CLIMATE ACTION PLAN

CITY OF ESCONDIDO

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March 2021

This Climate Action Plan ("CAP") provides a comprehensive roadmap to address the challenges of climate change in the City of Escondido ("City"). While climate change is a global issue, it impacts communities on a local scale. It is the responsibility of all members of society, including local governments, to reduce greenhouse gas ("GHG") emissions in their communities. Acting on climate change means both reducing GHG emissions from activities within the city and helping the community adapt to climate change and improve its resilience over the long term. The City has dedicated resources and partnered with the San Diego Association of Governments ("SANDAG") to create this CAP to achieve GHG reductions and address climate change at the local level. In an effort to combat climate change, this CAP sets GHG reduction targets and proposes achievable, locally-based strategies to reduce GHG emissions from both municipal and community activities.

This CAP aims to address climate change by reducing GHG emissions from activities within the city, and by identifying threats and strategies for adapting to adverse environmental conditions caused by climate change.

Scientific evidence shows that the Earth's climate is experiencing a warming trend as a result of increasing GHGs in the atmosphere. Increasing average temperatures are also causing changes in the climate, including disrupted ocean currents, increased extreme weather events, and changes in precipitation patterns, etc. This phenomenon is known as global climate change. As California continues to experience historic trends of rising average temperatures, extreme weather events and storms, and higher sea levels, there is evidence that the effects of global climate change are already occurring and that reductions in GHG emissions are needed to prevent the most catastrophic effects of climate change.

The State has taken several steps to reduce GHG emissions and respond to the threat of global climate change. In 2006, the California Global Warming Solutions Act (Assembly Bill ["AB"] 32) established the state's first target to reduce GHG emissions, which set a goal of lowering emissions to 1990 levels by 2020. In 2016, Governor Brown signed Senate Bill ("SB") 32 into law, which established a new mid-term GHG reduction target of 40 percent below 1990 levels by 2030, aligned with leading international governments, such as the European Union. The 2030 target set under SB 32 places California on a trajectory towards meeting its longer-term goal, which is to bring emissions down to 80 percent below 1990 levels by 2050. According to the California Air Resources Board ("CARB"), the State has been making steady progress in reducing statewide emissions and has met its 2020 target. Many climate experts believe that eventually a reduction of greater than 80 percent will be required to achieve climate stabilization.

Over the last decade, the City has taken several steps to begin addressing climate change and achieving reductions in GHG emissions, both in the City's operations as well as the broader community. The City adopted its most recent CAP in 2013 ("2013 CAP"). The 2013 CAP detailed the City's first communitywide GHG inventories for 2005 and 2010, which provided baseline emissions data from which future GHG emissions were estimated and reduction measures were developed.

This CAP provides an update to the inventories, projections, and GHG reduction measures identified in the 2013 CAP.

