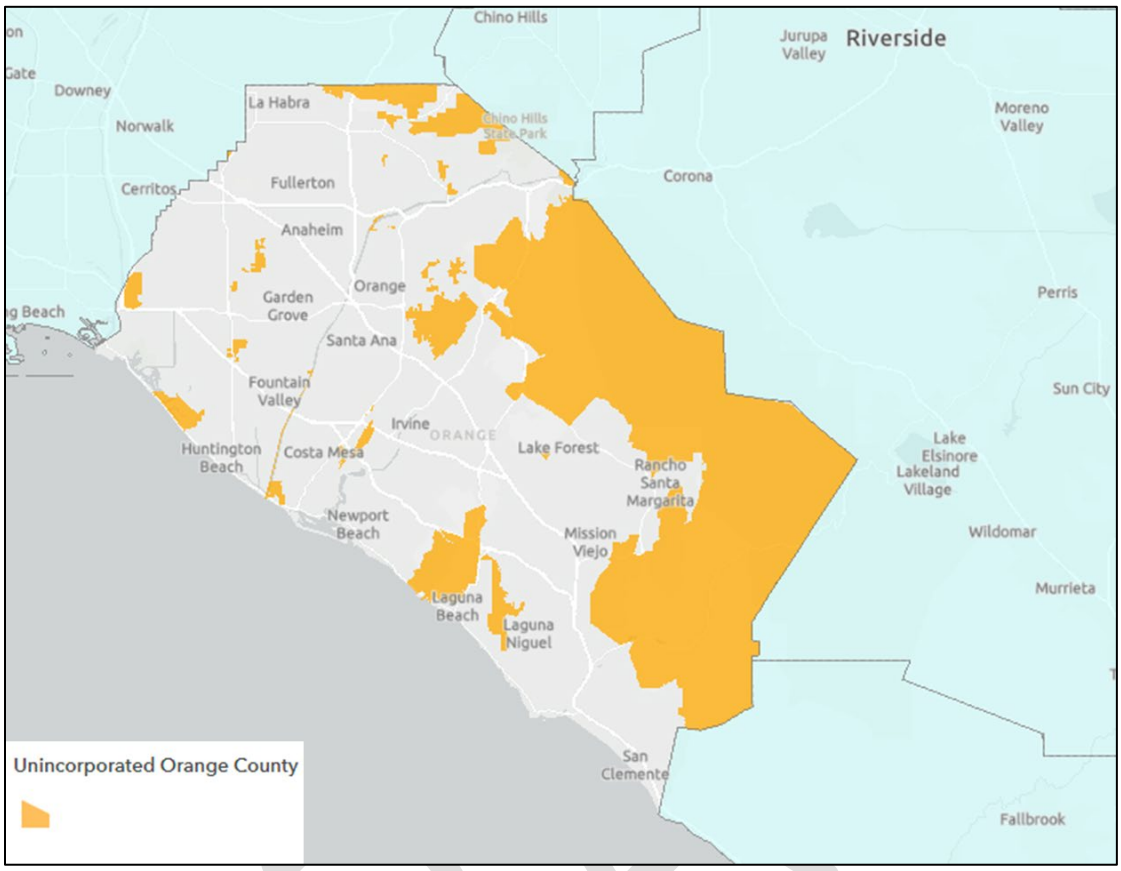
Vision

The County of Orange is a leader that embraces innovative solutions to mitigate climate change, protect the natural environment, and ensure the well-being and prosperity of all residents for generations to come.

Scope

Approximately 130,000 residents in Orange County live in unincorporated areas that encompass 205 square miles (**Figure 1-1**). The Climate Action Plan (CAP) will serve the County's 22 departments and respective buildings and activities, nearly 19,000 employees, and unincorporated communities so that all residents have access to carbon neutral benefits. The Final CAP will include a comprehensive action plan that outlines activities the County will engage in to meet the goals it sets for each target area identified. In this document, "County" denotes County of Orange government, "unincorporated Orange County" refers to unincorporated areas *only* in Orange County, and "Countywide" refers to Orange County in its entirety, inclusive of both unincorporated and all incorporated cities.

Figure 1-1. Unincorporated Regions of Orange County



The CAP will be completed in two phases, the Preliminary CAP and the Final CAP, and will follow a simple five-step approach, outlined below.

1. Conduct an inventory and forecast of local greenhouse gas (GHG) emissions.
2. Establish GHG reduction targets.
3. Develop an action plan for achieving emissions reduction targets.
4. Implement the emissions reduction action plan.
5. Monitor and report on progress.

The Preliminary CAP includes a detailed quantification of GHGs that establishes an accurate baseline for forecasting emissions both with and without CAP implementation, while also accounting for future growth. Emissions inventories are calculated for municipal operations (referred to as municipal inventory) and activities of residents in unincorporated areas (referred to as community inventory). The Preliminary CAP presents a draft of inventories and forecasts, while the Final CAP will revise the inventories as needed and establish GHG reduction targets.

The Final CAP will include specific policies, programs, or tools that the County will deploy to support the activities to reduce emissions. The measures must balance competing priorities such as sustainability, reliability and cost-effectiveness. A comprehensive review of all 22 County departments, with an

emphasis on the industrial-serving departments, will follow. This review will identify achievements and potential obstacles, refining the master list of the County's needs and aligning them with the initiatives outlined in the CAP. The Preliminary CAP presents an initial list of GHG reduction measures, along with potential action items for implementing the measures. The Final CAP will include a quantification of the measures, and revisions to measures and action items as necessary. The Final CAP will also include a CEQA analysis and a climate risk and vulnerability assessment.

The Preliminary CAP development process included seven community forums from June-August 2024; six held for individual supervisorial districts and one for the general public. Forum participants provided feedback on preliminary GHG reduction measures and direction for the County's sustainability and climate action activities overall. County staff determined how to incorporate this feedback and shared the rationale for their decisions. Further and more extensive engagement with stakeholders and the public will be included in the production of the Final CAP.

In the Final CAP, County staff will analyze all feedback and recommendations to determine an appropriate implementation timeline that aligns with the County's budget process, federal and state funding processes, and regulatory requirements. The County's Director of Sustainability will oversee the implementation and monitoring of the Final CAP.

California Environmental Quality Act (CEQA) Streamlining

Staying true to the County's vision of a meaningful document that demonstrates tangible results, the CAP will be refined and undergo a full CEQA analysis. The CEQA analysis will begin upon completion of the GHG inventory, future forecasts and reduction targets of all proposed initiatives. The process will include completing an environmental checklist to determine the appropriate type analysis and will ultimately include an additional series of public workshops to solicit further input from the community.

The County determined that conducting a full CEQA analysis is appropriate to ensure the document's validity and identify any secondary adverse impacts or further opportunities not previously considered. The CEQA analysis may also serve to streamline project-specific implementation of measures in the future. The County's CEQA analysis will determine whether the CAP may be used in this manner to streamline the GHG analysis of future development projects in the County, by enabling such projects to demonstrate their consistency with the CAP's policies, programs, and requirements. Per CEQA Guidelines Section 15183.5, a "CEQA qualified" CAP must:

- Quantify existing and forecasted GHG emissions.
- Establish a GHG level where activities performed in conformance with the CAP would not be considerable from an emissions perspective.
- Identify the GHG emissions resulting from specific actions, or categories of actions anticipated within the geographic area.
- Specify measures or a group of measures, including performance standards, that, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.
- Establish a method to monitor the plan's progress toward achieving that level and require amendments if the plan is not achieving specified levels.
- Be adopted in a public process following environmental review.

Priority Sectors

The Preliminary CAP organizes measures to reduce emissions into 6 priority sectors. The County selected each sector based on the following: potential to reduce emissions, co-benefits, available grant opportunities or funding, alignment with the County's Capital Improvement Program (CIP), and jurisdictional authority. Sectors may be amended or adjusted after incorporating public input and completing the GHG inventory.

1. Energy

The County owns more than 800 buildings and many other assets, including parks, an airport, harbors, and three landfills. These assets contribute to GHG emissions. The County has chosen this sector because it has the authority to implement energy efficiency upgrades to its new and existing structures. This sector offers the co-benefits of improved indoor air quality to its staff, utility cost savings, criteria pollutant reductions and outreach opportunities to assist our local community partners.

2. Mobility

The County's extensive fleet includes thousands of passenger vehicles, buses, vans, medium- and heavy-duty trucks, on-and off-road construction equipment, airport ground support equipment (GSE), and marine craft. This sector aims for fleet conversion and offers co-benefits such as reduced traffic congestion, improved health from decreased exposure to pollutants, and cost-savings from reduced fossil fuel dependence. The County has identified many projects that align within its CIP.

3. Resource Recovery and Waste

The County operates three active landfills and maintains and monitors 20 closed facilities. Landfills are widely considered to be the third largest contributor of GHGs and related criteria pollutants. The County is studying new landfill gas collection technology and expanding recycling and organic waste management strategies. Co-benefits include the reduction of criteria pollutants, revenue to the County from converting additional landfill gas to energy, and a reduction of bulk items to the landfills. The County has identified projects that align within its CIP as well.

4. Environmental Justice

Recognizing the need to prioritize vulnerable communities, the County has made Environmental Justice its own sector. Climate change disproportionately affects communities of color in lower-income areas, causing poor air quality, extreme heat, and infrastructure degradation. Co-benefits also include reduction in health risks, reduced heat island effect, improved indoor air quality, jobs growth and other economic benefits.

5. Natural Resources

Orange County aims to preserve its natural resources and ecosystems while promoting water conservation and best management practices. Goals include increasing access to alternative water sources, setting Countywide water conservation targets, habitat and coastal restoration and implementing stormwater retrofits. Co-benefits include healthier ecosystems, public health improvements, and economic stability.

6. Resilience

The County must anticipate, prepare for and respond to climate-related hazardous events, trends and disturbances. By reducing GHG emissions, the County contributes to global climate efforts and prepares for impacts such as severe wildfires, heatwaves, droughts, disease spread, and rising sea levels that threaten its coastal communities. Ongoing resilience efforts include incorporating climate adaptation into the Local Hazard Mitigation Plan. The CAP will support and build upon these efforts to ensure public health, safety and well-being of our residents and their homes.

Environmental Justice and Vulnerable Populations

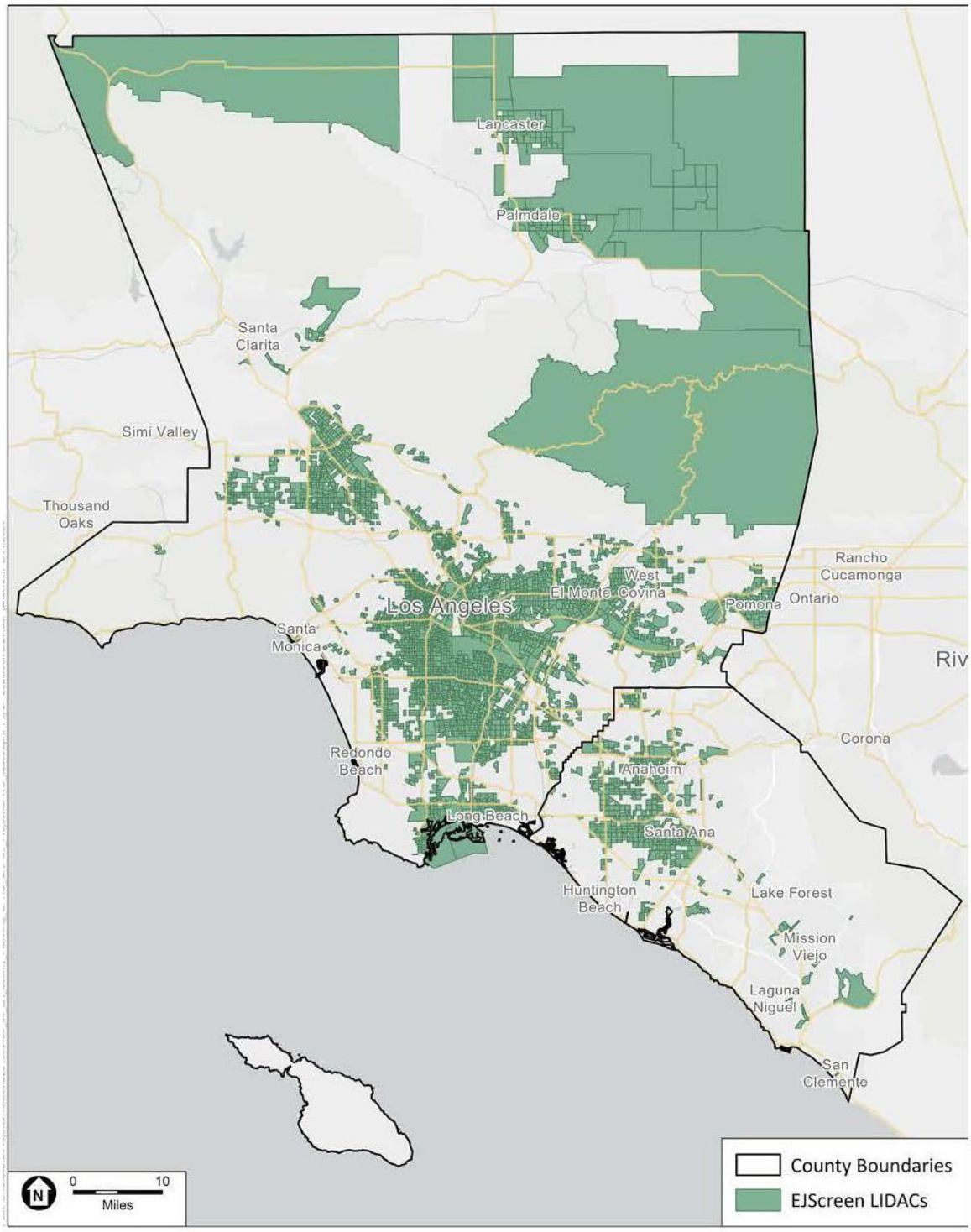
The impacts of climate change will never be distributed evenly; some communities will experience more harm from extreme-weather events and have fewer resources to recover and adapt. Often, these same communities are the least likely to benefit from policies and programs to reduce emissions, perpetuating the cycles of disinvestment that contribute to existing disparities. These communities can be described as vulnerable populations, which is an imperfect term attempting to describe a variety of complicated issues. It does not describe any intrinsic characteristic of a population group, but rather a failure of society which has rendered them vulnerable.

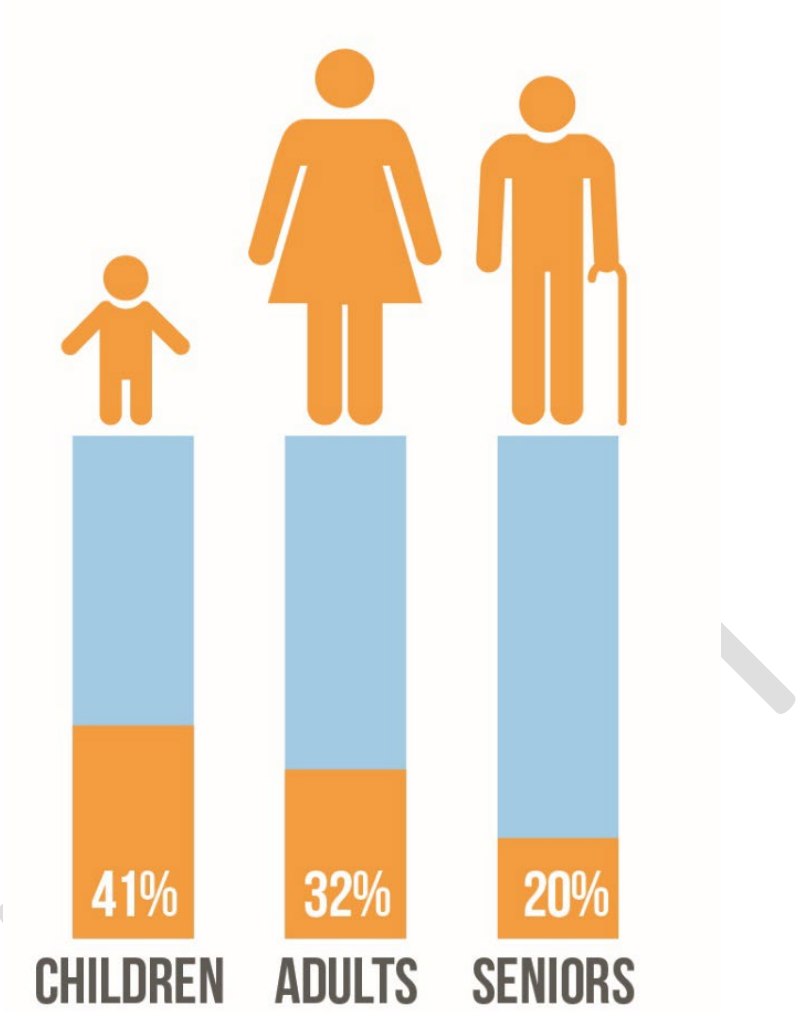
One component of the Priority Climate Action Plan (PCAP) [1] recently developed for Orange and Los Angeles counties was an analysis of Low Income and Disadvantaged Communities (LIDAC), who face a higher risk of experiencing unequal impacts from climate change hazards. Specific impacts include worsening air and water pollution, lead exposure, wildfires, extreme heat, drought conditions, and other factors. Studies on climate change impacts have revealed that communities and census tracts with large concentrations of people of color bear a disproportionate burden of exposure to climate risks. The PCAP mapped the location of EJ communities in Orange and Los Angeles counties using tools from multiple sources: the White House Council on Environmental Quality (CEQ)'s Climate and Economic Justice Screening Tool (CEJST), the EPA's Environmental Justice Screening and Mapping Tool (EJScreen), and the

California Environmental Protection Agency's (CalEPA) Priority Population Investments tool. Locations of communities identified using EJScreen are mapped below.

1 A Priority Climate Action Plan (PCAP) is a high-level roadmap for reducing emissions in regions across six key sectors: electricity generation, industry, transportation, buildings, agriculture/natural and working lands, and waste management. Priority Climate Action Plan, Los Angeles/Orange County Metropolitan Statistical Area, Submittal to U.S. EPA, March 1, 2024.

Figure 1-2. Low-Income Disadvantaged Communities Identified by EJScreen





Though Orange County is often depicted as an affluent area known for its pristine beaches and high cost of living, low-income communities are numerous. For example, a significant portion of Countywide population relies on Medi-Cal. Specifically, 41 percent of children, 32 percent of adults and 20 percent of senior citizens qualify for Medi-Cal. The County processes approximately 8,800 Medi-Cal applications each month and maintains an average of 940,000 active Medi-Cal clients.[2]

Moreover, economic disparities within Orange County are significant. Red Zones are defined as census tracts where unemployment rates are at least 2.0 percent higher than the national average and average per capita income is less than 80 percent of the national average. This translates to a census tract with an unemployment rate of 7.3 percent or higher and per capita incomes of $33,009 or lower. Orange County currently has 48 Red Zones; comprising 9 percent of the population Countywide.[3] Overall, 289,752 Orange County residents (9 percent of the county population) reside in Red Zones. It is for these reasons among others that Environmental Justice has been identified as a critical target sector of the Preliminary CAP.

Table 1-1. Orange County Red Zones by City[4]

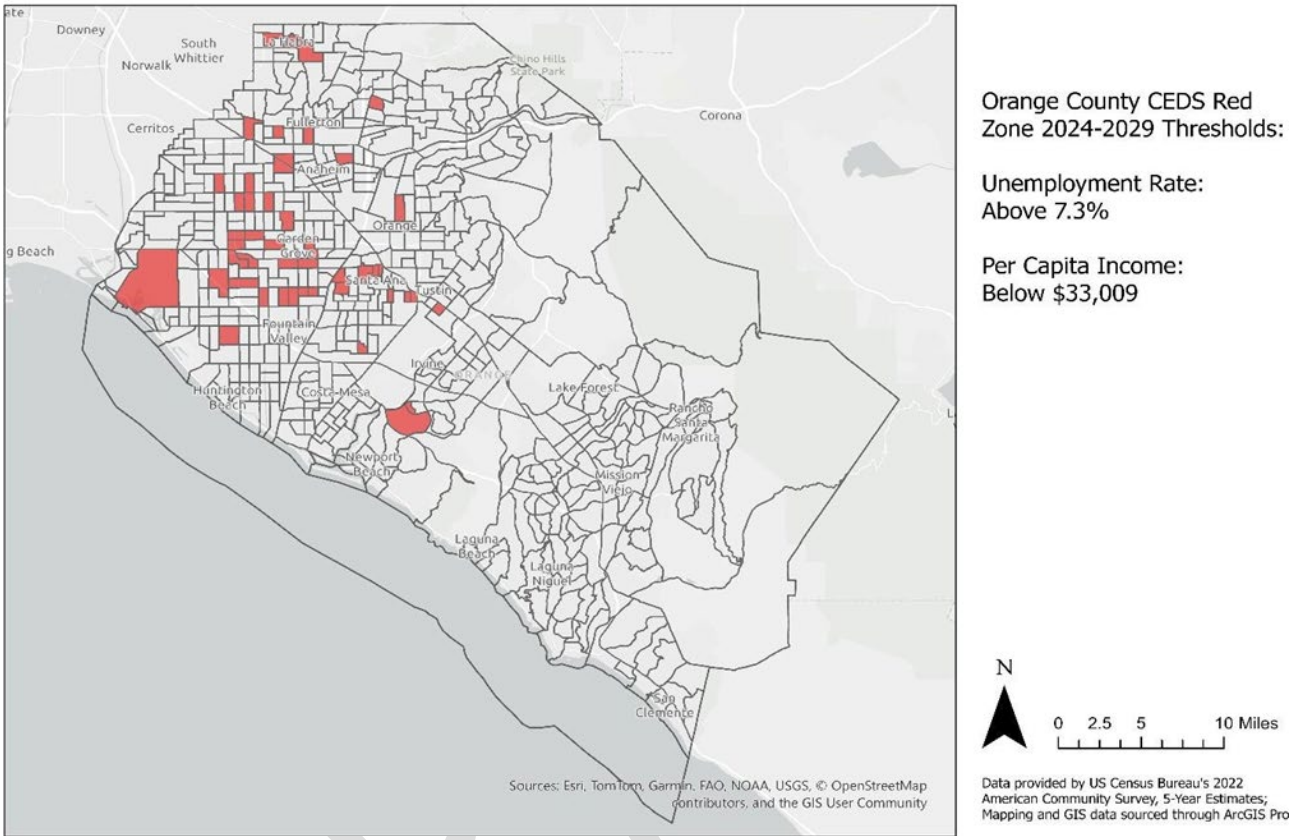
	Total Population	Population Living in Red Zones	Percent of Population living in Red Zones	Number of Red Zone Census Tracts
Anaheim	335,946	54,303	16%	8
Buena Park	83,359	5,627	7%	1
Fullerton	143,013	11,097	8%	2
Garden Grove	171,195	49,485	29%	9
Huntington Beach	196,469	7,808	4%	1
Irvine	305,688	23,065	8%	2
La Habra	62,037	12,245	20%	3
Orange	138,155	7,020	5%	1
Placentia	51,327	7,023	14%	1
Santa Ana	304,258	64,282	21%	11
Seal Beach	24,871	701	3%	1
Tustin	79,696	16,884	21%	3
Westminster	90,660	30,212	33%	5
Orange County	3,151,946	289,752	9.2%	48

[2] County of Orange, Social Services Agency, Orange County Collaborative, 2023

[3] Draft Orange County Workforce and Economic Development Division Comprehensive Economic Development Strategy (2024-2029), May 2024.

[4] Source: U.S. Census Bureau, American Community Survey; California Department of Finance, Demographic Research Unit

Figure 1-3. Orange County Comprehensive Economic Development Strategy Red Zones



Greenhouse Gases and Climate Change

Global warming occurs when carbon dioxide (CO2) and other air pollutants collect in the atmosphere and absorb sunlight and solar radiation that have bounced off the earth's surface. Normally this radiation would escape into space, but these pollutants can last for years to centuries in the atmosphere, trap the heat, leading to a rise in global temperature. These heat-trapping pollutants—specifically carbon dioxide, methane, nitrous oxide, water vapor, and synthetic fluorinated gases—collectively known as greenhouse gases (GHG), cause the greenhouse effect.[5]

Nearly 100% of scientists agree that global warming affects the physical environment as well as all aspects of both natural and human systems – including social and economic conditions and the functioning of health systems. It is therefore a threat multiplier, undermining and potentially reversing decades of progress in public health. As climatic conditions change, more frequent and intensifying weather and climate events are observed, including storms, extreme heat, floods, droughts and wildfires.[6]

[5] Natural Resources Defense Council, Global Warming 101, April 7, 2021, accessed on February 28, 2024.

[6] World Health Organization, Key Facts of Climate Change, October 12, 2023, accessed via the world wide web on February 27, 2024.

Orange County is part of the South Coast Air Basin which, under the Clean Air Act, is in extreme non-attainment for ozone and serious non-attainment for PM 2.5. These pollutants, ozone and black carbon, a form of fine particulate matter, also contribute to the formation of GHG emissions. Consequently, Orange County residents are breathing some of the worst air quality in the nation, especially in low-income disadvantaged communities that are situated near industrial sources and in proximity to transportation and goods movement-related activity.[7] The detrimental effects of air pollution contribute to asthma and lung damage, respiratory and cardiac diseases, cancer, birth defects, premature death, and other health complications.

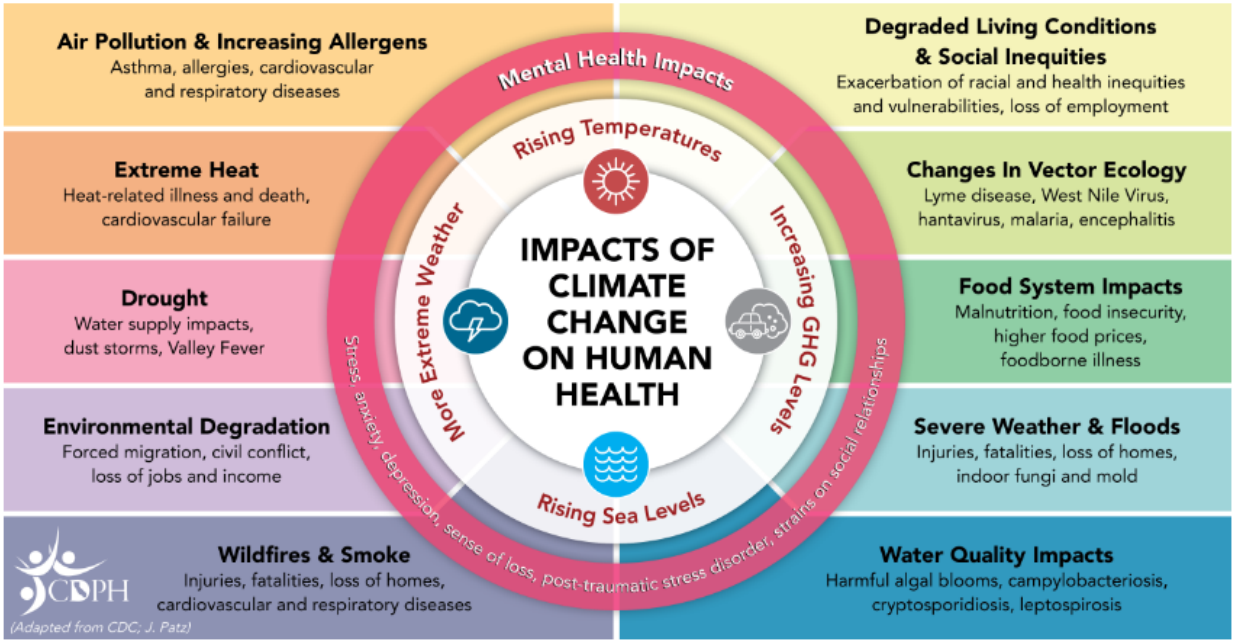
Basic human activities are the root cause of global warming. The largest sources of greenhouse gases come from burning fossil fuels for electricity, heat and transportation. The ramifications of climate change have a disproportionate impact on the most vulnerable communities. Environmental change cannot occur without a corresponding shift in human behavior.

Public Health Co-Benefit of the Climate Action Plan

A CAP typically provides a wide range of co-benefits, which are additional positive outcomes beyond mitigating climate change. Public health is one of the more important co-benefits identified for this Preliminary CAP. Climate change is one of the century's top public health priorities, affecting all aspects of life and the environment. It leads to long-term health impacts that cut across all ages and sectors. These negative human health impacts include increased injuries from natural disasters and extreme weather events, a rise in chronic conditions related to air, water, and environmental pollution, and more frequent outbreaks of infectious diseases. Climate change is expected to amplify these existing health threats. The California Department of Public Health provides a comprehensive overview of the wide range of health impacts resulting from climate change, as shown in Figure 1-4 below from the Department's web site.

[7] Priority Climate Action Plan, Los Angeles County/Orange County Metropolitan Statistical Area, Submitted to US EPA, March 1, 2024.

