CITY OF

ORANGE

SUSTAINABILITY PLAN 2024

TEAMWORK
INTEGRITY
EXCELLENCE

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Table of Contents:

Executive Summary

This Sustainability Plan for the City of Orange aims to identify and track large sectors of greenhouse gas emissions within the City and provides a roadmap with realistic sustainability measures and actions that can be implemented to mitigate the negative effects experienced by the residents of the City of Orange. This Sustainability Plan evaluates specific sectors (e.g., energy, transportation, waste) and provides feasible steps to take to reduce the greenhouse gas emissions. By adopting a Sustainability Plan, the City of Orange is showing its commitment to improving the life of its current and future residents.

This Sustainability Plan provides an overview of existing policies and laws both at a federal level and the state level. A greenhouse gas inventory is provided describing the sources of greenhouse gas emissions throughout the City of Orange to better focus the City's efforts and resources in reducing greenhouse gas emissions. Community input from three city-wide events and individual meetings with three City Council members provided a better understanding of the priority needs of residents. Finally, recommendations are provided to promote sustainable practice communally, boost the City's economy, and decrease greenhouse gas emissions.

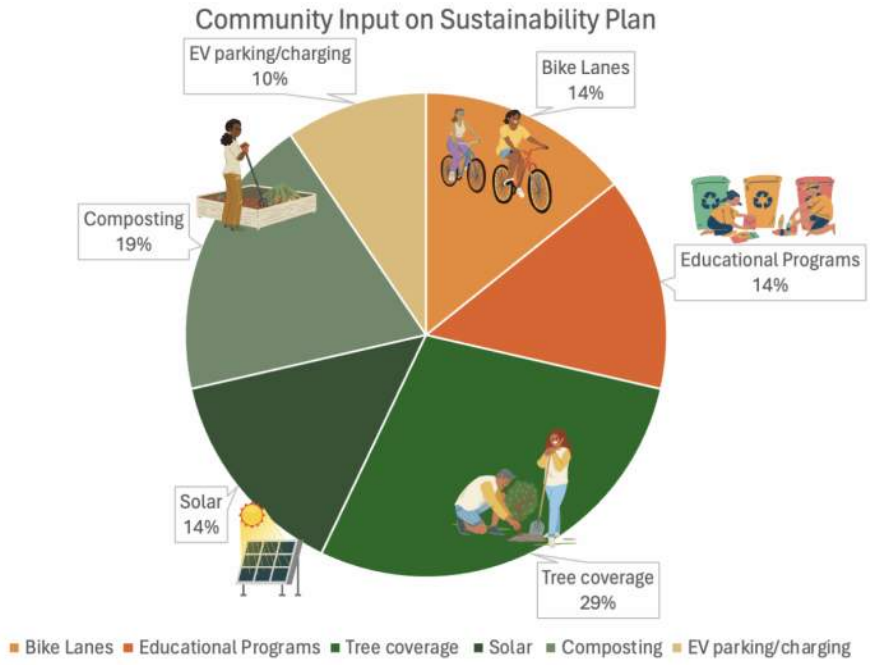
Key findings from the greenhouse gas inventory showed that community level emissions are evenly distributed between residential, commercial, and industrial sectors; however, transportation data was missing at the community level for mobile sources and will require additional study. Key recommendations to promote sustainability and decrease greenhouse gas emissions include:

- Education and incentive programs for clean energy
- EV charging stations that use renewable energy
- Household composting workshops
- Urban tree planting incentives

Each of these recommendations align with the priorities of the community. Below is a figure showing the measures Orange residents felt were important.

The Sustainability Plan provides recommendations and implementation strategies provided including sources of funding/revenue for improved residential quality of life. Implementation recommendations include:

- Identifying lead staffer/team for implementation and potential of Fellowships through California Climate Action Corps.
- Development of speciality plans for specific recommendations (e.g., Tree Cover, Composting)
- Collaborate with organizations such as Orange Sustainability Group
- Completion of GHG inventory to include any data gaps (e.g., mobile transportation)



Plan Overview

- Chapter 1, *Introduction*, describes the science of climate change, current policy promote sustainability, and discussion of environmental justice in Orange.
- Chapter 2, *Greenhouse Gas Inventory*, describes the main sources of greenhouse gas emissions within the City of Orange and how that data was collected.
- Chapter 3, *Community Engagement*, describes the community's priorities and concerns with regards to current sustainability efforts.
- Chapter 4, *Sustainability Recommendations*, describes recommendations and funding for Residential and Commercial Energy, Transportation, Solid Waste, and Urban Greening.
- Appendix A, *OC Public Health Agency Census Tracts*, describes two different census tracts in Orange and the effects increased greenhouse gas emissions have on them.
- Appendix B, *Data Sources for GHG emissions for the City of Orange*, describes the data used for the Greenhouse Gas Inventory described in Chapter 2
- Appendix C, *Supplemental Community Engagement Information*, describes the suggestions and priorities by community members at several community events.

Chapter 1

Introduction

City of Orange Sustainability Plan 2024

City of Orange Background

Since its incorporation in 1888 [1], the City of Orange has grown both in population and area. With a population of 138,944, 47,351 households, and a land area of 27 square miles [1][2], the City of Orange is among the largest cities in Orange County. Transportation is a major part of the city's infrastructure with four major freeways including Interstate 5, State Route 22, State Route 55, State Route 57, State Route 18, and Toll Road 241. The City of Orange is also well served by public transportation with nine bus routes and two train lines.

The extensive transportation infrastructure as well as households in the City of Orange aid in the addition of greenhouse gases into the atmosphere. It is important to understand the effects this addition of greenhouse gases into the atmosphere has globally and at a local level. This section aims at providing the necessary information to understand the effects greenhouse gases have on the environment as well as explain the importance of sustainability for the residents of the City of Orange.

Climate Science

Scientists and organizations worldwide, such as the Intergovernmental Panel on Climate Change (IPCC), the United States Environmental Protection Agency (US EPA), and the United Nations (UN) have all presented scientific findings that support the idea that human behaviors, especially the combustion of fossil fuels, have contributed to the changing of the Earth's atmosphere [3][4][5]. It is imperative that local governments and communities use the evidence provided by the IPCC, EPA, and the UN to develop a plan to mitigate the negative effects that result from the altering of the Earth's atmosphere.

Fossil fuel combustion leads to more Greenhouse Gases (GHGs) emitted into the atmosphere, resulting in an altered atmosphere. This abundance of GHGs in the atmosphere creates a sort of blanket around the Earth that traps heat from the sun resulting in higher average global temperatures [3]. The increase of average global temperatures creates several positive feedback loops that if unchecked will perpetuate the changing climate.

An increase of GHGs have devastating effects on the environment including an increase in wildfire frequency and intensity, increased flooding, increased frequency of droughts as well as their intensity and duration, rising sea levels, and poor air quality among many other devastating effects [3]. In California, we are seeing these effects through the increased wildfires throughout the state, more flooding in coastal cities as well as cities near major bodies of water, extended severe droughts, and record high temperatures. The increase of natural disasters throughout the state of California as a result of increased GHGs in the atmosphere can be mitigated by local governments and communities through collaborative action.

What is a Sustainability Plan?

A Sustainability Plan is an effective way that local communities can enact change. Sustainability Plans are a set of goals and steps outlining specific actions that are being taken to reduce the communities impact on the environment. This includes actions being done to reduce GHGs emitted into the atmosphere, as well as other sustainable initiatives and practices. Not only are Sustainability Plans protecting the natural environment, they also prioritize the health and well-being of the local residents. Some of the beneficial outcomes from Sustainability Plans include improved air quality, increased access to natural resources such as green space, and reduction of energy costs for residents.

California recognizes the importance of local governments in promoting sustainability statewide. With the continued growth of the City of Orange since its incorporation in 1888,

it is crucial to the well being of the City of Orange's current and future residents to adopt sustainable practices. With that in mind, the City of Orange has produced this Sustainability Plan.

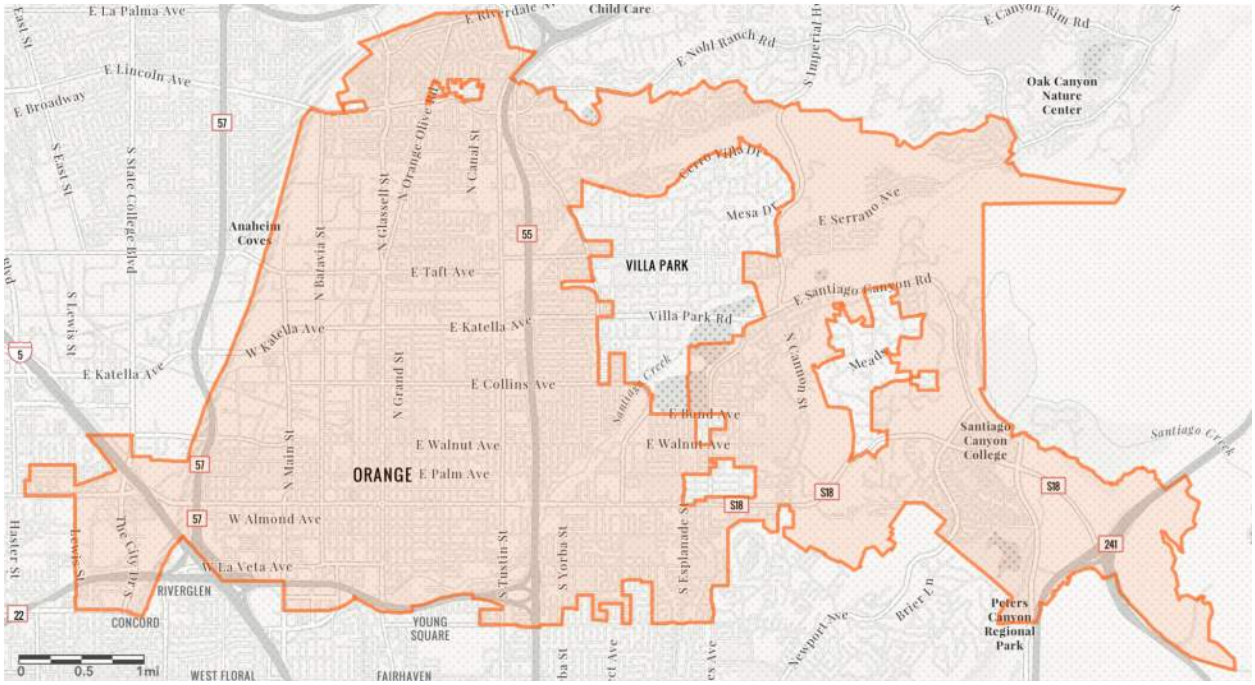


Figure 1 Map of the City of Orange

Orange Benefits from Sustainability

A Sustainability Plan is crucial for protecting the natural environment, promoting public health, and stabilizing the economy. The recommendations outlined in this plan will help preserve the City's rich history and vibrant community while having cost-saving benefits. The City of Orange is already seeing some extreme events of climate change, such as intense droughts, heat, and flooding. For example, the City declared a Level 2 water supply shortage from 5/23/2022 - 4/25/2023. One source of our water supply, the Colorado River Basin, is projected to have significantly less water as drought conditions continue to impact the area. This directly affects the City of Orange [6]. Without proper planning for the future, these events will continue to worsen and feel harsher. Marginalized communities of Orange will especially feel these exacerbated effects. Although everyone in Orange feels the impacts of climate change, the City's most vulnerable community members are disproportionately affected. It is essential to consider environmental justice in city planning.