Source: City of Escondido

Key Components of Climate Action Planning

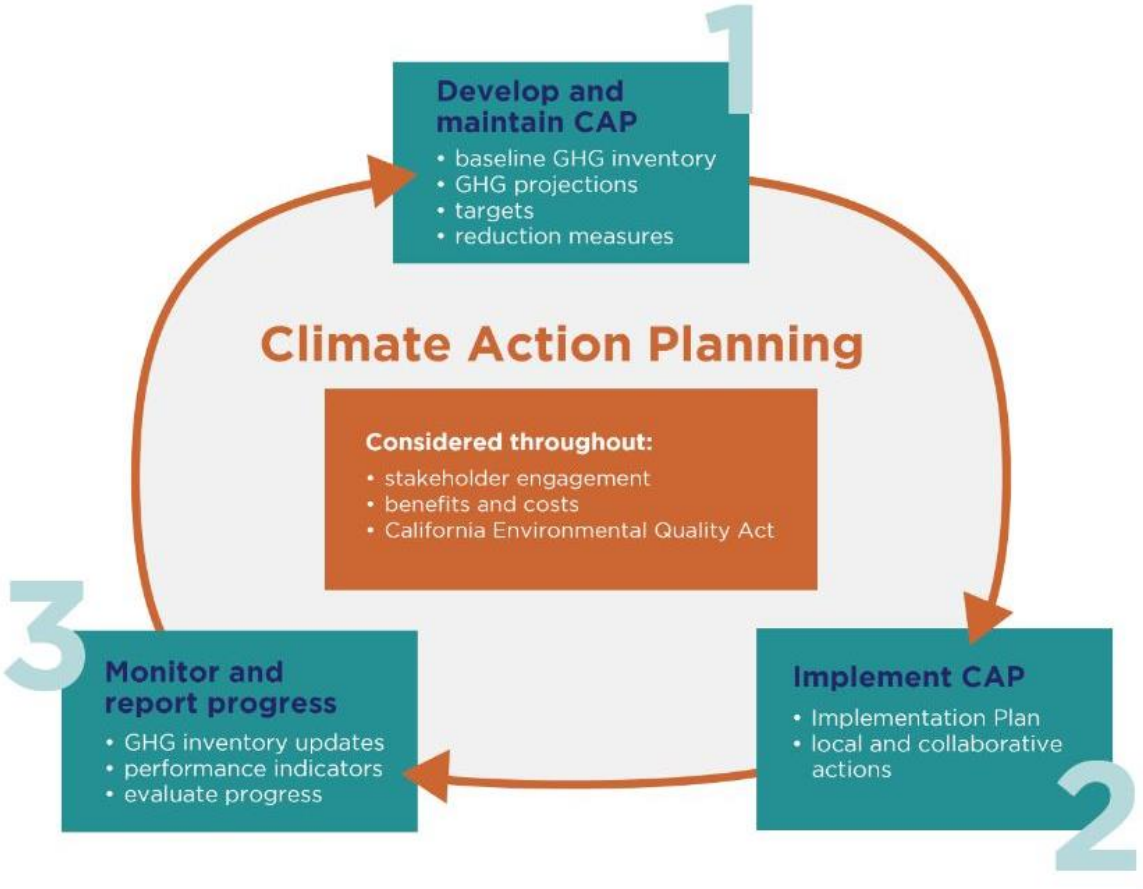
Three essential steps to the climate action planning process include:

Step 1: Develop and Maintain a CAP, which includes preparing baseline emissions estimates and projections and developing reduction targets and strategies.

Step 2: Implement the CAP through local measures.

Step 3: Monitor and Report Progress on CAP implementation and identify improvements or adjustments that can be made to the plan in the future.

Adoption of this CAP marks the beginning of an iterative process of maintaining, implementing, monitoring, and updating the CAP. Over time, the City will continue to repeat the iterative process by updating this CAP as new technologies, legislative actions, information, and inventories become available. The key components of the climate action planning process are summarized below and shown graphically in **Figure ES-1**.



Source: SANDAG 2018.

Figure ES-1 **The Climate Action Planning Process**

Step 1: CAP Development

Development of the CAP consists of setting a baseline inventory of communitywide GHG emissions, projecting GHG emissions for future years, setting GHG reduction targets, and identifying strategies and measures the City will implement to achieve these reduction targets.

Baseline GHG Inventory

A baseline GHG inventory provides a snapshot of the emissions associated with a community's GHG producing activities in a single year. For this CAP, a baseline GHG emissions inventory was prepared for 2012, consistent with the base year used for SANDAG's Series 13 Regional Growth Forecast. It was estimated that the City generated 943,000 metric tons of carbon dioxide equivalent ("$MTCO_2e$") in 2012. The two largest sources of GHG emissions were from on-road transportation (e.g., on-road vehicular gasoline and diesel consumption) and energy sources (e.g., electricity and natural gas consumption in buildings) accounting for 53 percent and 39 percent, respectively. Baseline inventories also provide the emissions levels from which to forecast emissions and set emissions reduction targets based on state goals. The City's baseline emissions inventory, forecasted emissions, and reduction targets are further discussed in **Chapter 2**.