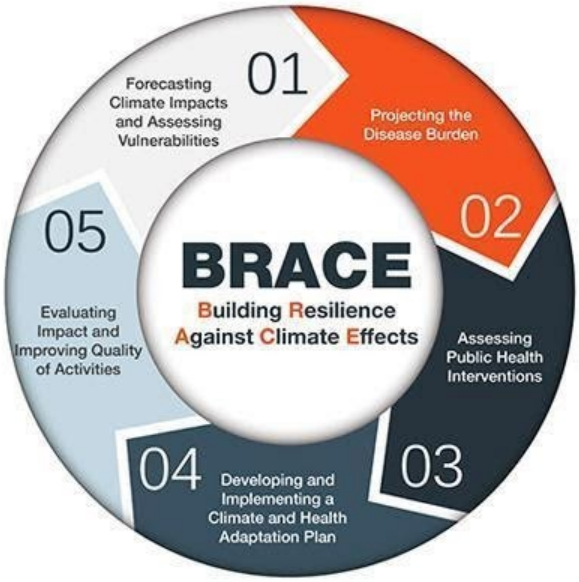
Figure 1-4. Impacts of Climate Change on Human Health (adapted from the Centers for Disease Control and Prevention (CDC) and J. Patz)



Adapting to climate change and caring for the community is a shared responsibility. In 2009, the Center for Disease Control and Prevention established the Climate and Health Program which initiated the Climate-Ready States and Cities Initiative (CRSCI) and developed the Building Resilience Against Climate Effects (BRACE) framework. This five-step process identifies how climate change affects human health and outlines steps that can be taken to protect communities.[8] The framework is applicable not only to the health sector but also to government, energy, agriculture, and transportation sectors. Climate change strategies must focus on social determinants of health, as non-medical factors and social circumstances in which people are born, grow, live, work, and play significantly influence health outcomes.

[8] https://www.cdc.gov/climate-health/php/climate_ready/?CDC_AAref_Val=https://www.cdc.gov/climateandhealth/climate_ready.htm

Figure 1-5. CDC BRACE Framework



Locally, the OC Health Care Agency (HCA) provides a variety of preventative and regulatory services to protect and promote health. These services include mental health services, alcohol and drug use services, preventive health services for the aging, health care for incarcerated individuals, communicable disease control, immunizations, public health community nursing and clinics, food protection, hazardous waste regulation, water quality monitoring, and pollution prevention. The HCA collaborates with both public and private sectors to coordinate resources effectively.

Public Health Green Workforce Projection: Environmental Scientists, Health Safety Specialists, and Environmental Program Managers working to protect the environment and public health have a projected job growth resulting in approximately 6,900 annual job openings. According to the Bureau of Labor and Statistics, this field is expected to expand and grow by 6% in Orange County by 2032. Within the County, OC Health Care Agency has over 2,800 employees on their team dedicated to working in partnership with the community to deliver sustainable and responsive services that promote population health and equity. Job opportunities with OC Health Care Agency can be found on the County Careers website.

Economic Co-Benefit of the Climate Action Plan

Green Jobs Creation

The green economy encompasses a wide range of industries, and the jobs within it vary significantly.

Not all green jobs are identical; each has the potential to influence climate action uniquely, including but not limited to industries that promote green technologies, energy from renewable sources, energy efficiency, pollution reduction, greenhouse gas reduction, recycling and reuse, natural resources conservation, environmental compliance, and public awareness education/training.

The U.S. Bureau of Labor and Statistics has categorized green jobs based on their impact on sustainability objectives into a few categories to better understand the impact on sustainability objectives:

- Output: Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources.
- Process: Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or manage the use/conservation of natural resources.

Economic Development in Orange County

The 2024-2029 Comprehensive Economic Development Strategy Report (2024-2029CEDS Report) was developed by the Orange County Community Resources, Orange County Community Services' Workforce and Economic Development Division (OCCS/WEDD), in partnership with the Orange County Workforce Development Board. This report identifies six key goals and strategies to maximize career placement and growth potential for Orange County residents in green jobs:

GOAL 1 - Provide World-Class Education, Career, and Workforce Opportunities to Address the Skills Gap

- Help industry sectors fill key occupations by identifying skill sets needed and provide access to training and education resources to build career pathways that are responsive to industry need.
- Access to skills training and job training programs leading to industry recognized credentials in high-skill and high demand industry sectors. Career Services | Workforce Solutions (ocworkforcesolutions.com)

GOAL 2 - Focus on Residents Living in Disinvested Communities

- Develop specific project proposals focused on Red Zones/Disinvested Communities to help spur economic and employment growth.
- Improve access to high-quality, high-paying employment opportunities with support services to help reduce any additional barriers Support Services | Workforce Solutions (ocworkforcesolutions.com)

GOAL 3 - Promote key industry clusters such as Green Energy

- Encourage the support, expansion, and retention of key industry clusters in the region through programs that build a talent pipeline.
- Apprenticeship programs, aiming to serve 500,000 apprentices by 2029. This initiative exists to boost workforce development and economic growth, and focuses on sectors such as healthcare, technology, and construction. Local Workforce Development Boards and educational institutions are working collectively to engage employers https://www.ocgov.com/news/county-orange-partners-california-division-apprenticeship-standards-create-apprenticeship

GOAL 4 - Improve Orange County's Economic Competitiveness in a Global Economy

- Increase investment and support of small businesses and start-ups while promoting innovation and entrepreneurship.
- Leverage Workforce and Development program resources. For Businesses | Workforce Solutions (ocworkforcesolutions.com)

GOAL 5 - Plan and develop State-of-the-Art Infrastructure

- Expand and improve existing transportation infrastructure to help reduce congestion and travel times for commuters.
- Focus on expanding affordable housing options to help better attract and retain young families and professionals into the region.

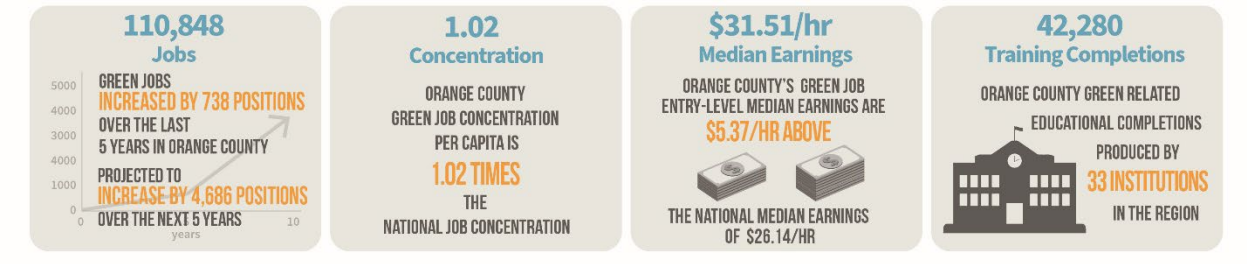
GOAL 6 - Foster a Greater Regional Collaboration by Increasing Economic and Workforce Development Partnerships

- Convene meetings and/or conferences that encourage cross-pollination between Orange County economic and workforce development organizations and professionals that takes all Orange County residents into account, including the county's Disinvested Communities. Local Workforce Development Boards' Unified Local and Regional Plan | Orange Workforce Alliance

OCCR/OCCS/WEDD, in partnership with the Board of Supervisors-appointed Orange County Workforce Development Board (OCWDB) oversees Orange County's workforce development activities and establishes programs in response to meet the local workforce needs. These activities include providing labor market information, employment and training services, and business assistance.

Central to OCWDB's ability to provide services and respond to industry workforce needs is the network of Workforce Solutions Centers, satellite centers and youth employment and training programs located throughout the County form the backbone of these efforts. OC Workforce Solutions, an American Job Center of California (AJCC) that provides comprehensive no-cost employment and training services for job seekers, youth, dislocated workers, people with disabilities, veterans, and other community members facing barriers.

The OC Workforce Solutions Business Solutions team supports local businesses with hiring and staffing solutions, customized training programs, business resources, layoff aversion, and outplacement assistance, also at no-cost. Training for green jobs is offered to eligible individuals through 51 training providers offering 120 courses related to green job skill development. Industries range from construction trades (carpenters, welding, HVAC, electricians, solar panels), forestry, energy, logistics, environmental remediation, solid waste management, water treatment management, and advanced manufacturing. For more information about workforce programs and program eligibility visit: About WIOA | Workforce Solutions (ocworkforcesolutions.com).



Current data shows that Green Jobs increased by 738 additional unique positions from 2018-2023 (0.7%), less than the national growth rate of 10.4%. The occupations are projected to increase by 4,686 additional unique positions from 2023-2028 (4.2%), less than the national projected growth rate of 7.5%.

Regional job concentration per capita for Green Jobs is 1.02 times the national job concentration. In other words, there are 2% more Green Jobs in this region than the average region nationwide. Cost of labor in the region is above median. The median earnings for entry level Green Jobs in the region is $31.51/hr., which is $5.37/hr. above the national median of $26.14/hr.

With the rise of "green collar" job development, green technology presents exciting opportunities. Orange County holds a unique position, boasting a 50% higher concentration in green technology employment compared to the state of California. According to the Orange County Workforce Development Board, Orange County is particularly strong in the green transportation cluster and more concentrated in employment in this industry sector relative to the state. The Orange County Transportation Authority (OCTA) is Orange County's primary transportation agency with a mission to develop and deliver transportation solutions to enhance the quality of life and keep the county moving. OCTA has a long-standing history of environmental stewardship and has been proactively laying the groundwork for a resilient transportation system. This includes several key efforts with OCTA's approximately 1400 employees, outlined in the 2024 OCTA Climate Adaptation and Resiliency Plan. Strategies in this plan include:

Climate Adaptation Strategies:

1. Air Quality & Emissions Management
2. Building & Infrastructure Development
3. Emergency Preparedness
4. Human Comfort & Health Enhancement
5. Greenery & Landscape Management
6. Energy Efficiency & Renewable Energy

Sustainability Strategies:

1. 100% Zero-Emission Bus Fleet
2. Cleaner Non-Revenue Fleet
3. Facility Energy Efficiency
4. Facility Electrification
5. Onsite Renewables
6. Purchase Renewable Energy
7. Purchase Renewable Energy Credits

OCTA is expected to experience growth in the coming years, but specific projections for the next five years are not readily available. However, it's worth noting that the total economy is projected to add about 4.7 million jobs during this decade, with employment reaching 169.1 million by 2032.

Policies like AB 32 and investments from the American Recovery and Reinvestment Act signal future growth in the energy and environmental green technologies field. The U.S. Bureau of Labor Statistics projected growth for the below green occupations in Orange County by 2030 (Table1-2 & Table 1-3).

Table 1-2. Selected Green Occupations Projected Employment Growth Countywide, 2020-30

Occupation	New jobs, projected 2020-2030
Environmental scientists and specialists, including health	7,300
Solar photovoltaic installers	6,100
Wind turbine service technicians	4,700
Environmental science and protection technicians, including health	3,600
Environmental engineers	1,900
Conservation scientists	1,500
Environmental engineering technologists and technicians	1,300

Table 1-3. Selected Green Occupations Employment Characteristics Countywide

Occupation	Median annual wage 2021	Employment 2020	Employment, projected 2030	Typical entry-level education
Environmental engineers	$96,820	52,300	54,300	Bachelor's degree
Environmental scientists and specialists, including health	$76,530	87,100	94,400	Bachelor's degree
Conservation scientists	$63,750	25,300	26,800	Bachelor's degree
Wind turbine service technicians	$56,260	6,900	11,700	Postsecondary nondegree award
Environmental engineering technologists and technicians	$48,390	17,300	18,600	Associate's degree
Solar photovoltaic installers	$47,670	11,800	17,900	High school diploma or equivalent
Environmental science and protection technicians, including health	$47,370	34,200	37,800	Associate's degree

Orange County must expand its workforce to meet the growing demand for green jobs. This demand is driven by emerging technologies, legislative mandates, green building commitments, grant opportunities, and significant infrastructure investments aimed at achieving carbon neutrality by 2045. Legislative mandates include SB 1383, affect the County's landfill operations and necessitate increased support staff

at all three active landfills as well as its Santa Ana headquarters. Additional mandates such as zero-emission passenger cars and trucks by 2035, electrical grid infrastructure improvements, and drought-resistant landscaping requirement will all require workforce expansion. Grant opportunities would also result in the creation of green jobs. The County is prepared to provide the training needed to qualify individuals for these positions and any future roles, aiming to bridge the gap and reduce Red Zone communities located within the County.

Funding Opportunities and Grant Competitiveness

As of this publication, the State has made cuts to some of its climate programs, which will likely increase reliance on grant funding. It is important for Orange County to have a qualified CAP to maintain competitiveness for a variety of funding sources. Some of the more important Federal grant programs are described below.

The Infrastructure Investment and Jobs Act (IIJA) is a comprehensive bill with the primary objective of revitalizing America's infrastructure. The IIJA focuses on rebuilding America's bridges, rails, and roads, expanding access to clean water, investing in vulnerable communities, tackling the climate crisis, and ensuring universal access to high-speed internet. For decades, infrastructure in California has suffered from a systemic lack of investment. This infrastructure law aims to improve the quality of life for millions of California residents by creating a generation of good-paying union jobs and fostering economic growth.[9]

The Department of Labor (DOL) Building Pathways to Infrastructure Jobs Grant Program funds public-private partnership to develop, implement, and scale worker-centered sector strategy training programs to build the workforce needed to for the sizeable infrastructure investments made through the Bipartisan Infrastructure Law (BIL). To maximize the impact of the BIL investment, and other investments such as the CHIPS (Creating Helpful Incentives to Produce Semiconductors) and Science Act and the Inflation Reduction Act, this grant program will train job seekers in advanced manufacturing; information technology; and professional, scientific, and technical services occupations that support renewable energy, transportation, and broadband infrastructure sectors.

The Inflation Reduction Act (IRA) is the most significant law to date for the energy transition in U.S. history. The IRA represents over $1 trillion of expected federal funding available for the deployment of infrastructure. These funds are uncapped and not competitive; unlike grant programs with a fixed budget and onerous application process, IRA incentives are available for all eligible technologies deployed over the 10-year program timeline (2023-2032). The Direct Pay provision (also known as Elective Pay) presents a significant opportunity for Orange County. This provision enables tax-exempt entities—like the County and its Districts—to access tax credit incentives for the deployment of technologies such as electric vehicles, EV charging stations, solar energy, and energy storage projects. By leveraging the Direct Pay provision, local governments can use this federal IRA funding to attract additional private sector investment and supercharge their economies. The incentives are lucrative; for example, it's possible for a solar energy project to receive IRA tax credits worth up to 70% of the total costs of the project.

[9] U.S. Department of Transportation, The Bipartisan Infrastructure Law Will Deliver for California, April 13, 2022, accessed March 3, 2024

Since its enactment, the IRA has driven extensive investments in clean energy production, electric vehicles, and battery manufacturing, particularly benefiting disadvantaged communities. The IRA includes various tax credits and incentives to promote clean energy, such as the Low-Income Communities Bonus Credit, which supports solar and wind projects in low-income areas. This program aims to lower energy costs and create jobs in these communities. Additionally, the IRA offers tax credits for individuals and businesses that invest in energy-efficient improvements and clean energy technologies, such as electric vehicles and renewable energy installations.

The County's CAP is intended to align with the Climate Pollution Reduction Grant Opportunity (CPRG) program, which provides $5 billion in grants to states, local governments, tribes, and territories to develop and implement ambitious plans for reducing greenhouse gas emissions and other harmful air pollution. The program aims to transition America equitably to a low-carbon economy through the deployment of new technologies, operational efficiencies, and other GHG-reducing measures. Authorized under Section 60114 of the Inflation Reduction Act, this two-phase program provides $250 million for noncompetitive planning grants, and approximately $4.6 billion for competitive implementation grants. The first phase of the CPRG program is the Priority Climate Action Plan (PCAP). The Los Angeles-Long Beach-Anaheim, CA metropolitan statistical area (MSA) PCAP covers Los Angeles and Orange Counties. The County of Orange, as part of the MSA, submitted its PCAP to the U.S. EPA on March 1, 2024. The document provides the roadmap of measures to a lower-carbon environment with less reliance on fossil fuels. Grant applications for specific measures contained in the PCAP were submitted on April 1, 2024, and awards will be announced in July 2024. Any funds received from EPA will be instrumental in implementing measures outlined in the CAP. As of July 2024, the MSA was awarded $500 million in funding for the INVEST CLEAN initiative from the EPA's CPRG funding. This award is the largest in the nation's history, and the only award given within the State of California. INVEST CLEAN projects will decrease regional GHG emissions by 12 million $MTCO_2e$ from 2020 to 2050.

Advocacy and Outreach

The County established the Office of Sustainability within OCWR to ensure CAP efforts and public engagement continue long after CAP completion. To that end, this Office will host green collaboration and networking events where cities, Non-governmental Organizations (NGOs) and green small business incubators can share ideas and learn about emerging technology and any impacts on their workforce needs. Further, the Office will review upcoming legislation that could impact Orange County's cities and highlight available grant opportunities. Collaborating with cities will give Orange County a competitive edge in securing grant funding.

To support local jurisdictions, the County is creating a web-based database that centralizes essential resources. This platform will include a dashboard tracking the County's CAP progress, templates and resources for grant applications, a template for a city CAP or Sustainability Plans, updates on pending legislation, information on local events and opportunities, and details on green incubator businesses vetted by the County. It will also provide updates on extreme weather events and preparation strategies, along with other valuable information for County constituents. Through this web-based outreach and green collaboration, the County will integrate its workforce and economic development office, emphasizing job creation as a critical co-benefit of CAP implementation. Shifting to new and emerging technologies will require extensive outreach, education, and access to training opportunities and workforce programs to create jobs that provide economic stability for many County residents without it.

The County will focus on collaborating with its Environmental Justice communities, which is a designated Priority Sector within the CAP. Targeting the benefits of the CAP to these often-underserved communities is critical to success.

II. GHG EMISSIONS INVENTORY, FORECASTS, AND REDUCTION TARGETS

Greenhouse Gas Emissions Inventories

The 2018 greenhouse gas (GHG) emissions data for unincorporated Orange County (county) form the baseline community and municipal operations inventories for the County of Orange's (County's) Preliminary CAP. The year 2018 was selected as the emissions baseline for the Preliminary CAP because it is the most recent year for which complete data is available. The GHG inventories are compliant with the Local Government Operations Protocol (LGO Protocol) and the Global Protocol for Community-Scale Greenhouse Gas Inventories (Community Protocol).[10,11] The inventories account for the carbon dioxide equivalence (CO2e) of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and hydrofluorocarbons (HFCs).

The County's community inventory quantifies the annual GHG emissions resulting from activities within the unincorporated county by residents, businesses, and the County government. The municipal operations inventory represents emissions associated with County of Orange government operations and represents a subset of the community inventory, compiled using a different dataset. Together, the inventories provide an understanding of where GHG emissions originate and what can be done to reduce them.

Community Greenhouse Gas Inventory

The County's community emissions inventory is comprised of emissions from activities occurring within unincorporated Orange County, including emissions that occur outside of county boundaries because of those activities. A good example is electricity, which is used locally but generated outside of the county.

The community GHG emissions inventory for unincorporated Orange County was developed using the Community Protocol. The inventory is organized into the following sectors, based on the activity type or general source of emissions:

- On-Road Transportation: The on-road transportation sector accounts for emissions from fuel combusted by on-road vehicles (passenger vehicles, trucks, and buses).[12]
- Off-Road Equipment: The off-road equipment sector accounts for emissions from fuel combusted by off-road equipment (e.g., cargo-handling, agricultural, construction, lawn and garden, etc.).

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10 California Air Resources Board, California Climate Action Registry, ICLEI, and The Climate Registry, 2010. *Local Government Operations Protocol.* Version 1.1 May 2010. Available: https://ww2.arb.ca.gov/sites/default/files/classic/cc/protocols/lgo_protocol_v1_1_2010-05-03.pdf

11 World Resources Institute, C40 Cities Climate Leadership Group, and ICLEI – Local Governments for Sustainability, 2014. *Global Protocol for Community-Scale Greenhouse Gas Inventories*, Version 1.1. December 2014. Available: https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities.

12 Electricity consumption emissions associated with electric vehicles are captured in the energy sector.

- **Rail:** The rail sector accounts for emissions from fuel combusted by freight trains and passenger trains.
- **Energy:** The energy sector includes direct emissions from the consumption of natural gas and indirect emissions from grid-supplied electricity used in buildings and facilities.
- **Solid Waste:** The solid waste sector accounts for fugitive methane emissions generated at landfills by the decomposition of organic material (e.g., paper, food scraps, yard trimmings, etc.).
- **Refrigerants:** The refrigerant sector accounts for emissions associated with the use of high-global-warming-potential (high-GWP) refrigerants (such as HFCs) in on-road vehicles, off-road equipment, and buildings.
- **Water & Wastewater:** The water and wastewater sector accounts for emissions associated with the electricity used for water distribution, wastewater collection, and water/wastewater treatment.
- **Agriculture:** The agriculture sector accounts for emissions associated with manure management, enteric fermentation, and fertilizer application.
- **Large Stationary Source:** The large stationary sector accounts for emissions from fuel combustion, energy use, and product use in large industrial facilities.

In 2018, total emissions generated by community activities occurring in unincorporated Orange County amounted to 776,984$MTCO_2e$. When excluding large stationary sources covered under Cap-and-Trade, community emissions total 727,405 $MTCO_2e$.[13] The on-road transportation sector was the largest contributor to the inventory, accounting for approximately 338,026 $MTCO_2e$ (47 percent)[14] of total GHG emissions. The remaining sectors include natural gas (21 percent), electricity (20 percent), solid waste (5 percent), refrigerants (3 percent), off-road equipment (2 percent), water and wastewater (1 percent), rail (1 percent), and agriculture (0.1 percent).[15] **Table 2-1** presents the 2018 community GHG emissions breakdown by sector. **Figure 2-1** illustrates each major sector's proportion of total 2018 community emissions, excluding large stationary sources. See Appendix A for additional detail on the methods and data sources used to develop the inventory.

[13] The large stationary sector accounts for emissions in large industrial facilities. Local jurisdictions have little-to-no influence over these facilities; furthermore, the State's Cap-and-Trade Program is in place to monitor and reduce GHGs associated with these large emitters. Therefore, the large stationary sector is typically excluded from the forecasts, targets, and emission reduction planning of local jurisdictions' climate plans.

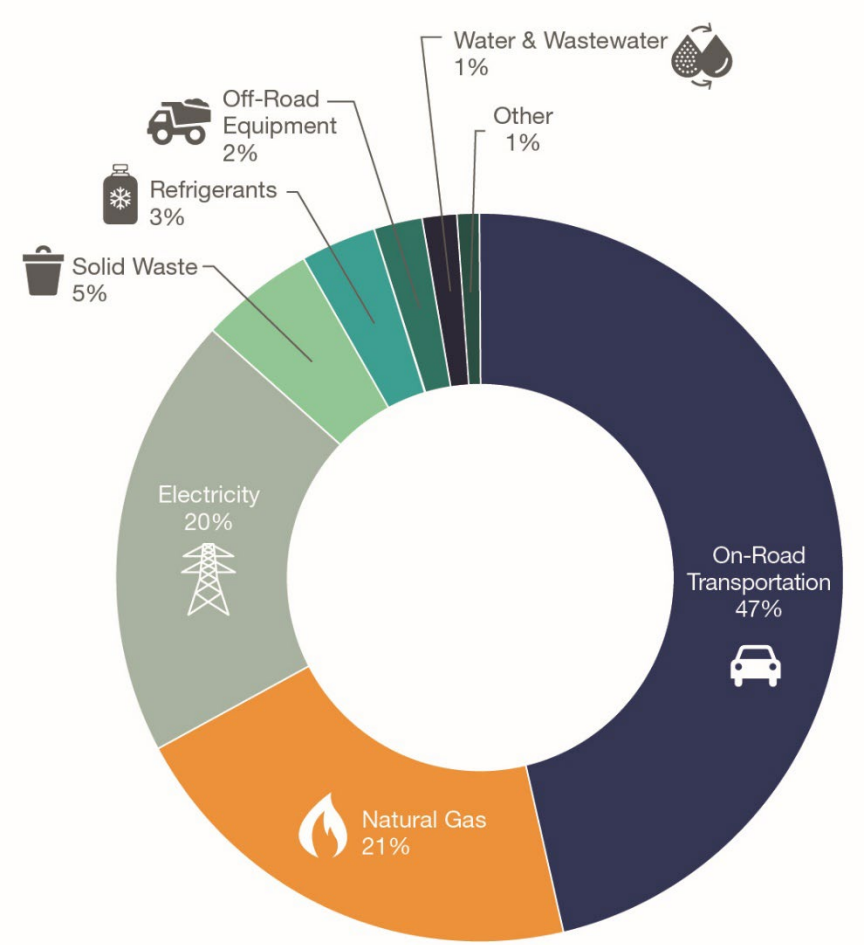
[14] The percentages in this paragraph are calculated based on total emissions excluding the large stationary sector.

[15] The rail and agriculture sectors are combined in Figure 2-1 as "Other."

Table 2-1. 2018 Unincorporated Orange County Community GHG Emissions

Sector	Emissions ($MTCO_2e$)	Percent of Total (Including Large Stationary)	Percent of Total (Excluding Large Stationary)
On-Road Transportation	338,026	44%	47%
Natural Gas	150,791	19%	21%
Electricity	142,889	18%	20%
Large Stationary	49,579	6%	N/A
Solid Waste	37,035	5%	5%
Refrigerants	24,095	3%	3%
Off-Road Equipment	16,007	2%	2%
Water & Wastewater	10,658	1%	1%
Rail	7,366	1%	1%
Agriculture	538	0.1%	0.1%

Figure 2-1. 2018 Unincorporated Orange County Community GHG Emissions by Sector



Unlike the other sectors included in the community GHG inventory, the natural and working lands (NWL) inventory represents an estimate of carbon stock. The estimates account for carbon stored in vegetation and soils on natural (e.g., grasslands, forests) and working (i.e., agricultural) lands within the unincorporated county. Carbon can move between ecosystem components due to natural processes (growth, decay, and succession) and disturbances (e.g., wildfire) or anthropogenic forces such as land use change. The NWL inventory is advantageous for tracking these transfers of carbon and the causes of said changes. Table 2-2 shows the unincorporated county's carbon stock by land cover type.

Table 2-2. 2018 Unincorporated Orange County Carbon Stock and Acreage by Land Cover Type

Land Cover Type	Area (acres)	Carbon Stock ($MTCO_2e$)
Cropland	525	0
Developed Land	24,710	0
Forest	7,426	1,055,205
Grassland	16,567	87,193
Other Natural Land	1,366	1,936

Shrubland	122,549	2,728,817
Wetlands	3,413	204,475
Total	**176,555**	**4,077,626**

Municipal Greenhouse Gas Inventory

The municipal emissions inventory represents GHGs that occur due to the County of Orange's operations. Municipal emissions are not a separate inventory, but a subset of the community emissions inventory;[16] they represent sources over which the County of Orange has operational control. By measuring emissions from its own facilities and operations and taking actions to reduce them, the County of Orange is committed to taking a leadership role in reducing GHG emissions.

The municipal inventory captures emissions from the following sectors:

- **Electricity:** This sector accounts for indirect emissions associated with electricity use in County-owned buildings and operations.
- **Natural Gas**: This sector accounts for direct emissions associated with purchased natural gas for County-owned buildings and operations.
- **Fleet:** This sector accounts for emissions associated with fuel combusted by County-owned/operated on-road vehicles and off-road equipment.
- **Landfill**: This sector accounts for emissions from decomposing waste in County owned/operated landfills.
- **Water & Wastewater:** This sector accounts for electricity emissions associated with water use at County-owned buildings and properties and water discharged from County-owned buildings and properties into a wastewater treatment system (excludes irrigation).
- **Employee Commute**: This sector accounts for emissions associated with fuel combustion by County employees' vehicles during their commute.

[16] This is true for each source except for emissions associated with landfill operations, which captures waste generated by jurisdictions outside of the unincorporated County boundary.

In 2018, emissions generated by County of Orange municipal operations amounted to 995,514 $MTCO_2e$. Landfill operations accounted for the largest source of municipal emissions, contributing 865,360 $MTCO_2e$ (87 percent). These emissions, about 23 times higher than the community solid waste sector, are associated with waste decomposition at the five County of Orange-owned and -operated landfills, which accept waste from multiple cities and counties in the surrounding region which are outside the jurisdiction of the County of Orange.[17] The remaining emission sources include natural gas (5 percent), electricity (4 percent), employee commute and fleet (2 percent each), and water and wastewater (0.2 percent). Table 2-3 summarizes the results for the 2018 municipal operations inventory by sector.

Table 2-3. 2018 County of Orange Municipal GHG Emissions by Sector Including Landfill

Sector	Emissions ($MTCO_2e$)	Percent of Total
Landfill	865,360	87%
Natural Gas	52,498	5%
Electricity	36,784	4%
Employee Commute	19,498	2%
Fleet	19,671	2%
Water & Wastewater	1,703	0.2%

Figure 2-2 illustrates each sector's proportion of total 2018 municipal emissions. Figure 2-3 provides the sector breakdown of 2018 municipal emissions excluding landfill operations. The County of Orange has less control over landfill emissions than their other emissions sources, as they do not have influence over the waste that is generated and disposed of at the landfills they operate. Analyzing the municipal inventory without landfill emissions can provide insight into the greatest opportunities for emissions reductions. When excluding landfill operations, natural gas emissions are the biggest contributor to the municipal inventory (40 percent) followed by electricity (28 percent). Employee commute and fleet contribute similar portions at 16 and 15 percent, respectively, while water and wastewater emissions make up just over 1 percent.