Climate change-induced effects can significantly impact public health, leading to respiratory problems, chronic diseases, and reduced quality of life. A Sustainability Plan can prioritize initiatives such as improving air and water quality, promoting active transportation, and

enhancing access to green spaces, safeguarding residents' health and well-being. Sustainable urban planning strategies, such as mixed land-use development and pedestrian-friendly infrastructure, can create healthier, more livable communities, encouraging physical activity and social interaction. Furthermore, a Sustainability Plan can improve the City's economy by fostering innovation with sustainable initiatives and attracting green businesses. Investing in renewable energy, energy-efficient infrastructure, and sustainable transportation can create job opportunities and stimulate long-term economic growth. By reducing reliance on non-renewable resources and promoting local production and consumption, the City can build resilience against economic shocks such as fluctuations in energy prices or resource scarcity from global events as seen during the Global Pandemic and the War in Ukraine.

Failure to implement proper planning will have disastrous consequences for the climate, people, and economy. California has already experienced 8 inches of sea level rise within the past century [7]. Decreased air quality and increased sea levels are harmful to human health, and damaged infrastructure is expensive to repair. In recent years, Orange, along with the rest of Southern California, has experienced extreme heat waves. Data from NASA displays that Orange can experience up to a 49°F change in maximum temperatures during summer months by 2028 [8]. If no action is taken, temperatures will continue to rise, putting the City's elderly and youth at risk for cardiovascular and respiratory conditions. Furthermore, those who lack access to air conditioning and work outdoors will suffer. Not only will Orange get much hotter in the summer, but it will also get much colder during winter months (e.g., up to 24°F colder in 2028 than normal). Temperature will become more variable and unpredictable, so the community will feel a whiplash of weather patterns.

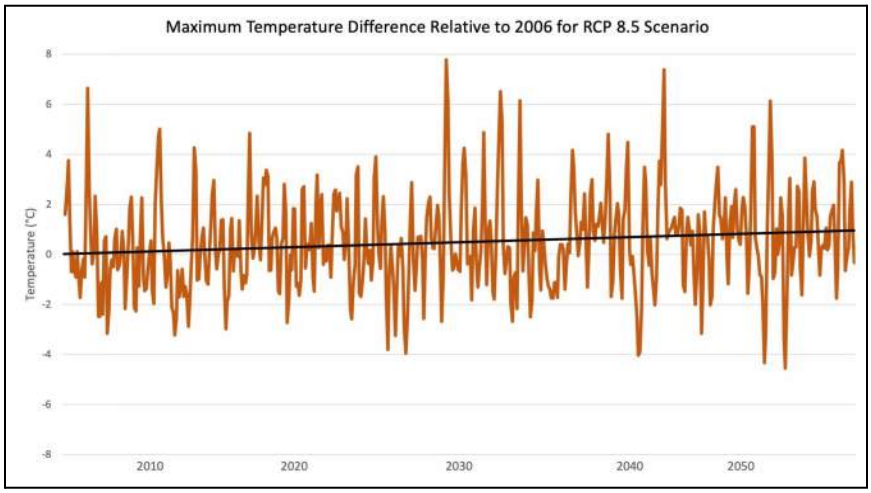


Figure 2 Projected maximum temperature change in Orange, CA under RCP 8.5 (baseline 2006). Data comes from gridded NASA NEX DCP30. The graph displays a moving average of monthly projected temperatures minus temperatures in 2006

Additionally, Orange has experienced some intense rainfall as recently as April 2024. Due to this weather, the City of Orange announced closures of public parks on several occasions, such as Hart Park and Yorba Dog Park. The City's infrastructure was not built to handle massive amounts of rain, causing flash flooding.

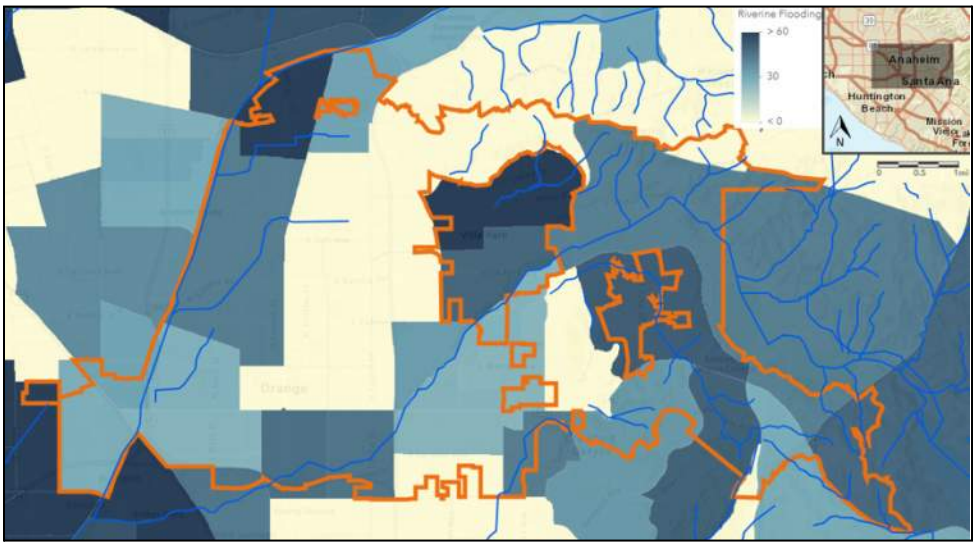


Figure 3 Map of river flood risk measured by index score for census tracts in Orange, CA. Scores range from 0 to 100, with data from The National Risk Index

The map above demonstrates how likely an area is to flood within the City of Orange (orange line boundary). Darker shaded areas, near Santiago Canyon, Batavia Street, and La Veta Avenue, are more prone to flooding. It is important to note that areas with a river (blue line) nearby have a high flood risk index score, meaning they are more prone to flooding. Overall, the city has an average flood risk index score of 26/100, with the highest being 93/100 and the lowest being 0/100. Figure 1 displays that temperature will become more extreme, making disastrous flooding events more likely for areas with a high index score [9]. This is due to the fact that higher temperatures facilitate higher rates of evaporation, and a warmer atmosphere is able to hold more water; these two impacts work in conjunction to produce more intense rainfall leading to more flooding. The Sustainability Plan presented here is critical for implementing initiatives that either prevent these events or mitigate their impact.

The City of Orange has already implemented some environmental initiatives. For example, bike lanes on some streets, stormwater runoff management [10], EV charging stations in high-traffic areas, and energy-efficient LED street lights [11]. This Sustainability Plan builds on these existing initiatives in addition to new policy recommendations. Regional sustainability requirements include a tougher energy baseline (Energy Code Title 24), lowering carbon through building design (CALGreen), and water use efficiency requirements (MWELO). In addition to City initiatives, Chapman University has

implemented drought-tolerant landscaping, LEED certification, energy conservation, and transportation efficiency. Furthermore, community groups have gathered to promote sustainability. For example, OC Goes Solar hosts community solar workshops, including one in Orange in March 2024 [12].

Figure 4 Image from Mazda of Orange

Policy Drives Sustainability

The City of Orange's Sustainability Plan reflects a comprehensive approach to sustainability that integrates environmental, economic, and social priorities to create a resilient and livable community for its residents.

Policies are critical in driving sustainability initiatives and shaping how communities, businesses, and individuals interact with the environment. At its core, policies provide a framework of rules, regulations, incentives, and guidelines that guide decision-making and behavior toward more sustainable practices. They create a structured approach to addressing environmental challenges, promoting conservation, and fostering resilience in the face of global issues like climate change. Policy-driven sustainability initiatives provide a roadmap for creating a sustainable world.

Both federal and state governments provide environmental guidelines for local governments.

Federal Laws

Clean Air Act

The Clean Air Act is a federal act that authorizes the U.S. Environmental Protection Agency (EPA) to set standards & requires states to submit implementation plans, monitor air quality, and enforce outlined standards. The Clean Air Act enforces two types of standards: ambient air quality standards and emission standards. The National Ambient Air Quality Standards are: PM2.5, SO_2, NO_2, VOC, O_3 and Lead [12]. On December 7, 2009, the U.S. Environmental Protection Agency announced that greenhouse gases threaten the public health of the American people through the emission of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (SF_6)[14].

State Laws

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) is a statute that requires state and local agencies to identify environmental impacts of proposed projects, and avoid or mitigate those effects when feasible [15]. Where effects are significant, a project can proceed if it can be shown that those effects can be avoided or mitigated by proposed changes to the project. CEQA encourages the protection of the environment by requiring state and local agencies to prepare a range of environmental impact analyses. Local CEQA guidelines were updated and approved by the City of Orange (July 14, 2020). The current state of California guidance and goals for reductions in greenhouse gas emissions are embodied in Assembly Bill 32, Executive Order S-03-05, and Senate Bill 375.

Assembly Bill (AB) 32

AB 32 is also known as the California Global Warming Solutions Act. This landmark legislation passed in 2006, requires California to reduce its GHG emissions to 1990 levels by 2020 and further reduce them by 40% below 1990 levels by 2030 [16]. It established the California Air Resources Board (CARB) as the lead agency for implementing climate policies.

Executive Order S-3-05

Executive Order S-3-05 states that by 2010, GHG emissions will be reduced to 2000 levels by 2020. In addition, it states that by 2050, GHG emissions must be at the 1990 levels and 80% below the 1990 levels [17].

Assembly Bill (AB) 1279

AB 1279 is known as the California Climate Crisis Act, which would establish the state's commitment to attain net zero greenhouse gas emissions at the earliest opportunity, but no

later than 2045, and to subsequently achieve and uphold net negative greenhouse gas emissions. It would also mandate that by 2045, California's human-caused greenhouse gas emissions will decrease to a minimum of 85% below the levels recorded in 1990. Additionally, the bill would compel the state board to collaborate with pertinent state agencies to ensure that revisions to the scoping plan pinpoint and propose actions to reach these policy objectives, and to recognize and execute a range of policies and tactics facilitating carbon dioxide removal methods and the adoption of carbon capture, utilization, and storage technologies within the state. [18]

CARB Scoping Plan/Cap-and-Trade Program

California operates a cap-and-trade program as part of its efforts to reduce GHGs emissions from major industrial sectors. The program sets a cap on total emissions and allows companies to buy and sell emission allowances, creating economic incentives for emissions reductions [19].

Zero-Emission Vehicle (ZEV) Program

As a part of CARB's Advanced Clean Cars package, they created the Zero-Emission Vehicle Program. This program was implemented to meet California's health-based air quality standards and greenhouse gas emission reduction goals. The ZEV program requires car manufacturers operating in California to have a given proportion of their produced vehicle be of zero-emission vehicles, such as electric cars and hydrogen fuel cell vehicles [19]. This program was established with the goal to reduce greenhouse gas emissions from transportation within California.

SB 1383

SB 1383, began in 2022 and mandates statewide organic waste collection. It requires every jurisdiction to provide organic waste collection services to all residents and businesses, including schools. It emphasizes education to all residents and businesses on what qualifies as organic waste and then how to properly dispose of organic waste. This ensures that less organic waste ends up in landfills. As organic waste sits in landfills, deprived of oxygen, it produces methane. Properly disposing of organic waste will not only reduce methane emissions but will cut greenhouse gas emissions, simultaneously. In addition the bill has substantial impact at the city level because it holds waste services accountable and incentivizes composting at the household and commercial levels. [20]

Environmental Justice in the Orange Community

Why Environmental Justice?

Environmental justice refers to the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, concerning the development, implementation, and enforcement of environmental laws, regulations, and policies. This expects that no population has a disproportionate share of negative environmental consequences resulting from industrial, municipal, and commercial operations or from federal, state, and local laws; regulations; and policies.