In 2012, the City's total GHG emissions of 943,000 $MTCO_2e$ were produced across the following emissions categories:

- **53% from on-road transportation**
- **39% from energy (electricity and natural gas consumption)**
- **3% from off-road transportation**
- **3% from solid waste**
- **2% from water and wastewater**

Citywide Emissions Projections

Citywide emissions projections were modeled based on a continuation of current trends in activity, population, and job growth. The business-as-usual ("BAU") condition provides estimates of future citywide emissions based on existing growth trends assuming no additional actions would be taken to reduce GHG emissions. Based on trend data, the City would experience a decrease in emissions through 2020 under BAU conditions to 12 percent below 2012 baseline levels. This decrease is primarily due to the City's implementation of the 2013 CAP and State and federal actions that have resulted in GHG reductions locally. Citywide emissions under BAU conditions would steadily rise after 2020 through 2035 but would not exceed 2012 baseline levels.

Source: City of Escondido

State and federal actions that are planned to take place in the future would further reduce the City's projected emissions when applied across the various GHG emissions categories. This projection, with the application of state and federal legislative actions that would reduce local GHG emissions, is referred to as the Legislatively-Adjusted BAU condition. With legislative reductions applied, the City's emissions would be 16 percent below 2012 baseline levels in 2020, 37 percent below 2012 baseline levels in 2030, and 40 percent below 2012 baseline levels in 2035 with legislative actions. **Table ES-1** provides a summary of both BAU and Legislatively-Adjusted BAU project emissions for 2020, 2030, and 2035.

Table ES-1 Greenhouse Gas Emissions Projections and Targets

Projection	2012 Baseline Emissions ($MTCO_2e$)	2020		2030		2035	
		Total Emissions ($MTCO_2e$)	Change from 2012 Baseline (%)	Total Emissions ($MTCO_2e$)	Change from 2012 Baseline (%)	Total Emissions ($MTCO_2e$)	Change from 2012 Baseline (%)
BAU	943,000	831,000	-12	833,000	-12	842,000	-11
Legislatively-Adjusted BAU	--	789,000	-16	598,000	-36	570,000	-39
Reduction Targets	--	907,000	-4	547,000	-42	456,000	-52

Notes: BAU = business-as-usual; GHG = greenhouse gas; MTCO2e = metric tons of carbon dioxide equivalent
Source: EPIC 2018, EPIC 2020.

Reduction Targets

This CAP's reduction targets were established using a communitywide mass emissions approach as recommended by CARB. These targets, to be achieved through implementation of this CAP, are to reduce citywide GHG emissions to four percent below 2012 levels by 2020, 42 percent below 2012 levels by 2030, and 52 percent below 2012 levels by 2035. A summary of the projections and targets is shown in **Table ES-1**. The methodologies used for calculating each projection and City reduction targets are further discussed in **Chapter 2**.

Reduction Strategies and Measures

The City would meet its 2020 emissions reduction target under BAU conditions, based on existing activities and trends. However, to meet the City's 2030 and 2035 reduction targets, additional actions beyond those implemented at the State and federal level are required. To meet the City's 2030 and 2035 targets, this CAP identifies strategies and measures to reduce GHG emissions citywide from a variety of emissions categories. In total, the City has identified nine strategies for reducing citywide GHG emissions, listed below in **Table ES-2**.

Table ES-2 Strategies for Reducing Greenhouse Gas Emissions

Strategy	Description
Strategy 1	Increase the Use of Zero-Emission or Alternative Fuel Vehicles
Strategy 2	Reduce Fossil Fuel Use
Strategy 3	Reduce Vehicle Miles Traveled
Strategy 4	Increase Building Energy Efficiency
Strategy 5	Increase Renewable and Zero-Carbon Energy
Strategy 6	Increase Water Efficiency
Strategy 7	Diversify Local Water Supply
Strategy 8	Reduce and Recycle Solid Waste
Strategy 9	Carbon Sequestration and Land Conservation

Source: EPIC 2020.

Implementation of all GHG reduction measures would result in a reduction of approximately 499,000 $MTCO_2e$ in 2030 and 456,000 $MTCO_2e$ in 2035.