[17] In 2018, County of Orange landfills had a combined service population of around 5 million, whereas the population of unincorporated Orange County was approximately 130,000.

Figure 2-2: 2018 County of Orange Municipal GHG Emissions by Sector

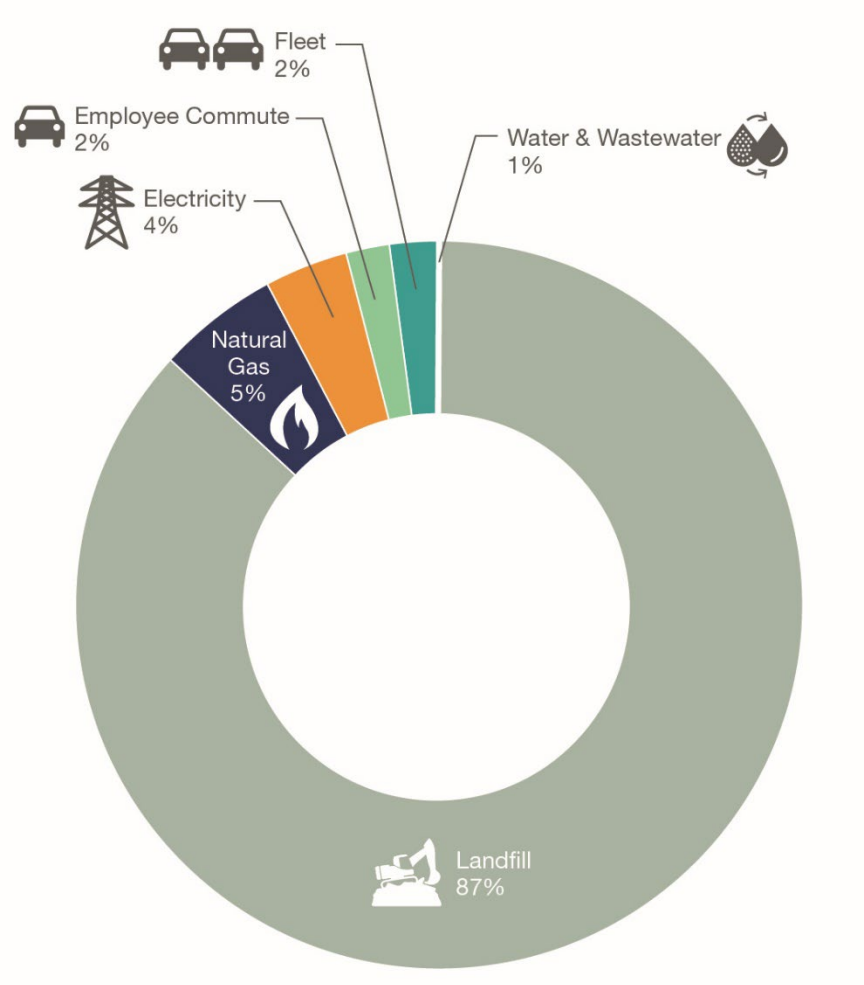
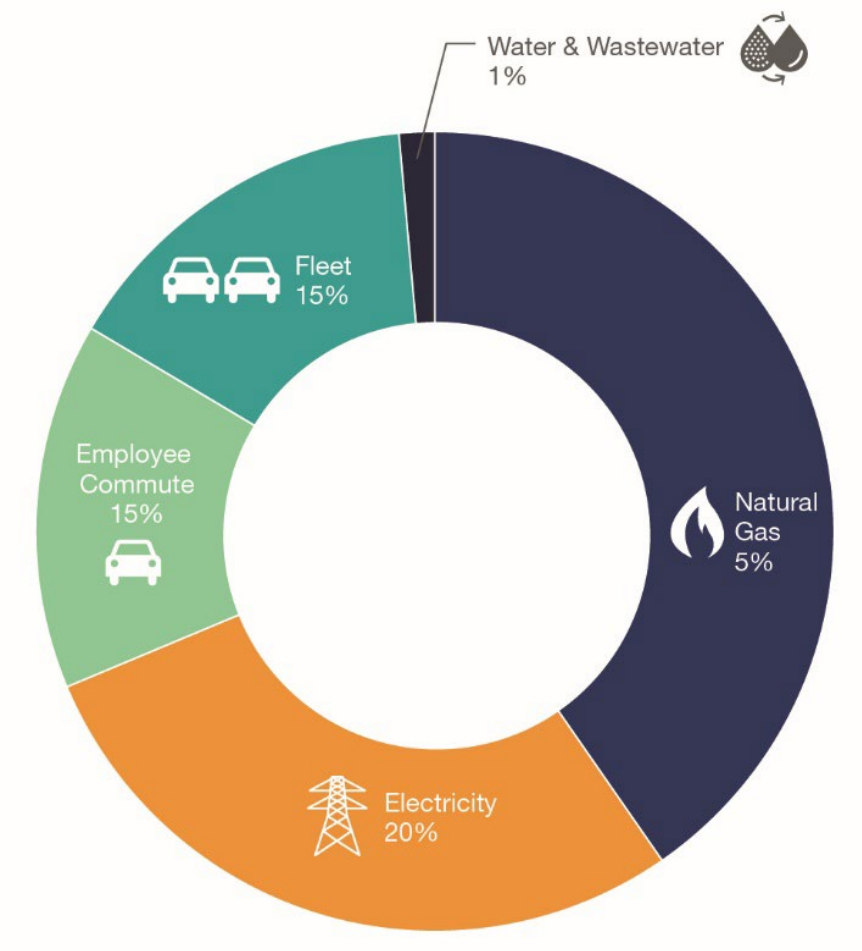


Figure 2-3. 2018 County of Orange Municipal GHG Emissions by Sector, Excluding Landfills



Greenhouse Gas Emissions Forecasts

The emission forecasts used in the Preliminary CAP account for socio-economic trends, population growth, historic emission patterns, and existing policies and legislation that affect GHG emissions. The 2018 community and municipal GHG emissions inventories serve as the baseline from which future emissions are forecasted.

Business-as-Usual Forecasts

Business-as-usual (BAU) emissions forecasts were developed by sector for the years 2030 and 2045. The BAU forecasts do not account for government policies and regulations that reduce GHG emissions; they are based on the regional population, housing, and employment growth projections from the Southern California Association of Government's (SCAG) 2024 Regional Travel Demand Model, as shown in Table 2-4.

Table 2-4. Unincorporated Orange County Socioeconomic Data

Factor	2018	2030	2045

Population	128,781	146,567	168,799
Households	41,684	51,841	64,539
Employment	33,619	38,246	44,029

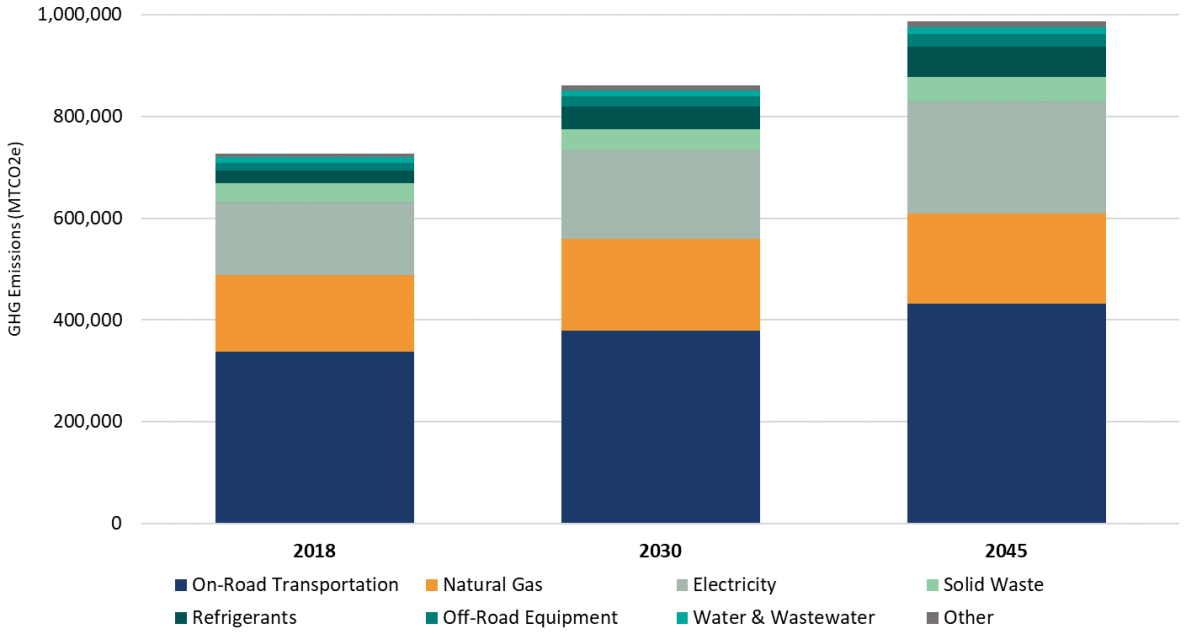
Community BAU Emissions Forecast

Table 2-5 shows the projected total community emissions by sector for each forecast year under the BAU scenario. Total emissions for unincorporated Orange County are forecasted to increase from 727,405 $MTCO_2e$ in 2018 to 986,828 $MTCO_2e$ by 2045, a 36 percent increase. Figure 2-4 compares the baseline community inventory to the 2030 and 2045 BAU forecasts.

Table 2-5. Unincorporated Orange County Community BAU Emissions Forecasts ($MTCO_2e$)

Sector	Baseline	BAU Forecast	
	2018	2030	2045
On-Road Transportation	338,026	379,697	431,765
Natural Gas	150,791	179,706	177,465
Electricity	142,889	173,464	219,683
Solid Waste	37,035	42,146	48,534
Refrigerants	24,095	44,854	60,353
Off-Road Equipment	16,007	19,309	23,736
Water & Wastewater	10,658	11,802	13,233
Rail	7,366	8,918	11,520
Agriculture	538	538	538
Total	727,405	860,434	986,828
Percent Change from Baseline	N/A	18%	36%

Figure 2-4. 2030 and 2045 Unincorporated Orange County Community BAU Emissions Forecasts



Municipal BAU Emissions Forecast

Table 2-6 shows the projected total municipal operations emissions by sector for each forecast year under the BAU scenario. Total municipal emissions are forecasted to increase from 995,514 $MTCO_2e$ in 2018 to 1,064,870 $MTCO_2e$ by 2045, a 7 percent increase. The figures below compare the municipal baseline inventory to the 2030 and 2045 BAU forecasts. Figure 2-5 includes landfill operation emissions and Figure 2-6 excludes them.

Table 2-6. County of Orange Municipal BAU Emissions Forecasts (MTCO2e)

Sector	Baseline	BAU Forecast	
	2018	2030	2045
Landfill	865,360	887,134	914,351
Natural Gas	52,498	56,287	61,019
Electricity	36,784	38,739	41,996
Employee Commute	19,498	20,904	22,661
Fleet	19,671	21,090	22,863
Water & Wastewater	1,703	1,825	1,979
Total	995,514	1,025,979	1,064,870

Figure 2-5. 2030 and 2045 County of Orange Municipal BAU Emissions Forecasts

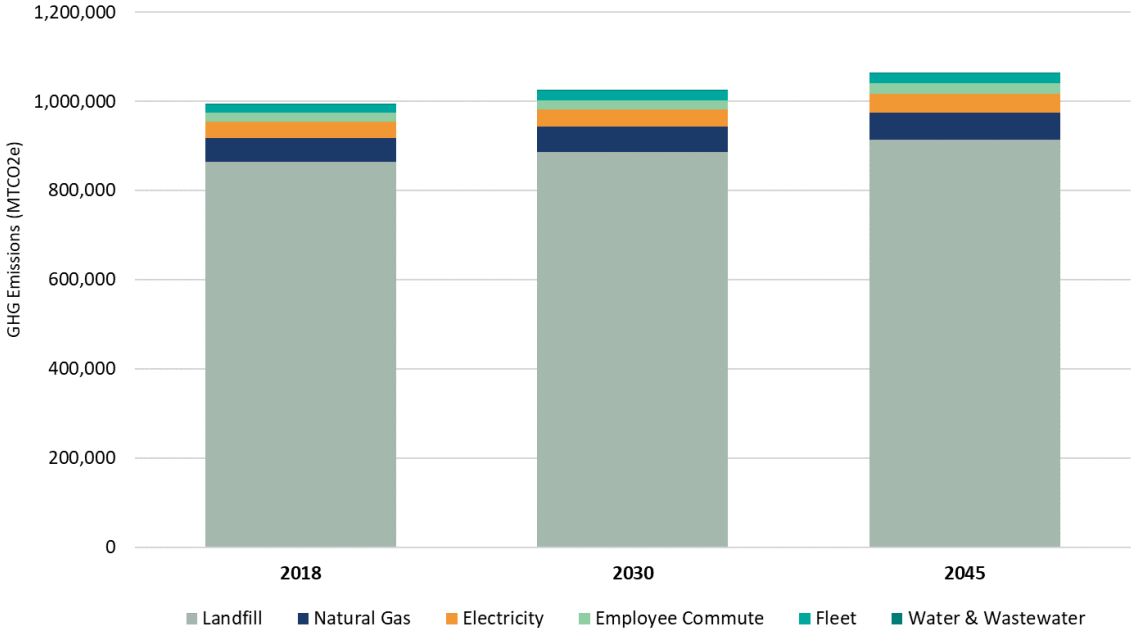
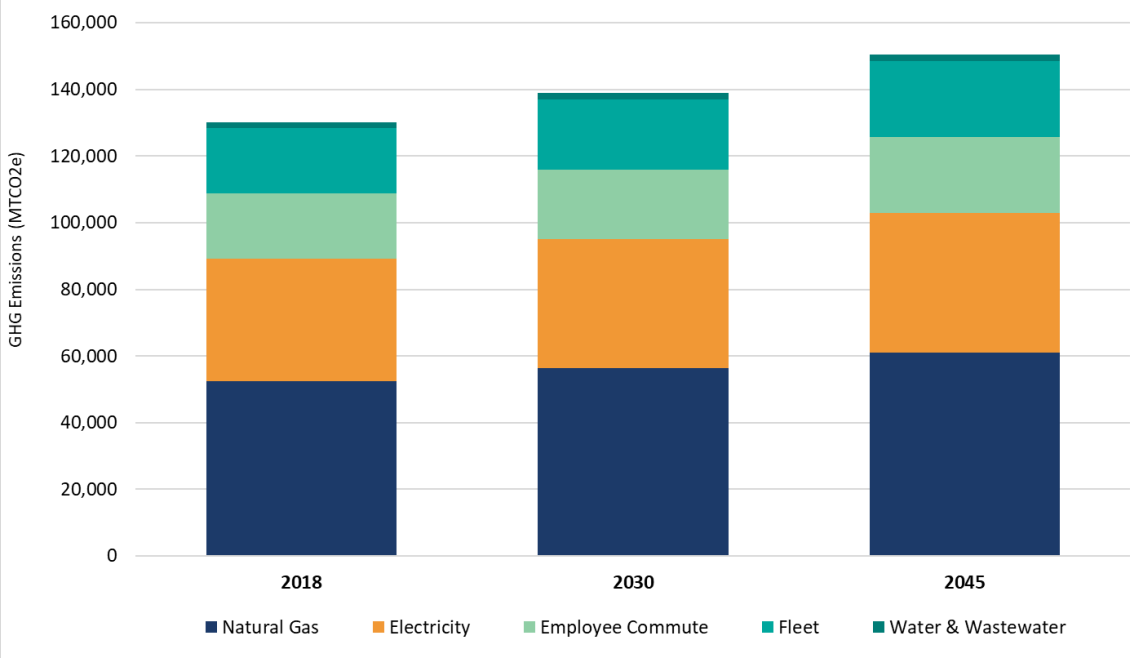


Figure 2-6. 2030 and 2045 County of Orange Municipal BAU Emissions Forecasts, Excluding Landfill Emissions



Adjusted Business-As-Usual Forecasts

The Adjusted BAU forecasts account for future growth under BAU conditions but adjust for federal, state, and County regulations that existed at the time the Preliminary CAP was developed. These include the California Energy Commission (CEC) 2019 and 2022 Title 24 building energy efficiency requirements, California Renewables Portfolio Standards (SB 100), California's Short-Lived Climate Pollutant Reduction Strategy (SB 1383), Pavley (AB 1493) and Advanced Clean Car Standards I & II, Advanced Clean Fleets (ACF), and California Low Carbon Fuel Standards (EO S-01-07).

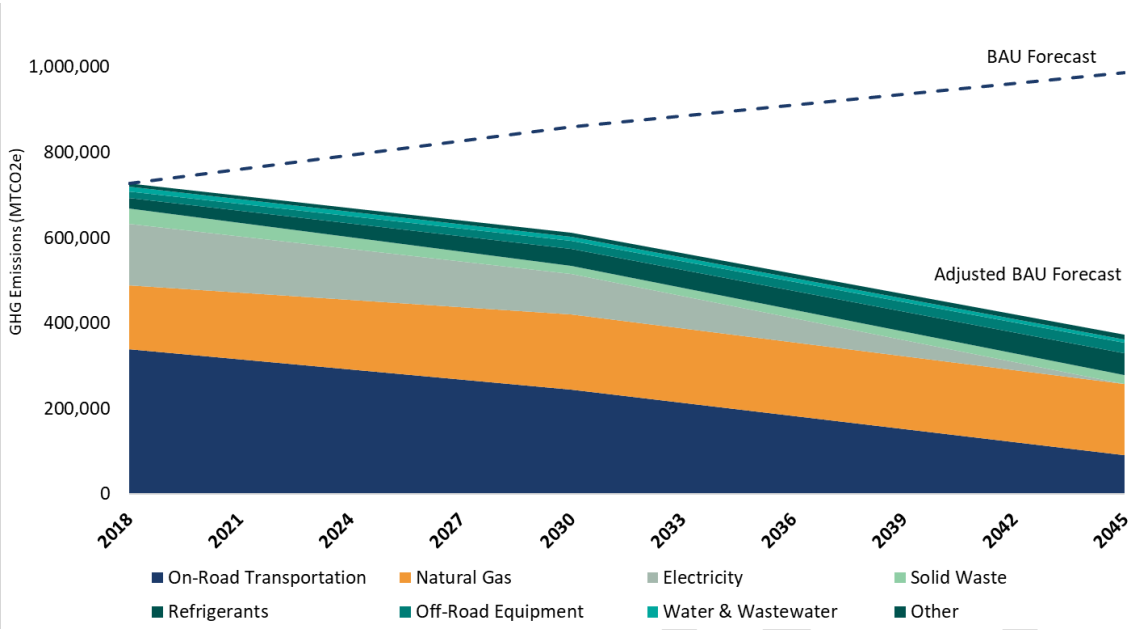
Community Adjusted BAU Emissions Forecast

Table 2-7 shows the projected community emissions by sector for each forecast year under the Adjusted BAU scenario. Total emissions for unincorporated Orange County are forecasted to decline from 727,405 $MTCO_2e$ in 2018 to 373,010 $MTCO_2e$ by 2045, a 49 percent reduction. Figure 2-7 compares the community Adjusted BAU forecast to the BAU forecast.

Table 2-7. Unincorporated Orange County Community Adjusted BAU Emissions Forecasts ($MTCO_2e$)

Sector	Baseline	Adjusted BAU Forecast	
	2018	2030	2045
On-Road Transportation	338,026	245,005	90,423
Natural Gas	150,791	174,621	166,788
Electricity	142,889	96,024	0
Solid Waste	37,035	17,561	20,223
Refrigerants	24,095	40,302	52,274
Off-Road Equipment	16,007	19,309	23,736
Water & Wastewater	10,658	9,661	7,507
Rail	7,366	8,918	11,520
Agriculture	538	538	538
Total	727,405	611,938	373,010
Percent Change from Baseline	N/A	-16%	-49%

Figure 2-7. Unincorporated Orange County Community Adjusted BAU Emissions Forecasts



Municipal Adjusted BAU Emissions Forecast

Table 2-8 shows the projected municipal operations emissions by sector for each forecast year under the Adjusted BAU scenario. Total municipal emissions are forecasted to decrease from 995,514 $MTCO_2e$ in 2018 to 955,827 $MTCO_2e$ by 2045, a 4 percent reduction. When landfill operation emissions are excluded, the remaining sectors are anticipated to decrease 40 percent between 2018 and 2045. The figures below compare the municipal baseline inventory to the 2030 and 2045 Adjusted BAU forecasts. Figure 2-8 includes landfill operation emissions and Figure 2-9 excludes them.

Table 2-8. County of Orange Municipal Adjusted BAU Emissions Forecasts ($MTCO_2e$)

Sector	Baseline	Adjusted BAU Forecast	
	2018	2030	2045
Landfill	865,360	870,804	877,608
Natural Gas	52,498	56,287	61,019
Electricity	36,784	23,220	0
Employee Commute	19,498	13,212	4,656
Fleet	19,671	16,681	12,544
Water & Wastewater	1,703	1,094	0
Total	**995,514**	**981,298**	**955,827**
Percent Change from Baseline	**N/A**	**-1%**	**-4%**
Total Excluding Landfill	**130,154**	**110,494**	**78,219**
Percent Change from Baseline	**N/A**	**-15%**	**-40%**

Figure 2-8. County of Orange Municipal Adjusted BAU Emissions Forecasts

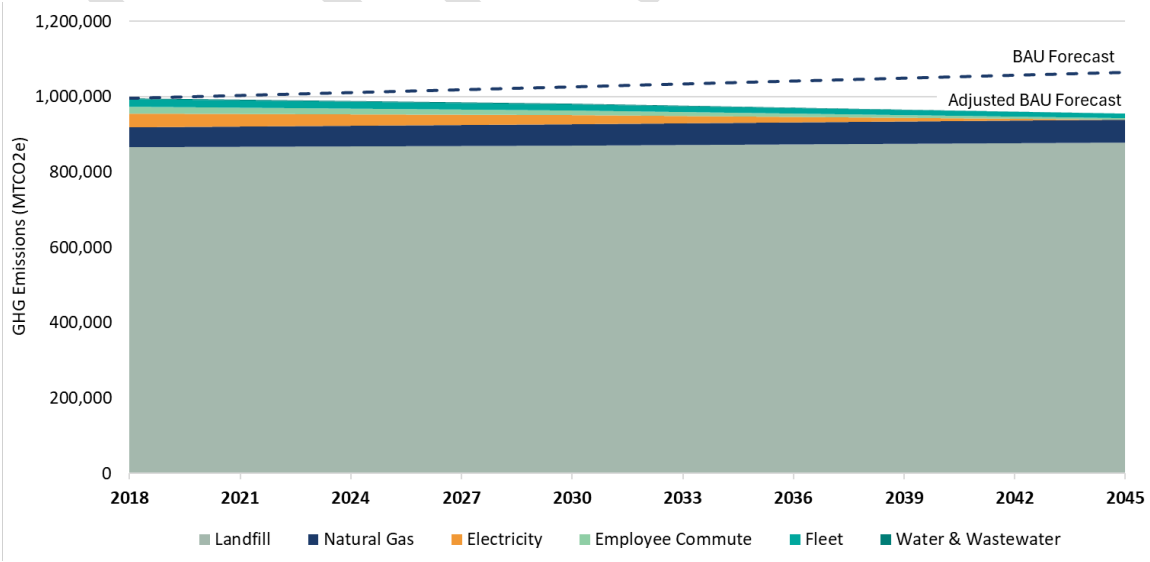
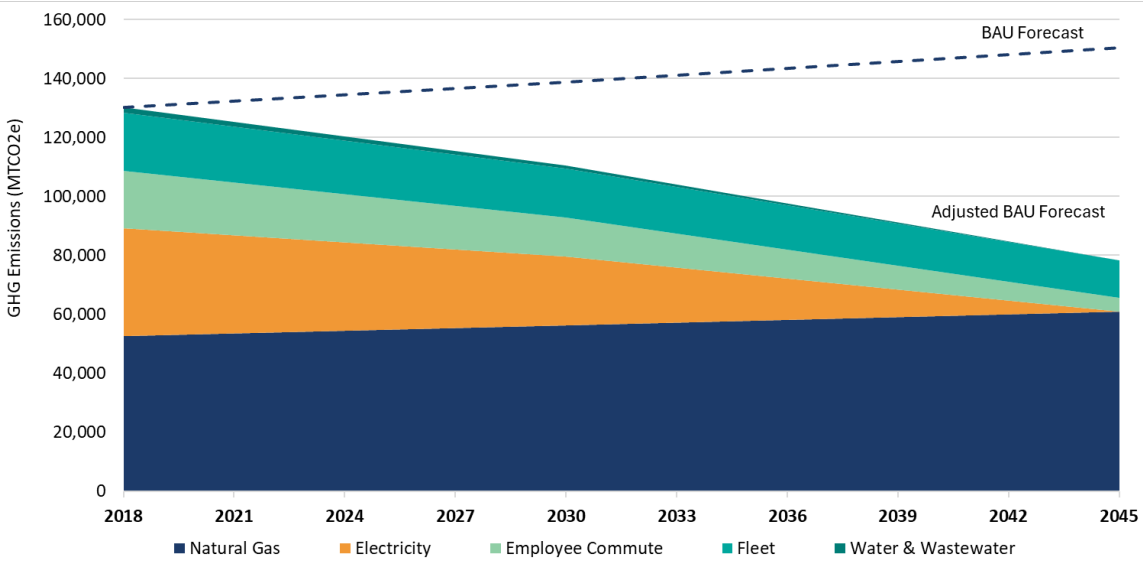


Figure 2-9. County of Orange Municipal Adjusted BAU Emissions Forecasts, Excluding Landfill Emissions



Greenhouse Gas Emissions Reduction Targets

Regulatory Context

The State of California has established multiple GHG emissions reduction targets between 1990 and 2050 to address various aspects of climate change. Assembly Bill 32, the California Global Warming Solutions Act of 2006, was enacted to reduce GHG emissions to 1990 levels by 2020. This legislation established a comprehensive, multi-year program involving a variety of measures, including a cap-and-trade system, renewable energy mandates, and energy efficiency standards. It also required major industrial sources to report and verify their emissions, aiming for significant reductions through both regulations and market-based mechanisms. SB 32, passed in 2016, builds upon AB 32 by setting a more ambitious target of reducing GHG emissions to 40 percent below 1990 levels by 2030. AB 1279, signed into law in 2022, further accelerates California's climate goals by codifying a target to achieve carbon neutrality by 2045 and net negative emissions thereafter, and requires an 85 percent reduction in anthropogenic GHG emissions from 1990 levels by the same date. A summary of California's climate goals is provided below.

AB 32 and SB 32:

- By 2020, reduce GHG emissions to 1990 levels.
- By 2030, reduce GHG emissions to 40 percent below 1990 levels.

AB 1279:

- By 2045, reduce statewide anthropogenic GHG emissions to at least 85 percent below 1990 levels.
- By 2045 or sooner, achieve net zero[18] GHG emissions and achieve and maintain net negative GHG emissions thereafter.

California's 2022 Scoping Plan

The 2017 Scoping Plan set forth a statewide plan to achieve the State's SB 32 2030 GHG emissions reduction target. The 2022 Scoping Plan, adopted by CARB in December 2022, supersedes the 2017 Scoping Plan, and is the state's plan to achieve carbon neutrality by 2045 or earlier and reduce anthropogenic emissions to 85 percent below 1990 levels by 2045 as mandated by AB 1279. The 2022 Scoping Plan concludes that deeper reductions than mandated by SB 32 are needed by 2030 to achieve the State's 2045 reduction targets. To achieve the target of 85 percent below 1990 emissions levels by 2045, the State must achieve a 48 percent reduction in GHG emissions below 1990 levels by 2030, surpassing the previous target of 40 percent as codified by SB 32.

Statewide Target Alignment

The pivotal years for setting targets for the CAP, particularly from a CEQA perspective, are 2030 and 2045, because these dates align with state-level codified targets. These targets underscore the imperative for proactive measures and sustained commitment to environmental sustainability and climate resilience within Orange County and across the state.

The County of Orange intends to establish GHG reduction targets for its municipal assets as well as the unincorporated community, that align with the State's climate targets. There are several ways to set State-aligned targets, and the County is in the process of determining the best approach based on its emissions profile and sectors, reduction potential of each sector, and individual GHG reduction strategies and measures. The County will consider all options with the goal of setting ambitious but feasible targets that are aligned with the State's targets.

[18] AB 1279 defines *net zero GHG emissions* as "emissions of GHGs, as defined in subdivision (g) of Section 38505, to the atmosphere are balanced by removals of GHG emissions over a period of time, as determined by CARB." California Health and Safety Code Section 38562.2.

III. EMISSION REDUCTION ACTION PLAN

Using the six Priority Sectors previously identified, the Action Plan for this Preliminary CAP includes Measures, Actions, and Co-Benefits. The Final CAP will include comprehensive performance goals by Measure and goals for the entire Sector; some initial draft goals are included where feasible.