Environmental Justice in Orange

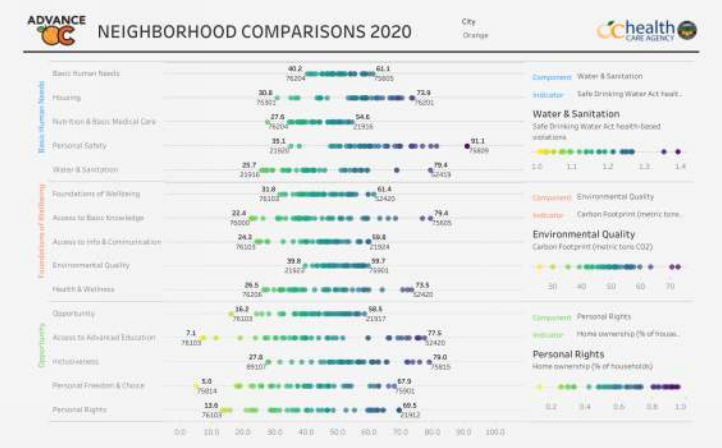


Figure 5 Neighborhood Comparisons 2020 from Advance OC, a 501c3 nonprofit, and OC Health Care Agency, a regional interdisciplinary health jurisdiction

Within the "Foundations of Wellbeing" section of Figure 5, environmental quality is assessed based on a mix of indicators across various census tracts, including: Ozone average 8-hour concentration (ppm) Carbon Footprint (metric tons CO_2) Nitrogen dioxide average annual concentration (ppb) Ozone average 8-hour concentration (ppm) PM2.5 average annual concentration ($\mu g/m^3$) and Wildfire hazard potential. The main subsection under the Foundation of Wellbeing ranks the census locations based on an overall assessment. However, more specific assessments based on the indicators listed above can be viewed on the side bar, highlighting both the highest and lowest quality census tracts across different components and indicators.

The environmental quality data ranges from census tract 6059021923, with an environmental quality score of 39.8, to census tract 6059075901 with an environmental quality score of 59.7. It's important to note that the higher the score, the higher the emissions, indicating poorer environmental quality. (See Appendix A for additional information)

Other Areas to Consider

In considering the sociodemographic factors within Orange, it's important to recognize disparities in access to clean space, air, and water across different neighborhoods. Collaborating with community groups like Orange County Environmental Justice (OCEJ) can offer valuable insights into residents' priorities for environmental equity.

Environmental justice considerations are integral to crafting an inclusive Sustainability Plan, to ensure all residents are able to benefit from local natural resources. Analyzing the distribution of green space relative to household income can help us understand potential inequities and guide equitable resource allocations. The addition of this environmental justice analysis to the Sustainability Plan presents a significant opportunity to address injustice, improve health, provide economic development, and create family-supporting local jobs; including climate education and green-oriented employment in Orange.

To further promote an equitable and sustainable future for the residents of the City of Orange, it is imperative that we understand the major sources of greenhouse gas emissions impacting the City and its residents.

Greenhouse Gas Inventory

Greenhouse Gasses and Their Relevance to Sustainability

The emission of greenhouse gasses (GHGs) heavily correlates to the health and cleanliness of the local community through its perpetuation of climate change. The limitation of greenhouse gas (GHG) emissions within a county leads to an overall decrease in localized smog production, increase in the purity of air and water quality, decrease in respiratory illnesses, and overall increased ecosystem stability. The local ecological and economic health are sustainably promoted when managing emissions of GHGs.

Role of a GHG Tool in Achieving Sustainability Goals

A GHG inventory allows for tracking and monitoring of emissions from different sources within the city. Examples of sources include car emissions, electricity, gas use, and agriculture. By categorizing and tracking emissions data, it provides a baseline for the City of Orange's current emissions profile. By defining what categories the emissions makeup strategies and decision making can be tailored to the interest and priorities of stakeholders.

An inventory can allow for a prioritization and allocation of resources to mitigate emissions through goal setting and policy making within the city's jurisdiction.

Methodology of Inventory

The EPA has created a tool in Microsoft Excel that allows for a complete Greenhouse Gas Inventory. This tool is split into two separate spreadsheets, a community GHG inventory, and a government GHG inventory. The community tool is to account for any emissions created by activities within the communities geopolitical boundary, while the government tool is to account for any emissions created by government operations within the geopolitical boundary. Complete data sources are listed in Appendix B. Each of these two tools are then broken up into three scopes:

- Scope 1 is for all direct GHG emission sources from activities taking place within the community or government.
- Scope 2 is for energy-related indirect GHG emissions that result as a consequence of consumption of grid-supplied electricity and heating and/or cooling for the community or government.
- Scope 3 is all other indirect emissions that occur as a result of activities within the community or government.

For each of these scopes there are multiple categories in which data can be then inputted. This data comes from an outside source such as electricity providers for the local government or the community. Within these categories, there are particular instructions on how to insert data and which specific types of data can be inserted. Within each sector data, cleaning, calculations, and reorganization was required to input the data effectively. Once the data is inputted into each section, the EPA tool uses various functions within Microsoft Excel to calculate specific GHG emissions for each section within each scope. The GHG tool then generates summary statistics featuring insights into which scope emits the largest amount of GHG emissions, specific GHGs, and their CO_2 equivalent GHG effect (CO_2e). These statistics are also split into specific sources within a scope. These general summary statistics can then be used to help guide policy makers, community members, and government officials on how to limit greenhouse gas emissions.

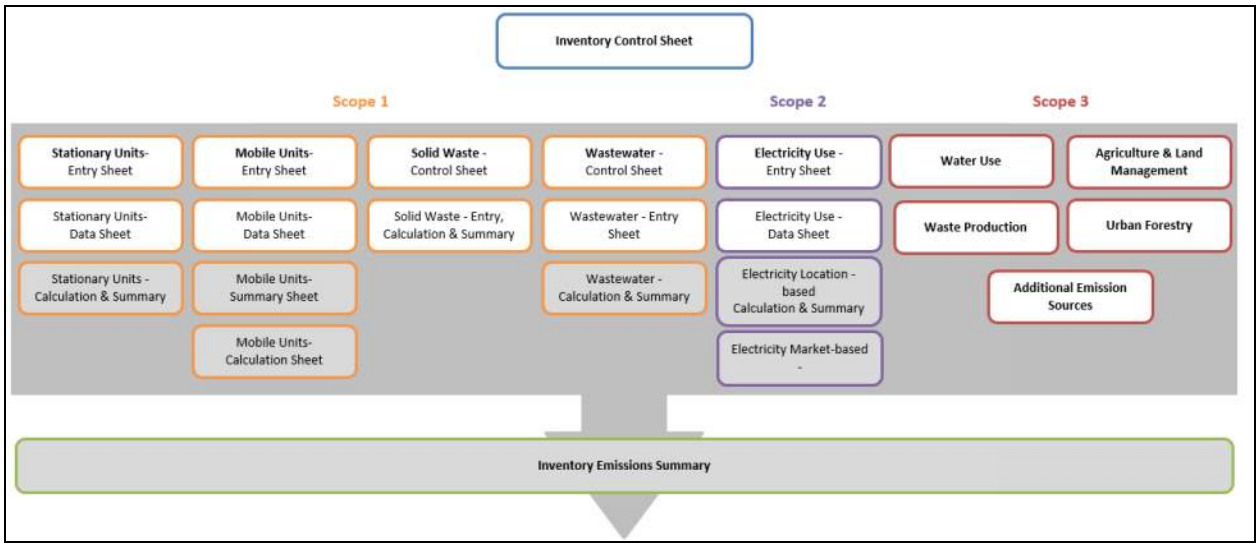


Figure 6 Table of Contents for the EPA tool outlining the contributing sources to the 3 scopes of emissions

Community GHG Tool

The following describes all community data sources used and assumptions made with the community GHG tool. All data presented are for the year 2022.

Scope 1

- The EPA tool requires input of sector, vehicle type, vehicle year, fuel type, fuel consumption, and vehicle miles traveled for each individual vehicle used in the community. Unfortunately, transportation data with the necessary input points does not exist for this sector. This is due to the high population of the City of Orange, and the constant travel to, from, and through by persons not living in the City of Orange.
- The EPA tool requires input of sector, fuel type, and amount of fuel used in MCF (1,000 cubic feet). This data comes from the Southern California Gas Company (SoCal Gas) and is organized by zip code. The sector fuel type and amount of fuel in therms are all supplied in this data set. The only necessary actions were to remove any blank zip codes and convert the amount of fuel from therms to MCF.
- Since City of Orange does not use landfills within the city for solid waste from its own sources such as public parks and government facilities, solid waste data is not included in Scope 1 as it is not a direct GHG emission. Solid waste data is moved to Scope 3, waste production.
- Waste water data is not available and not included.

Scope 2

- Electricity data is supplied by SoCal Edison. The data is organized by sector. (Residential, Commercial, and Industrial/Agricultural) and amount used in kilo-watt hours (Kwh).

- There are no other assumptions that were made in this section.

Scope 3

- Water use for the community was collected from the City of Orange for the year of 2022 and covered consumption for commercial, industrial and residential use for condominiums, single family, and multi family.

Data Gaps

- There is no mobile units data as the data does not exist.
- There is no urban forestry data for the City of Orange meaning that a large carbon sink is not accounted for.
- There is no available waste water data for the City of Orange, however in other GHG inventories it is a very small portion of the total emission, so this portion has been left out.
- There is no agriculture occurring in the City of Orange, so this portion is left out.
- No additional emission sources are used in this inventory.
- Local waste data from sources is absent, this data could be supplied by CR&R.

City GHG Tool

The following describes all city data sources and assumptions used with the city GHG tool. All data presented are for the year 2022.

For the city GHG tool, the City of Orange departments were re-organized for simpler data input. The departments are organized as follows:

- City Manager is merged with the City Clerk, Community Development, Economic Development, Finance, Human Resources, and City Attorney departments.
- Community Services
- Fire
- Library Services
- Police
- Public Works

Scope 1

- The EPA tool requires input of sector, fuel type, and amount of fuel used in MCF. Stationary Units data is supplied from SoCal Gas. The service address of each billed location was provided, which allowed the gas bills to be sorted by department. The service addresses also provided the exact building in which it was billed, which allowed for easy department categorizing. For example, many of the billed addresses are fire buildings which correspond to the fire department and many are parks which correspond to community service departments.
- The EPA tool requires input of department, vehicle type, vehicle year, fuel type, fuel consumption, and vehicle miles traveled for each individual vehicle used by the City.

The mobile units data were supplied by the City of Orange. The data set consists of the city vehicle fleet organized by department, as well as type of fuel. The City also supplied fuel usage broken down by department. For example, the fire department used 6,131 gallons of gasoline in 2022, as well as 42,185 gallons of diesel fuel. By using this fuel consumption data and the total amount of vehicles using gasoline or diesel within a department, accurate fuel usage amounts were calculated per vehicle. Applying the EPA's estimates for miles per gallon to these fuel usage amounts calculated accurate vehicle miles traveled per vehicle. The only assumptions needed to be made in this section are with regards to the vehicle type. The specific vehicle types listed in the EPA tool are passenger car, light truck (vans, pickup trucks, SUVs), heavy-duty vehicle, motorcycle, agricultural equipment, construction equipment, utility and recreational equipment, aircraft, ship/boat, and locomotives. Based on the vehicle model and department, vehicle type was assumed.

- Since there is no landfill within the City of Orange, solid waste data is not included in scope 1 as it is not a direct GHG emission. Solid waste data is moved to scope 3, waste production.
- Waste water data is not available and not included.

Scope 2

- Electricity data is supplied by SoCal Edison. The data is organized by their Industry Descriptions and amount used in Kwh. This data includes street lights and city buildings, among other infrastructure. The data includes all electricity used in city operations. Assumptions were made with regards to which city department specific electricity billing addresses, or industries, correspond to. These assumptions are very accurate, as the addresses correspond to specific city buildings or specific types of city lighting that correspond to a specific department.

Scope 3

- Commuting data for city employees was collected through a survey given to the City of Orange City Hall employees. Information about commuting types, days worked, commute length (miles), and number of employees was used to average the total emissions for the year.
- Water use for the city was supplied by the City of Orange. This data set consisted of total water use broken down by sector for the year of 2022 and covered consumption for agriculture, bike trails, fire service, and municipal. Using the amount of buildings used in each department, accurate assumptions of consumption data were then calculated. The calculation swapped the organization from sector to the proper input by department.
- Waste production data was supplied by the City of Orange and is broken down by specific departments. Waste product data was collected for the year of 2022 and covered solid waste and recyclables from city managed sites, including fire stations, police stations, public libraries, parks, and government buildings.