Under each of the nine strategies are detailed measures to help reduce GHG emissions citywide. The City will implement 31 total measures to achieve emission reductions from five emissions categories: transportation, energy (electricity and natural gas consumption), water and wastewater, solid waste, and carbon sequestration. The emissions categories identified in this CAP are consistent with the presentation of emissions categories defined through SANDAG's Regional Climate Action Planning Framework ("ReCAP"). Measures were developed based on a review of the measures included in the 2013 CAP, community input, existing and future planning efforts in the City, potential co-benefits, and feasibility of implementation. Each measure provides direct and measurable emissions reductions through implementation of specific programs, policies, or projects. **Table ES-3** provides a list of five measures in this CAP from which the City would receive the greatest GHG reduction benefits.

Table ES-3 Key GHG Reduction Measures

Measure	Description
Measure E-5.3	The City will develop or join a program to further increase grid-supply renewables and zero carbon electricity to 100 percent of the City's electricity supply, reducing citywide emissions by 29,486 $MTCO_2e$ in 2035.
Measure S-8.1	The City will work with its franchise waste hauler to prepare a waste diversion plan that achieves a 90 percent waste diversion rate, reducing citywide emissions by 27,405 $MTCO_2e$ in 2035.
Measure T-3.8	The City will work with MTS and NCTD to increase transit ridership through increased service frequency and development located near transit stations, reducing citywide emissions by 17,099 $MTCO_2e$ by 2035.
Measure T-3.9	The City will develop a service population-based threshold for VMT to apply to new development project to support the reduction in citywide VMT, reducing citywide emissions by 11,075 $MTCO_2e$ by 2035.

Notes: MTS = Metropolitan Transit System; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NCTD = North County Transit District; VMT = vehicle miles traveled
Source: EPIC 2020.

Step 2: Implementation

Implementation of the CAP plays a crucial role in how the City will meet its GHG emission reduction targets. Implementation of the CAP will require investments, long-term commitments, and widespread community participation. Ongoing partnerships between community residents, businesses, property owners, the City, and other agencies and organizations in the region are essential for successful implementation. On a communitywide level, individuals and businesses can play an important role in reducing GHG emissions by changing habits to produce less waste or use alternative modes of transportation.

As new development is proposed in the city, it will be required to incorporate more sustainable design features to reduce project GHG emissions. Consistent with the California Environmental Quality Act ("CEQA") Guidelines Section 15183.5, this qualified CAP will allow for CEQA streamlining through a CAP Consistency Review Checklist ("Checklist"). The CAP Checklist contains GHG reduction measures applicable to development projects that are required to be implemented on a project-by-project basis. Further details on City implementation strategies are provided in **Chapter 4**.

Step 3: Monitoring

Ongoing management, oversight, and collaboration is required to support the implementation of the CAP. Similar to implementation of the CAP, monitoring is an important part of ensuring the success of the CAP in achieving the City's 2030 and 2035 reduction targets. The City will monitor progress towards the 2030 and 2035 targets through partnerships with SANDAG and other local jurisdictions in developing local GHG inventory updates every two years. City staff will provide annual updates to the City Council and Planning Commissions on CAP implementation and efforts. Just as this CAP serves as an update to the City's 2013 CAP, the City will update this CAP in the future to ensure strategies and measures remain implementable and feasible, adjusting measures based on changing conditions or demands, and incorporating new technologies not considered in previous CAPs. **Chapter 4** provides a detailed description of the City's monitoring efforts to ensure reduction targets and goals are met.

Source: City of Escondido

Adaptation Measures

The climate action planning process is primarily focused on addressing the causes of climate change and identifying measures to reduce GHG emissions and limit additional impacts on the climate system (i.e. the five spheres that comprise Earth's climate). Though many CAPs recognize that climate change is already taking place, the interactions between climate change, human health, and equitable climate solutions are not always addressed. As an additional component to climate action planning, the City recognizes the importance of building resilience in the community to future climate change—related impacts through climate adaptation. Climate adaptation refers to adjusting individual and societal behaviors, systems, and infrastructure to reduce the impact climate change impacts like heat waves, worsening air quality, and flooding have on infrastructure, services, and the well-being of the community. These impacts would not affect all persons in the community equally and certain climate change effects would impact certain vulnerable populations more than others. A broader examination of social equity and environmental justice through climate adaptation planning assists in the development of more sustainable public policies that address climate change at the community level. Therefore, this CAP includes measures to improve the city's resilience to potential environmental risks and hazards that will be exacerbated by climate change, while seeking equitable climate change adaptation solutions for all residents, businesses, and other community members. Measures are organized to reduce climate change impacts associated with increased temperatures, increased frequency of extreme weather events and heat waves, changes in precipitation patterns and water availability, increased likelihood of flooding, and increased wildfire risk. Included within each adaptation strategy are programs and policies to support climate adaptation and resiliency, with a focus on specific vulnerabilities and impacts that have the potential to affect the community's populations, functions, and structures. The City will implement the measures in **Table ES-4** to adapt to the impacts of climate change. A detailed discussion of the City's climate vulnerabilities and adaptation strategies is included in **Chapter 5**.