- Priority Sectors: Energy, Mobility, Resources Recovery and Waste, Environmental Justice, Natural Resources, Resilience
- Measures: Focused, sub-sector programs and other activities which reduce emissions and/or achieve other goals of the CAP. Measures will include performance standards that are designed to be quantified for GHG emission reductions. For example, *E1 – Pursue Building Decarbonization Throughout County-owned Facilities*
- Actions: Steps needed to achieve the Measure. Actions are the specific policies, programs, or tools that will be implemented to support long-range planning. For example, *E1.2 – Pursue LEED Platinum certification for all new County buildings*
- Co-Benefits: Positive benefits of the Measure in other areas beyond GHG reductions as discussed previously.

Environmental Justice

Public Health

Economic

Advocacy and Education

In this document, "County" denotes County of Orange government, "unincorporated Orange County" refers to unincorporated areas *only* in Orange County, and "Countywide" refers to Orange County in its entirety, inclusive of both unincorporated areas and all 34 incorporated cities. Some Measures and Actions are very specific to County departments, assets, and projects, while others are broader due to the nature of the Sector. For example, some Measures in the Mobility Sector pertain only to the County's fleet, whereas Measures in the Environmental Justice Sector aim to increase resources for low-income and vulnerable communities Countywide and will rely heavily on collaboration and partnerships to implement the Action Items.

This Preliminary CAP contains preliminary emission reduction measures and action items. Measures will be modified and further fleshed out for the Final CAP. Modifications to measures will be informed by

quantification of their emissions reduction potential, further stakeholder and public engagement, and qualitative analysis. Measures and actions will likely become more prescriptive in the next phase of the CAP.

SECTOR 1 – ENERGY (E)

SECTOR GOAL: All new buildings be operationally carbon neutral by 2030 and all buildings will be carbon neutral by 2045.

State and Federal Mandates: Senate Bill 100 sets a goal to power all retail electricity sold in California, as well as state agency electricity needs, with renewable and zero-carbon resources by 2045. These resources, such as solar and wind energy, do not emit climate-altering GHGs. Additionally, California's Green Plan, issued in accordance with the passage of AB 32, aims to reduce building-related emissions by 40% below 1990 levels by 2030 and carbon neutrality by 2045.

The Federal Office of Energy Efficiency and Renewable Energy has multiple mandates and programs related to energy efficiency, GHG reductions, sustainable buildings (such as Energy Star Ratings), hot water systems, and more. These mandates generally apply to federally owned or leased structures or entities.[19] Currently, there are approximately 250 federally-owned or leased structures in Orange County.

California's 2022 Scoping Plan outlines a roadmap for the state to achieve carbon neutrality by 2045 or earlier. An assessment of the potential for buildings to meet this target is underway.

Assembly Bill 32 (Friedman, 2018) requires the California Energy Commission, in consultation with the California Air Resources Board (CARB) and California Public Utilities Commission, to assess the potential for California to reduce building-related emissions by at least 40 percent below 1990 levels by 2030.

Foundation: In unincorporated Orange County, electricity comprises 20% (142,889 MTCO2e) of all emissions and natural gas comprises 21% (150,791 MTCO2e). For County of Orange operations, electricity represents 4% (36,784 MTCO2e) of total emissions and natural gas 5% (52,498 MTCO2e). If the County excludes landfill operations from the emissions inventory, electricity contributes 28% and natural gas 41%.

Energy Sector Workforce Analysis: Current data shows that Energy Sector Jobs increased by 738 additional unique positions from 2018-2023 (0.7%) in Orange County, less than the national growth rate of 10.4%. The occupations are projected to increase by 4,686 additional unique positions from 2023-2028 (4.2%), less than the national projected growth rate of 7.5%. Regional job concentration per capita for Energy Sector Jobs is 1.02 times the national job concentration. In other words, there are 2% more Energy Sector Jobs in this region than we would expect to find in the average region. Cost of labor in the region is above median. The median earnings for entry level Energy Sector Jobs in the region is $31.51/hr., which is $5.37/hr. above the national median of $26.14/hr.

[19] Energy.gov, Office of Energy Efficiency and Renewable Energy, Federal Energy Management Program, at https://www7.eere.energy.gov/femp/requirements/requirements_filtering/High%20Performance%20Sustainable%20Buildings accessed on May 15, 2024.

E1 – Pursue Building Decarbonization Throughout County-owned Facilities

Building decarbonization entails transitioning buildings off natural gas and making energy efficiency improvements. The County is committed to leading by example by incorporating clean energy sources into all new County buildings and clean energy or energy efficient retrofits during remodels.

Potential Action Items:

E1.1 – Conduct energy audits of existing County-owned facilities, similar to the commitment made by JWA, to identify energy and sustainability measures to budget for building modification projects.

E1.2 – Pursue LEED Platinum certification for all new County buildings.

E1.3 – Pursue LEED Gold certification for retrofit projects.

E1.4 – Develop incentive programs to retrofit non-County buildings with clean and renewable energy technologies.

E1.5 – Commit to prioritizing renewable energy sources, investing in power purchase agreements, and utilizing lease-back systems for solar installation.

E1.6 – Review capital projects during the annual Strategic Financial Planning process for consistency with the CAP goals and prioritize CAP-related projects.

E1.7 – Leverage existing regulated-utility ratepayer-financed incentive programs to support building energy audits and conversion of existing heating systems from gas to electric.

Co-Benefits	

E2 – Improve Efficiency of County-owned Cogeneration Facilities.

The County maintains two CHP cogeneration facilities capable of operating as microgrids independently from the electric utility (i.e., Southern California Edison). The CUF provides cooling, heating and/or electricity to 20 buildings within the Civic Center. Similarly, the JWA CUP provides cogeneration energy for the airport. The County is investing $16 million to audit its CHP-supplied facilities to reduce fuel consumption and explore the feasibility of using excess renewable natural gas produced at the County's landfills to power the CUF and/or CUP. Further, the County will research opportunities for expanding the application of microgrids and enhancing grid resiliency. This includes regional energy storage and other grid modernization technologies such as peak shaving, demand management, and net energy metering.

Potential Action Items:

E2.1 – Identify and prioritize energy and sustainability initiatives at County-owned CHP facilities. This includes conducting building and cogeneration facility energy audits to discover energy-saving opportunities. Implement energy efficiency retrofits based on these audits. **E2.2** – Assess the feasibility of integrating onsite renewable energy sources and examine corresponding CHP operational impacts. **E2.3** – Explore the potential for using County-generated Renewable Natural Gas (RNG) to fuel County-owned CHP facilities, reducing reliance on traditional fossil fuels. **E2.4 -** Consider decommissioning CHP operations and transitioning to electric-powered district chilled water and heating sources.

Co-Benefits	

E3 – Pursue Solar Installation in County-owned Facilities

In Southern California, solar energy plays a crucial role in achieving a net-zero carbon footprint by 2045. As a renewable source of power that significantly reduces GHG emissions, solar energy provides a cost-effective means of mitigating climate change and protecting humans, wildlife, and the environment. However, it is important to be mindful of its impact on the land, especially when utilizing ground-mounted solar and concentrating solar-thermal power (CSP) installations. Sites for these installations must be carefully selected, designed, and managed to minimize disruptions to local wildlife, habitats, and soil and water resources. This approach ensures that the benefits of solar energy are harnessed while also preserving the natural balance of local ecosystems.
Potential Action Items: **E3.1** – Include solar panel installation to the design of all new County-owned buildings and retrofit County buildings wherever feasible. **E3.2** – Incorporate solar power and battery storage into the JWA Capital Improvement Project Plan to support current and future airport energy needs. **E3.3** – Explore power purchase agreements or utilize lease-back systems for solar installation. **E3.4** – Pursue grant funding or public-private-partnerships to secure funding to expand solar power and battery storage at County-owned facilities where feasible. **E3.5** – Develop a program through the County's Procurement Office that connects private businesses and individuals with County-approved vendors and resources to incentivize the private adoption of solar power and microgrid technology.

Co-Benefits	

E4 – Promote Building Decarbonization Throughout the Community

Potential Action Items:

E4.1 – Leverage funding to incentivize private building owners to retrofit buildings with energy efficiencies.

E4.2 – Streamline County permitting processes for installation of onsite zero-GHG and renewable energy generation systems.

E4.3 – Establish incentives for cities to streamline permitting processes for installation of onsite zero-GHG and renewable energy generation systems, including battery storage, throughout the MSA.

E4.4 – Provide technical assistance to private building owners and tenants regarding building decarbonization.

E4.5 – Work with local utilities and/or the Southern California Regional Energy Network (SoCalREN) to promote replacement of natural gas appliances through education, financial incentives.

E4.6 – Launch educational campaigns for residents, businesses, and building owners and managers on the programs and incentives offered by the local utilities and/or SoCalREN.

E4.7 – Develop Building Performance Standards that strongly encourage electrification in unincorporated areas under County jurisdiction.

Co-Benefits	

SECTOR 2 – MOBILITY (M)

SECTOR GOAL: Reduce GHGs from the County's fleet and employee commute by 25% from baseline levels by 2030 and 50% reduction from baseline levels by 2035 with net zero carbon emissions by 2045.

State and Federal Mandates: State mandates related to the transportation sector include only zero-emission passenger vehicles to be sold in California beginning in 2035 (Advance Clean Cars); only zero-emission trucks and buses can be sold in California beginning in 2036 (Advanced Clean Fleets); and the phase out of medium and heavy-duty trucks from fleets between 2024 and 2035 (Advanced Clean Trucks).

The EPA regulates emissions from mobile sources by setting standards for the specific pollutants, including carbon monoxide, hydrocarbons, nitrogen oxides, and particulate matter. These standards have become progressively more stringent since the mid-1970s for on-road vehicles and in the early 1990s for nonroad engines and equipment. Emissions standards limit the amount of pollution a vehicle or engine can emit.

Foundation: In unincorporated Orange County, on-road transportation comprises 47% (338,026 MTCO2e) of total emissions and rail comprises 1% (7,366 MTCO2e). For County of Orange operations, employee commutes represent 2% (19,498 MTCO2e) of total emissions and fleet operations 2% (19,671 MTCO2e). If the County excludes landfill operations from the emissions inventory, employee commutes contribute 15% and fleet 15%.

Mobility Sector Workforce Analysis: Mobility Sector jobs increased by 1,414 from 2018-2023 (1.4%) in Orange County, less than the national growth rate of 9.6%. The Mobility Sector occupations are projected to increase by 5,885 from 2023-2028 (5.9%), less than the national projected growth rate of 8.4%. Regional job concentration per capita for Mobility is 1.04 7mes the national job concentration. In other words, there are 4% more Mobility Sector jobs in this region than we would expect to find in the average region. Cost of labor in the region is above median. The median earnings for Mobility Sector jobs in the region is $34.69/hr., which is $4.36/hr. above the national median of $30.33/hr.

Fleet transition measures apply to County-owned fleets only.

M1 – Pursue Decarbonization of County-owned Fleet

Orange County owns thousands of vehicles that range from passenger vehicles, buses, sports utility vehicles, Class 6, 7 and 8 trucks, as well as on-road and off-road construction equipment fleets. These fleets are being turned over naturally as vehicles age. The CAP seeks to expedite the turnover process while encouraging alternative forms of transportation such as carpooling, biking, walking and public transit.

Potential Action Items:

M1.1 – Install EV charging stations/infrastructure for County fleet, including for off-road equipment.

M1.2 – Survey County fleet operations to understand average daily vehicle miles traveled (VMT) and average daily charging demand. Add dedicated EV charging infrastructure, at County facilities to accommodate increase EV charging needs.

M1.3 – Replace fossil fuel-powered vehicles (light, medium, and heavy-duty) with zero-emission vehicles (ZEV). Purchase at least 50% EVs over 8500 Gross Vehicle Weight Rating (GVWR) Starting 2024; 100% by 2027 as mandated by CARB Advanced Clean Fleet Regulation.

M1.4 — Update the County's light-duty (below 8,500 GVWR) fleet acquisition policies such that:

- All new vehicle purchases and leases are ZEVs.
- Exceptions may be granted for emergency vehicles and other unique duty circumstances with the approval of the County Executive or designee.

Align EV replacement with OCPW schedule to meet Advanced Clean Fleets ZEV Targets:

Model Year Schedule	
Compliance Year	Count of ZEVs in Fleet
2024	21
2025	38
2026	59
2027	79
2028	79
2029	102
2030	130
2031	144
2032	171
2033	209
2034	287
2035	379
2036	478
2037	554
2038	621
2039	647
2040	673
2041	679
2042	683

M1.5 – Initiate RFP to assess technological feasibility of specialty heavy-duty ZEV equipment and infrastructure needs.

M1.6 – Replace remaining fossil fuel-powered goods movement equipment including, but not limited to, cargo-handling equipment, forklifts, and cranes, with zero-emission options. **M1.7** – Complete electrification of aircraft ground support equipment at JWA and replace airport primary shuttles with zero-emission shuttles.	
Co-Benefits	

M2 – Expand County-owned and Publicly-accessible EV Charging Infrastructure

Potential Action Items: **M2.1** – Increase EV network capacity by installing additional EV chargers throughout County properties. **M2.2** – Prioritize EV charging in Environmental Justice communities. **M2.3** – Increase the quantity of public-facing charging stations at County-owned public facilities. **M2.4** – Evaluate providing dedicated electric services to new public-primary EV charging infrastructure to facilitate Level-3 DC fast charging. **M2.5** – Complete EV charging infrastructure plan at JWA which includes identifying opportunities to expand EV charging infrastructure available to the public, rental car providers, JWA staff, and County-owned fleet vehicles.	
Co-Benefits	

M3 – Decrease the Tourism-related GHG Emissions in Orange County

Potential Action Items: M3.1 – Collaborate with JWA to quantify the annual number of tourism-specific passenger visits to Orange County via aircraft. M3.2 – Pursue opportunities to increase the availability of and/or provide incentives for the use of zero-emission rental cars at JWA. M3.3 – Coordinate with public transportation operators, chambers of commerce/Travel Visitors Bureau, Disney, OC Fair, JWA and LOSSAN Rail Corridor to expand transit service areas at tourist destinations.	
Co-Benefits	

M4 – Reduce VMT for County Employees and County-owned Fleet

Potential Action Items: M4.1 – Evaluate opportunities to support and expand active transportation infrastructure along major commute routes for County employees. M4.2 – Complete the County Active Transportation and Implementation Plan. M4.3 – Establish commute trip reduction programs that incentivize rideshare or alternatives to vehicles for County employees. M4.4 – Promote VMT reduction measures and incentives in unincorporated Orange County.	
Co-Benefits	

M5 – Reduce VMT in Unincorporated Areas

Potential Action Items: M5.1 – Evaluate opportunities to support and expand active transportation infrastructure to major destinations within unincorporated areas. M5.2 – Coordinate with public transportation agencies to expand transit service areas and increase service frequency to major destinations within unincorporated areas. M5.3 – Encourage transit-oriented, mixed-use, and compact development.	
Co-Benefits	

M6 - Optimize Traffic Flow to Reduce Idle Time in Unincorporated Areas

Potential Action Items: M6.1 – Implement traffic signal synchronization on arterial roads within the County jurisdiction. M6.2 – Improve circulation at the airport to decrease idling time through congestion relief projects and policies. M6.3 – Invest in smart parking infrastructure where necessary to reduce congestion and idling at high density developments such as the airport.	
Co-Benefits	

SECTOR 3 – RESOURCE RECOVERY & WASTE (RRW)

SECTOR GOAL: Establish a Zero-Waste Policy in County buildings by 2030. This sector also targets a reduction in GHGs of 30% below the baseline by 2030 and 40% by 2035.

State and Federal Mandates: State mandates require the reduction of organic waste to landfills by 75% and improving edible food recovery by 20% by 2025.

While there are no federal laws specific to recycling targets, federal programs such as EPA's WasteWise and Sustainable Materials Management programs, federal grant and tax incentive programs, and federal procurement requirements are leveraged to encourage waste minimization, support recycling

infrastructure investment, and increase demand for recycled materials. These types of programs extend into related industries such as clean energy initiatives and fuel standards.

In September 2016, Governor Edmund Brown Jr. set methane emissions reduction targets for California (SB 1383 Lara, Chapter 395, Statutes of 2016) in a statewide effort to reduce emissions of short-lived climate pollutants (SLCP). California's SB 1383 aims to reduce methane emissions from landfills to combat climate change by reducing organic waste to landfills by 75% and improving edible food recovery by 20% by 2025. This regulation includes requirements for organic waste collection processing, compliance & monitoring, outreach & education, edible food recovery, ordinances, procurement of recovered organic waste products, and record keeping.

Foundation: In unincorporated Orange County, fugitive methane emissions generated at landfills account for 37,035 MTCO2e, which is 5% of total emissions in unincorporated Orange County. Waste decomposition at County-owned and -operated landfills accounts for 865,360 MTCO2e, which is 87% of total municipal operations emissions.

Resource Recovery & Waste Sector Workforce Analysis: Resource Recovery and Waste Sector jobs increased by 13,054 from 2018-2023 (8.3%) in Orange County, less than the national growth rate of 16.9%. These occupations are projected to increase by 6,407 from 2023-2028 (3.8%), less than the national projected growth rate of 6.9%. Regional job concentration per capita for Resource Recovery and Waste Sector jobs is 0.84 times the national job concentration. In other words, there are 16% fewer Resource Recovery and Waste Sector jobs in this region than we would expect to find in the average region. Cost of labor in the region is above median. The median earnings for Resource Recovery and Waste Sector jobs in the region is $29.70/hr., which is $3.41/hr. above the national median of $26.29/hr.

RRW1 – Expand Infrastructure and Increase Public Participation in County Waste Diversion Programs

Potential Action Items:

RRW1.1 – Establish pilot program for zero waste diversion.

RRW1.2 – Ensure availability of public source selective organics and recycling bins at all County-owned facilities, including County Parks.

RRW1.3 - Improve signage on bins to clarify what is acceptable for disposal.

RRW1.4 – Implement and expand edible food recovery programs to reduce donation dumping, increase efficiencies, reduce service duplications, and align with nutritional needs.

RRW1.5 – Continue expanding County procurement standards for recycling and composting.

RRW1.6 – Continue County partnerships with participating cities to promote and host used oil and used oil filters exchange events under the guidance of the Cal Recycle Program.

RRW1.7 – Continue conducting inspections and investigations of waste tire management at regulated businesses as part of the Cal Recycle Program.

RRW1.8 - Explore the feasibility for co-located organic and recyclable material recovery operations at landfills for recycling markets and on-site conversion. **RRW1.9** – Expand opportunities for reuse and repurpose of discarded items.	
Co-Benefits	

RRW2 – Increase Waste-to-Energy Potential at County Landfills

Potential Action Items: **RRW2.1** – Expand landfill gas capture capability and establish waste-to-energy systems in landfill facilities. **RRW2.2** – Explore the feasibility of regional anaerobic digestion and conversion technology facilities. **RRW2.3** – Explore the feasibility of new recycling technologies that create marketable beneficial products.	
Co-Benefits	

SECTOR 4 – ENVIRONMENTAL JUSTICE (EJ)

SECTOR GOAL: Prioritize measures and funding opportunities in low-income and vulnerable communities by providing additional resources, workforce development, upgraded infrastructure, open space and safe and reliable alternatives to single-occupant vehicles.

State and Federal Mandates: California state law defines Environmental Justice (EJ) as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.[20] Fairness in this context means that everyone should benefit from a healthy environment, and the burdens of pollution should not be borne by sensitive populations or communities experiencing its adverse effects.

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," issued in 1994, directs each Federal Agency to make achieving EJ part of its

[20] Gov. Code, § 65040.12, subd. (e)

mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations, including tribal populations.

Federal agencies must consider environmental justice in their activities under the National Environmental Policy Act (NEPA). The Environmental Justice Interagency Working Group (EJ IWG) recently developed the report *Promising Practices for EJ Methodologies in NEPA Reviews*, which compiles methodologies from current agency practices regarding the integration of environmental justice considerations through NEPA processes.[21]

The principles of environmental justice call for fairness regardless of race, color, national origin or income, and for the meaningful involvement of communities in the development of laws and regulations that affect their natural surroundings, and the places people live, work, play and learn. California was one of the first states to codify environmental justice in statute. Community leaders in the environmental justice movement strive to meaningfully include communities disproportionately impacted by pollution in decision-making processes, aiming to lift the unfair burden of pollution from those most vulnerable to its effects.[22]

Foundation: Climate change poses an unequal risk to communities least able to anticipate, cope with, and recover from adverse impacts. [23] These risks include extreme heat affecting weather-exposed outdoor workers, new asthma diagnoses in children ages 0-17, coastal flooding and associated traffic, deaths due to extreme heat, and property damage. Orange County residents and communities are vulnerable to these climate change events, making a CAP more crucial than ever. All improvements implemented through the CAP are intended to benefit EJ communities. In Orange County, disparities exist in access to nature and open space, clean air, sufficient transportation, and safe and healthy homes. Additionally, there are gaps in economic opportunity and a considerable amount of residents rely on Medi-Cal Countywide.

EJ1 – Expand Access to Open Space for Communities Lacking Recreational Amenities or Tree Coverage

Potential Action Items:

EJ1.1 — Inventory all open spaces in the unincorporated areas of Orange County to identify communities lacking access to recreational amenities and tree coverage.

EJ1.2 — Develop an Urban Forest Master Plan that systematically increases shade cover, prioritizing the needs of vulnerable communities.

[21] U.S. Environmental Protection Agency, Environmental Justice and NEPA, accessed on May 15, 2024 at https://www.epa.gov/environmentaljustice/environmental-justice-and-national-environmental-policy-act.

[22] California Environmental Protection Agency, Environmental Justice, accessed on May 15, 2024 at https://calepa.ca.gov/envjustice/

[23] EPA. 2021. Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts. U.S. Environmental Protection Agency, EPA 430-R-21-003. www.epa.gov/cira/social-vulnerability-report

EJ1.3 — Collaborate with cities and public transportation agencies to plant trees for shade at bus stops in areas without shade to reduce heat exposure for public transportation riders. **EJ1.4** — Enhance partnerships with schools and cities to provide technical support and expertise for developing community gardens.	
Co-Benefits	

EJ2 - Promote and Expand Active Transportation Networks to Essential Destinations in Vulnerable Communities

Potential Action Items: **EJ2.1** — Engage in community outreach to ascertain the highest priorities of EJ, LIDAC, and other vulnerable communities. **EJ2.2** — Review access to sidewalks, crosswalks and public transportation in vulnerable communities. **EJ2.3** — Identify necessary improvements to traffic signal and crosswalk to enhance pedestrian safety in vulnerable communities. **EJ2.4** — Improve the connectivity of the bicycle network for all ages and abilities by expanding safe bicycle infrastructure. **EJ2.5** — Enhance pedestrian infrastructure in high-density areas by expanding protected multi-use trails and sidewalks. **EJ2.6** — Establish Safe Routes to Schools programs to prioritize public health in collaboration with HCA, cities, school districts and public transportation agencies. **EJ2.7** — Provide technical assistance to schools and cities to support the initiation of Safe Routes to Schools efforts.	
Co-Benefit	

EJ3 – Promote Building Retrofits Located in Vulnerable Communities

Potential Action Items:

EJ3.1 — Research public-private partnership opportunities available for building and appliance retrofits or replacements aimed to decarbonize, weatherize, or remove health risks from homes or businesses.

EJ3.2 — Identify vulnerable communities that qualify for building and appliance retrofits or replacements aimed to decarbonize, weatherize, or remove health risks from homes or businesses. Explore opportunities to address other critical building upgrades such as mold or lead remediation and pest management during decarbonization retrofits.

EJ3.3 — Partner with local nonprofits and community-based organizations (CBOs) to raise awareness and educate residents, business-owners, or landlords about the benefits of building and appliance retrofits.

EJ3.4 — Establish a streamlined process for County permitting and approval of retrofit projects to reduce barriers and expedite implementation in vulnerable communities.

EJ3.5 – Monitor data, provide care coordination and/or education and/or conduct investigation for reported elevated blood lead levels in children.

Co-Benefits	

EJ4 – Incentivize Transit Oriented Development (TOD) for Permanent Supportive, Affordable, and Workforce Housing

Potential Action Items:

EJ4.1 — Prioritize resources, including capital funding and rental subsidies, such as Orange County Housing Authority (OCHA) project-based vouchers, to fund projects that meet the state's Affordable Housing and Sustainable Communities Program and incentivize developers to pursue projects that meet VMT reduction, density, and proximity to public transportation standards.

EJ4.2 — Establish a streamlined process for County permitting and approval of TOD developments to reduce barriers and expedite affordable housing in vulnerable communities.

EJ4.3 — Partner with public transportation agencies to ensure TOD projects are well-connected to existing public transportation networks, enhancing accessibility to vulnerable communities.

Co-Benefits	

EJ5 – Expand and Promote Workforce Development in Green Industries

Potential Action Items: EJ5.1 — Partner with local educational institutions, vocational schools, and community colleges to develop and offer training and certification programs in green industries, such as renewable energy, energy efficiency, sustainable construction, and environmental conservation for vulnerable communities. EJ5.2 — Create internship and apprenticeship programs in collaboration with local labor unions, businesses, and within County departments to provide hands-on experience and career pathways in green jobs for people with barriers to employment. EJ5.3 — Partner with local nonprofits and CBOs to raise awareness about opportunities in green jobs, including hosting job fairs, informational workshops, and career counseling services, targeting vulnerable communities. EJ5.4 — Provide training and certification programs for local contractors and construction workers to ensure they are equipped to perform retrofit work.	
Co-Benefits	

SECTOR 5 – NATURAL RESOURCES (NR)

SECTOR GOAL: Enhance natural resource stewardship by protecting the 42 miles of coastline, restoring natural habitats, ensuring accessibility to alternative water sources, developing Countywide water conservation targets, and implementing stormwater retrofits where feasible.

State and Federal Mandates: Numerous state mandates focus on the protection of California's natural resources. The Coastal Act guides land use and development decisions along the California coast, with a goal to maintain, and, where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and built resources.[24] The California Environmental Quality Act (CEQA), adopted in 1970, requires public agencies and local governments to evaluate and disclose the environmental impacts of development projects or other major land use decisions, and to limit or avoid those impacts to the extent feasible.[25] The Porter-Cologne Water Quality Control Act, enacted in 1969, established a comprehensive program to protect water quality and the beneficial uses of water in California. Other regulatory authorities include the California State Water Board, California Department of

[24] California Coastal Commission, accessed on May 15, 2024, at https://www.coastal.ca.gov/laws/

[25] California Public Resource Code Section 21000 et seq

Forestry and Fire Protection, California Department of Fish and Wildlife and the California Natural Resources Agency.

The federal government also enforces several conservation measures to protect natural resources. These include the Clean Air Act of 1990, the Clean Water Act of 1977, the Endangered Species Act of 1973, and the Safe Drinking Water Act of 1974, administered by agencies such as the EPA, U.S. Department of the Interior and the U.S. Fish and Wildlife Service.[26] The National Environmental Policy Act (NEPA) is another significant federal legislation aimed at protecting natural resources in relation to federal projects.

Foundation: Promoting natural resource stewardship is essential to maintaining the health and resilience of our environment. Efforts include protecting coastal areas, restoring habitats and ensuring sustainable water management practices. Compliance with state and federal mandates helps guide these initiatives, ensuring that environmental impacts are minimized, and natural resources are preserved for future generations. By developing and adhering to specific conservation targets and implementing necessary infrastructure improvements, the County can achieve its goal of enhancing natural resource stewardship.

Water and Wastewater Emissions (from the electricity required for operations): In unincorporated Orange County, water and wastewater operations comprise 1% of total emissions (10,658 MTCO2e). For County of Orange operations, water and wastewater comprise 0.2% of total emissions (1,703 MTCO2e).

Natural Resource Sector Workforce Analysis: Water Supply and Water Treatment Sector-related jobs decreased by 3,683 from 2018-2023 (-4.1%) in Orange County, less than the national growth rate of 4.4%. The Water Sector related occupations are projected to increase by 4,406 from 2023-2028 (5.1%), less than the national projected growth rate of 5.9%. Regional job concentration per capita for Water Sector related occupations is 0.95 times the national job concentration. In other words, there are 5% fewer Water Sector-related occupations in this region than we would expect to find in the average region. Cost of labor in the region is above median. The median earnings for Water Sector related occupations in the region is $27.05/hr., which is $1.54/hr. above the national median of $25.51/hr.

[26] Federal Emergency Management Agency, accessed on May 15, 2024, at https://www.fema.gov/emergency-managers/practitioners/environmental-historic/laws/descriptions.