Data Gaps

- Assumptions were made for vehicle type in Scope 1 mobile units.
- Water use data was not correctly organized as supplied, therefore assumptions were made when calculating the proper breakdown by department. EPA Tool categories listed more specific categories than those provided by the City of Orange.
- The only commuting data supplied was for city hall employees.
- There is no urban forestry data for the City of Orange, meaning that a large carbon sink is not accounted for.
- There is no available waste water data for the City of Orange, however in other GHG inventories it is a very small portion of the total emissions, so this portion has been left out.
- There is no agriculture occurring in the City of Orange, so this portion is left out.
- No additional emission sources are used in this inventory.

Inventory Results

Community Data

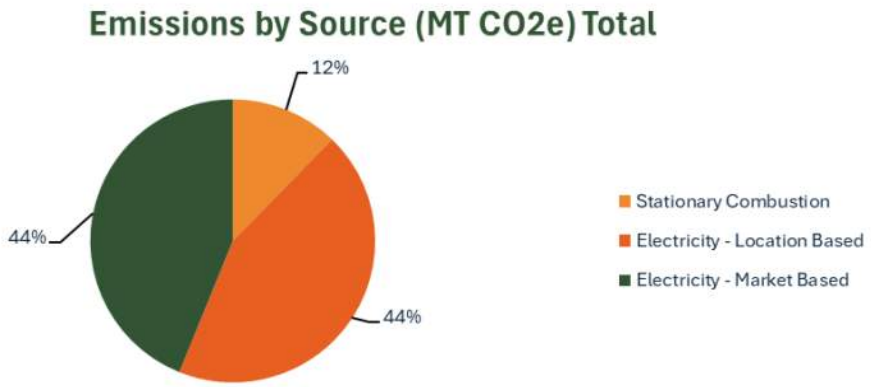


Figure 7 Contributions to CO_2 emissions by type of source. Electricity - Location Based & Market Based are the largest (both 44%) followed by Stationary Combustion (12%).

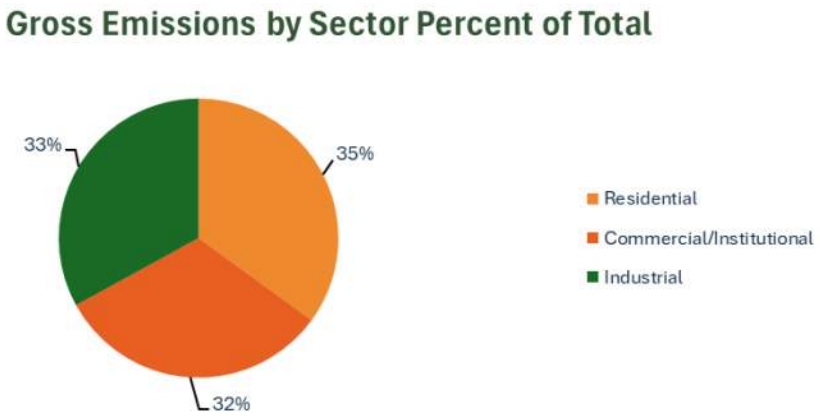


Figure 8 Contributions to CO_2 Emissions by each type of source. Residential is the largest (35%) followed by Commercial/Institutional (33%), then Industrial (32%)

For the community data, there are many data gaps, so these results only include natural gas and electricity data. Based on this data we see that electricity is a very large emitter (Figure 7). The City of Orange is a highly populated area which consists of numerous electricity uses. In Figure 8, each sector (residential, commercial/institutional, and industrial) contributes nearly equal proportions of GHGs.

The state of California offers a number of different programs incentivizing homeowners to install solar panels, which can be utilized by residents or home/building owners. These programs could be promoted by the City of Orange. Similarly, the City could promote electricity reducing habits such as turning off lights at night time, including outdoor lights. Many schools and businesses have large LED signs, or lighting that is on 24 hours a day. The City could encourage businesses to shut off lighting outside of business hours, and promote to homeowners, business owners, and residents to cut back on electricity usage. Overall, the city should focus on electricity as an emission source, and work to promote cleaner sources and more sustainable electricity habits. Additionally, the City of Orange and its residents would benefit from joining the Orange Power Authority, which facilitates pooling renewable resources for energy use, and empowers homeowners to feel more empowered to act on climate change while reducing the environmental impact of their energy use.

City Data

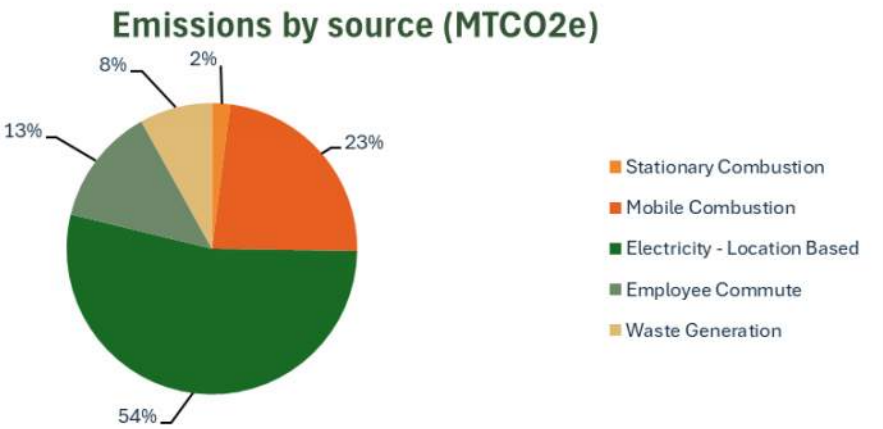


Figure 9 Contributions to CO_2 Emissions by each type of source. Electricity - Location Based is the largest (54%) followed by Mobile Combustion (23%), Employee Commute (13%), Waste Generation (8%), then Stationary Combustion (2%)

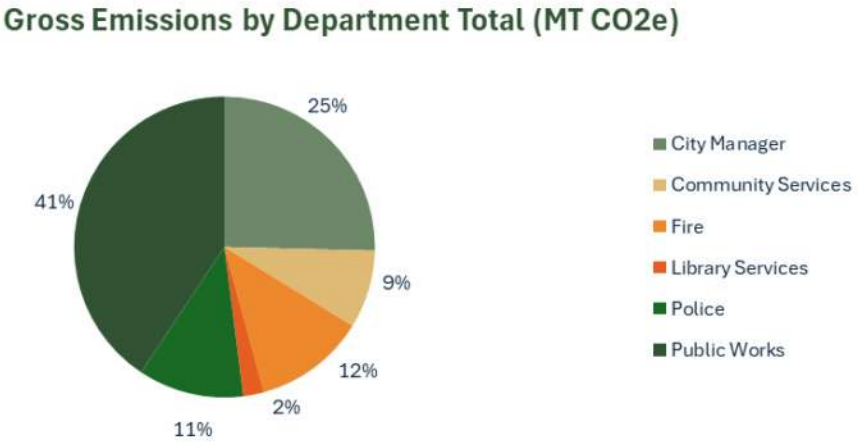


Figure 10 Contributions to CO_2 Emissions by each type of source. Public Works is the largest (41%) followed by City Manager (25%), Fire (12%), Police (11%), Community Services (9%), then Library Services (2%)

Based on these numbers, public works is the largest department emitter of GHGs. This is expected as the public works has a large vehicle fleet. Data from the GHG inventory shows that electrical usage in buildings contributes a large proportion of GHGs. Emissions can be reduced by using cleaner energy sources such as solar when appropriate. In addition, street lighting likely contributes to a large proportion of GHG emissions. The City should continue to evaluate energy efficient strategies from both building and street lighting as these are major contributors of GHGs.

To better understand the priorities of the community and existing sustainability activities, the community engagement group spoke with various stakeholders as discussed in the next chapter.

Community Engagement

The involvement of the community in the development of a city Sustainability Plan allows for initiatives to be included that address the issues and concerns of the people within the City of Orange. The correspondence between the community engagement group, the city council, community members, and the sustainability group bring different perspectives to include in the plan.

Who We Talked To

To achieve this goal, individual meetings were held with city council members to receive city-wide and district-specific feedback. Additionally, community member opinions were collected at various events as input for our plan. At all these events, the residents of Orange gave thoughtful and helpful suggestions from eager citizens who were excited to see the plan brought to fruition and want a say in the process. Approximately 30 community members and three city council members provided input to this plan. (See Appendix C for additional information)

Some events or locations include:

- OC Goes Solar
- Orange Sustainability Meeting
- Farmer's Market
- City Council Meeting

Figure 11 Senior Environmental Science Capstone students at Orange Home Grown's farmers market

What was Asked

To collect the necessary data, information was obtained through asking questions regarding current and future sustainability efforts. The question was then turned around to see if community members had any general questions to clear up any confusion as to what sustainability means and how that could impact Orange. Opening up the space for people to ask questions created a dialogue that allowed for citizens to gain a better understanding and knowledge of what the plan entails.

The specific questions that were asked to community members across all events and to the city council members include:

- **What *current sustainability* efforts have you observed in the City of Orange or in your district?**
- **What sustainability initiatives *would you like to see* implemented?**
- **Do you have *questions* about sustainability efforts?**

How the Community Responded

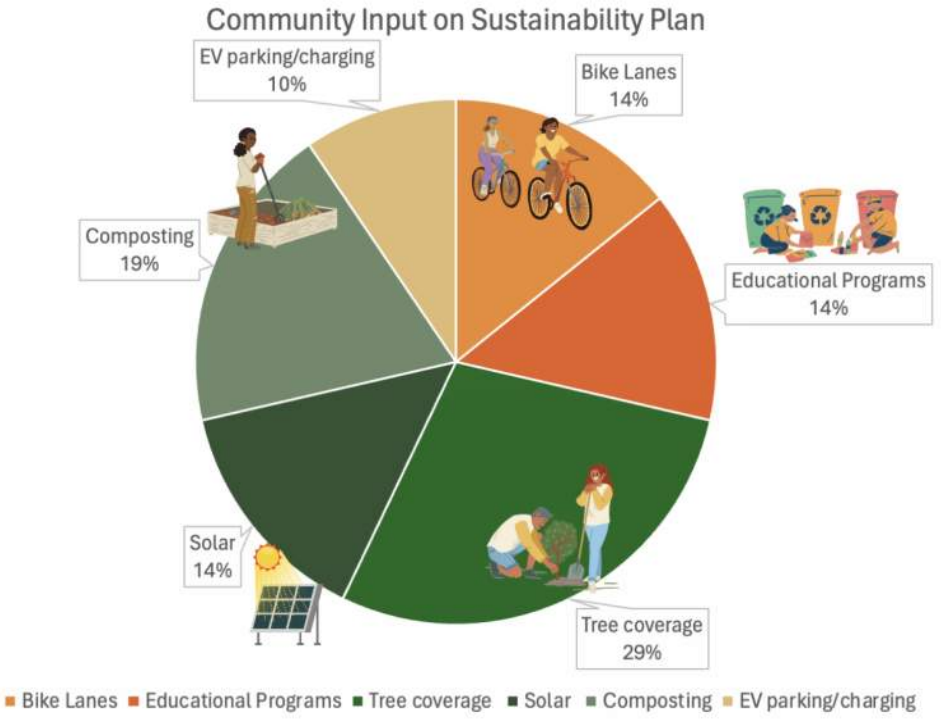


Figure 12 Community input on Sustainability Plan by category. Tree coverage was the community members' utmost concern at (29%), followed by Composting(19%), then Solar, Bike Lanes, and Educational Program(all 14%), and finally EV parking/charging(10%)

With an effort to gain insight into what the community members of Orange believe would create a more sustainable Orange, council members were asked to provide their insight. As representatives of their districts, they represent the general consensus among their own communities. Topics such as bike lane expansion, composting, solar power, and tree coverage are of high interest to the council. These are only a few of the various efforts that would help carry out an effective Sustainability Plan for the community of Orange.