> **While the City works to reduce GHG emissions, climate change impacts are already occurring. To ensure equitable response for all residents, the City will implement adaptation measures to address current climate change impacts at the local level.**

Table ES-4 Climate Adaptation Measures

Measure	Description
Measure A-1.1	Fully anticipate, plan for, and mitigate the risks of climate change and seize the opportunities associated with the social and environmental change.
Measure A-1.2	Make sure that everyone is given the opportunity to be prepared for the current and future risks that are exacerbated by climate impacts.
Measure A-1.3	Hardwire social equity and environmental justice into new programs and projects.
Measure A-1.4	Develop working relationships with other agencies and continue to analyze climate impacts.
Measure A-2.1	Make sure that everyone has equitable access to healthy environments in which to live, work, and play.
Measure A-2.2	Create "climate safe and decent" housing options.
Measure A-2.3	Build capacity for adaptive neighborhoods.
Measure A-2.4	Build a sustainable and resilient transportation network.

Source: City of Escondido, 2020.

To be effective, this CAP includes a roadmap for implementing new polices, programs, incentives, and requirements shortly after adoption, as well as longer term actions that the City would implement following additional research and examination, in line with the City's ongoing CAP monitoring and evaluation of new technologies. In addition to addressing challenges faced by the City in reducing GHG emissions and adapting to climate change, the CAP will enable the City to continue to be on the forefront of sustainable planning. For the City, the goal of sustainable planning will be to meet the needs of the present without compromising the future. Through addressing both communitywide GHG reduction and adaptation together, the City has been able to consider how actions can synergistically produce multiple co-benefits, such as addressing existing environmental health disparities while improving quality of life and health for all residents.

CAP Organization

This CAP is organized into five chapters. **Chapter 1** provides an introduction to climate action planning, the need for a CAP to address local GHG emissions, and the framework for CAP development. **Chapter 2** summarizes the City's baseline GHG emissions, estimates GHG emission forecasts for target years, and sets citywide GHG reduction targets. **Chapter 3** includes a description of strategies and measures the City will take to reduce local GHG emissions and describes the supporting actions and co-benefits of each strategy. **Chapter 4** provides an outline for how the City will implement these reduction strategies and measures and includes guidelines for monitoring and updating the CAP. **Chapter 5** evaluates the City's vulnerability to climate change and strategies the City is and will be implementing to adapt to climate change impacts.

ESCONDIDO
City of Choice

Chapter 1

INTRODUCTION

Climate Action Plans ("CAPs") serve as comprehensive roadmaps that outline specific activities a community will take to reduce greenhouse gas ("GHG") emissions and potential impacts of climate change.

The City's CAP was developed for the following purposes:

- **Build on the City's previous CAP, adopted in 2013.**
- **Create an updated GHG emissions inventory of citywide activities.**
- **Identify reduction targets consistent with state goals.**
- **Set strategies and measures for sustainable activities and development in the City.**
- **Streamline CEQA review for projects consistent with CAP goals.**