NR1 – Improve Water Supply Reliability and Efficiency

Potential Action Items: NR1.1 — Maximize water use efficiencies in both outdoor and indoor applications at County-owned facilities. NR1.2 — Advocate for reduced water consumption throughout the County. NR1.3 — Optimize sanitary sewer systems to reduce energy usage and increase the availability of recycled water. NR1.4 — Improve the efficiency of drinking water treatment and distribution systems through collaboration with local water districts. NR1.5 — Promote the use of recycled water to add to local potable water supplies through collaboration with local water districts. NR1.6 — Protect and sustainably manage groundwater resources.	
Co-Benefits	

NR2 – Protect and Enhance Surface and Beach Water Quality

Potential Action Items: NR2.1 — Control man-made pollutants from developed areas to the maximum extent practicable. NR2.2 — Control man-made dry weather flows from the developed area to the maximum extent practicable. NR2.3 — Control wet weather flows to meet applicable and/or Municipal National Pollutant Discharge Elimination System permit criteria from developed areas to the maximum extent practicable. NR2.4 — Expand the use of water quality treatment systems with a focus on regional projects.	
Co-Benefits	

NR3 – Integrate Flood Management with Other Water Management Practices

Potential Action Items: NR3.1 — Promote channel restoration to support habitat and/or improved water quality. NR3.2 — Reduce erosion on canyons, rivers, streams and channels while supporting natural systems. NR3.3 — Improve conveyance and/or reliability of channelized flood control systems and remove properties from the 100-year floodplain. NR3.4 — Improve storm drain systems where historical flooding exists.	
Co-Benefits	

NR4 – Restore and Protect Ecosystems, Native Habitat and Natural Resources

Potential Action Items: NR4.1 — Increase the habitat for native terrestrial and aquatic species. NR4.2 — Remove invasive species that are a danger to habitat, water supply or other economic or beneficial use. NR4.3 — Increase the use of water quality treatment systems that also increase wildlife habitat and wetlands by restoring a natural water balance. NR4.4 — Preserve and enhance open space.	
Co-Benefits	

SECTOR 6 – RESILIENCE (R)

SECTOR GOAL: To develop a countywide climate vulnerability assessment that addresses hazards and extreme weather events including droughts, heatwaves, flood events, wildfires, etc. and uses it to guide priorities for investments in public health preparedness, emergency preparedness and response planning, and community resiliency. Develop a specific Coastal Resiliency Plan for Sea Level Rise, tsunamis and extreme flooding. Create a mechanism to facilitate reporting of incidents by residents/municipalities to help identify and address any chronic local flooding issues.

State and Federal Mandates: Local Hazard Mitigation Plans (LHMP) are required by FEMA under the Stafford Act, the federal law which authorizes most of the disaster response aid in the county. LHMPs identify hazards, such as earthquakes, fires, and floods, assess vulnerabilities to the hazards, and develop strategies to prepare for, respond to, and recover from hazards events. Cities and counties in California must address climate adaptation in their LHMP and General Plan Safety Elements, as per Senate Bill 379 (2015). Recent State legislation (Senate Bill 272, 2023) will require all local governments in the coastal zone to submit sea level adaptation plans by 2034.

Foundation: Current hazard and climate resilience planning efforts include the OC Transportation Authority's Climate Adaptation and Sustainability Plan, a Countywide vulnerability and opportunities assessment of tidal wetland habitat, a climate change vulnerability assessment of Caltrans District 12, and the County's LHMP—which has an update underway at the time of this publication. Hazard-specific work includes emergency response planning for excessive heat and cold through PrepareOC, a Drought Task Force led by OCPW, and Integrated Regional Water Manager Plans.

R1 – Support the Implementation of South Orange County Regional Coastal Resilience Strategic Plan and Related Efforts

Potential Action Items:

R1.1 — Map out the countywide distribution of climate risks including flooding, heat, wildfire, mud, debris, beach loss and coastal erosion.

R1.2 — Support streamline permitting processes to facilitate and enable rapid and opportunistic projects.

R1.3 — Prioritize flood channel improvements in consideration of the potential for risk reduction.

R1.4 — Complete resiliency assessment of airport to withstand climate related impacts such as heat, wildfire, increased severity of wind and storm events, and drought and identify infrastructure improvements required for airport to operate safely and remain a lifeline to the community in critical and disaster events.

Co-Benefits	

R2 – Improve Preparation for and Response to Hazard Events

Potential Action Items: R2.1 — Expand shade and cooling / warming facilities. R2.2 — Provide shelters for populations displaced by extreme weather including wildfires, floods and/or earthquakes. R2.3 — Review/revise plans for emergency management based on changing climate extremes (in consideration of updated climate risk mapping). R2.4 — Assess opportunities for brush clearing and creating fire breaks that can double as hiking trails, enhancing recreational access while improving wildfire prevention.	
Co-Benefits	

R3 – Improve Response to Disaster Health Orders

Potential Action Items: R3.1 — Conduct investigations of communicable disease reports or environmental factors affecting water safety, including but not limited to collection of water samples, analyzing test results and issuance of facilities closure orders for affected bodies of water warranting closure. R3.2 — Coordinate disaster medical and health resources. R3.3 — Issue Disaster Health Orders to coordinate county lifesaving efforts for high-risk/vulnerable populations.	
Co-Benefits	

Appendix A: County of Orange Departments and Recent Accomplishments

Orange County has already made significant strides in its commitment to a greener community. Recent accomplishments are noted below with their respective department, but the County has just begun its proactive assault on climate change.

Infrastructure

The County has made significant investments in infrastructure projects to improve its climate change, resilience, sustainability, and conservation efforts.

- The County opened County Administration South and County Administration North in 2019 and 2023, respectively. Both buildings, located in downtown Santa Ana, received LEED Silver certification. These buildings, along with the facelift of the County's entire Civic Center represent the largest County developments in decades.
- The County operates two Combined Heat & Power (CHP) facilities: the 10 MW Central Utility Facility (CUF) located in the Civic Center, and the 7MW Central Utility Plant (CUP) located at John Wayne Airport (JWA). Both plants recover the heat produced during electrical generation to power building heating and cooling equipment, achieving higher total fuel efficiency compared to a utility natural gas power plant.
- Frank L. Bowerman currently produces 380,000 megawatt-hours of renewable energy from waste-generated landfill gas; all of which is then used by Orange County residents and businesses.
- The County's Green Fleet Initiative has increased the proportion of electric vehicles (EVs) in its fleet to 13 percent, with plans to continue to expand this percentage as practically possible. This number includes Full electric, Hybrid/Plug-in Hybrid and CNG powered vehicles and forklifts/carts.
- The Dana Point Harbor Revitalization Project is modernizing one of the County's two harbor by mitigating water runoff from marine vessels.

Despite these substantial efforts, the County continues to evaluate further opportunities for green infrastructure investments. These initiatives aim to save taxpayer dollars and contribute to the mitigation of climate change impacts.

Infrastructure Green Workforce Projection: Within County, infrastructure jobs run across many agencies. Job postings can be found on the County website. With regards to the Infrastructure Green Sectors: The Bureau of Labor Statistics expects substantial job opportunities in the green sector related to infrastructure development by 2030. For example: *Green construction, including solar technicians, is projected to have a 68% increase by 2030. Electric Vehicle Charging Infrastructure needs are expected to create more than 160,000 jobs by 2032 across various cross sectors such as electrical, software, maintenance, repair, planning/design, administration, even legal. *Note, While Green Construction is projected to have growth, the general home construction workforce is forecast to level off or decline as housing production is projected to decline after 2024.

- Charging into the future: the transition to electric vehicles : Beyond the Numbers: U.S. Bureau of Labor Statistics (bls.gov)
- Green growth: Employment projections in environmentally focused occupations : Career Outlook: U.S. Bureau of Labor Statistics (bls.gov)
- Orange County Economic Forecast

OC Parks/ OC Public Libraries

OC Parks services both natural and manmade parks and trails as well as shoreline that encompasses over 60,000 acres within the county. OC Parks is home to its own zoo located within the 477-acre Irvine Regional Park. Coastal facilities operated by OC Parks include Capistrano Beach, Dana Point Harbor, Salt Creek Beach and Sunset Harbour. Millions of residents and visitors enjoy these amenities each year.

OC Parks is committed to managing its land and facilities in a way that maximizes public enjoyment while properly maintaining and overseeing the sites to ensure their accessibility for generations to come.

Recent Accomplishments

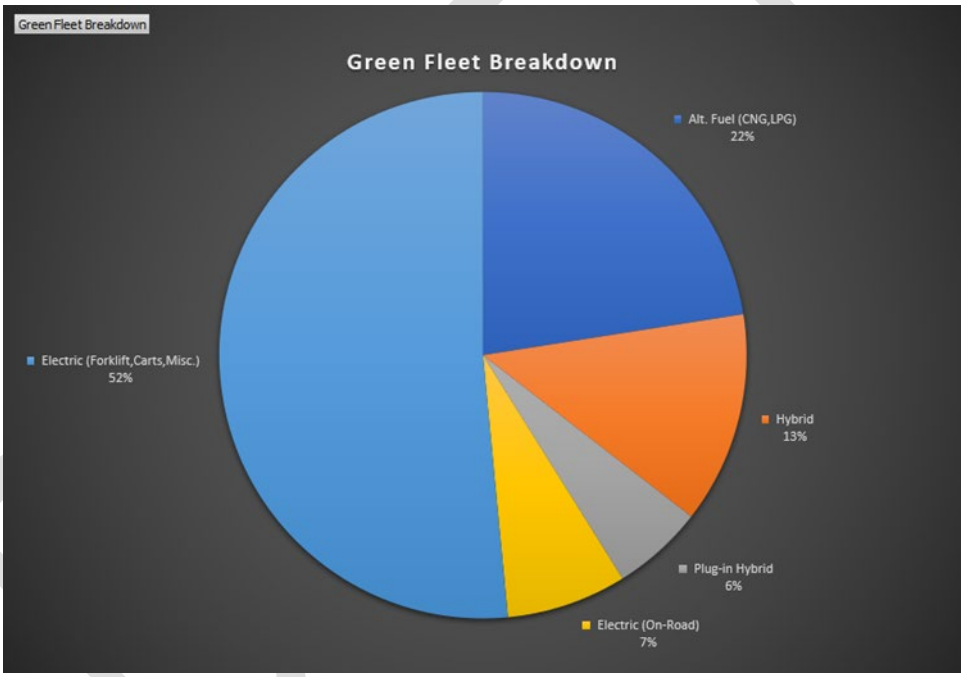
- Reviewing the replacement of heavy-duty trucks with light-duty electric trucks at County parks.
- On-going tree planting throughout County parks and open space.
- Completion of a LEED Silver Maintenance Yard.
- Upgraded lighting to title 24 requirements.
- Upgraded electrical and HVAC Systems for energy efficiency.
- Upgraded Building Automation Systems to control heating and cooling.
- Sink fixtures with auto-shutoff mechanisms and water-saving toilets and urinals.
- Drought tolerant landscaping and reclaimed water systems.

OCPL educates the public to encourage zero waste and sustainability. OCPL partners with OCWR to present workshops and children's events for the public on composting and recycling. The Library of Things programs encourage residents to borrow items rather than purchase them, example, musical instruments, garden tools, appliances, outdoor tools, party games, and equipment. OCPL presents programs on upcycled art/craft/fashion programs; give old clothes new life, create art using recycled materials, craft supplies swap for sustainability. Not only does OCPL support OCPW's implementation of recycling at all County buildings but it continues to apply for applicable grants around the topic of green initiatives, sustainability, climate change.

OC Public Works maintains and oversees 340 miles of critical roadways, 205 square miles of unincorporated land, 380 miles of flood channels, 4 dams and 7 pump stations. The department procures and services a fleet of over 3,000 County-owned vehicles and equipment; manages construction services for road and flood control capital improvement projects; oversees architectural and engineering services in support of vertical capital project and programs; oversees planning and development of project entitlement requirements; operates and maintains County and Orange County Flood Control District (OCFCD) public infrastructure; manages services for roads and flood control capital projects; and, performs all surveying and mapping services.

Recent Accomplishments

- The Environmentally Preferable Purchasing (EPP) Policy was adopted in 2022 and aims to provide information and tools to ensure that County of Orange agencies and departments actively research and purchase recycled and other environmentally preferable products and services whenever they meet the price and performance requirements of the County and reflect the lowest life-cycle cost.
- The Central Utility Facility infrastructure upgrade project was completed in 2018. Upgrades were made to the plant electrical, cooling and heating systems along with the replacement of failing distribution lines. These modifications resulted in a 20 percent to 30 percent efficiency improvement, improved resiliency and reduced emissions.
- Orange County has already converted 94% of forklifts with engines greater than 1 Brake Horsepower (bhp) to electric to be in compliance with CARBs large-spark engine (LSI) regulation with a
- 79% of all forklifts in the Counties fleet electric. See below for the County's current Green Fleet Breakdown.



- The Active Transportation Plan (ATP), "OC On the Move," was adopted in August 2023. The Plan was developed to enable walking and biking connections in its unincorporated areas and along OC Flood Control District channel maintenance roads. The Plan makes recommendations to greatly expanded the County's active transportation network by approximately 80 miles, thereby improving transportation equality for people of all ages and abilities, and ensuring interconnectivity between incorporated and unincorporated areas, key destinations, and public transit. The Plan built on numerous previous active transportation planning efforts, community engagement, and Orange County stakeholder input. This Plan focused on active transportation use in 28 unincorporated areas, and along 16 flood control channels in Orange County.
- The use of renewable energy such as solar has been implemented throughout the County and is currently producing a combined 5 million kilowatts of electricity annually at six different sites.

- Installation of water efficient features and the elimination of water services.
- The County currently has approximately 111 charging stations located throughout its jurisdiction. There is an EV Infrastructure Master Plan currently under development. The infrastructure needs will be site specific and driven by demand. The Draft EV Infrastructure Master Plan targets installing between 100-264 charging ports by July 2028. All solar opportunities will be evaluated to further reduce GHGs and reliance on public utilities.
- Incorporation of Leadership in Energy and Environmental Design (LEED) best practices. Three buildings have been completed to date that include both the County Administration North, County Administration South and Irvine Regional Park Maintenance Yard, LEED is the most widely used green building rating system in the world. Available for virtually all building types, LEED provides a framework for healthy, efficient, and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement and leadership. The LEED framework informs all building types including new construction, interiors, operations and maintenance, and core and shell.[i]
- OC Public Works is using low carbon alternatives to traditional concrete and asphalt materials, where applicable, for both in-house maintenance work and maintenance projects. This includes using Portland Limestone Cement (PLC) which lowers carbon impact by approximately 10% compared to Portland Cement. Staff is evaluating expanding the use of PCL on larger capital improvement projects. OC Public Works continues to use asphalt with approximately 20% recycled asphalt pavement (RAP) content for pavement maintenance. Staff has begun using asphalt with 100% RAP on small asphalt repairs and pothole repairs and will continue to evaluate for potential use on a larger scale.
- OC Public Works re-uses some of the dirt, rock, and sand materials removed from OCFCD channels, depending on quality. This reduces the need to produce/procure new materials and saves fuel associated with transportation of new materials. Staff is evaluating potential creating of a centralized stockpile site specifically for beach-quality sand which is important for coastal resilience.
- On a smaller scale, OC Public Works maintenance crews are in the process of phasing out gas-powered small tools in favor of battery powered tools. The team is also developing a tree replanting plan to help offset the loss of trees in unincorporated Orange County due to age, disease, and other impacts.
- OC Public Works has actively pursued Coastal Zone restoration projects including the recently completed Talbert Channel Living Shoreline project which served to stabilize the severely eroded bank of a flood control channel while creating a valuable large scale salt marsh habitat.

Planning Transportation Green Workforce Projection: The projected job growth for related urban and regional planner jobs in Orange County, California, aligns with national trends. From 2022 to 2032, employment in this field is expected to grow between 3% to 4%, which is about as fast as the average for all occupations. Within the County, OC Public Works has approximately 900 employees on their team dedicated to protecting and enriching Orange County communities through sustainable projects and services. Job opportunities with OC Public Works can be found on the County Careers website.

OC Waste &Recycling

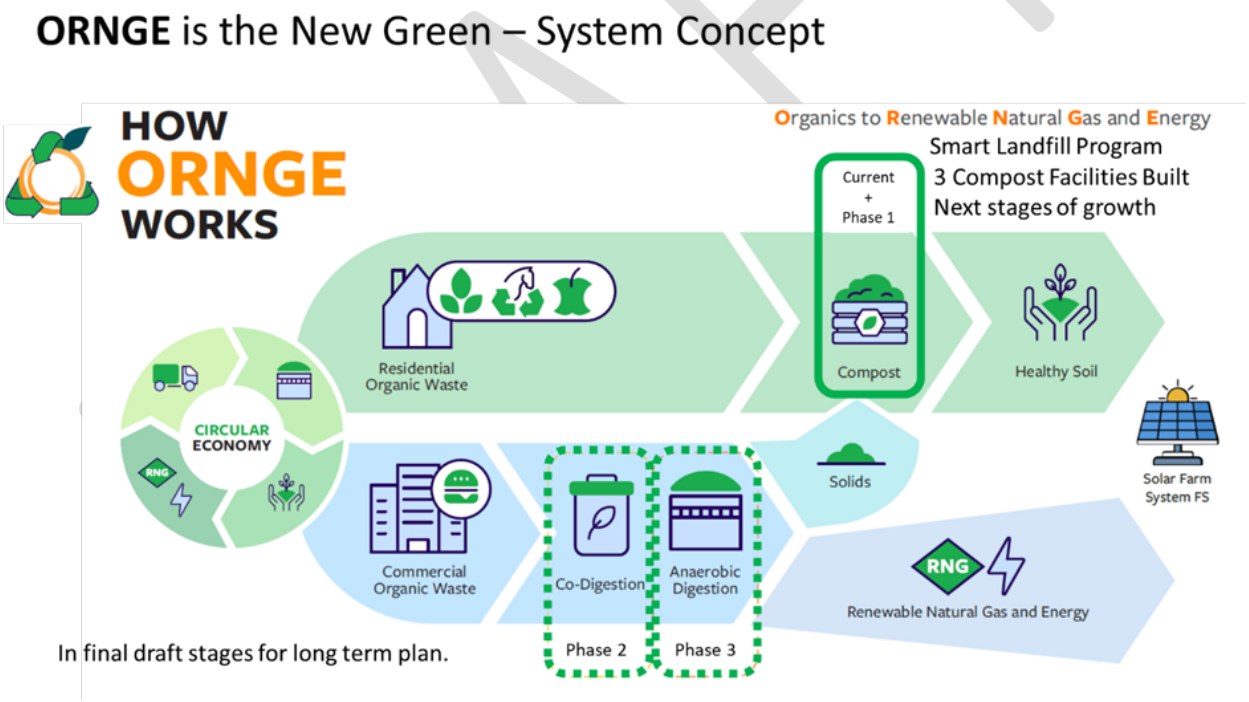
OC Waste and Recycling provides waste management services, operating and maintaining active and closed public landfills, resource recovery facilities, and household hazardous waste facilities with the purpose of protecting community health and safety. OC Waste and Recycling invests in renewable energy

enterprises while promoting recycling through outreach and education. The department receives more than four million tons of solid waste annually. OC Waste and Recycling also operates compost facilities in Irvine, San Juan Capistrano and Brea. The full-circle recycling program starts with curbside residential collection of green and organic waste that is turned into high-quality compost and mulch.

Recent Accomplishments

- Transitioned to 100% renewable diesel for all equipment, including heavy equipment.
- Leveraged public-private partnerships to generate over 350,000 megawatt-hours of renewable electricity at two landfill gas to electricity plants.
- Developed three commercial-scale compost facilities that were able to convert 19,259 tons of organic matter into healthy soils in 2023 while removing the greenhouse gases caused by organic waste decomposition inherent to landfills.
- Invested in landfill gas collection and control systems and related best available control technologies to greatly reduce air pollutants.

Orange is the New Green Initiative



Landfills have been identified as some of the largest methane emitters in United States. The disposal and decomposition of organic material, such as green waste and food waste, generates a methane-rich landfill gas. In response, California legislation, such as SB 1383, aims to reduce organic waste in landfills and thereby reduce landfill gas generation. Aligning with legislation, the OC Waste and Recycling (OCWR) has developed a phased approach for methane reduction.

The first phase involves building out three regional compost facilities. These facilities convert incoming residential green waste, food waste, manure, and other organic material into compost and mulch without generating methane. The resulting compost and mulch are then returned to the communities for healthy soil enrichment.

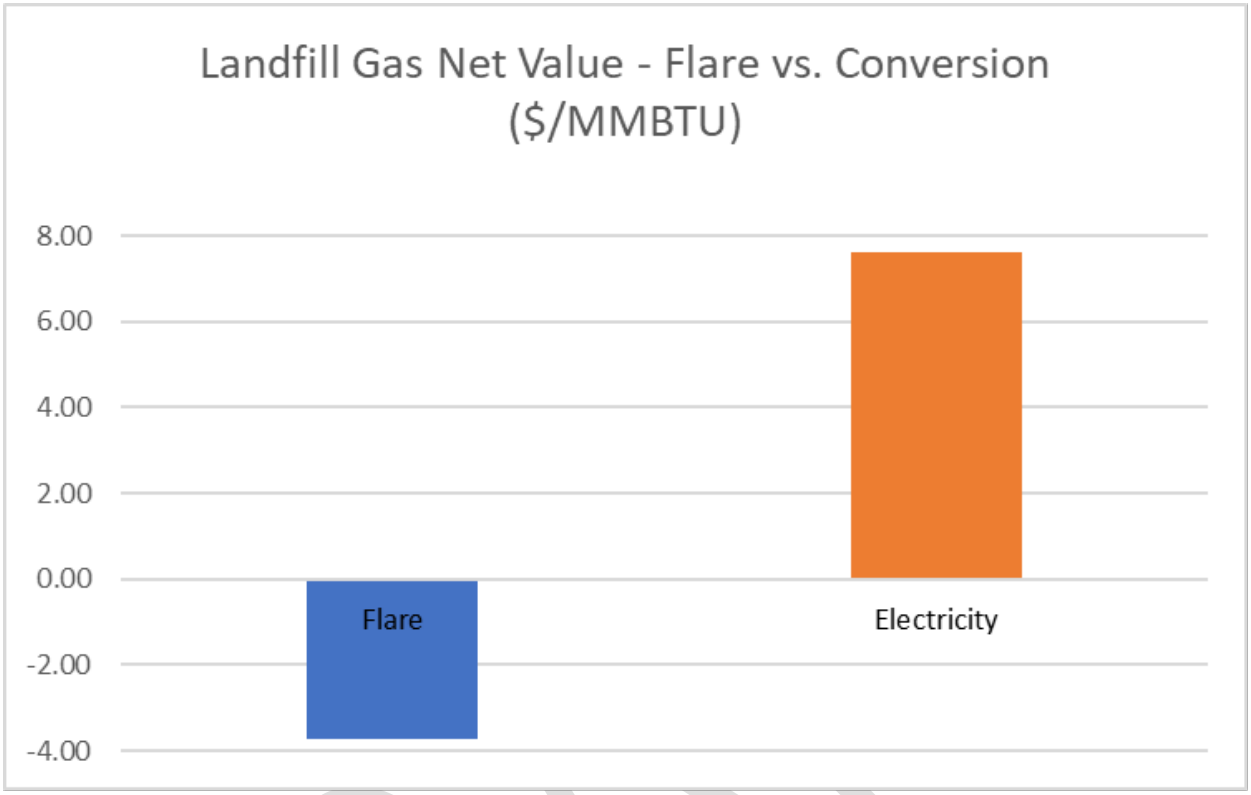
The second phase focuses on converting food waste into renewable natural gas and energy by utilizing local Wastewater Treatment Plant's (WWTP) existing anaerobic digestion infrastructure. The County plans to develop and operate food waste processing technology to deliver a suitable product to the WWTP, facilitating the digestion of waste and generation of renewable natural gas and renewable energy products.

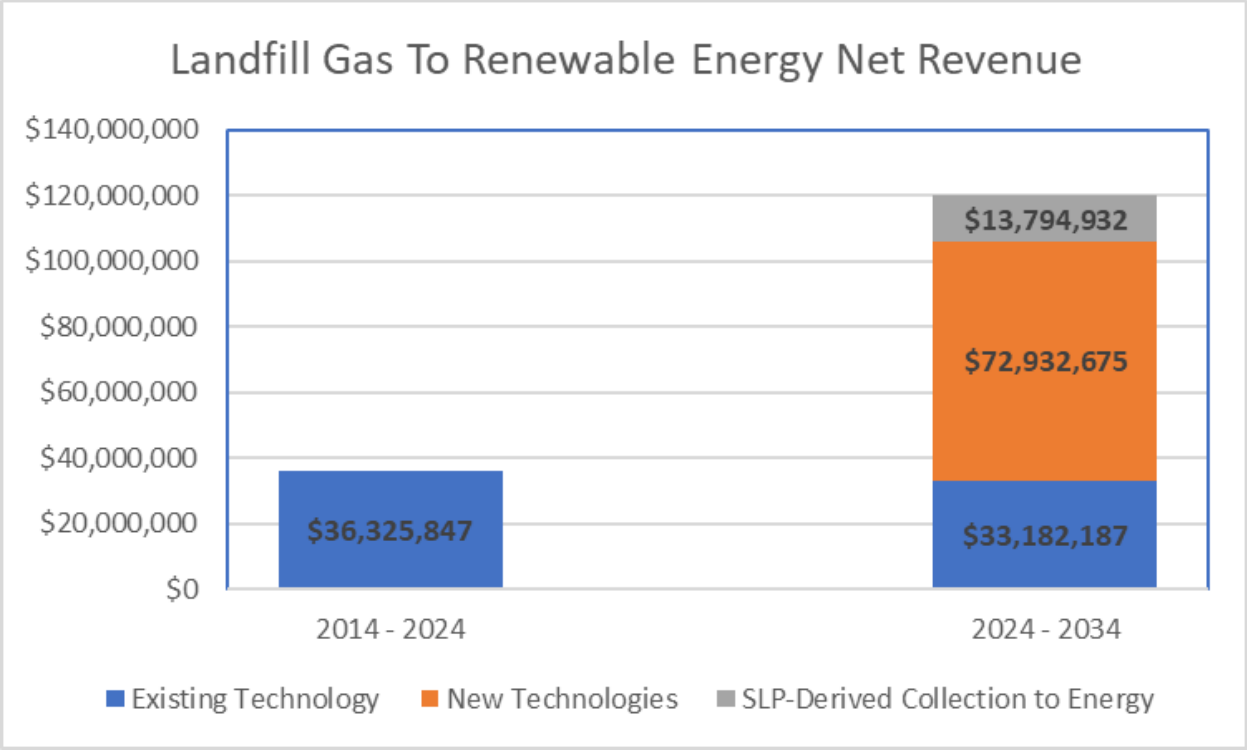
The third phase ensures that the region's organics recycling needs are met by constructing regional anaerobic digesters, which convert organics to renewable natural gas and energy. The residual waste from this process will be integrated back into the compost infrastructure built in the first phase.

Simultaneously, OCWR is implementing a Smart Landfill Program to enhance and automate critical information and equipment for increased landfill gas collection. This program incorporates real-time data assessment, drone technology, and infrared technology to monitor and manage the landfill system, predicting maintenance needs and enabling real-time adjustments to the landfill gas collection and control system. These advancements will reduce methane emissions while increasing the amount of methane collected for conversion into renewable natural gas and energy.

The County's organics recycling phases and Smart Landfill Program are generating new fuels and energy products. County agencies are collaborating to assess the feasibility of decarbonizing county buildings and infrastructure with these new County-generated energy products.

Energy savings





OC Sheriff's Department

OC Sheriff's Department is among the largest in the nation, providing exemplary law enforcement services focused on a collaborative, dedicated and innovative approach to public safety. The Department has nearly 4,000 sworn and professional staff all committed to serving the needs of Orange County through six organizational Commands comprised of 23 Divisions. Together, these Commands and Divisions provide services including land, air and sea-based patrol, custody operations, investigative services, emergency management, coroner services, forensics and specialty operations, among an extensive list of other public safety services.

Recent Accomplishments

- Completion of the state-of-the-art James A. Musick facility; an 896-bed facility designed to meet the needs of an evolving jail population.
- Conversion of all lighting to LED.
- Review of vehicle fleet for electric utilization potential and infrastructure needs.
- The Emergency Management Division promotes, facilitates and supports the County of Orange and the Operational Area (OA) efforts to prepare for, respond to and recover from disasters.
- The division provides emergency management and preparedness services to the unincorporated areas of Orange County and supports the efforts of the Orange County Operational Area. There are currently over 100 jurisdictions in the Operational Area (OA) encompassing all County departments and agencies, public and private organizations and the general population within the boundaries of Orange County.

John Wayne Airport

John Wayne Airport (JWA) is owned and operated by the County of Orange. JWA is the only commercial service airport in Orange County, California. The Airport is located approximately 35 miles south of Los Angeles, between the cities of Costa Mesa, Irvine, and Newport Beach. The service area includes more than three million people within the 34 cities and unincorporated areas of Orange County. Approximately 11.3 million annual passengers were served by JWA in 2022 including 314,000 international travelers.

JWA completed its own Climate Action Plan in December 2017 with approval obtained in 2018. Reduction measures target energy, airside equipment and sources, ground transportation, and solid waste. The airport is a unique entity overseen by the County of Orange. It has aircraft emissions, ground equipment, passenger trips and shuttle buses, restaurants, and baggage operations. This Draft CAP will include GHG emissions and reduction initiatives for JWA. The airport's initiatives are being subsumed into this CAP to provide for one comprehensive document for the County of Orange's municipalities. This integration aims to streamline efforts and provide a cohesive approach to climate action across the County. Please refer to Appendix X for a complete copy of the JWA's Climate Action Plan.