Input from City Council Members

Councilman John Gyllenhammer:

It is important to stay focused on the already existing sustainability projects and initiatives, such as ones like the switch from regular electricity to Solar LED lights, which has decreased the city spending and is reducing the use of non-renewable sources of power. The city has also implemented more EV charging stations, but also hopes to see an expansion in another mode of transportation; bike lanes. Furthermore, traffic reduction is one of the priorities that would allow for cleaner air and easier transportation throughout the city. Composting has also been of peak interest and could provide a more positive

impact, and is already being carried out within households in Orange. For more sustainable initiatives, a campaign on composting seems to be something that the community could benefit from.

Any measures taken towards a sustainable Orange, ideally should have a utility expense reduction perspective, allowing the City to fund more programs and address multiple priorities. As a city, it would be beneficial to leverage events such as Earth Day and Clean Up Orange. This would only enhance the community feel of creating a more sustainable Orange. There is power in coming together with a common goal in mind. At this moment in time, efforts to provide incentive to the community of Orange, there is an ongoing search for grants that could promote more sustainable cities.

Mayor Pro Tem Arianna Barrios:

The historic district has a priority to maintain aesthetics within the area that encompasses the feel of the old town. This effort pushes for sustainable measures to accommodate historic standards. This effort looks at small changes within both residential and commercial places, like mini split air conditioners and changing to energy-efficient lighting. Though there is a push for more sustainable actions within the district, even more incentives and programs are to be implemented and widely communicated with the local residents. The push of a more pedestrian-friendly Orange Circle through bikes and public transportation, and business incentives for employees to ride the bus are around the corner and encouraged to those visiting and living in the district.

Moving forward with potential plans, there are many that pertain to keeping the aesthetic of the historic district but accommodating to sustainable standards. A push for more community informational programs on gardening, more drought-resistant yards, information about waste management, and a microtransit program to have a safer, more accessible Orange Circle.

Councilman Denis Bilodeau:

Current sustainability efforts within the community include composting initiatives and rebate programs for water conservation. CR&R is the waste management company in charge of the City of Orange, and recently, large compost bins have been provided for households. These bins help minimize the amount of solid waste going to landfills by diverting organic material, which is then converted into compost. The City raises awareness of the benefits of composting by coordinating a compost giveaway event near Earth Day, where each household can receive two bags filled with compost. Other current sustainability initiatives include rebate programs. Such programs may provide discounts to help residents remove their turf and exchange it for something that is more savvy when it

comes to conserving water. Residents are encouraged to switch to synthetic grass or to native plants, which are typically drought-tolerant.

Future sustainability efforts that would help the City of Orange include adequate tree coverage and selection, as well as effective allocation of funds as received from the South Coast Air Quality Management District (AQMD). There is a growing interest in having adequate tree coverage to ensure more shade is available, and high temperatures (known as the urban heat island effect) are reduced, all while providing a more pleasing aesthetic to the City. In an effort to increase tree coverage, the root systems, tree litter/debris, and general obstructions will need to be carefully considered. Additional sustainability goals include improved planning and allocation of funds to be used toward reducing air pollution as a part of AB 2766. Such funds received by the City of Orange could potentially be utilized toward installing more electric vehicle parking spaces.

Sustainability Recommendations

This section is a comprehensive list of sustainable policy recommendations based on input from the Orange City Council and Orange residents. We utilized best practice research in formulating these recommendations, building from the successes of other CA cities' sustainable action plans. We have formatted this section into individual sectors that have great potential to increase sustainability (Residential Energy, Commercial Energy, Transportation, Solid Waste, and Urban Forestry). Each sector has a main priority recommendation (low cost, short-term action), a list of general recommendations, and funding opportunities to aid with implementation. See the Summary Table below for a synopsis of the Policy Recommendations. (See Appendix D for additional information)

	Priority Recommendation	General Recommendations	Funding
Residential Energy	**Education Campaign** in partnership with SoCal Edison (informational workshops and promotion of rebates/incentives)	Promote energy benchmarking, Reduce permitting fees for solar, Encourage high efficiency appliances and building electrification	Rebates/incentives for residents (Energy Savings Assistance, Weatherization Assistance), R-PACE Financing Program
Commercial Energy	**Clean energy incentive programs** for businesses (tax breaks, private-public partnerships, financial incentives, etc)	Leverage existing city resources, innovative financing models, simplify and expedite the permitting process for solar installation	California Solar Initiative, California Energy Commission Grants, Southern California Gas Company Energy Efficiency Programs
Transportation	Education on bike transportation and **EV charging**	Alternative transportation, adding EV charging stations, fixing bike lanes	OCTA Renewed Measure M2, OCTA Renewed Measure M3,CTFP Project X "Environmental Clean Up"
Solid Waste	Community **Composting Initiative** (informational workshops and increase community compost drop-off locations)	Implement plastic waste reduction efforts, increase community gardens, and improve waste management	Climate Pollution Reduction Grants, CalRecycle Grants
Urban Forestry	City of Orange **Tree Planting Initiative** (create a Urban Tree Master Plan and provide informational workshops)	Increase permeable landscapes, review and revise Orange's tree palette, and require tree planting in the construction of new homes and buildings	Urban and Community Forestry Grants, Adaptation Planning Grant Program

Figure 13 Policy Recommendation Overview by Sector for the City of Orange

Residential Energy

Education Campaign (in partnership with SoCal Edison) → Teach residents how to reduce energy use, increase energy efficiency, transition to clean energy, and save money!

Informational Workshops

Hold or promote informational meetings and workshops that teach residents about their energy use, how to increase their energy efficiency, and how to effectively transition to clean energy, such as solar.

- See SoCal Edison Energy Education Classes
    - Electrification & Decarbonization Courses
    - Home Energy Series for Homeowners – Solar & Storage
    - Renewable Energy and Sustainability Courses
- Potential to create Orange-specific courses that focus on ways for residents who live in the historic district to implement energy efficiency and clean energy upgrades that align with the area's stricter building codes.
- Create infographics and newsletters that provide residents with tips & tricks on how to save energy and money, such as the following (provided by SoCal Edison):
    - Shut off your oven for the final 7 minutes of cooking; the trapped heat will finish the job.
    - Wash laundry in cold water. It saves energy and is gentler on clothes.
    - Turn down the brightness on your TV. Most viewing occurs at night anyway, so turning down your TV's brightness will greatly reduce its energy output.
    - Unplug unused electronics. Standby power can account for 10% of your annual electricity use.
    - Replace your incandescent light bulbs with more efficient LEDs.
    - Cook with your microwave to keep your home cooler and reduce energy costs.
- Promote a "How To" on the steps for residents to implement a solar project at their home & be interconnected to SoCal Edison's electric grid (SoCal Edison, see link for an example)

Rebates/Incentives

Direct residents to rebates/incentives to save them money and make their homes more sustainable & energy efficient.

Figure C1 Image from Current Home

- Low-income assistance programs
    - SoCal Edison's **Energy Savings Assistance Program (ESA)** is designed to help you conserve energy and save money. Income-qualified customers may be eligible to receive energy-efficient appliances at no charge or a minimal charge. If you qualify, SoCal Edison will cover the costs of new energy-efficient appliances—including installation. (SoCal Edison, see link for eligibility, how to apply, and additional information)
    - The U.S. Department of Energy's (DOE) **Weatherization Assistance Program (WAP)** helps reduce energy usage and costs by providing services intended to improve energy efficiency in the homes of eligible low-income households. (California Department of Community Services and Development, see link for eligibility and additional information).
- Energy Efficiency Financing (SoCal Edison, see the link for additional information)
    - **GoGreen Home Energy Financing** provides financing options for energy efficiency upgrades to help residents reduce their overall energy use. Single-family homes, townhomes, condos, manufactured homes, and properties of 1-4 units are eligible.
    - **GoGreen Affordable Multifamily Energy Financing** offers financing options to upgrade deed-restricted multifamily properties to be more energy efficient. Both in-unit and common area measures are eligible, and a portion of funds can go toward non-energy improvements such as landscaping and play equipment.
    - Demand Response Programs (SoCal Edison, see link for additional information and how to sign up)
        - **Summer Discount Plan**
            - Residents can earn up to $160 in summer bill credits by reducing energy consumption during high demand periods.

SoCal Edison automatically cycles the resident's A/C on and off during high demand events in exchange for bill credits.

- **Smart Energy Program**
  - Residents earn a $75 sign-up credit and up to $40 in annual bill credits when maintaining enrollment from June 1st to September 30th. SoCal Edison automatically adjusts the resident's thermostat by up to four degrees during peak energy demand events in order to save energy, and the resident can override events at any time.
- **Power Saver Rewards Program**
  - Residents who reduce energy use during PSR program events can earn energy bill credits (average of $20 annually).

- Solar Energy Programs
  - **GRID Alternatives' Energy for All Program** provides no-cost solar for families with limited or fixed incomes. (GRID Solar, see link for eligibility and more information)
  - Renters can advocate for their building owner to participate in the **Solar on Multifamily Affordable Housing (SOMAH)** program and can see a credit from solar production on their energy bills. (SOMAH, see link for additional information)

General Recommendations

Below is a list of sustainable actions implemented by a variety of local CA governments that provides Orange with a template of ways the City can help residents reduce their energy consumption and GHG emissions.

- Promote high efficiency appliances in the home (City of Dana Point)
- Recommend high energy efficient lighting options (City of Dana Point)
- Promote battery recycling and light bulb recycling for residents (City of Dana Point)
- Encourage energy audits for residents (City of Dana Point)
- Encourage natural lighting and ventilation through solar tubes; orient buildings during construction to maximize southern exposure (City of Dana Point)
- Complete energy efficiency retrofits in existing residential buildings (City of La Mesa)
- Energy Benchmarking: Promote tools like ENERGYSTAR Portfolio Manager for residential and non-residential property owners and operators to build awareness of their energy use, GHG footprint, and options for improving efficiency (City of La Mesa)

- The City can review its existing building codes and regulations to identify potential barriers to solar project implementation, and reduce or remove these barriers through a municipal code amendment. (City of La Mesa)
- As with other measures, the City can learn from local best practices in this topic area and consult with regional jurisdictions on their past efforts to streamline the solar permitting process, reduce permit fees, or remove other regulatory barriers. (City of La Mesa)
- Enhance enforcement of Title 24 compliance for existing residential buildings (City of Corona)
- Establish online permitting to facilitate energy efficiency and clean energy upgrades (City of Corona)
- Educate City staff and developers on future Title 24 updates and new energy efficiency opportunities for new residential development (City of Corona)
- Adopt a Residential Energy Efficiency Ordinance (City of Encinitas)
- Require or encourage decarbonization of new residential buildings (City of Encinitas)
- Provide incentives and reduce regulatory barriers for new residential buildings to install solar systems (City of Encinitas)
- Encourage or require energy efficiency audits and upgrades at the time of building sale (City of Glendale)

Funding

- See above (Priority Recommendation) for a list of rebates/incentives/financing programs for residents.
- Residential Property Assessed Clean Energy Programs, or R-PACE (run by the Department of Energy)
    - R-PACE allows homeowners to finance energy efficiency, renewable energy, and other eligible improvements on their homes using private sources of capital. PACE programs are typically enabled through state legislation, and authorized at the local government level. Municipalities may directly administer residential PACE programs, or through public-private partnerships with one or more PACE providers.
    - There are currently 10 active programs in California: see **HERE** for the guidelines of R-PACE programs and how to enact one in Orange.
- Power Purchase Agreements (PPA)
    - These programs help to facilitate broader community-wide PV installations. With PPAs, solar service providers install PV systems that they own and maintain, then sell the generated electricity back to the property owner at an established rate. Some of these programs also offer lease-to-own options in which property owners own the PV system at the end of their PPA contract

Commercial Energy

Clean Energy Incentive Program for Businesses → Establish a program offering financial incentives or tax breaks for businesses that transition to clean energy sources such as solar, wind, or geothermal power.