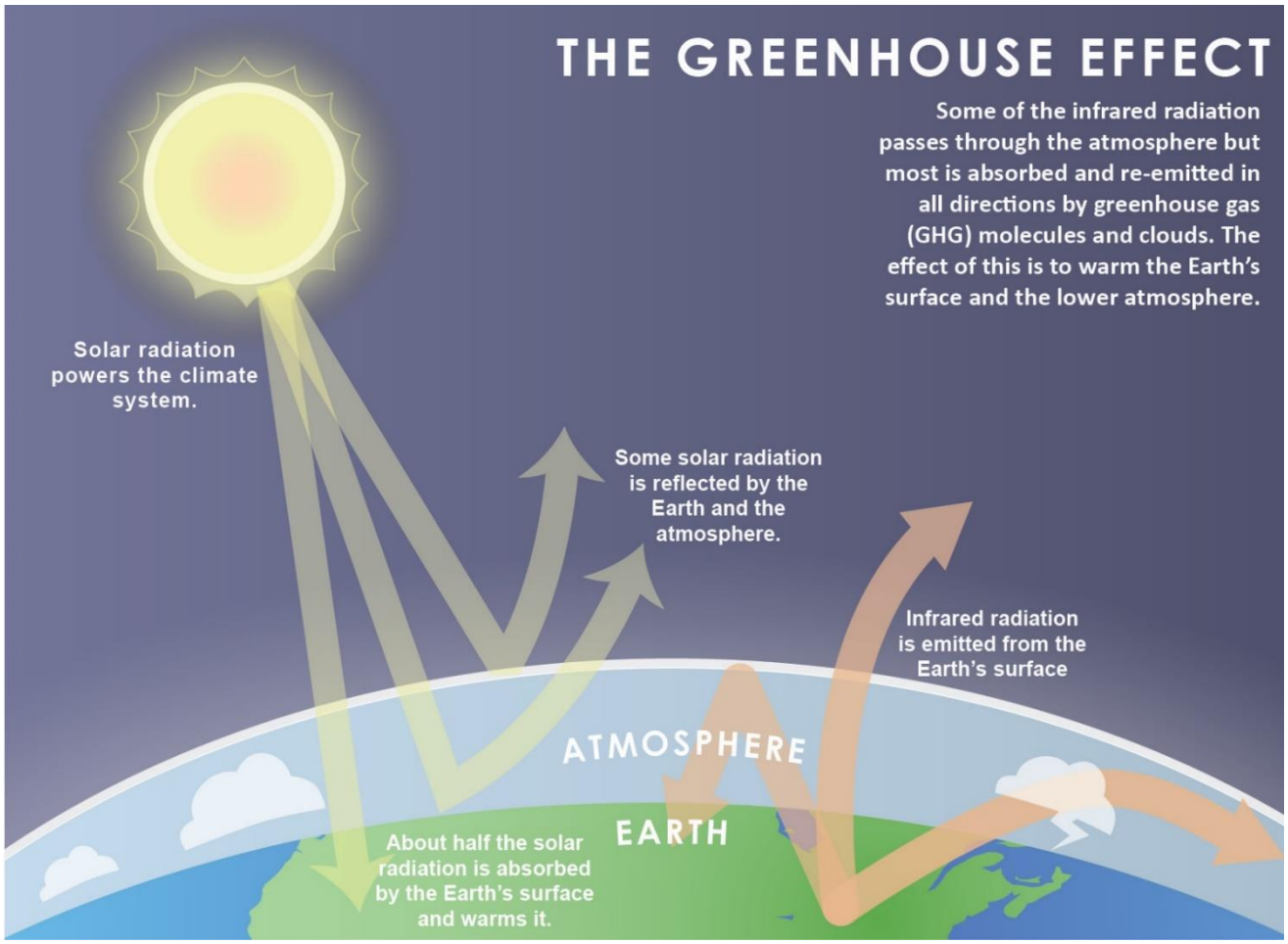
There are many "natural" factors (e.g. volcanic eruptions and solar variations) and "anthropogenic" (human-induced) factors (e.g. emissions from vehicles) that contribute to climate change. Climate fluctuations have always been a part of Earth's history, which is evident in geological records. However, the rapid rate and the magnitude of climate change occurring now cannot be explained by only natural factors - seasons are shifting, average temperatures are increasing, precipitation levels are changing, and sea levels are rising. These changes have the potential to adversely affect human health and safety, economic prosperity, provision of basic services, and the availability of natural resources. While global climate change is happening worldwide, local efforts to reduce human-induced GHG emissions and build resilience in the face of adverse climate change effects can make a difference. Local action on climate change cannot be addressed insularly by one agency or community, but requires active and ongoing partnerships between residents, businesses, the City of Escondido ("City"), and other agencies and organizations in the region. By beginning to plan now and engaging in more sustainable practices, communities will be better suited to adapt to climate change and increase resiliency for the future.