Recent Accomplishments

As noted above, JWA approved its own Climate Action Plan in 2018. JWA has long practiced sustainability efforts to reduce its environmental footprint and in the past 5 years has increased focus on greenhouse gas emission reduction. Recent initiatives and efforts include the following:

Waste diversion from landfills is accomplished through focused efforts on waste reduction, separation of recyclables and organics from landfill waste, edible food recovery, and a 90% recycle goal for applicable construction projects. In a recent enhancement, the airport renovated and outfitted a dedicated a room with refrigeration, with the support of a CALRecycle Grant, for enhanced edible food recovery from restaurants to bring food that would otherwise go to waste to the food insecure of Orange County.

Mobile Source Emissions Reduction is being accomplished through:

- Continued provision of power and pre-conditioned air to aircraft while parked at the terminal so that hydrocarbon burning auxiliary power units on the aircraft can be turned off while at the gate.
- Upgrading electric service at the Airport and the commercial ramp to support new chargers to accelerate the replacement of diesel ground support equipment (GSE) supporting aircraft refueling and baggage loading with electric (eGSE). The current eGSE fleet reduces carbon dioxide equivalent emissions (CO2e) by over 3,400 metric tons/year than if no eGSE were in use.
- Purchase of five zero emission shuttle buses (50% of fleet) to replace compressed natural gas buses for passenger and guest shuttle operations to the airport remote lot. Complete electrification of the shuttle fleet is planned in the near future.
- Construction of a fuel pipeline to bring jet fuel to the airport removes over 38 daily fuel truck trips from the roads, approximately 530 metric tons CO2e annually.
- Ongoing replacement of fleet vehicles with low or zero emission vehicles.

Ongoing emission reductions associated with energy use is supported by a new policy for green project design and construction, requiring interior retrofit projects to meet California Building Code Title 24 (CALGreen) Tier 1 standards (equivalent to LEED Gold) and linear infrastructure projects to address Institute for Sustainable Infrastructure's Envision Gold criteria. This policy assures that energy efficiency improvements are continual through routine renovations and replacement of electrical mechanical equipment with more energy efficiency version along. Recent specialty projects have addressed airfield lighting, elevators and escalators, and other electric motors and drives.

The General Aviation Improvement Project at the airport involving the redevelopment of 60 acres by fixed based operator tenants, will be built out to meet a minimum of CALGreen Tier 1 and Envision Gold. This will ensure energy and water efficient facilities equipped with the latest equipment to support a lower GHG future. These areas additionally will be building advanced stormwater treatment systems to reduce pollutants in stormwater runoff to Newport Bay.

A Green Concession Program being launched this year is designed to incentivize Airport concessions to operated sustainably focusing on edible food recovery, organics diversion, environmentally preferable purchasing, recycling, environmentally safe cleansers, and waste reduction among other measures.

John Wayne Airport Green Workforce Projection: John Wayne Airport (JWA) has approximately 125 employees. JWA has a Sustainability unit with staff dedicated to environmental sustainability that addresses operational best practices in accordance with environmental regulations and policy. Growth projection data specific to JWA is not available, however job opportunities can be viewed on the website.

OC Health Care Agency

HCA is a regional provider, charged with protecting and promoting individual, family, and community health through coordination of public and private sector resources. The HCA provides a variety of preventive and regulatory services. The funding for the HCA is complex, with 171 different funding sources. The state and federal mandates under which the HCA operates require the County of Orange to provide for or regulate certain health services. Many also carry specific requirements for staffing, operations, claiming and recordkeeping.

Recent Accomplishments

The HCA CalFresh Healthy Living (CFHL) program as part of the Supplemental Nutrition Assistance Program Education (SNAP-Ed) program, supports healthy, active, and nourished lifestyles through community and school garden efforts.

The HCA Safe Routes to School (SRTS) program conducted trainings for Walk to School Day coordinators and distributed 123 Walk to School Day Tool Kits.

The HCA Environmental Health Division collected 309,841 gallons of used oil and 84,050 oil filters through community exchange events with participating cities throughout Orange County focusing the efforts on reducing and eliminating unlawful disposal of motor oil while increasing community awareness to pollution prevention.

The HCA Environmental Health Division conducted 476 inspections and investigations of waste tire management of all regulated businesses that generate waste tires under Cal Recycle.

The HCA Childhood Lead Poisoning Prevention Program Public Health Nurses provided education and care coordination for 1,368 individuals with elevated blood lead levels. Environmental Health conducted 24 environmental and complaint investigations, three clearance inspections, and worked on 16 continued lead remediation efforts.

The HCA Environmental Health Division conducted 515 active solid waste facility inspections including witnessing the organic waste sampling, observing proper recordkeeping, and reporting to Cal Recycle.

The HCA Communicable Disease Control Division and Environmental Health worked in partnership to conduct nine legionella investigations, collect water samples, analyze test results, and/or issue facility closure orders to bodies of water.

The HCA Emergency Medical Services coordinates disaster medical and health resources.

Appendix B: Summary of Public Feedback

Six public forums were held in June 2024, where participants provided feedback on the Preliminary CAP's. Public feedback was also gathered through email. Comments are summarized below by Preliminary Plan Sector; the "Source" column refers to where the comment was heard, using the following abbreviations:

- F1: Forum 1, June 17, 2024 – Los Olivos Community Center – Irvine; District 5
- F2: Forum 2, June 18, 2024 – OC Sailing & Event Center – Dana Point; District 5
- F3: Forum 3, June 24, 2024 – Brea Community Center – District 4
- F4: Forum 4, June 25, 2024 – County Administration Building – District 2
- F5: Forum 5, June 25, 2024 – Heritage Park Library, Irvine – District 3
- F6: Forum 6, June 27, 2024 – Freedom Hall at Mile Square Park – District 1

ENERGY SECTOR		
Feedback	**Response**	**Source**
Is the County moving to LEED certification? Should pursue LEED platinum in County buildings	Currently included in Plan, see *Potential Actions E1.2* and *E1.3*	F1
Add solar canopies at County facilities	Currently included in Plan, see *Draft Measure E3*	F1, F3
While energy costs were not a burden on all participants, they were identified as a strain in several forums. One indicated that the strain is so severe that they had to cut groceries when the electric bill is high. It was also noted that utility costs have grown.	Comment will be incorporated into next version of the Plan	F2, F3, F4, F5, F6

ENERGY SECTOR		
Feedback	**Response**	**Source**
While some participants proactively switched their appliances to electric, many people wait until the appliance breaks.	Comment will be incorporated into next version of the Plan	F1
Need more information and clarification about tax credits for solar, and other incentives for building decarbonization	Currently included in Plan, see *Potential Action E4.6*	F1, F5
Need examples of how solar homes work, there is confusion about the best approach. Need for improved understanding of solar lifespan and maintenance needs, and how solar works in conjunction with SCE	Comment will be incorporated into next version of the Plan	F2, F3, F4, F5
Building codes should favor carbon neutral options	Currently included in Plan, see *Potential Action E4.7*	F1
Renters interested in solar panels and energy efficiency upgrades do not have the ability to make building improvements. Need clarification and guidance for landlords.	Currently included in Plan, see *Potential Action E4.4*	F1, F4, F5, F6
Expand solar incentives	Currently included in Plan, see *Potential Action E4.3*	F4
Install solar in parking lots	Comment will be incorporated into next version of the Plan	F4
Constraints to install solar identified in townhome design, HOA regulations, and mobile home parks	Comment will be incorporated into next version of the Plan	F1, F5, F6

ENERGY SECTOR		
Feedback	**Response**	**Source**
Finding local and reputable contractors is a barrier to solar installation	Comment will be incorporated into next version of the Plan in *Draft Measure 4* and/or *Draft Measure EJ5*	F2
Contradictory opinions about buying solar panels vs. leasing	Comment will be incorporated into next version of the Plan in Draft Measure 4	F2
Cost a barrier for household solar and battery storage	Comment will be incorporated into next version of the Plan in *Draft Measure 4*	F4, F5, F6
Costs of housing maintenance (i.e. asbestos removal, roof replacement) preventing energy upgrades	Comment will be incorporated into next version of the Plan in *Draft Measure E4*	F3, F4, F5
Explore other renewables such as geothermal.	This concept is not being considered currently	F1
Ways to have a Greener OC include joining/rejoining Orange County Power Authority (OCPA)	Comment noted	F3, F4, F5, F6
Includes hydrogen blending	Comment will be evaluated in next version of Plan	F6
Consider incentivizing electrification through OCHA	Comment will be incorporated into next version of Plan	F3
The community needs access to microgrid storage.	Comment will be evaluated in next version of Plan	F1

MOBILITY SECTOR		
Feedback	Response	Source
Up-front costs were identified as barriers to EV ownership at all forums	Comment will be incorporated in future versions of Plan	F1, F2, F6
Lack of access to charging was identified as a barrier to EV use in all forums	Comment currently included in Plan, *see Draft Measure M2*	
Lack of access to charging infrastructure for renters specifically was highlighted as a gap	Comment will be incorporated into future version of Plan in *Draft Measure M2*	F1, F2, F6
Charging at work should also be an option since it's during hours when renewables can be maximized; workplace identified with an EV charger from funds from the Inflation Reduction Act	Comment will be incorporated into future version of Plan in *Draft Measure M2*	F1, F6
Need more EV chargers in public places	Comment currently included in Plan, *see Draft Measure M2*	F3, F6
Many respondents stated safety concerns as a barrier to biking, need for better protected bike lanes, vegetative buffers	Comment will be incorporated into future version of Plan in *Potential Action M5.1*	F1, F2, F6
Safety concerns also expressed as a barrier to walking, requesting more vegetative buffers and improved connectivity across open spaces	Comment will be incorporated into future version of Plan in *Potential Action M5.1*	F2
Need expanded bike lanes, some specific locations identified such as lane around Mile Square Park	Comment currently included in Plan, *see Potential Action M5.1*. Specific locations will be discussed when developing an implementation plan for the final Action.	F4, F6

MOBILITY SECTOR		
Feedback	Response	Source
Need safe bike storage at end destinations	Comment will be incorporated into future version of Plan in *Potential Action M5.1*	F6
One suggested strong quantifiable VMT targets to hit, especially in low-income communities.	Comment currently included in Plan, see *Draft Measure M4*, *M5*, and *EJ4*	F1
Need more rail to connect to LA Metro, suggested building rail rather than expanding freeways	Comment will be considered for future version of Plan	F1, F2
Request for expanded bus service	Comment currently included in Plan, see *Potential Action M5.2*	F1, F6
Change the perception that public transit is not safe.	Comment will be incorporated into future version of Plan in *Potential Action M5.2*	F1
Look at the Laguna Beach van service.	Comment will be considered for future version of Plan	F1
High-density housing should be near amenities and public transit.	Comment currently included in Plan, see *Potential Action M5.4* and *Draft Measure EJ4*	F1
Build Regional Housing Needs Allocation up, not out.	Comment currently included in Plan, see *Potential Action M5.4*	F1
Request for free buses	Comment will be considered for future version of Plan	F2

MOBILITY SECTOR		
Feedback	Response	Source
Better information on bus routes, more frequent bus routes and some type of link to Union Station and the IE is needed.	County will work with OCTA to investigate including in next version of Plan	F2
Two respondents adamantly said they would not recommend an EV	Comment noted	F2
One respondent said nothing would convince them to carpool	Comment noted	F2
Environmental concerns with creating (and then ultimately disposing) of large batteries, need better disposal options	Comment noted and County agrees, will support future efforts to improve production and disposal of batteries	F2, F5

RESOURCE RECOVERY AND WASTE		
Feedback	Response	Source
Green bins are a waste of resources and money in Irvine. The green waste creates odor. May be more useful if it can be picked up every 2-3 days.	Comment noted	F1
Many questions about whether recycled materials are actually being recycled.	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F1
Multiple comments (including unincorporated residents) requesting more information about curbside composting operations	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F1
Confusion expressed about difference between organic and recyclable in F1. In F2, respondents said they were aware of recycling goals and indicated that they knew they were required to put food in the green waste.	Comment currently in Plan, see *Potential Action RRW1.3*	F1, F2
Question about whether Cal Recycle has a dashboard to see how cities are doing with 1383 compliance?	Comment will be considered for future versions of Plan	F1
Inconsistencies noted in which communities have or have not received separate bins for green waste (Tustin has not)	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F1
Numerous requests for more information about disposal, including which plastics are recyclable, bioplastic composting, e-waste education, and general recycling guides of what goes where and what cannot be recycled at all	Comments will be considered in developing the implementation for *Potential Action RRW1.3*	F1, F3, F6
Mixed responses in awareness that the County gives away free mulch and compost	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F1, F2, F6

RESOURCE RECOVERY AND WASTE		
Feedback	**Response**	**Source**
Need education (start with young people) on the importance of sorting trash and a penalty system for not complying	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F2
Building complexes were identified that have no recycling or green waste programs	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F6
Outreach requested at mobile home parks	Comment will be incorporated into future version of Plan in *Draft Measure RRW1*	F6

ENVIRONMENTAL JUSTICE		
Feedback	Response	Source
Incorporate the job training into high school certificate programs to lead to OC jobs straight out of HS	Will consider comment in future versions of Plan in *Draft Measure EJ5*	F1
More cities need programs like Costa Mesa Bridge Program	Will consider comment in future versions of Plan in *Draft Measure EJ5*	F1
Unfamiliarity with energy efficiency rebate programs, need expanded outreach and education	Will incorporate comment into future version of Plan in *Draft Measure EJ3*	F1
Creation of community gardens	Will incorporate feedback into future version of Plan in *Draft Measure EJ1*	F1, F6
Creation of youth advisory groups similar to LA County	Will consider comment in future version of Plan	F1
Community pools should be opened	Will consider comment in future version of Plan	F2
Trash and debris along the street make it hard to walk and exercise	Will incorporate feedback into future version of Plan in *Draft Measure EJ2*	F2
Plant more trees/tree canopies was suggested several times	Comment currently in Plan, see *Draft Measure EJ1*	F2, F4, F6
Add more parks and outdoor events	Comment currently in Plan, see *Draft Measure EJ1*	F2

ENVIRONMENTAL JUSTICE		
Feedback	Response	Source
Assistance needed for low-income residents make energy efficient purchases, including appliances; need expanded outreach and education	Will incorporate comment into future version of Plan in *Draft Measure EJ3*	F4, F6
Mixed familiarity with County's workforce training programs	Outreach and education will be included in implementation planning for *Draft Measure EJ5*	F6
Suggested multi-lingual training programs	Comment will be included in future version of Plan in *Draft Measure EJ5*	F6
Mixed awareness of assistance through OCPA and SCE		F6
Help incentivize community buildings		F5
Moving oil drilling away from homes, assist communities remove lead from soil		F6
F1: Emotional anxiety, indoor air pollution, asthma (caused by methane gas-powered buildings), and chronic cough. F2: Heat and asthma and allergies were the health problems encountered. F6: Health problems include heat stroke, poor air quality, and health impacts from pesticide use.	Comments will be considered in future iteration of Plan	F1, F2, F6

NATURAL RESOURCES		
Feedback	Response	Source
Use drought-friendly plants	Comment will be considered in future version of Plan in *Draft Measure NR4*	F1
More green spaces in low-income areas	Comment currently in Plan, see *Draft Measure EJ1*	F1
Challenges include greenwashing and invasive species	Comment noted	F1
Challenges identified of pollution, pesticides, run-off, and harmful chemicals, need for regulation	Comment noted	F1, F6
Terraces over garages can creates gardens, shading and allow for charging.	Comment will be considered in future version of Plan	F1
Mustard removal will allow for more native plants and animals to move in.	Currently included in Plan, see *Potential Action NR4.2*	F1
Create Miyawaki urban forests to assist with biodiversity.	Comment will be considered in future version of Plan	F1
F1: The most important ecosystems are the watersheds, oceans, beaches, OC Parks, state parks, wetlands and chaparral. F2: The most important natural resources are the beach, mature trees, flowing water in the Trabuco watershed, poppies in open spaces, chaparral shrubland, riparian corridors, Laguna Canyon and greenbelt, Laguna Beach and Marine Protected Areas.	Comment noted	F1, F2

NATURAL RESOURCES		
Feedback	Response	Source
F2: The biggest threats facing our natural resources were coastal erosion, tree removal, invasive plants, and geothermal solar radiation management.	Comment noted	F2
Policies or initiatives you would like to see implemented include more laws and protections of shared space, more protected green space, more enforcement and awareness about regulations pertaining to natural resources and outreach to get citizens involved in environmental stewardship	Will be considered in next iteration of Plan	F5
The most important natural resources are Mile Square Park, Santa Ana River, Chino Hills State Park and Coyote Creek.	Comment noted	F6
Ideas to promote environmental stewardship include getting children involved	Will consider comment in future version of Plan	F6
Mixed responses in attendees who have implemented water conservation practices	Comment noted	F6
Challenges facing our natural resources include citizens not clearing their brush or being responsible with their trash, over building our region, and bark beetles.	Comment will be considered in future version of Plan	F6
Replace concrete with green space	Reference with measure in EJ	F5
Expand OC groundwater replenishment system to all of OC	Comment noted, and will be investigated in future version of Plan	F5

NATURAL RESOURCES		
Feedback	**Response**	**Source**
Re-naturalization of the Santa Ana River in collaboration with the Indigenous people	Comment noted and will be considered in future version of Plan	F5
Multiple comments to fund Indigenous people to restore their land and conserve natural resources	Comment will be incorporated into future version of Plan	F5, F6

RESILIENCE		
Feedback	Response	Source
County should coordinate with schools to use them as cooling centers in the summer; encourage public spaces with cooling centers during heat waves for less individual strain and more socialization.	Comment will be incorporated into future version of Plan in implementation for *Potential Action R2.1*	F1, F2, F6
County should create a Youth Think Tank on Climate Change	Will consider comment in future version of Plan	F1
Increase funding for cities to plant drought-resistant plants	Comment will be considered in future version of Plan in *Draft Measure NR4*	F1
Difficult to use air conditioner during extreme heat	Comment will be incorporated into future version of Plan in *Potential Action R2.1*	F1
How is Sea Level Rise risk being considered? SLR mitigation plans are critical	Comment will be incorporated into future version of Plan	F1
Beach restoration and erosion prevention stated in several meetings, such as sand dune restoration.	Comment will be incorporated into future version of Plan	F1, F2
Feedback on emergency response communications. Requesting reverse 911 alerts from the County. Information regarding emergencies is received from local news. Suggested emergency response calls in English and Spanish. One respondent gets their news from Nixie in Laguna Beach	Comment will be considered in future version of Plan in *Draft Measure R2* and *R3*	F1, F2
Two respondents have personal to-go bags ready and know to only take one car	Comment will be considered in future version of Plan in *Draft Measure R2* and *R3*	F1

RESILIENCE		
Feedback	Response	Source
Develop resilience hubs in EJ communities	Comment will be incorporated in future version of Plan	F1
Develop prevention goals rather than just reactionary measures.	Comment will be incorporated into future version of Plan	F1
No concerns about SLR, only concerns about erosion	Comment noted, and County will explore education on sea level rise and erosion	F2
Water reduction ideas shared, including changing systems to drip irrigation, removing grass, water-conservation appliances, more information on local ecology	Comment will be considered in future version of Plan in *Draft Measure NR4*	F2
Update County's emergency plan	Currently included in Plan, see *Draft Measures R2* and *R3*	F2
Respondents stated that the go to the library or the beach during extreme heat	Comment will be incorporated into future version of Plan in *Potential Action R2.1*	F6
Educating community about the County's resiliency plans	Comment will be incorporated into future version of Plan	F6
Gets information from Alert OC, one through phone alerts, others through the news and social media	Comment will be considered in future version of Plan in *Draft Measure R2* and *R3*	F6
F1: The County is most vulnerable to fire and drought. F2: Community is most vulnerable to climate change from coastal erosion at San Clemente and Laguna	Comments noted	F1, F2, F6

RESILIENCE		
Feedback	Response	Source
Beach blufftop erosion, flooding, fires, air pollution contributing to chronic cough, biodiversity and habitat loss, increase of predators and invasive plants. F6: Respondents felt most vulnerable to flooding, extreme heat, fires, and poor air quality.		

Appendix C: Unincorporated Orange County Greenhouse Gas Emissions Inventory and Forecasts Methods

C.1: Purpose

This Appendix describes the greenhouse gas (GHG) accounting and projections methods for community and municipal activities in calendar year 2018 for Unincorporated Orange County (henceforth referred to as "the County" unless otherwise specified). The baseline year of 2018 was selected due to the availability of complete and accurate data. This year serves as the reference point for measuring progress in reducing GHG emissions over time. It also presents methods for the business-as-usual (BAU) and Adjusted BAU forecasts for 2030 and 2045. The document is organized into four sections corresponding with the following objectives:

Section B.2: 2018 Community Greenhouse Gas Emissions Inventory

This section describes the methods for estimating baseline GHG emissions from Community activities and sources and presents the emissions inventory for the year 2018. The Community inventory includes emissions from on-road transportation, electricity, natural gas, solid waste, refrigerants, off-road equipment, water, wastewater, rail, and agriculture emissions. The inventory also includes an estimation of the 2018 carbon stock from natural and working lands (NWL).

Section B.3: 2018 Municipal Operations Greenhouse Gas Emissions Inventory

This section describes the approach for estimating baseline GHG emissions from Municipal operations and presents the emissions inventory for the year 2018. The Municipal operations inventory includes emissions from electricity, natural gas, on-road vehicles, off-road equipment, landfills, water, wastewater, and employee commute.

Section B.4: 2018 to 2045 BAU & Adjusted BAU Forecasts

This section describes the approach for modeling both Community and Municipal BAU and Adjusted BAU scenarios, which projects future emissions based on current population and regional growth trends, land use growth patterns, and regulations or policies. The BAU scenarios demonstrates the growth in GHG emissions that would occur if no further action were to be taken by the County or the State of California after 2018. Like the standard BAU forecast, the Adjusted BAU forecast provides an estimate of future emission levels based on the continuation of existing trends in demographic growth (such as population and housing), activity or resource consumption (such as electricity use), technology changes, and regulation. Unlike the BAU forecast, the Adjusted BAU forecast accounts for expected outcomes of federal and state regulatory actions.

Introduction

This appendix provides a comprehensive greenhouse gas (GHG) emissions inventory for the County, using 2018 as the baseline year and projecting emissions for 2030 and 2045. The inventory follows established protocols to ensure accurate and reliable data, including the Local Government Operations Protocol (LGOP) and the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC). The GHGs

accounted for in this inventory include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and hydrofluorocarbons (HFCs). The two frameworks below are from the *Greenhouse Gas Protocol*:

Scopes Framework: This framework captures GHG emissions produced within a geographic boundary by categorizing emissions as scope 1, 2, and 3 emissions in each Sector:

- Scope 1: Emissions produced from activities and sources within the entity's boundaries.
- Scope 2: Emissions generated from the use of grid-supplied electricity, heat, steam and/or cooling within the entity's boundaries; and
- Scope 3: Emissions occurring outside the entity's boundaries due to activities taking place within the entity's boundaries.

City-induced Framework: This framework measures GHG emissions attributable to activities and sources within a geographic boundary and covers selected scope 1, 2, and 3 emissions from each sector. This framework offers two reporting levels:

- **BASIC:** Includes emissions from in-boundary transportation, building energy, and in-boundary generated waste.
- **BASIC+:** Includes all BASIC requirements as well as emissions from transmission and distribution grid losses; transboundary transportation; in-boundary generated waste emission sources; industrial processes and product use (IPPU); and agriculture, forestry, and other land use (AFOLU).

The 2018 GHG emissions inventories for the County use the City-induced BASIC+ Framework with global warming potential (GWP) values from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5)[27], unless otherwise specified. The inventory is prepared using sector-specific generation and resource consumption data for relevant subsectors included in the BASIC+ protocol. The accounting methods, data sources, and emission factors used for accounting 2018 emissions are detailed in the subsequent sections.

C.2: 2018 Community Greenhouse Gas Emissions Inventory

The Community GHG emissions inventory for the County quantifies annual emissions from various activities occurring within unincorporated Orange County, including emissions that occur indirectly because of those activities. The sectors included in the Community inventory are:

- On-Road Transportation
- Off-Road Equipment
- Rail
- Energy (Electricity and Natural Gas)

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[27] IPCC, Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. 2014. Available at: https://archive.ipcc.ch/report/ar5/syr/. Accessed January 2021.

- Solid Waste
- Water
- Wastewater
- Agriculture
- Large Stationary
- Refrigerants
- Natural & Working Lands

The sector-specific methods and emissions inventories are presented below.

Energy

This sector includes emissions from energy use (electricity and natural gas) in residential and non-residential (commercial/institutional/agricultural, and manufacturing/industrial) buildings. Table C.2-1 breaks down the activity use of energy for each sector. Table C.2-2 presents the emission factors used for each utility.

Table C.2-1. 2018 Energy Use and Emissions

Energy Sector	Activity Data	Activity Unit	Emissions ($MTCO_2e$)
Electricity*	577,817	MWh	142,889
Residential Electricity	405,156	MWh	102,712
Non-Residential Electricity	172,661	MWh	40,177
Natural Gas*	28,346,855	Therms	150,791
Residential Natural Gas	14,558,062	Therms	77,479
Non-Residential Natural Gas	13,788,793	Therms	73,312
Total			293,681

*Categorical totals for residential and non-residential emissions and activity data

Table C.2-2. 018 Energy Emission Factors

Utility / Fuel	Emission Factor	Units
SCE	513.0	lbs CO_2e per MWh
SDG&E*	664.0	lbs CO_2e per MWh
Residential/Commercial Natural Gas	11.73	lbs CO_2e per therm
Industrial Natural Gas	11.71	lbs CO_2e per therm

*Only residential buildings used SDG&E as a utility provider

Residential Energy

This category includes direct emissions from the consumption of natural gas and indirect emissions from grid-supplied electricity consumed by residential buildings in the County. Direct GHG emissions from natural gas consumption in residential buildings are calculated using SoCalGas natural gas consumption data and emission factors from the Climate Registry. Indirect GHG emissions from electricity consumption in residential buildings are calculated using data provided by Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), including electricity consumption, emission factors, and power mix. Emissions associated with transmission and distribution losses are accounted using a loss factor of 4.8 percent for California from the EPA's eGRID2018 Summary Table (WECC California subregion).

Data Sources

- Natural gas and electricity consumption data provided by SCE, SoCalGas, and SDG&E
- SCE Emission Factor. Link: https://download.edison.com/405/files/202210/eix-2019-sustainability-report.pdf?Signature=C%2FLXTmp3RyIVj7GAopHQ8Wh71ro%3D&Expires=1720782849&AWSAccessKeyId=AKIAJX7XEOOELCYGIVDQ&versionId=8AL2Z6HFhJxphTqpplKQMwL.gwrjmTPi&response-content-disposition=attachment
- SDG&E Emission Factor. Link: https://csr.sempra.com/wp-content/uploads/sempra_csr_2022_rgb.pdf
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.
- EPA eGRID. Link: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

Non-Residential Energy

This category includes direct emissions from the consumption of natural gas and indirect emissions from grid-supplied electricity consumed by non-residential buildings including commercial, municipal, institutional (such as schools, hospitals, and other public facilities), agricultural, manufacturing and industrial buildings. Direct GHG emissions from natural gas consumption in non-residential buildings are calculated using SoCalGas natural gas consumption data and emission factors from The Climate Registry. Indirect GHG emissions from electricity consumption in non-residential buildings are calculated using data provided by Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), including electricity consumption, emission factors, and power mix. Emissions associated with transmission and distribution losses are accounted for using a loss factor of 4.8 percent for California from the EPA's eGRID2018 Summary Table (WECC California subregion).

Data Sources

- Natural gas and electricity consumption data provided by SCE, SoCalGas, and SDG&E
- SCE Emission Factor. Link: https://download.edison.com/405/files/202210/eix-2019-sustainability-report.pdf?Signature=C%2FLXTmp3RyIVj7GAopHQ8Wh71ro%3D&Expires=1720782849&AWSAccessKeyId=AKIAJX7XEOOELCYGIVDQ&versionId=8AL2Z6HFhJxphTqpplKQMwL.gwrjmTPi&response-content-disposition=attachment.
- SDG&E Emission Factor. Link: https://csr.sempra.com/wp-content/uploads/sempra_csr_2022_rgb.pdf
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.

- EPA eGRID. Link: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

Transportation

This section includes the transportation emissions of on-road transportation (passenger vehicles, trucks, and buses), off-road equipment, freight rail, and passenger rail. Table C.2-3 presents the emissions for the transportation sector.

Table C.2-3. 2018 Transportation Emissions by Subsector

Subsector	Emissions (MTCO2e)
On-Road	338,026
Off-Road	16,007
Freight Rail	5,227
Passenger Rail	2,139
Total	**361,399**

Source: EMFAC2021; Fehr & Peers 2024

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent;

On-Road Transportation

The on-road transportation subsector includes GHG emissions from annual VMT of on-road passenger vehicles, trucks, and buses. Bus VMT was not available by jurisdiction and was instead apportioned to the unincorporated County based on population share relative to the entire County. Table C.2-4 presents vehicle category, annual VMT, and emissions for the on-road transportation sector.