Figure C2 Image from Revel Energy

- Provide resources and guidance such as public-private partnerships to help businesses to assess their energy needs and identify suitable clean energy solutions
- Host workshops or seminars specifically tailored for business owners to educate them about available clean energy grants, subsidies, and financing options.
- Invite experts from relevant government agencies or organizations to guide in navigating the application process and accessing funding for clean energy projects.
- Provide financial incentives for businesses to install solar panels on commercial and industrial buildings. These incentives could include rebates, grants, or low-interest loans to offset the initial investment costs and make solar energy more economically viable for businesses.

General Recommendations

- Leverage existing city resources:
    - Retrofit LED street lights with solar panels to offset energy consumption and reduce operating costs or implementing performance-based contracts on the LEDs so that the City pays for lighting based on actual energy savings, freeing up funds for investment in solar energy initiatives
    - Identify synergies between existing city programs and environmental objectives to maximize impact and efficiency.
    - Integrate sustainability considerations into city planning processes, procurement policies, and infrastructure development projects

- Collaborate with local businesses, community organizations, and academic institutions to leverage expertise, resources, and funding opportunities for environmental initiatives
- Investigate innovative financing models, such as Property-Assigned Clean Energy (PACE) programs or green bonds, to fund solar energy projects without straining the city's budget. The City of La Mesa has used this in the past.
- Simplify and expedite the permitting process for solar installations to reduce bureaucratic hurdles and encourage more businesses to adopt solar energy
- Partner with neighboring cities to create projects that improved long-term energy efficiency.
    - The City of Newport Beach has partnered with Edison and their neighbor cities to work on energy sustainability projects
- Implement demand-side management programs to encourage businesses to shift energy usage to off-peak hours.
- Offer incentives or time-of-use pricing structures to incentivize energy conservation during peak demand periods.
    - The City of Anaheim offers Customized Energy Incentives that help businesses pay for energy-efficient upgrades.
- Implement or strengthen green building standards and codes for new commercial construction and major renovations.
- Encourage the use of energy-efficient building materials, sustainable design practices, and renewable energy integration in new commercial developments.
- Require commercial buildings to benchmark their energy usage and publicly disclose energy performance data.
- Explore opportunities for the city to procure renewable energy directly from utility-scale solar or wind farms through power purchase agreements (PPAs) or community choice aggregation (CCA) programs.
- Advocate for policies that support greater access to clean energy procurement options for commercial entities, such as aggregated purchasing arrangements or renewable energy tariffs.
- Develop voluntary energy management certification programs tailored to the needs of commercial businesses, recognizing and rewarding those that demonstrate excellence in energy performance and sustainability practices.
- Implement Orange County Power Authority (OCPA)
    - Irvine, Buena Park, and Fullerton have all embraced the OCPA with remarkable success. Irvine achieved a significant reduction in greenhouse gas emissions through increased use of renewable energy sources facilitated by OCPA and lowered electricity costs for residents and businesses. Buena Park successfully transitioned a large portion of municipal operations to renewable energy, resulting in a notable decrease in carbon footprint, while

also implementing community programs to encourage renewable energy adoption among residents. Fullerton enhanced energy resilience and reliability through diversified energy sources, reducing vulnerability to grid disruptions and engaging in collaborative initiatives with neighboring cities to amplify the impact of renewable energy procurement and infrastructure development

Funding

- **California Solar Initiative (CSI)**
  - The CSI offers financial incentives to businesses in California to install solar energy systems, such as solar panels, in their commercial buildings. By offsetting upfront costs, the CSI encourages businesses to embrace renewable energy sources, reducing reliance on fossil fuels and lowering electricity expenses. Through widespread adoption of solar power, the program contributes significantly to California's clean energy objectives.
- **California Energy Commission Grants**
  - The CEC grants fund various energy-related projects aimed at enhancing energy efficiency, reducing greenhouse gas emissions, and promoting renewable energy adoption in commercial buildings. These grants support research, development, and deployment of innovative technologies and practices, helping businesses implement energy-saving measures and transition to cleaner energy sources.
- **Southern California Gas Company Energy Efficiency Programs**
  - SoCalGas provides energy efficiency programs and rebates to commercial customers, facilitating reductions in natural gas consumption, operational costs, and environmental impact. These programs incentivize businesses to invest in energy-efficient equipment and technologies, thereby promoting energy conservation and emission reduction

Transportation

Initiative on promoting alternative transportation (biking programs, bus usage, electric vehicles). By having informational workshops, the City can educate the residents of Orange on alternatives for transportation, such as biking, public transportation, electric vehicles, and carpooling/ ride sharing. One way to encourage biking is to fix current bike trials or to expand bike trails that are currently in place.

- Increase bicycle paths
    - An example could be Fullerton's Bicycle Master Plan, which improves the city's bikeways and encourages alternative transportation methods
        - OCTA BikeShare Pilot Program Kicks Off in Fullerton - Orange County Transportation Authority
        - The bike share program allows rail and bus commuters who signed up for an annual membership, and they got access to an unlimited number of trips under 30 minutes which made it ideal for short trips around the city.
- Promote bus usage
    - Orange County Sustainable Communities Strategy which is a plan set out to reduce based fuel transportation and improve traffic technology
    - Bus Usage can be promoted by increasing time and implementing new programs OCTA recently released OC bus rapid, which decreases waiting times, and has implemented more clean energy buses
    - Bus usage can be promoted by branding and marketing bus rides, which can encourage more people to choose busses as their preferred mode of transportation

- Promote EV knowledge
    - Use vacant spaces or convert them to EV charging stations (bring more customers to the Orange circle)
    - Installation of charging stations will allow for an easier transition to EV, and there will be a reduction in fuel
        - Increasing charging infrastructure encourages the community to consider the opinion because it will be shorter distance and easily accessible

General Recommendations

- Have more electrical vehicles for city-owned vehicles, which can reduce gas consumption in the City of Orange
    - This can be a long-term effect that helps reduce noise, promotes reduction in greenhouse gasses and improves air quality
    - When obtaining new city cars, opt for electric cars and replace older models with clean energy cars
- Educate citizens on alternative transportation (share/short-term rental program)
    - Use incentives by partnering up with local bike shops to increase bike usage
    - Share through social media or locally populated areas around the city of Orange about alternative transportation
    - Discuss the idea in city council meetings or create sustainable meetings that allow people to share and communicate ideas on sustainability and transportation
- Establish more bike lanes and fix the ones that are already in place to ensure maximum efficiency
    - Use volunteer work when cleaning up recreational areas or bike lanes
    - Update bike lanes that need fixing, such as coloring or adding graphics to make it stand out more
    - Adding safety signs that help warn people about pedestrians or bikers
- Safe Routes to School program to encourage eco-friendly transportation and educate families on other alternatives for school
    - Santa Ana used this plan to encourage more families to walk to school by rewarding students and getting crossing guards.
    - Adding safety neighborhood signs and encouraging school participation
    - Encourage schools to host meetings on how students can participate in walking to school and how parents can help to reduce traffic in school areas
- Adjust parking rations and look into the city's zoning code
    - An example of this can be found in Santa Ana's climate action plan where they adjusted parking ratios to reduce the minimum amount of parking required to encourage more people to find alternative transportation
    - Locate large parking lots and reduce them to obtain more green spaces and reduce traffic in populated areas
- Adding trolleys around Orange Circle and other areas that are easily accessible
    - Examples can be found in City of Laguna Beach's Plan, which promotes trolley use by making it free and expanding its hours working from Monday through Sunday
    - It also reduces traffic congestion and allows for more visitors
- Reduce traffic in highly populated areas (ex: orange circle) by encouraging carpooling or share rides

    - Through social media, one can connect or share the idea of carpooling or share rides
    - Workplaces can implement a plan that helps coworkers commute together
- Get e-bikes and e-scooters in areas that have high traffic
    - The City of Davis has partnered up with SPIN, which is a micro-mobility program that provides a full fleet of e-bikes and e-scooters as an alternative method for those who need short mile connections and benefits many who don't have access to a car and lowers greenhouse gas emissions

Funding

Alternative transportation

- OC Transit Vision
    - 30 year plan for enhancing and expanding public transit in Orange County
- OC Street Car
    - First modern streetcar and will be 4.15 miles around Orange County
- OCTA Renewed Measure M2
    - Transportation investment plan a measure for authorizing collection of sales tax over 30 years for fund transportation
    - OCTA Renewed Measure M3

Biking Programs

- Grants | PeopleForBike
    - Help transform communities by funding bike infrastructure and promoting bike usage among community members
- Conservation and Outdoor Recreation Division (U.S. National Park Service) (nps.gov)
    - Provides funding for local communities to help conserve water and lands close to home outdoor recreation.

- California E-Bike Incentive Project (ebike incentives.org)
    - Funded by the California Air Resource Board, their main goal is to help promote and protect public health and ecological resources
- CTFP Project X "environmental Clean Up"
    - Improves overall water quality in Orange County from transportation-generated pollution and funds are designed to supplement existing transportation

EV Charging

- California Vehicle Infrastructure Project

    - Helps fund EV charging stations around areas that are most populated to encourage the use of electric cars to reduce petroleum use
- Tesla
    - Electric car vehicle production company that installs SuperCharger stations for free, again encouraging the reduction of petroleum reliance.
- Clean Transportation Program
    - Provides funding to support innovation and accelerate the development and deployment of zero-emission transportation

Solid Waste

Community Composting Initiative → Teach residents how to compost at home → reduce GHG emissions, minimize landfill waste, and fertilize your garden and houseplants!

Beginning in 2020, City of Orange household green waste bins became organic waste bins (See CR&R Organics Processing). This means residents are required to begin sorting organic waste (i.e. food scraps, yard trimmings, and paper) into their organic waste bin.However, there are **currently no requirements for apartment complexes to provide organic waste disposal bins** which has led to an increased demand in compost initiatives for residents in apartment complexes who don't have access to organic waste bins or a spacious yard for in-ground composting.

Additionally, to comply with SB 1383, CR&R should provide residents of the City of Orange smaller organic waste bins to put in their home to more easily dispose of organic waste prior to disposing of organic waste in the green waste bins. This has been implemented in neighboring cities with great success, including Laguna Beach and Anaheim.

Informational Composting Workshops

- Teach residents how to compost at home!
- Collaborate with local organizations to host the workshop
- This workshop will cover:
    - How to compost at home (what can and can't be composted)
    - How to use the compost in the garden!
    - Common concerns about composting
    - The benefits of composting

- Refer to Mission Viejo's Free Composting Class and Long Beach's Free Composting Class for nearby examples
- Hold a raffle to give away one free compost container
    - Additionally, participants can purchase compost containers at a discounted price
- Regularly hold these workshops twice a year to allow residents who are interested in composting to have the best chance of attending a class
- While composting reduces landfill waste and greenhouse gas emissions, it also has the potential to reduce the cost of waste disposal
    - See USEPA Composting Report

- Organic materials comprise 51.4 percent of municipal solid waste in landfills
- Wasted food is responsible for 58% of landfill methane emissions

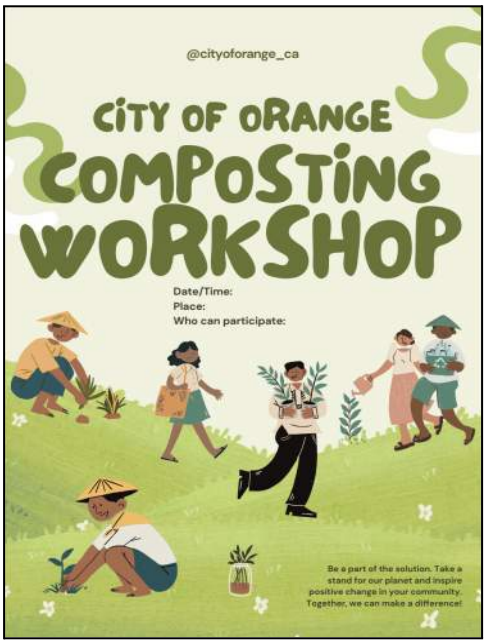


Figure C4 Composting Workshop Flyer Sample Template

Community Composts

- Orange Home Grown is currently the only location in Orange where the community can drop-off their compost
  - This limits their ability to accept everyone's compost as they can only process a given amount at a time
- Create more compost drop-off locations at local parks!
  - See City of Santa Ana Community Compost and Chicago's Free Food Scrap Drop-Off
    - Makes waste reduction more accessible for residents in apartment complexes
    - Supported by volunteers and community members
      - Weekly volunteer maintenance crew

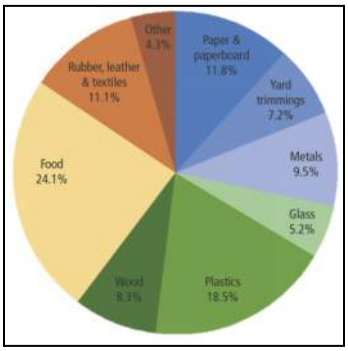


Figure C5 Total Municipal Solid Waste Landfilled (by material), 2018 EPA Advancing Sustainable Materials Management: 2018 Fact Sheet (pdf)

Landfills lack the oxygen required to break down organic materials which allows anaerobic decomposition (the breakdown of organic material without oxygen) to take place. This process releases methane and carbon dioxide, which are air pollutants that are major contributors to climate change. Therefore, by composting our organic waste and using the compost produced, we can reduce the emission of these pollutants and return the nutrients back to the soil which would **improve soil quality and help to make our ecosystems more resilient to the impacts of climate change**.