The City is committed to providing a livable, sustainable, equitable, and economically vibrant community. In developing a CAP, jurisdictions evaluate the volume of GHGs emitted during a baseline year (2012 for this CAP) and determine the amount of emissions that need to be reduced to achieve statewide GHG reduction targets. At a local scale, individuals and businesses in the City can work towards reducing their carbon footprint by changing habits to consume less energy, generate less waste through recycling and composting, conserving water, using sustainable transportation modes, and promoting carbon sequestration. Through successful implementation and administration of the CAP, the actions in this document would strengthen the City's economy, improve risk management, clean the environment, and improve the health and wellness of residents.

Source: City of Escondido

1.1 Introduction to Climate Change Science

The greenhouse effect, as outlined below in **Figure 1-1**, results from a collection of atmospheric gases called GHGs that insulate the Earth and help regulate its temperature. These gases, consisting of mainly water vapor, carbon dioxide ("CO_2"), methane ("CH_4"), nitrous oxide ("N_2O"), ozone ("O_3"), and chlorofluorocarbons ("CFCs") all act as effective global insulators, reflecting Earth's visible light and infrared radiation to keep temperatures on Earth conducive to life as we know it. The greenhouse effect is essential for the planet to support life when not exacerbated.



Source: Ascent Environmental 2019.

Figure 1-1 **The Greenhouse Effect**

Global climate change may lead to rising temperatures and changes in precipitation patterns impacting average temperatures and water supply at the local level.

In recent decades, human activities (e.g., burning of fossil fuels for transportation and energy, increasing rates of deforestation and development) have contributed to an elevated concentration of GHGs in the atmosphere. Human-caused (i.e., anthropogenic) emissions of GHGs above natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the Earth's climate, known as global climate change, or global warming. There is strong scientific consensus that it is "extremely likely" that most of the changes in the world's climate during the last 50 years are a result of anthropogenic (i.e. human caused) GHG emissions (IPCC 2014). Global climate change, in turn, is the driver behind changes in precipitation patterns, shrinking polar ice caps, an increase in sea level, and other impacts to biological resources and humans.

Short-lived climate pollutants ("SLCPs"), which are GHGs that remain in the atmosphere for a much shorter period than long-lived climate pollutants (e.g., CO_2 and N_2O), are also powerful climate forcers that have an outsized impact on climate change in the near term. Despite their relatively shorter atmospheric lifespan, their relative potency in terms of how they heat the atmosphere (i.e., global warming potential ["GWP"]) can be tens, hundreds, or even thousands of times greater than that of CO_2. SLCPs include CH_4; fluorinated gases ("F-gases"), including hydrofluorocarbons ("HFCs"), perfluorocarbons ("PFCs"), and sulfur hexafluoride ("SF_6"); and black carbon.

Climate change is a global problem that can lead to significant fluctuations in regional climates. It is the driver behind rising average temperatures and changes in precipitation patterns globally, resulting in increased extreme heat events, reduced water supplies, and extended droughts. This CAP represents an important step in acknowledging global climate change effects on the city. The document is organized into five chapters. **Chapter 2** summarizes the City's GHG emissions that are contributing to climate change. **Chapter 3** includes a description of strategies and measures the City will take to reduce local GHG emissions. **Chapter 4** provides an outline for how the City will implement these reduction strategies and includes guidelines for monitoring and updating the CAP. **Chapter 5** provides strategies the City is and will be implement to adapt to climate change impacts and ensure all populations in the city prepared for future changes in climate patterns.

Source: City of Escondido

1.2 Regulatory Framework

In response to the increase in human-caused GHG emissions and the threat of global climate change, the federal and State governments have already taken several steps to both reduce GHG emissions and adapt to climate change. The following section provides a summary of the policies which provide context for this CAP.