VMT for the County is estimated using a trip-based travel forecasting model developed by SCAG. SCAG's 2024 Regional Travel Demand Model, the version for which a complete dataset was available at the time of modeling, was used by Fehr and Peers to analyze the transportation network and socioeconomic data such as population, household, and employment, to forecast daily vehicle trips and VMT for each traffic analysis zone (TAZ) within the County.[28] Emissions from passenger vehicles, trucks, and buses are estimated based on VMT by each vehicle type.

[28] VMT estimates for large urban areas are commonly developed using regional travel demand models. These models are developed and periodically updated, calibrated, and validated for use in long range infrastructure planning, environmental impact assessments, and air quality conformity analyses by local and regional agencies. Trip-based travel forecasting models generate (output) daily vehicle trips for each TAZ across various trip purposes based on inputs such as the transportation network and socioeconomic data such as population, household, and employment. SCAG staff maintain a regional travel demand model that uses a four-step model process to arrive at a set of forecast vehicle trips based on the data described above.

Table C.2-4. 2018 Transportation Activity Data and Emissions by Vehicle Type

Vehicle Category	Annual VMT	Emissions (MTCO2e)
Passenger	828,179,312	298,803
Truck	33,563,361	36,764
Bus	1,200,891	2,459
Total	**862,943,563**	**338,026**

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled

The 2024 SCAG Regional Travel Demand Model has a base year of 2019 and horizon year of 2050. VMT for the inventory year was linearly interpolated from the 2012 and 2040 model values. Daily VMT are estimated using the origin-destination analysis approach (Full Accounting Method) and Boundary Method.

The Full Accounting Method accounts for VMT depending on where the trip is starting and ending. This method tracks (and "fully accounts" for) all the vehicle trips being generated by a geographic area (i.e., a city) across the entire regional network, ana allows for the isolation of different types of VMT as follows.

- Internal-internal (II) VMT: Includes all trips that begin and end entirely within the geographic area of study.
- One-half of internal-external (IX) VMT: Includes one-half of trips with an origin within the geographic area of study and a destination outside of this area. This assumes that the geographic area under study shares half the responsibility for trips traveling to other areas.
- One-half of external-internal (XI) VMT: Includes one-half of trips with an origin outside of the geographic area of study and a destination within this area. Similar to the IX trips, the geographic area of study shares the responsibility of trips traveling from other areas.
- External-external (XX) VMT: Trips through the geographic area of study are not included. This approach is consistent with the concept used for the IX and XI trips. Therefore, the XX VMT would be assigned to other areas that are generating the trips.

The Full Accounting Method was utilized to develop the VMT estimates for the County because it more fully accounts for the length of regional travel generated in the County, not just the travel occurring on the County's roadways. VMT data was estimated for passenger/light duty vehicles and trucks for the County.

The Boundary Method is another way to measure VMT that estimates all the travel that takes place within a specific geographic area (for example, within county boundaries) and truncates the mileage of each trip to only the distance traveled within that border. Under this method, the VMT is estimated for Orange County and captures all VMT occurring on their roadways, including all through trips that neither start nor end in the jurisdiction. This is done by selecting the roadway links within the SCAG model by county. VMT is then calculated based on the link volumes and link lengths within each area.

The Boundary Method was utilized to provide an estimate of all VMT occurring within Orange County. Since emissions vary by type of vehicle and by speed of travel, VMT was calculated separately for passenger/light duty vehicles, trucks, and transit (buses), and then categorized by speed bins (in 5 MPH increments) by time of day.

Emissions were calculated using the California Air Resources Board's (CARB) EMission FACtors 2021 model (EMFAC2021). EMFAC2021 generates vehicle emission rates by area, year, vehicle type, fuel type, speed, and other parameters. EMFAC2021 was run for Orange County for 2018 in "emission rate" mode to generate vehicle travel emission factors for all vehicle types and fuel types for aggregated (average) speeds. The EMFAC vehicle type categories were aligned with the three categories of VMT provided by Fehr & Peers (passenger, truck, and bus).[29] The EMFAC emission factors by vehicle type and fuel assigned to passenger VMT and truck VMT were then weighted using County-wide VMT and trip generation profiles for each vehicle type modeled in EMFAC2021.30. Table C.2-5 shows the emission factors used for each vehicle type.

Table C.2-5. 2018 Transportation Emission Factors by Vehicle Type

Vehicle Category	Emission Factor (gCO2e/mile)
Passenger	360.8
Truck	1,095.4
Bus	2,047.6

Source: EMFAC2021

Abbreviations: g CO2e = grams of carbon dioxide equivalent

Data Sources

- 2024 SCAG Regional Travel Demand Model, provided by SCAG
- Fehr & Peers Modeling Analysis (June 2024)
- EMFAC2021 Model. Link: https://arb.ca.gov/emfac/emissions-inventory/c3a757e884363e857de19a89c291e03223b875bc

Off-Road Equipment

The off-road equipment subsector includes emissions from heavy equipment fuel combustion (gasoline, diesel, and natural gas). Table C.2-6 presents fuel usage and emissions for the off-road fleet and equipment subsector.

[29] The "passenger vehicle" category corresponds to EMFAC vehicle categories LDA, LDT1, LDT2, MCY, and MDV. The "trucks" category corresponds to EMFAC vehicle categories LHDT1, LHDT2, MHDT, HHDT.

[30] For example, if the LDA vehicle type represents 70% of VMT at an emission rate of 300 grams CO2 per mile and the LDT1 vehicle type represents 30% of VMT at an emission rate of 350 grams CO2 per mile, the VMT-weighted emission rate for LDA and LDT1 vehicles combined is calculated as follows: 70% * 300 + 30% * 350 = 315 grams CO2 per mile.

Off-road equipment emissions were calculated using CARB's OFFROAD2021 Emissions Inventory Tool. OFFROAD2021 includes many offroad equipment types by sector and subsector. All sectors were included in the emissions inventory. Total fuel consumption by sector was provided in the OFFROAD2021 output and used to calculate the GHG emissions using standard emission factors per gallon for diesel, gasoline, and natural gas.

Table C.2-6. 2018 Off-Road Equipment Activity Data and Emissions by Fuel Type

Source	Fuel Use (gallons)	Emissions (MTCO2e)
Diesel	892,435	9,192
Gasoline	587,844	5,180
Natural Gas	282,948	1,635
Total	**1,763,226**	**16,007**

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent.

Data Sources

- California Air Resources Board (CARB), OFFROAD2021 Emissions Inventory Tool. Link: https://arb.ca.gov/emfac/offroad/emissions-inventory
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.

Freight Rail

The freight rail subsector includes emissions resulting from CARB's line-haul emission inventory. The inventory was used to estimate fuel consumption and generated emissions from freight rail activity in the entire region of Orange County. Emissions were then apportioned to the unincorporated County based on its population. Table C.2-3 includes emissions generated from the freight rail subsector.

Data Sources

- California Air Resources Board (CARB), 2021 Line-Haul Emissions Inventory Aggregated at County/Air Basin/Statewide. Link: https://ww2.arb.ca.gov/sites/default/files/2024-01/2021_line_haul_locomotive_emission_inventory_summaries%20web%20FINAL%202024V.xlsx.
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.

Passenger Rail

The passenger rail inventory includes emissions associated with Amtrak and Metrolink rail services. To calculate Metrolink emissions, locomotive fuel use was obtained from the National Transit Database and multiplied by a standard emission factor for diesel fuel. Metrolink emissions were separated by county based on operating route miles within each county.

Amtrak's total ridership, ridership by station, and total emissions were obtained from the agency's website. Amtrak emissions were calculated by apportioning Amtrak's total emissions of the County based on ridership share by station. Table C.2-3 includes emissions generated from the passenger rail subsector.

Data Sources

- Amtrak, Amtrak Sustainability Report FY2019. Link: https://media.amtrak.com/wp-content/uploads/2019/11/FY19-Year-End-Ridership.pdf
- Amtrak, California Station Ridership – Fact Sheet FY2019. Link: https://media.amtrak.com/wp-content/uploads/2019/11/FY19-Year-End-Ridership.pdf.
- Amtrak, National Ridership FY2019. Link: https://media.amtrak.com/wp-content/uploads/2019/11/FY19-Year-End-Ridership.pdf.
- Federal Transit Administration, National Transit Database, Energy Consumption by Transportation Agency. Link: https://www.transit.dot.gov/ntd/ntd-data
- Metrolink, Route Miles – Southern California Regional Rail Authority, 2018-2019 Fact Sheet. Link: https://metrolinktrains.com/globalassets/about/agency/facts-and-numbers/fact-sheet-for-website-q1-fy-19.pdf

Solid Waste

Emissions generated at landfills by solid waste in the County are reported under the solid waste sector. GHGs from solid waste are comprised mainly of methane (CH_4) emissions with a small percentage being attributed to CO_2 as a result of methane oxidizing in the cover soil of a landfill.

Solid waste disposal tonnage for 2018 was provided by Orange County Waste and Recycling. The disposed waste tonnage for each year was characterized using data from CalRecycle. Emission factors for each waste category, in units of metric tons of CH_4 per ton of waste, were obtained from the ICLEI Community Protocol. These emission factors were then applied to the characterized solid waste data to estimate GHG emissions associated with disposal of waste in the landfill. Table C.2-7 illustrates waste volume and emissions generated by County waste.

Table C.2-7. 2018 Solid waste Activity Data and GHG Emissions

Jurisdiction	Total Waste Disposal (tons)	Emissions (MTCO2e)
Unincorporated Orange County	86,659	37,035

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent;

Data Sources

- Calrecycle 2018 Disposal Facility Based Characterization of Solid Waste in California. Link: https://www2.calrecycle.ca.gov/Publications/Details/1666
- ICLEI, U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Appendix E: Solid Waste Emission Activities and Sources. Link: https://icleiusa.org/ghg-protocols/

Water

This sector includes emissions from water treatment and distribution of Community water use within the County. Emissions in this section were calculated using the Municipal Water District of Orange County's 2020 Urban Water Management Plan (MWDOC 2020), population data for the County, South Coast

region water cycle stage electricity intensities from California's Water-Energy-Climate Nexus report, and data provided by SCE, SDG&E, and the EPA, including emission factors, and power mix.

The local and imported water use within the County was calculated by back-casting MWDOC 2020 water use with Orange County and jurisdictional population data.

Table A.2-8 breaks down water use and associated emissions for the County. Table C.2-9 indicates the electricity intensity factors, emission factors, and populations that were used in the water use emission calculations.

Table C.2-8. 2018 Water Use, Energy Demand, and Emissions

Sector	Water Use (AF)	Electricity Use (MWh)	Emissions ($MTCO_2e$)
Local Water Use	10,684	7,778	1,972
Imported Water Use	5,736	4,176	1,059
Total	**16,419**	**11,953**	**3,030**

Table C.2-9. 2018 Water Intensity and Emission Factors

	Factor	Unit
Emission Factors		
SCE	513.0	lbs CO_2e per MWh
SDG&E	664.0	lbs CO_2e per MWh
Unincorporated OC Average	558.9	lbs CO2e per MWh
Electricity Intensity Factors		
Conventional Drinking Water Treatment*	227	kWh per AF
Urban Water Distribution*	501	kWh per AF

*South Coast hydrological region

Data Sources

- MWDOC 2020 Urban Water Management Plan https://www.mwdoc.com/wp-content/uploads/2021/04/2020-UWMP.pdf
- Population data provided by Connect SoCal 2024 https://scag.ca.gov/sites/main/files/file-attachments/23-2987-connect-socal-2024-final-complete-040424.pdf?1714175547
- The Future of California's Water-Energy-Climate Nexus https://pacinst.org/wp-content/uploads/2021/09/Water-Energy-Report_Sept-2021.pdf (pg18 Table 4)
- SCE Emission Factor. Link: https://download.edison.com/405/files/202210/eix-2019-sustainability-report.pdf?Signature=C%2FLXTmp3RyIVj7GAopHQ8Wh71ro%3D&Expires=1720782849&AWSAccessKeyId=AKIAJX7XEOOELCYGIVDQ&versionId=8AL2Z6HFhJxphTqpplKQMwL.gwrjmTPi&response-content-disposition=attachment

- SDG&E Emission Factor. Link: https://csr.sempra.com/wp-content/uploads/sempra_csr_2022_rgb.pdf
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.
- EPA eGRID. Link: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

Wastewater

Wastewater emissions are calculated using population-based equations from the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions and SCAG population data. **Table C.2-10** breaks down wastewater emissions for the County into the different stages of wastewater treatment and the emissions associated.

Table C.2-10. 2018 Wastewater Emissions

Sector	Emissions ($MTCO_2e$)
Process Emissions	104
Effluent Discharge Emissions	4,841
Septic Systems	782
Collection	308
Treatment	1,593
Total	**7,627**

Data Sources

- U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Appendix F: Wastewater and Water Emission Activities and Sources, Version 1.1. 2013 Link: https://icleiusa.org/us-community-protocol/
- Population data provided by Connect SoCal 2024 Link: https://scag.ca.gov/sites/main/files/file-attachments/23-2987-connect-socal-2024-final-complete-040424.pdf?1714175547

Agriculture

This section includes emissions from agricultural activities, including enteric fermentation, manure management, and fertilizer application. Enteric fermentation emissions were calculated using emission factors from ICLEI's Community Protocol and County livestock inventories from the United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) Quick Stats tool. County-level emissions were apportioned to the unincorporated County based on share of cattle. Cattle was used as a proxy for all livestock because cattle produce the highest levels of methane from enteric fermentation. Manure management and fertilizer application emissions were calculated by apportioning total State emissions by the County's share of cattle and cropland, respectively. USDA's NASS Quick Stats tool was used to determine Statewide crop acreage and County-wide crop acreage was determined using GIS tools and the United States Geological Survey's (USGS) National Land Cover Database (NLCD). **Table C.2-11** shows agricultural emissions by source.

Table C.2-11. 2018 Agriculture Emissions

Sector	Emissions ($MTCO_2e$)
Enteric Fermentation	45
Manure Management	36
Fertilizer Application	457
Total	538

Data Sources

- Orange County Annual Crop Report 2018 Link: https://ocerac.ocpublicworks.com/sites/ocpwocerac/files/import/data/files/documents-2018CropReport96dpi.pdf
- California Air Resources Board, "GHG Emissions Inventory (GHG EI) 2000-2021," 2023. Link: https://ww2.arb.ca.gov/ghg-inventory-data
- USDA, NASS Quick Stats Tool, Link: https://quickstats.nass.usda.gov/#2ACCD721-30CD-3856-93B4-994E36C4B92D
- USGS, NLCD, 2019. Link: https://www.usgs.gov/centers/eros/science/national-land-cover-database

Large Stationary Sources

This section includes emissions resulting from large facilities and industrial processes within the County. Emissions were estimated using CARB's Pollution Mapping Tool to identify facilities located within the County. The County includes three large stationary facilities. The total emissions are summarized in **Table C.2-12**.

Table C.2-12. 2018 Large Stationary Source Emissions

\Sector	Emissions ($MTCO_2e$)
Large Stationary Sources	49,579

Data Sources

- California Air Resources Board (CARB), Mandatory GHG Reporting. Link: https://ww2.arb.ca.gov/resources/carb-pollution-mapping-tool

Refrigerants

Short-lived climate pollutant (SLCP) emissions were estimated for two categories:

1. **Mobile Sources – Vehicle Air Conditioning:** includes fluorinated gas (F-gas) emissions from vehicle air conditioning (AC) operation.
2. **Residential AC, Refrigerators, Consumer Products, MDI, Foam, Medical, and Fire Suppression:** includes F-gas emissions from residential AC operation (refrigerants), residential refrigerator use (refrigerants), use of consumer products (aerosol propellants, such as in hairspray), Metered Dose Inhaler (MDI) aerosol propellants, insulating foams, medical sterilants, and fire suppression (e.g. fire extinguishers).

The refrigerant emissions by category are presented in **Table C.2-13**.

Table C.2-13. 2018 Refrigerant Emissions

Category	Emissions ($MTCO_2e$)
Mobile Sources	8,402
Residential AC, Refrigerators, Consumer Products, MDI, Foam, Medical, and Fire Suppression	15,693
Total	**24,095**

Mobile Sources – Vehicle Air Conditioning

Vehicle population data for Orange County were obtained from EMFAC2021. VMT data were obtained from the SCAG 2024 Regional Model. Emission rates for vehicle air conditioning (AC) was obtained from CARB's statewide inventory F-Gas model.[31] Off-road vehicle data was obtained from the CARB's OFFROAD2021 model.

Average vehicle total refrigerant loss rates for light-duty autos (0.17 lbs/yr), heavy-duty vehicles (0.91 lbs/yr), buses (2.95 lbs/yr), and off-road vehicles (0.91 lbs/yr)[32] were multiplied by statewide speciation values for each relevant refrigerant type including HFC-125, HFC-134a, HFC-143a, and HFO-1234yf to determine average vehicle refrigerant loss rates by refrigerant types. CFC-12 and HCFC-22 were not included because these refrigerants are being phased out under the Montreal Protocol and were not included in the statewide GHG inventory.

For on-road vehicles, these loss rates were then multiplied by the total vehicle populations for each vehicle type category for Orange County (obtained from EMFAC2021) to determine county-wide refrigerant loss emissions. These emissions were multiplied by the GWP values from the IPCC AR4 report, consistent with the statewide GHG inventory. Emission factors were derived on a per-VMT basis (grams per mile) using countywide VMT from the EMFAC2021 model. These emission factors were then

[31] Gallagher, Glenn, Air Pollution Specialist, California Air Resources Board Research Division, email communication, February 20, 2018

[32] Gallagher 2015, ARB Methodology to Estimate GHG Emissions from ODS Substitutes

multiplied by County-specific VMT obtained from the SCAG 2024 Regional Model (see On-Road Transportation sector above).

For off-road vehicles, the average vehicle loss rate was multiplied by the total vehicle populations for each vehicle type category for Orange County (obtained from the OFFROAD2021 model) to determine county-wide refrigerant loss emissions. These emissions were multiplied by the GWP values from the IPCC AR4 report, consistent with the statewide GHG inventory. Countywide emissions were apportioned to the unincorporated County using employment data, following the same approach as was used to apportion gallons of fuel consumed as described in the Off-road Emission sector.

Residential AC, Refrigerators, Consumer Products, MDI, Foam, Medical, and Fire Suppression

F-gas emissions were obtained from CARB's statewide inventory F-Gas model.[33] Statewide population and housing data were obtained from the California Department of Finance (CA DOF).[34] County population and housing data were obtained from the SCAG 2024 Regional Model.

Statewide refrigerant emissions for residential AC and refrigerators were scaled based on housing. This approach was recommended by CARB.[35] Statewide housing estimates were obtained from the California Department of Finance[36]; County-specific housing data were obtained from the SCAG 2024 Regional Model. Emissions of HFC-32, HFC-125, HFC-134a, and R-600a Isobutane were included. As discussed above, CFC-12 and HCFC-22 were not included.

Statewide refrigerant emissions for consumer products, MDI, foam, medical, and fire suppression were scaled based on population. This approach was recommended by CARB.[37] Statewide population estimates were obtained from the California Department of Finance[38]; County-specific population data were obtained from the SCAG 2024 Regional Model. Emissions of HFC-32, HFC-125, HFC-134a, and R-600a Isobutane were included. As discussed above, CFC-12 and HCFC-22 were not included.

[33] Gallagher, Glenn, Air Pollution Specialist, California Air Resources Board Research Division, email communication, February 20, 2018

[34] CA DOF, Population and Housing Estimates, 2018. https://dof.ca.gov/forecasting/demographics/estimates/

[35] Gallagher, Glenn, Air Pollution Specialist, California Air Resources Board Research Division, email communication, February 20, 2018.

[36] CA DOF, Population and Housing Estimates, 2018. https://dof.ca.gov/forecasting/demographics/estimates/

[37] Gallagher, Glenn, Air Pollution Specialist, California Air Resources Board Research Division, email communication, February 20, 2018

[38] CA DOF, Population and Housing Estimates, 2018. https://dof.ca.gov/forecasting/demographics/estimates/

Data Sources

- CA DOF, Population and Housing Estimates, 2018. Link: https://dof.ca.gov/forecasting/demographics/estimates/
- CARB, EMFAC2021 Model. Link: https://arb.ca.gov/emfac/emissions-inventory/c3a757e884363e857de19a89c291e03223b875bc
- CARB, OFFROAD2021 Emissions Inventory Tool. Link: https://arb.ca.gov/emfac/offroad/emissions-inventory
  - Gallagher, Glenn, Air Pollution Specialist, California Air Resources Board Research Division, email communication, February 20, 2018.
  - Gallagher 2015, ARB Methodology to Estimate GHG Emissions from ODS Substitutes.

Natural & Working Lands

Unlike the other sectors included in the Community GHG inventory, the Natural & Working Lands (NWL) inventory represents an estimate of carbon stock. The estimates account for carbon stored in vegetation and soils on natural (e.g., grasslands, forests) and working (i.e., agricultural) lands within the unincorporated County. Carbon can move between ecosystem components due to natural processes (growth, decay, and succession) and disturbances (e.g., wildfire) or anthropogenic forces such as land use change. The NWL inventory is advantageous for tracking these transfers of carbon and the causes of said changes. Jurisdictions can increase carbon stock by preventing land use changes (e.g. conserving forest lands that would otherwise be developed).

The NWL inventory was calculated by classifying the land area of Orange County into seven distinct land cover types (forests, shrublands, grasslands, other lands, wetlands, croplands, and developed lands). The land cover types correspond to land cover types as defined by CARB's Inventory of Ecosystem Carbon in California's Natural & Working Lands.[39] Land cover types for the County were determined using the USGS' NLCD. The NLCD categories vary from the land cover types used in CARB's NWL inventory, so NLCD categories were grouped into the most suitable land cover types for consistency with CARB's NWL inventory.

Once the acreage by land cover type was determined, the acreage was converted to hectares and an average biomass density factor was applied to each land cover type to determine the carbon stock by land cover type. Cropland and developed land are excluded from the NWL inventory due to unavailability of average biomass density factors and differences in methodology within the CARB NWL inventory. The NWL average biomass density, acreage, factors, and carbon stock by land cover type are presented in Table C.2-14.

[39] CARB, An Inventory of Ecosystem Carbon in California's Natural & Working Lands, Table 4, 2018. https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/NWL%20Inventory%20Report%20Website.pdf.

Table C.2-14. 2018 Natural and Working Lands Carbon Stock

Land Cover Type	Average Biomass Density (MT/Acre)	Area (acres)	Carbon Stock ($MTCO_2e$)
Forests	142.1	7,426	1,055,205
Grassland	5.3	16,567	87,193
Other Natural Land	1.4	1,366	1,936
Shrubland	22.3	122,549	2,728,817
Wetland	59.9	3,412	204,475
Cropland*	N/A	525	-
Developed Land*	N/A	24,710	-
Total	-	**176,555**	**4,077,626**

***** Cropland and developed land are excluded from the NWL inventory due to unavailability of average biomass density factors and differences in methodology within the CARB NWL inventory.

Data Sources

- CARB, An Inventory of Ecosystem Carbon in California's Natural & Working Lands, 2018. https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/NWL%20Inventory%20Report%20Website.pdf.CARB, EMFAC2021 Model. Link: https://arb.ca.gov/emfac/emissions-inventory/c3a757e884363e857de19a89c291e03223b875bc
- USGS, NLCD, 2019. Link: https://www.usgs.gov/centers/eros/science/national-land-cover-database

C.3: Municipal Operations Greenhouse Gas Emissions Inventory: 2018

The County's municipal emissions inventory represents GHGs that occur due to County operations. Municipal emissions are not a separate inventory, but a subset of the community emissions inventory; they represent sources over which the County has operational control. The sectors covered in municipal inventory are:

- Municipal Energy (Electricity & Natural Gas)
- Fleet (On-Road Vehicles and Off-Road Equipment)
- Landfill
- Water
- Wastewater
- Employee Commute

Energy

This sector includes emissions from energy use (electricity and natural gas) in municipal owned buildings and operations. These emissions are calculated using electricity and natural gas consumption data provided by the County, and data from SCE, SDG&E, The Climate Registry 2022, and the EPA, including emission factors, and power mix. Since the amount of municipal electricity provided by each utility is unknown, a weighted average emission factor for the County was calculated using SCE and SDG&E emission factors. **Table C.3-1** breaks down 2018 municipal energy activity data and emissions. **Table C.3-2** presents the emission factors used for 2018 municipal energy emission calculations.

Table C.3-1. 2018 Energy Use and Emissions

Sector	Activity Data	Units	Emissions (MTCO2e)
Electricity	149,873	MWh	36,784
Natural Gas	986,466	MMBtu	52,498
Total			**89,281**

Table C.3-2. 2018 Emission Factors

Utility / Fuel	Emission Factors	Unit
Unincorporated Orange County Electricity*	531.5	lbs CO_2e per MWh
Natural Gas	53.22	kg CO_2e per MMBtu

*Weighted average for utilities covering Unincorporated Orange County

Data Sources:

- SCE Emission Factor. Link: https://download.edison.com/405/files/202210/eix-2019-sustainability-report.pdf?Signature=C%2FLXTmp3RyIVj7GAopHQ8Wh71ro%3D&Expires=1720782849&AWSAccessKeyId=AKIAJX7XEOOELCYGIVDQ&versionId=8AL2Z6HFhJxphTqpplKQMwL.gwrjmTPi&response-content-disposition=attachment
- SDG&E Emission Factor. Link: https://csr.sempra.com/wp-content/uploads/sempra_csr_2022_rgb.pdf
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.

Fleet

The municipal fleet emissions sector includes on-road fleet (passenger vehicles, trucks, and buses) and off-road equipment, primarily in the form of fuel (gasoline, diesel, propane, and natural gas) and total vehicle miles traveled. **Table C.3-3** presents emissions for the County's 2018 transportation sector.

Table C.3-3. 2018 On-road and Off-road Fleet Emissions

Sector	Fuel Use (Gallons)	Annual VMT	Emissions (MTCO2e)
On-Road Fleet			
Compressed Natural Gas (CNG)	44,485	919,914	329
Diesel	85,400	1,213,403	874
Propane	731	794	4
Gasoline	1,091,743	94,107,885	9,968
Off-Road Fleet & Equipment			
Compressed Natural Gas (CNG)	68	148	1
Diesel	28,046	33,186	8,491
Propane	590	1,029	3
Gasoline	257	1,733	2
OCWR Heavy Equipment (Diesel)	832,544	-	1
Total			19,671

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled; OCWR = Orange County Waste & Recycling

On-Road Fleet

The on-road fleets subsector includes emissions from fuel combustion (gasoline, diesel, propane, and natural gas) and VMT from on-road County vehicles, trucks, and buses. Table C.3-3 presents fuel usage, VMT, and emissions for the on-road fleets subsector.

Emissions from on-road County vehicles, trucks, and buses were estimated based on annual fuel usage and average annual VMT by each vehicle. Total fuel consumption and average annual VMT for the County's on-road fleet was summarized from the 2018 County Fleet and Fuel data provided by the County.

The GHG emissions estimated from fuel usages were calculated using standard emission factors per gallon for CNG, diesel, propane, and gasoline. Emissions from VMT were calculated using standard emission factors per mile driven.

Data Sources:

- State and Alternative Fuel Provider Fleets: https://epact.energy.gov/fuel-conversion-factors
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.
- 2018 County Fleet and Fuel Data, provided by the County

Off-Road Fleet & Equipment

The off-road equipment subsector includes emissions from heavy equipment fuel combustion (gasoline, diesel, propane, and natural gas) and VMT from off-road equipment and vehicles. Table C.3-3 presents fuel usage, VMT, and emissions for the off-road fleet and equipment subsector.

Emissions from off-road County vehicles and equipment were estimated based on annual fuel usage and average annual VMT by each vehicle. Total fuel consumption and average annual VMT for the County's off-road fleet was summarized from the 2018 County Fleet and Fuel data provided by the County.

The GHG emissions estimated from fuel usages were calculated using standard emission factors per gallon for CNG, diesel, propane, and gasoline. Emissions from VMT were calculated using standard emission factors per mile driven.

Data Sources

- State and Alternative Fuel Provider Fleets. Link: https://epact.energy.gov/fuel-conversion-factors
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.
- 2018 County Fleet and Fuel Data, provided by the County.

Employee Commute

The municipal employee commute includes emissions from County employees traveling to and from their respective offices. The employee commute data was obtained from the County's 2018 Annual Employee Commute Reduction Program Report. The data was used to estimate the weekly number of vehicle trips (in passenger vehicles) and converted to an annual mileage estimated based on default home to work round trip length for a "General Office Building" located in Orange County and an assumed 47 work week schedule. The passenger vehicle emission factors derived from EMFAC2021 data, which can be found in Table C.3-4 of the Community Inventory section, were then applied to the annual employee commute VMT.