General Recommendations

Below is a list of sustainable actions implemented by a variety of local CA governments that provides Orange with a template of ways the City can help reduce solid waste and GHG emissions

- Limit the use of disposable plastics and reduce waste within the City
    - See City of Arcadia Plastic Waste Reduction
    - Phase 1: Restrict the distribution of single-use food utensils (only upon request)
    - Phase 2: Ban food and beverage containers made of polystyrene (styrofoam)
        - See Children's Environmental Health Network for more information on why styrofoam is a health and environmental concern
- Create incentive programs for residents who reduce the quantity of waste they send to landfills
- Minimize waste produced at city festivals and large events
- Require vendors to only distribute compostable or recyclable food service items
- Communicate waste reduction goals with vendors, caterers, and guests
- Inform guests on how to dispose of waste
    - See DCEE Waste Reduction Guide and LA County Waste-Free Event Guide for more
- Support the creation of and contribute to a regional recycling data collective to better understand community waste
- Incentivize businesses to pursue strategies that minimize their waste
    - See City of San Jose C&D Diversion Deposit program

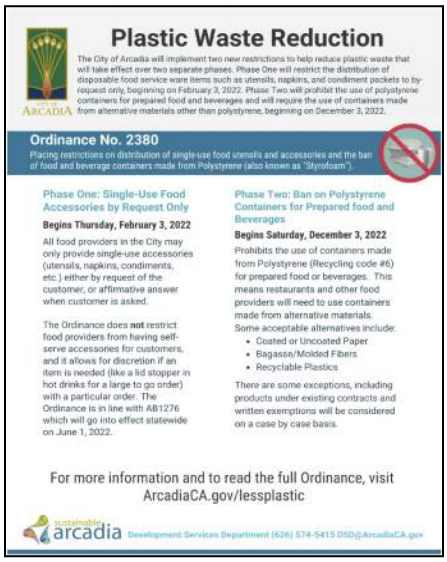


Figure C6 City of Arcadia's Plastic Waste Reduction Plan

- Collect a deposit when a building permit is issued for construction, demolition, and remodeling projects
    - To have their deposits returned, contractors are required to divert at least 50% of the generated waste
- Increase hard-to-recycle events and drop-off locations
- Collaborate with CalTrans to organize free "Dump Day Events" incentivized by the 2022 Clean California
    - For more information, see available grants below
- Increase availability of public organics bins
- Implement food recovery program
- Incentivize the incorporation of urban agriculture features including indoor agriculture, edible forestry, community gardens, etc.
- Continue and enhance public outreach programming that provides residents with strategies for household waste reduction, including from food waste and shipping and packaging (e.g., on-demand deliveries), including outreach in languages that reflect the diverse needs of Orange residents

Funding

- Climate Pollution Reduction Grants
    - The program 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
    - Authorized under the Inflation Reduction Act, this program provides $250 million for noncompetitive planning grants, and approximately $4.6 billion for competitive implementation grants.
- CalRecycle Grants
    - Community Composting for Green Spaces Grant Program
    - Program aims to Promote community activities that increase organic waste diversion in disadvantaged and low-income communities.
    - Reduce food and organic waste disposed of in landfills

Urban Greening

City of Orange Tree Planting Initiative ⟶ reduce air pollution, save on energy consumption, mitigate flooding, and simply make living in Orange a little more beautiful!

Urban tree coverage is not distributed equally. Studies have shown that neighborhoods with less tree coverage tend to be home to residents of lower income. The expansion of tree canopies in urban areas are crucial to climate adaptation measures because by providing shade to otherwise scorching hot pavement and homes, they have the ability to **reduce energy consumption and costs, regulate air and noise pollution, minimize water use**, and many more benefits to residents of Orange.

Urban Tree Planting Initiative

- Identify priority areas and streets in need of tree canopies
    - Utilize spatial data on tree canopies in Orange
- Create a Urban Tree Master Plan that identifies a target number of trees to be planted in specified areas by a target date (2028?)
    - This Master Plan will also:
        - Prioritize spaces in need of tree coverage
        - Identify ways to integrate permeable landscapes
        - Develop a plan to increase permeable areas for new trees and restore spaces that have been paved
- Provide workshops that teach residents about the tree planting initiative
    - Collaborate with a local groups to host the workshop such as a native plant nursery or Orange Home Grown
    - Participants can learn about:
        - How trees reduce utilities by reducing energy and water use
        - What trees and shrubs are best to grow in their yard
        - How to plant and maintain the plants
- Incentivize residents in identified areas to plant native trees and shrubs
    - Ensure the diversification of tree species, including using native tree and shrub species and/or species that are adapted to higher temperatures and require less water
- Increase awareness of strategies about tree planting to reduce greenhouse gas emissions by including signage and educational materials on tree canopies and carbon sequestration benefits at locations where trees have been successfully planted

- Below are some examples of cities that implemented a tree planting program for little to no cost to the city through grants and resident fees
    - Check out Anaheim's TreePower Rebate Program!
        - A partnership between Anaheim Public Utilities and City of Anaheim Community Services, offers a program to provide FREE trees to residents
        - Homeowners who are interested in purchasing their own trees can apply for a tree rebate
    - Fountain Valley Tree Planting Program
        - Residents without a tree by their curb in front of their property can purchase a tree to be planted for $35
    - See USC Urban Trees Initiative
        - A scientific plan for healthier and more resilient urban forests

Figure C7 City of San Diego's Tree Planting Program Poster

The cost of energy and water can be significantly reduced by planting drought-tolerant and native trees, especially when planting in areas served by recycled and/or greywater infrastructure. Tree canopies are capable of sequestering carbon dioxide and significantly improving air quality in a given area.

General Recommendations

- Increase permeable landscapes
    - See San Francisco's Green Landscaping Ordinance
        - Require 50% of outdoor surfaces to be permeable by using porous asphalt, porous concrete, interlocking pavers, bricks, and other landscaping options
- Increase native green spaces in urban areas
    - Transition non-native plants with drought-tolerant, native plants
    - Replace grass lawns with hardy, native plants and drought tolerant landscaping
- Review and revise the City of Orange tree palette to align with modern needs of Orange residents and the changing climate
    - Replace inadequate trees with native trees that:
        - Are beneficial to local wildlife
        - Provide shade on sidewalks and paved areas
        - Are drought-tolerant
        - Sequester carbon dioxide and other air pollutants
- Require a minimum of two trees to be planted with every new home or building constructed
    - See San Diego's Residential Tree Planting Program
        - By 2030, the county is aiming to plant 35,146 trees and an additional 28,202 trees between 2031-2050 at new residential developments in the unincorporated county
- Organize and promote tree and shrub planting events at local parks
- Expand tree planting initiatives on private, city, and school district property and in public right-of-way
- Promote the construction of infrastructure that reduce the urban heat island effect
    - Cool roofs and pavement, vertical gardens, trees along freeways, and reflective material
- Expand volunteer programs and partnerships with community organizations to plant and maintain trees
- Explore the allocation of revenue from tree removal fines and fees to fund the planting of new trees

- Develop policies that encourage and incentivize developers, homeowners' associations, and other organizations to preserve, maintain, and plant trees
- Support the creation of new urban green space along freeways

Funding

- Urban and Community Forestry Grants
    - In 2023, the USDA Forest Service Urban and Community Forestry Program awarded $1.5 billion to states, projects, and national initiatives that support urban communities in ensuring equitable access to trees
        - California $30.8 million for grant projects working at a community, regional, or statewide scale in this funding opportunity
    - Applications are now open and will be accepted through May 30, 2024 by 5:00 PDT
- Adaptation Planning Grant Program
    - This is a part of the California Governor's Office Integrated Climate Adaptation and Resiliency Program (ICARP)
    - The program provides funding to help fill local, regional, and tribal planning needs
        - Provides communities the resources to identify climate resilience priorities, and supports the development of a pipeline of climate resilient infrastructure projects across the state

Final Thoughts and Implementation

These recommendations provide an actionable guide to increasing sustainability in the City of Orange. These strategies help Orange to decrease their GHG emissions in line with the wants and needs of the residents of Orange and the City Council's capacity. The City of Orange is a unique and historic landmark that has the potential to make positive changes by implementing these sustainability recommendations. Especially considering that cities are main emitters of GHGs, it is necessary for populated cities, such as Orange, to take action in reducing their GHG emissions to mitigate and adapt to a changing climate. Beyond the goal of reducing emissions, these recommendations have a myriad of co-benefits, including reduced utility costs, city beautification, and encouraging healthier lifestyles.

The City may consider the following for implementation and/or additional work as part of this plan:

- Identifying lead staffer/team focused on the implementation and integration of this Sustainability Plan. Fellowships through California Climate Action Corps are available to facilitate this at minimal cost to the City.
- Development of speciality plans for specific recommendations (e.g., Tree Cover, Composting)
- Collaborate with organizations such as Orange Sustainability Group to facilitate community programs as suggested in Chapter 4
- Completion of GHG inventory to include any data gaps such as mobile transportation sources.

Overall, this Sustainability Plan and its recommendations are crucial to the longevity of the City, its residents and businesses, as well as the environment around it.

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Appendix A: OC Public Health Agency Census Tracts

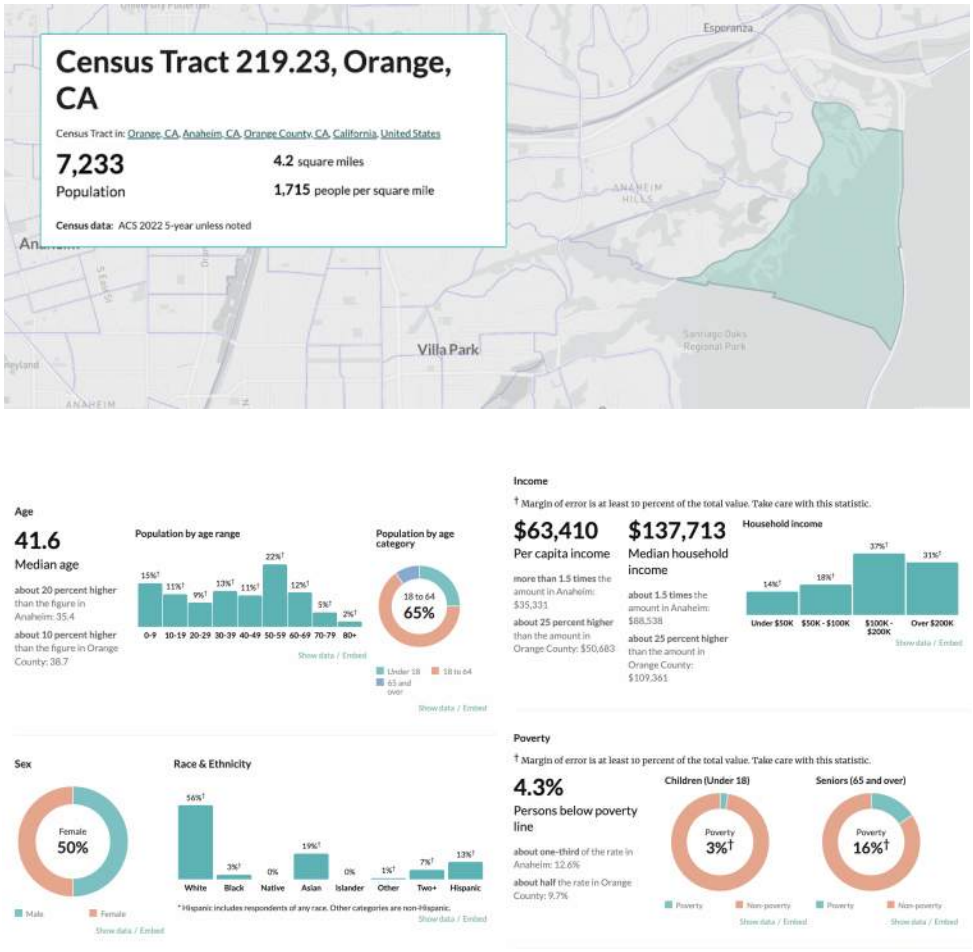

Figure D1 Census Tract Information 6059021923, U.S. Census Bureau (2022). American Community Survey 5-year estimates, accessed via Census Reporter Profile page for Census Tract 219.23, Orange, CA. A depiction of demographic and socioeconomic characteristics of Census Tract 219.23 in Orange, California. This tract spans an area of 0.5 square miles and is inhabited by a population of 7,233, with a median age of 41.6 years. The racial composition comprises 56% White, 19% Asian, 13% Hispanic, 3% Black, and 7% identifying as two or more races. Approximately 4.3% of residents live below the poverty line, while the median household income stands at $137,713. The environmental score according to for this tract is 39.8

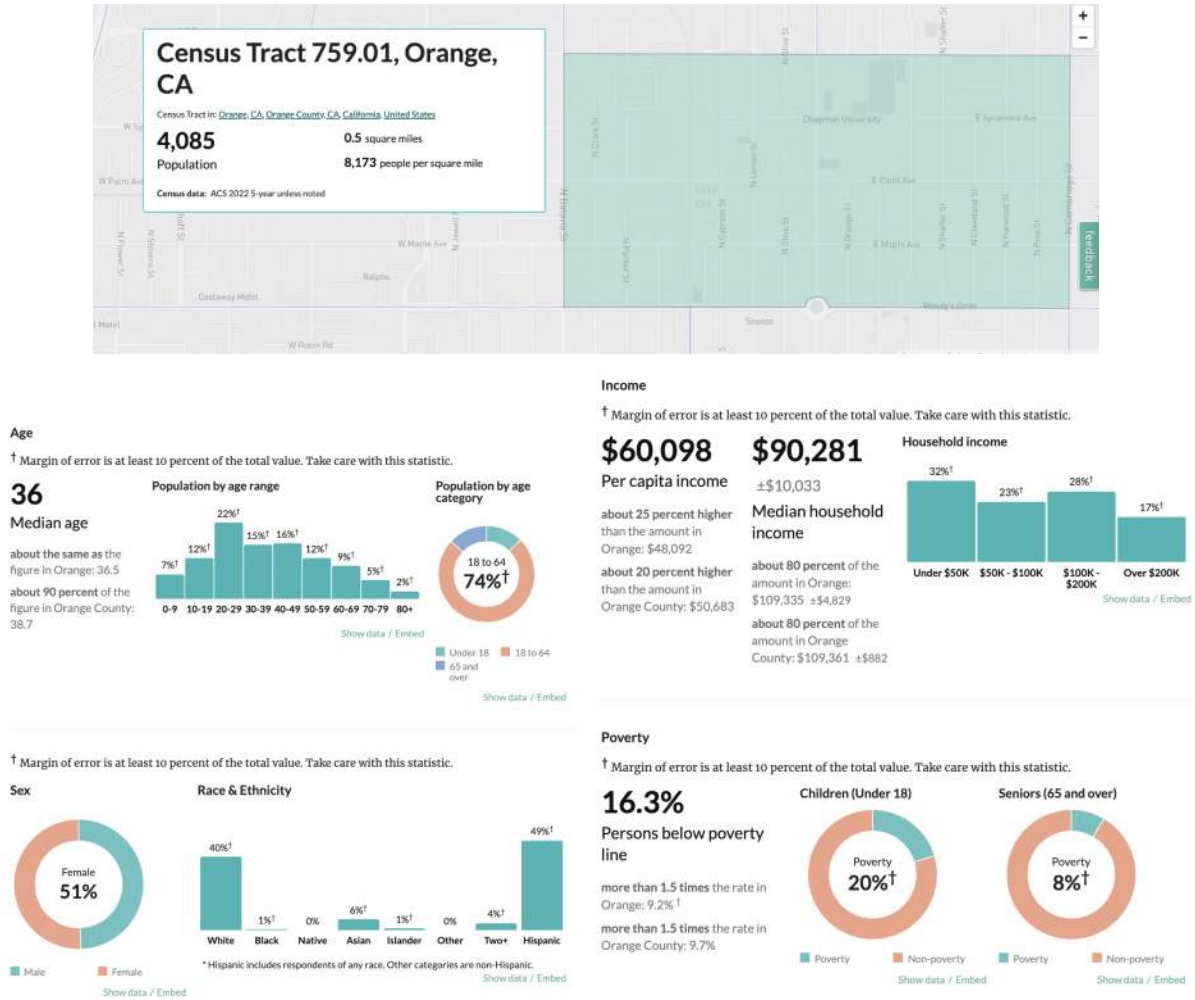

Figure D2 Census Tract Information 6059075901, U.S. Census Bureau (2022). American Community Survey 5-year estimates, accessed via Census Reporter Profile page for Census Tract 219.23, Orange, CA. An illustration of data for Census Tract 759.01, also situated in Orange, California. Covering the same area of 0.5 square miles, this tract is home to a population of 4,085, with a median age of 36 years. The racial composition includes 40% White, 49% Hispanic, 6% Asian, 1% Black, and 4% identifying as two or more races. Notably, a larger proportion of residents, 16.3%, fall below the poverty line, and the median household income is $90,281. The environmental score according to for this tract is 59.7

Observations

Census Tract 759.01 has a lower median household income ($90,281) compared to Census Tract 219.23 ($137,713). Tract 759.01 has a notably higher poverty rate (16.3%) compared to Tract 219.23 (4.3%). This suggests potential disparities in economic resources between the two areas, which could influence residents' ability to access environmental amenities or mitigate environmental hazards.

Tract 759.01 has a higher percentage of Hispanic residents (49%) compared to Tract 219.23 (13%). Environmental justice work often highlights racial disparities in exposure to pollution and access to environmental amenities. The higher proportion of Hispanic residents in Tract 759.01 raises questions about whether they face disproportionate environmental burdens compared to other racial groups in the area.

Overall, Census Tract 759.01 has a lower median household income and a higher poverty rate, with a larger percentage of marginalized identities compared to Census Tract 219.23. Conversely, Census Tract 219.23 exhibits higher median household income, a lower poverty rate, and a smaller percentage of marginalized identities. These disparities may influence residents' access to environmental amenities and their vulnerability to environmental hazards.

Tract 759.01 has a higher environmental score (59.7) compared to Tract 219.23 (39.8), indicating potentially poorer environmental quality in Tract 759.01. This discrepancy suggests that Tract 759.01 may experience higher levels of emissions or poorer environmental quality compared to Tract 219.23.

Appendix B: Data Sources for GHG emissions for the CIty of Orange

Type of Data in EPA tool	Data	Data Source
Community Data		
Scope 1: Stationary Combustion	Natural gas consumed by community	SoCal Gas
Scope 1: Mobile Units	No data available	N/A
Scope 1: Solid waste	No landfill in city of orange, included in scope 3	City Manager Office
Scope 1: Waste water	No data available	N/A
Scope 2: Electricity use	Electricity consumed by community	SoCal Edison
Scope 3: Water use	Water consumed by community	City Manager Office
Scope 3: Waste production	Trash produced by community	City Manager Office
Scope 3: Agriculture and land management	No agriculture in city of orange	N/A
Scope 3: Urban Forestry	No data available	N/A
Scope 3: Additional Emission sources	None established	N/A
City Data		
Scope 1: Stationary Combustion	Natural Gas consumed by city buildings	SoCal Gas
Scope 1: Mobile Units	Registered vehicles in City fleet	City Manager Office
Scope 1: Solid waste	Included in scope 3, no landfill in orange.	City Manager Office
Scope 1: Waste water	Not included	N/A
Scope 2: Electricity use	Electricity consumed by city	SoCal Edison

	operations	
Scope 3: Water use	Water consumed by city operations	City Manager Office
Scope 3: Waste production	Trash produced by city operations	City Manager Office
Scope 3: Agriculture and land management	No agriculture in city of orange	N/A
Scope 3: Urban Forestry	No data available	N/A
Scope 3: Additional Emission sources	None established	N/A

Figure A1 Data sources used in Greenhouse Gas Inventory

All charts/emissions calculations are supplied by EPA GHG inventory city and community tools after data entry.

Appendix C: Supplemental Community Engagement Information

Date	# of people	**EVENT**	**Suggestions**
3/2	**5**	**OC Goes Solar**	● Type of tree ● Tree coverage ● Root trees ● Class on composting and recycling ● The intersection at Tustin and Walnut ● Bike lanes ● Landfill to park Orange acres
3/25	**1**	**Meeting with Councilman Gyllenhammer**	● Not many current efforts of sustainability ○ Budget deficit $20 mil ● Cut or add revenue ● Areas that provide immediate economic expense ○ Utility expenditure reductions ● Priorities ○ land preservation ○ Traffic reduction ○ Trails connecting ○ Bike lanes ● Suggestions ○ Earth day ○ Come out as a city ○ Marketing flyers ○ Cleanup orange ○ Leverage what the city does already
3/25		**Sustainability Group Meeting**	● Landfill ● Implementing more sustainability ● compost
3/27	**1**	**Meeting with Councilwoman Barrios**	● Sustainable alternatives while maintaining historic aesthetic:mini-split, LED bulbs ● Find ways to make solar panels convenient to historic standards ● Microtransit pilot program

			• Free composting programs for the community • Training program for water resource: rainwater capture • Landscaping workshops to turn away from grass • Retraining the people of Orange to turn to electricity and try to shorten the social justice gap in price
4/6	**8**	**Farmers Market**	• More tree planting • Better bike paths • More solar on public buildings • Community program for fruit picking • More pedestrian-friendly areas in the circle: outside dining • More EV parking/charging • EV van pulls • Information on composting • More information on community garden programs • Microtransit programs • More promotion of the farmers market to student
4/22	**1**	**Meeting with Councilman Bilodeau**	• Messaging used to reduce waste and water use (CR&R, water bill) • Inform the community of rebates for faucets and using turf • Biannual compost collection • Considers district aesthetic-based • Push for more trees along roads in patterns beyond the plant palette guide • Push for Clean Air prioritization from the AQMD AB2766 for funds to go to EV charging • Enforce more food waste initiatives from the city and CR&R • Encourage and Publicize Recycle from Home - Private company - Collects e-waste, aluminum, glass and plastics - Picks up and pays clients

Figure B1 Specific suggestions of community members by event