Table C.3-4. 2018 Employee Commute Activity Data and Emissions

	VMT	Emissions (MTCO2e)
Passenger Vehicle	54,041,005	19,498

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent; VMT = vehicle miles traveled

Data Sources

- California Emission Estimator Model (CalEEMod), Version 2022.1.1. Link: https://www.caleemod.com/
- Emissions Factor (EMFAC) 2021 Model. Link: https://arb.ca.gov/emfac/emissions-inventory
- 2018 Ride Share AQMD Approval Report, provided by the County.

Landfill

Landfill-related emissions are estimated using OCWR's EPA landfill reports. Using these reports, County landfill gas (LFG) data were obtained for 5 open and closed landfills where County residents and businesses disposed their waste. Table C.3-5 summarizes emissions based on landfill location.

Most of the 5 landfills used by County residents and businesses have LFG collection systems with combustion control. These systems collect LFG for flaring, energy production, or for producing liquified natural gas (LNG), CNG and producer gas. GHG emissions from landfill gas collection are estimated based on LFG collection rate, LFG flow to energy, and methane content from CalRecycle's 2010 Landfill Gas Master. However, if the methane is recovered (via biogas or digester gas) and used for electricity generation, then the emissions are reported under the stationary energy sector as waste-to-energy facilities or biomass and auxiliary power facilities.

Table C.3-5. 2018 Landfill Emissions by Location

Landfill	Emissions (MTCO2e)
Prima Deshecha	97,928
Olinda Alpha	263,638
Frank R. Bowerman	361,875
Santiago Canyon*	32,873
Coyote Canyon*	109,046
Total	865,360

* = inactive

Abbreviations: MTCO2e = metric tons of carbon dioxide equivalent;

Data Sources

- CalRecycle Landfill Gas Master. Link: https://www2.calrecycle.ca.gov/PublicNotices/Documents/1642

Water & Wastewater

Emissions in this sector are generated from electricity consumption associated with treatment and distribution of water and wastewater use at municipal owned facilities and operations. These emissions are calculated using water and wastewater use data provided by the County, South Coast region water cycle stage electricity intensities from The Future of California's Water-Energy-Climate Nexus, and data from SCE, SDG&E, and the EPA, including emission factors, and power mix.

Table C.3-6 provides 2018 municipal water and wastewater activity data and emissions for the County. Table C.3-7 details the water cycle stage electricity intensities and emission factors used in calculating municipal water and wastewater emissions.

Table C.3-6. 2018 Water and Wastewater Volume and Emissions

Sector	Volume (gallons)	Emissions ($MTCO_2e$)
Water	1,520,876,774	820
Wastewater	1,495,714,552	883
Total	**3,016,591,326**	**1,703**

Table C.3-7. 2018 Water Intensity Factors

	Factor	Units
Utility Emission Factors		
SCE	513.0	lbs CO_2e per MWh
SDG&E*	664.0	lbs CO_2e per MWh
Unincorporated Orange County Electricity*	531.5	lbs CO_2e per MWh
Water Cycle Electricity Intensity Factors		
Conventional Drinking Water Treatment*	0.0007	kWh per gallon
Urban Water Distribution*	0.0015	kWh per gallon
Wastewater Treatment*	0.0021	kWh per gallon

Notes:
*South Coast hydrological region

Data Sources

- The Future of California's Water-Engery-Climate Nexus. Link: https://pacinst.org/wp-content/uploads/2021/09/Water-Energy-Report_Sept-2021.pdf (pg18 Table 4)
- SCE Emission Factor. Link: https://www.sce.com/sites/default/files/inline-files/2018SCEPCL.pdf
- SDG&E Emission Factor. Link: https://csr.sempra.com/wp-content/uploads/sempra_csr_2022_rgb.pdf
- The Climate Registry, 2022 Default Emission Factors. Link: https://theclimateregistry.org/wp-content/uploads/2023/06/2023-Default-Emission-Factors-Final-1.pdf.
- EPA eGRID. Link: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

B.4: Business-As-Usual and Adjusted Business-as-Usual 2018 to 2045 Forecasts

This section describes the approach for modeling Community Business-as-Usual (BAU) and Adjusted BAU emissions. The emissions forecasts are based on the 2018 Community GHG inventory along with socio-economic trends, population growth, historic emission patterns, and existing policies and legislation that affect GHG emissions.

Each sector of the inventory was forecasted to 2030 and 2045 using the socioeconomic data (SED) obtained from the 2024 SCAG Regional Travel Demand Model, which was used by Fehr & Peers to model future VMT and uses SED from the 2024 SCAG RTP/SCS. Population, housing, employment, and VMT data were available for 2019 and 2050, which were interpolated and extrapolated upon to obtain 2018, 2030, and 2045 SED for the County.

Business-As-Usual

BAU represents future emissions based on current population and regional growth trends, land use growth patterns, and regulations or policies which began implementation before the 2018 baseline year. The BAU scenario demonstrates the growth in GHG emissions that would occur if no further action were to be taken by the County, State, or Federal Government after 2018. The BAU forecasts serve as a reference point for other forecasting scenarios, which includes the Adjusted BAU that incorporates State regulations.

Adjusted Business-As-Usual

Like the standard BAU forecast, the Adjusted BAU forecast provides an estimate of future emission levels based on the continuation of existing trends in demographic growth (such as population and housing), activity or resource consumption (such as electricity use), technology changes, and regulation. Unlike the BAU forecast, the Adjusted BAU forecast accounts for expected outcomes of federal, state, and local measures. Specifically, the Adjusted BAU forecast includes the following programs and policies:

- California's Renewable Portfolio Standard (RPS) program, Senate Bill 100 (SB 100), and Senate Bill 1020 targets for renewable energy;
- Advanced Clean Cars I and II (ACCI & ACCII) and Pavley;
- Advanced Clean Fleets (ACF)
- CALGreen Title 24 energy efficiency standards and;
- Senate Bill 1383 (SB 1383)

Each of these adjustments is explained in the following sections.

Regulatory Action

Renewables Portfolio Standard and SB 100

The Clean Energy and Pollution Reduction Act of 2015, or Senate Bill 350 (Chapter 547, Statutes of 2015) was approved by Governor Brown on October 7, 2015. SB 350 increased the standards of the California RPS program by requiring that the amount of electricity generated and sold to retail customers per year

from eligible renewable energy resources be increased from 33% to 50% by December 31, 2030. On September 10, 2018, Governor Brown signed SB 100, establishing that 100% of all electricity in California must be obtained from renewable and zero-carbon energy resources by December 31, 2045. SB 100 also creates new standards for the RPS goals that were established by SB 350 in 2015. Specifically, the bill increases required energy from renewable sources for both investor-owned utilities and publicly owned utilities from 50% to 60% by 2030. Incrementally, these energy providers must also have a renewable energy supply of 33% by 2020, 44% by 2024, and 52% by 2027. The updated RPS goals are considered achievable, since many California energy providers are already meeting or exceeding the RPS goals established by SB 350. The Adjusted BAU forecast accounts for these renewable energy targets, as discussed below.

To account for California's RPS targets under SB 100 in the Adjusted BAU forecast, the GHG emission factors for electricity consumption were adjusted. These emission factors represent indirect GHG emissions generated at power plants and are applied to electricity consumption in the County. The RPS has the effect of lowering indirect emissions associated with electricity consumption because it mandates increasing percentages of renewable sources of power supplied by electricity utilities in future years. The RPS requires 60% eligible renewables by 2030 and 100% carbon-free by 2045.[40]

To adjust for the RPS in future years, indirect electricity emission factors reported for each utility within the County, along with the energy power mix, were collected for the years 2018–2021. The CEC reports power mix data in Power Content Labels; these are available through 2021 for all utilities.[41] Based on data reported for 2018–2021, a composite "non-RPS" emission intensity factor was generated for each year. This factor is calculated based on the reported total emission factor and the non-RPS power mix. Then, for each forecast year (2030 and 2045), an emission factor for total delivered electricity was calculated based on these composite "non-RPS" emission intensity factors for each reported year and the projected RPS requirement for eligible renewables for each year.

Pavley Vehicle Standards and Advanced Clean Cars I

In 2002, Governor Gray Davis signed AB 1493. AB 1493 requires that CARB develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State." To meet the requirements of AB 1493, in 2004 CARB approved amendments to the California Code of Regulations, adding GHG emissions standards to California's existing standards for motor vehicle emissions. All mobile sources are required to comply with these regulations as they are phased in from 2009 through 2016. These regulations are known as the Pavley standards (named for the bill's author, State Senator Fran Pavley).

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[40] RPS-eligible resources include solar, wind, geothermal, small hydroelectric, or biopower facilities that are located within the Western Electricity Coordinating Council (WECC) region, which encompasses fourteen western U.S. states and portions of Canada and Mexico. The majority of RPS-eligible electricity currently comes from solar and wind. Large hydroelectric dams and nuclear facilities, two major sources of carbon-free power, are not RPS-eligible.

[41] California Energy Commission (CEC), Power Content Labels, 2021. https://www.energy.ca.gov/programs-and-topics/programs/power-source-disclosure-program/power-content-label/annual-power-1. Accessed January 2024.

In January 2012, pursuant to Recommended Measures T-1 and T-4 of the Original Scoping Plan, CARB approved the Advanced Clean Cars I Program, an emissions-control program for model year 2017 through 2025. The program combines the control of smog, soot, and GHGs with requirements for greater numbers of zero-emission vehicles. By 2025, when the rules will be fully implemented, the new automobiles will emit 34 percent fewer global warming gases and 75 percent fewer smog-forming emissions. The program also requires car manufacturers to offer for sale an increasing number of zero-emission vehicles (ZEVs) each year, including battery electric, fuel cell, and plug-in hybrid electric vehicles. In December 2012, CARB adopted regulations allowing car manufacturers to comply with California's GHG emissions requirements for model years 2017–2025 through compliance with the EPA GHG requirements for those same model years.[42] The EMFAC2021 model incorporates Pavley and ACCI, therefore, the Adjusted BAU forecasts accounts for these vehicle fleet efficiency standards.

Advanced Clean Cars II

Governor Gavin Newsom signed an executive order (Executive Order No. N-79-20) on September 23, 2020, which would phase out sales of new gas-powered passenger cars by 2035 in California with an additional 10-year transition period for heavy vehicles. The State would not restrict used car sales, nor forbid residents from owning gas-powered vehicles. In accordance with the Executive Order, CARB is developing a 2020 Mobile Source Strategy, a comprehensive analysis that presents scenarios for possible strategies to reduce the carbon, toxic and unhealthy pollution from cars, trucks, equipment, and ships. The strategies will provide important information for numerous regulations and incentive programs going forward by conveying what is necessary to address the aggressive emission reduction requirements.

The primary mechanism for achieving the ZEV target for passenger cars and light trucks is CARB's ACC II Program. The ACC II regulations will focus on post-2025 model year light-duty vehicles, as requirements are already in place for new vehicles through the 2025 model year. A rulemaking package was presented to the Board in June 2022 and was adopted on November 30, 2022. The Adjusted BAU forecast accounts for these vehicle fleet efficiency standards by implementing ACCII adjustment factors to EMFAC2021 model outputs.

Advanced Clean Fleets

CARB's Advanced Clean Fleets (ACF) regulation mandates a transition to zero-emission vehicles (ZEVs) for medium- and heavy-duty fleets, targeting drayage trucks at seaports and railyards, government fleets, and high-priority fleets. The regulation requires drayage trucks to be zero-emission by 2035, mandates high-priority fleets to adopt a Model Year Schedule or ZEV Milestones Option starting in 2024, and ensures state and local government fleets purchase 50% ZEVs by 2024 and 100% by 2027. Manufacturers can only sell zero-emission vehicles in California from the 2036 model year onwards. The initiative aims to introduce 1.69 million ZEVs by 2050, significantly reduce pollutants, and provide health benefits by improving air quality, especially in communities near seaports, railyards, and distribution centers. The Adjusted BAU forecast accounts for these vehicle fleet efficiency standards by implementing ACF adjustment factors to EMFAC2021 model outputs.

[42] Advanced Clean Car I program information available online at: https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/about. Accessed January 2024.

CAL Green (Title 24 Building Energy Efficiency Standards)

The CEC first adopted Energy Efficiency Standards for Residential and Nonresidential Buildings (CCR Title 24, Part 6) in 1978 in response to a legislative mandate to reduce energy consumption in the State. Although not originally intended to reduce GHG emissions, increased energy efficiency and reduced consumption of electricity, natural gas, and other fuels would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard. The standards are updated periodically (typically every three years) to allow for the consideration and inclusion of new energy efficiency technologies and methods (CEC, 2016). The current Title 24, Part 6 standards (2019 standards) were made effective on January 1, 2020. The new Title 24, Part 6 standards (2022 standards) were adopted by the CEC in August 2021 and became effective on January 1, 2023. The Adjusted BAU forecasts accounts for these updates to Title 24, as discussed below.

Under the Adjusted BAU scenario, energy use was adjusted to reflect the effects of Title 24 standards. Title 24 Building Efficiency Standards are updated every three years by the California Energy Commission. Energy efficiency improvements were determined by estimating the increased energy efficiency percentages for the 2019 Title 24 standards[43] implemented in 2020, and the 2022 standards implemented in 2023.[44] The 2019 percentages are based on CEC estimates for residential and non-residential buildings and assume that the solar photovoltaic (PV) requirement is met. The 2022 percentages were calculated based on CEC's Draft Environmental Impact Report for the 2022 standards which outlines the changes in building energy use from the 2019 to 2022 standards on a project-by-project basis.[45] Weighted averages were taken to generate efficiency change values for single and multifamily residential buildings for both electricity and natural gas. Because energy efficiency increases are unknown after implementation of 2022 Title 24 Standards, the 2022 Title 24 efficiency increases are applied to future years.

SB 1383

California Senate Bill 1383 (SB 1383) aims to reduce short-lived climate pollutants by cutting organic waste disposal by 75% from 2014 levels by 2025. It mandates all jurisdictions to provide organic waste collection services for residents and businesses, including food, green material, and other organic wastes. As of January 1, 2022, residents and businesses must separate organic waste into designated bins. The bill also requires the recovery of at least 20% of currently disposed edible food by 2025 to combat food waste. SB 1383 is part of California's broader strategy to address climate change and improve air quality by reducing methane emissions from landfills. The Adjusted BAU forecast accounts for SB 1383 based on the goal of reducing organic waste disposal by 75% from 2014 levels by 2025.

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[43] CEC, 2019 Building Energy Efficiency Standards FAQ, 2020. https://www.energy.ca.gov/sites/default/files/2020-03/Title_24_2019_Building_Standards_FAQ_ada.pdf. Accessed January 2022.

[44] CEC, 2022 Building Energy Efficiency Standards Summary, 2021. https://www.energy.ca.gov/sites/default/files/2021-08/CEC_2022_EnergyCodeUpdateSummary_ADA.pdf. Accessed January 2022.

[45] CEC, *Draft Environmental Impact Report: Amendments to the Building Energy Efficiency Standards (2022 Energy Code)*, May 19, 2021. https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency. Accessed January 2022.

Community BAU and Adjusted BAU Forecasts

Community emissions forecasts are based on the Community GHG inventory along with socio-economic trends, population growth, historic emission patterns, and existing policies and legislation that affect GHG emissions.

Table C.4-1 presents the SED used for the BAU and Adjusted BAU forecast, while Table C.4-2 indicates which sets of socioeconomic and activity data were used to forecast each sector. Table C.4-3 details the community inventory along with 2030 and 2045 emissions forecast broken down by sector and subsector.

Table C.4-1. Unincorporated Orange County Socioeconomic Data

Metric	2018	2030	2045
Population	128,781	146,567	168,799
Households	41,684	51,841	64,539
Employment	33,619	38,246	44,029
Service Population	162,400	184,813	212,828

Note: Service population is the sum of population and employment.

Source: Fehr & Peers, 2024.

Table C.4-2. Community Forecasting Methods by Sector

Sector	Activity Data	Forecast Metric Used
Residential Energy	Electricity consumption (MWh) and natural gas consumption (therms)	Households
Non-Residential Energy	Electricity consumption (MWh) and natural gas consumption (therms)	Service Population
Transportation	Vehicle miles traveled (VMT)	Population, Households, Employment
Solid Waste	Waste disposed (tons)	Service Population
Water	Water use (AF)	Service Population
Wastewater	Wastewater emissions (MTCO2e)	Service Population

Table C.4-3. Community Inventory, BAU, and Adjusted BAU Forecasts by Sector (MTCO2e)

Sector	Baseline		BAU		Adjusted BAU
	2018	2030	2045	2030	2045
Electricity	142,889	173,464	181,214	87,850	0
Residential Electricity	102,712	127,742	167,030	70,725	0
Non-Residential Electricity	40,177	45,722	52,653	25,298	0
Natural Gas	150,791	179,706	177,465	174,621	166,788
Residential Natural Gas	77,479	96,360	96,231	92,832	89,092
Non-Residential Natural Gas	73,312	83,346	81,234	81,790	77,696

Sector	Baseline		BAU		Adjusted BAU
	2018	2030	2045	2030	2045
Transportation	361,399	407,923	467,021	273,231	125,680
On-Road Transportation	338,026	379,697	431,765	245,005	90,423
Off-Road Equipment	16,007	19,309	23,736	19,309	23,736
Freight Rail	5,227	6,779	9,382	6,779	9,382
Passenger Rail	2,139	2,139	2,139	2,139	2,139
Solid Waste	37,035	17,561	20,223	17,561	20,223
Water	3,030	3,122	3,236	1,779	0
Wastewater	7,627	8,681	9,997	7,881	7,507
Refrigerants	24,095	44,854	60,353	40,302	52,274
Agriculture	538	538	538	538	538
Total	**727,405**	**860,434**	**986,828**	**611,938**	**373,010**
Large Stationary	49,579	49,579	49,579	49,579	49,579
Total w/ Large Stationary	**776,984**	**910,013**	**1,036,407**	**661,517**	**422,589**
Natural Working Lands	(4,077,626)	(4,077,626)	(4,077,626)	(4,077,626)	(4,077,626)

Municipal BAU and Adjusted BAU Forecasts

Municipal emissions forecasts are based on the 2018 municipal GHG inventory along with socio-economic trends, population growth, historic emission patterns, and existing policies and legislation that affect GHG emissions listed earlier in this section.

Table C.4-4 presents the SED used for the BAU and Adjusted BAU forecast, while Table C.4-5 indicates which sets of socioeconomic and activity data were used to forecast each sector. Table C.4-6 details the municipal inventory along with 2030 and 2045 emissions forecast broken down by sector and subsector.

Table C.4-4. Municipal Socioeconomic Data

Metric	2018	2030	2045
Population	128,781	146,567	168,799
Public Administration Employment	134	144	156

Note: Service population is the sum of population and employment.

Source: Fehr & Peers, 2024.

Table C.4-5. Municipal Forecasting Methods by Sector

Sector	Activity Data	Forecast Metric Used
Energy	Electricity consumption (MWh) and natural gas consumption (therms)	Public Administration Growth Rate
Fleet	Fuel use (gallons)	Public Administration Growth Rate
Solid Waste	Waste disposed (tons)	Public Administration Growth Rate
Water	Water use (AF)	Public Administration Growth Rate
Wastewater	Wastewater emissions ($MTCO_2e$)	Public Administration Growth Rate

Table C.4-6. Municipal Inventory, BAU, and Adjusted BAU Forecasts (MTCO2e)

Sector	Baseline		BAU		Adjusted BAU
	2018	2030	2045	2030	2045
Electricity	36,784	38,739	41,996	23,220	0
Natural Gas	52,498	56,287	61,019	56,287	61,019
On-Road Fleet	11,174	11,980	12,987	7,572	2,668
Off-Road Fleet	8,497	9,110	9,876	9,110	9,876
Landfill	865,360	887,134	914,351	870,804	877,608
Water	820	878	952	526	0
Wastewater	883	947	1,026	568	0
Employee Commute	19,498	20,904	22,661	13,212	4,656
Total	**995,514**	**1,025,979**	**1,064,870**	**981,298**	**955,827**

Appendix D: Climate Change/Green Legislation

LEGISLATION / REGULATION	YEAR	DESCRIPTION
Statewide Emissions Reduction Targets		
EO S-3-05	2005	Established the state's first GHG emissions reductions targets: reduction to 2000 levels by 2010, 1990 levels by 2020, and 80% below 1990 levels by 2050.
AB 32, Global Warming Solutions Act	2006	Codified EO S-3-05's 2020 goal and authorized CARB to implement a comprehensive, multiyear program to reduce GHG emissions from all sources throughout the state.
SB 535, Greenhouse Gas Reduction Fund and Disadvantaged Communities	2012	Required that 25% of all funds allocated pursuant to an investment plan for the use of state monies collected through a Cap-and-Trade program be allocated to projects that benefit disadvantaged communities, and that at least 10% of these be spent on projects located in disadvantaged communities.
EO B-30-15	2015	Established a GHG emissions reduction target of 40% below 1990 levels by 2030.
SB 32, California Global Warming Solutions Act of 2006: Emissions limit	2016	Codified EO B-30-15's 2030 goal.
AB 398, California's Cap- and-Trade Program	2017	Extended the state's Cap-and-Trade Program through 2030, a key strategy for reducing GHGs in the state. The Cap-and-Trade Program sets total allowable emissions for facilities and creates carbon offset credits through carbon sequestration projects.
EO B-55-18	2018	Established a target to achieve carbon neutrality (net zero GHG emissions) by 2045.
AB 1279	2022	Established the policy of the state to achieve net zero GHG emissions as soon as possible, but no later than 2045; to maintain net negative GHG emissions thereafter; and to ensure that by 2045, statewide anthropogenic GHG emissions are reduced at least 85% below 1990 levels.

LEGISLATION / REGULATION	YEAR	DESCRIPTION
Transportation		
AB 1493 Clean Car Standards	2002	Established emissions reduction requirements for new passenger vehicles from 2009 to 2016.
EO S-01-07 Low Carbon Fuel Standard	2007	Established the State of California's Low Carbon Fuel Standard and an emissions reduction target of at least 10 percent of the carbon intensity of the state's transportation fuels by 2020. With the adoption of the 2022 Scoping Plan, the standard has been revised to a reduction of at least 20 percent.
SB 375	2008	Directed the California Air Resources Board to set regional targets for GHG emissions reductions from passenger vehicles.
AB 1493 Amendments	2009	Cemented the state's enforcement of the legislation starting in 2009, while providing vehicle manufacturers with new compliance flexibility.
Advanced Clean Cars Program	2012	Combined the control of smog-causing pollutants and GHG emissions into a single coordinated package of regulations to guide the development of environmentally advanced cars.
Mobile Source Strategy	2016	Described the strategy for transitioning to zero-emission vehicles, or ZEVs, with a goal of 1.5 million ZEVs by 2025 and 4.2 million ZEVs by 2030. The Mobile Source Strategy includes more stringent GHG emissions requirements for light-duty vehicles beyond 2025, and calls for increased deployment of ZEV trucks.
Advanced Clean Cars Update	2017	Affirmed that adopted GHG emissions reduction standards remain appropriate for 2022 through 2025 model years.
AB 2127	2018	Requires the CEC, working with CARB and the CPUC, to prepare and biennially update a statewide assessment of the EV charging infrastructure needed to support the levels of EV adoption required for the state to meet its goals of putting at least 5 million ZEVs on California roads by 2030 and reducing emissions of GHGs to 40% below 1990 levels by 2030.

LEGISLATION / REGULATION	YEAR	DESCRIPTION
EO B-48-15	2018	Established a statewide goal of at least 5 million ZEVs on state roads by 2030, and installation of 200 hydrogen fueling stations and 250,000 ZEV chargers.
EO N-79-20	2020	Established a target that 100 percent of in-state sales of new passenger cars and trucks be zero-emission by 2035 and that 100 percent of medium- and heavy-duty vehicles in the state be zero-emission by 2045 and by 2035 for drayage trucks.
Advanced Clean Cars I/II (ACC I/II)	2022	Requires that by 2035 all new passenger cars, trucks, and SUVs sold in California will be zero emissions. It amends the Zero-Emission Vehicle Regulation to require an increasing number of ZEVs, and relies on advanced vehicle technologies, including battery-electric, hydrogen fuel cell electric, and plug-in hybrid EVs, to meet air quality and climate change emissions standards. It also amends the Low-Emission Vehicle Regulations to include increasingly stringent standards for gasoline cars and heavier passenger trucks to continue to reduce smog-forming emissions while the sector transitions toward 100% electrification by 2035.
Advanced Clean Trucks (ACT)	2021	Establishes a manufacturer's ZEV sales requirement and a one-time reporting requirement for large entities and fleets. It is a holistic approach to accelerate a large-scale transition of zero-emission medium-and heavy- duty vehicles from Class 2b to Class 8. Manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines would be required to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck/chassis sales would need to be 55% of Class 2b – 3 truck sales, 75% of Class 4 – 8 straight truck sales, and 40% of truck tractor sales
Advanced Clean Fleets (ACF)	2023	Introduction of zero-emission technologies into California's truck and bus fleets requiring fleets that are well suited for electrification to transition to zero-emission vehicles (ZEV) through requirements to both phase-in the use of ZEVs for targeted fleets and requirements that manufacturers only manufacture ZEV trucks starting in the 2036 model year. Components of ACF include manufacturer sales mandate,

LEGISLATION / REGULATION	YEAR	DESCRIPTION
		drayage fleets, high priority and federal fleets, and State and Local agency fleets.
Energy		
SB 1078	2002	Required that 20% of electricity retail sales be served by renewable resources by 2017.
CALGreen Code (Title 24, Part 11)	2011	Established the first mandatory green building standards code in the country.
SB 350	2015	Accelerated implementation of SB 1078 and mandated a 50% Renewables Portfolio Standard, or RPS, by 2030. SB 350 includes interim annual RPS targets with three-year compliance periods and requires that 65% of RPS procurement be derived from long-term contracts of 10 or more years.
CALGreen Code Update	2016	Affirmed energy standards for newly constructed buildings, and additions and alterations to existing buildings. Added requirements for demand reductions during critical peak periods and future solar electric and thermal system installations.
SB 100 California Renewables Portfolio Standard Program	2018	Established a goal of supplying 100% of the state's electricity from clean sources by 2045.
SB 596	2021	Requires CARB, by July 1, 2023, to develop a comprehensive strategy for the state's cement sector to achieve net zero emissions of GHGs associated with cement used in California as soon as possible, but no later than December 31, 2045. The law establishes an interim target of 40% below the 2019 average GHG intensity of cement by December 31, 2035.
SB 1020	2022	Adds interim renewable energy and zero-carbon energy retail sales of electricity targets to California end-use customers set at 90% in 2035 and 95% in 2040. It accelerates the timeline required to have 100% renewable energy and zero-carbon energy procured to serve state agencies from the original target year of 2045 to 2035. This

LEGISLATION / REGULATION	YEAR	DESCRIPTION
		law requires each state agency to individually achieve the 100% goal by 2035, with specified requirements.
SB 905	2022	Requires CARB to create the Carbon Capture, Removal, Utilization, and Storage Program to evaluate, demonstrate, and regulate carbon capture, utilization, or storage and CO2 removal projects and technology.
SB 1137	2022	Prohibits the development of new oil and gas wells or infrastructure in health protection zones, as defined, except for purposes of public health and safety or other limited exceptions. This law requires operators of existing oil and gas wells or infrastructure within health protection zones to undertake specified monitoring, public notice, and nuisance requirements.
SB 1075	2022	Requires CARB, by June 1, 2024, to prepare an evaluation that includes policy recommendations regarding the use of hydrogen, and specifically the use of green hydrogen, in California; a description of strategies supporting hydrogen infrastructure, including identifying policies that promote the reduction of GHGs and short-lived climate pollutants; a description of other forms of hydrogen to achieve emission reductions; and other required elements.
SB 1206	2022	Mandates a stepped sales prohibition on newly produced high-GWP HFCs to transition California's economy toward recycled and reclaimed HFCs for servicing existing HFC-based equipment. This law also requires CARB to develop regulations to increase the adoption of very low-, i.e., GWP <10, and no-GWP technologies in sectors that currently rely on higher-GWP HFCs.

LEGISLATION / REGULATION	YEAR	DESCRIPTION
Waste and Water		
AB 341	2011	Required each city, county, and regional agency to develop a source reduction and recycling element of an integrated waste management plan containing specified components, including a source reduction component, a recycling component, and a composting component. With certain exceptions, the source reduction and recycling element of that plan was required to divert 75% of all solid waste from landfill disposal or transformation by 2020, through source reduction, recycling, and composting activities.
AB 1826	2014	Required any business, defined as a commercial or public entity that generates more than 4 cubic yards of commercial solid waste per week or is a multifamily residential dwelling of 5 units or more, to arrange for recycling services.
SB 1383	2016	Established emissions reduction targets in a statewide effort to reduce emissions of short-lived climate pollutants, including methane by 40%, HFC gases by 40%, and anthropogenic black carbon by 50% below 2013 levels by 2030.
SB 606 and AB 1668	2018	Required urban and agricultural water suppliers to enact new urban efficiency standards for indoor use, outdoor use, and water lost to leaks.

[i] LEED certification information for product manufacturers – U.S. Green Building Council (usgbc.org) accessed February 27, 2024.

Placeholder

Appendix E

August 2024 Public Comment Period and Public Forum Feedback