1.2.1 Federal and State Regulations

In 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which directed California to reduce GHG emissions to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. A year later, in 2006, the Global Warming Solutions Act (Assembly Bill ["AB"] 32) was passed, establishing regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions. AB 32 put a cap on GHG emissions, setting a target of reducing GHG emissions to 1990 levels by 2020. As part of its implementation of AB 32 and Executive Order S-3-05, the California Air Resources Board ("CARB") developed a Scoping Plan in 2008. The Scoping Plan, along with its Update in 2014, described the approach California will take to reduce GHGs to achieve the 2020 reduction target. California is currently on track to meet or exceed the AB 32 current target of reducing GHG emissions to 1990 levels by 2020.

As directed by AB 32, SB 32, and Executive Orders B-30-15 and S-3-05, the state aims to reduce annual GHG emissions to:

- **1990 levels by 2020;**
- **40 percent below 1990 levels by 2030; and**
- **80 percent below 1990 levels by 2050.**

On April 20, 2015, Governor Edmund G. Brown Jr. signed Executive Order B-30-15, establishing a new GHG emissions reduction target of 40 percent below 1990 levels by 2030. This target aligns with those of leading international governments such as the 28-nation European Union which adopted the same target in October 2014. Executive Order B-30-15 also directed CARB to update the AB 32 Scoping Plan to reflect the path to achieving the 2030 target. In September 2016, Governor Brown also signed Senate Bill ("SB") 32, which codified into statute the mid-term 2030 target established by Executive Order B-30-15. The new 2030 GHG emissions reduction target places California on a trajectory towards meeting the goal of reducing statewide emissions to 80 percent below 1990 levels by 2050.

In November 2017, CARB published the 2017 Climate Change Scoping Plan ("2017 Scoping Plan"), which lays out the framework for achieving the 2030 reductions as established in Executive Order B-30-15 and SB 32. The 2017 Scoping Plan identifies GHG reductions by emissions sector to achieve a statewide emissions level that is 40 percent below 1990 levels by 2030.

In addition to legislation setting statewide GHG reduction targets, SB 375, signed by Governor Schwarzenegger in 2008, better aligned regional transportation planning efforts, regional GHG emissions reduction targets, and land use and housing allocations. SB 375 requires Metropolitan Planning Organizations ("MPOs") to adopt a Sustainable Communities Strategy ("SCS") or Alternative Planning Strategy, showing prescribed land use allocations in each MPO's Regional Transportation Plan ("RTP"). CARB, in consultation with the MPOs, provides each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in their respective regions for 2020 and 2035.

To effectively address the challenges that a changing climate will bring, the State also prepared the 2009 California Climate Adaptation Strategy, which highlights climate risks and outlines possible solutions that can be implemented throughout the State. This Strategy was updated in both 2014 and 2018,and is now known as Safeguarding California. In 2015, the State also developed the Safeguarding California Implementation Action Plans.

Other relevant federal and State regulations relevant to the CAP are identified below in **Table 1-1**:

Table 1-1	Relevant Federal and State Regulations	
Federal	Federal Clean Air Act ("CAA")	The CAA, enacted in 1975 and most recently amended in 1990, regulates air emissions from stationary and mobile sources to protect public health and regulate hazardous air pollutants. In 2007, the U.S. Supreme Court ruled that carbon dioxide ("CO_2") is an air pollutant as defined under the CAA, and the U.S. Environmental Protection Agency has the authority to regulate emissions of GHGs.
Federal	Corporate Average Fuel Economy ("CAFE") Standards [1]	The federal CAFE Standards specify the fuel economy of certain vehicle classes in the U.S.
Federal	Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles	Establishes fuel economy standards for medium- and heavy-duty engines and vehicles.
State	SB 97	The State Office of Planning and Research prepared and the Natural Resources Agency adopted amendments to the California Environmental Quality Act ("CEQA") Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. Effective as of March 2010, the revisions to the CEQA Environmental Checklist Form (Appendix G) and the Energy Conservation Appendix (Appendix F) provide a framework to address global climate change impacts in the CEQA process; state CEQA Guidelines Section 15064.4 was also added to provide an approach to assess impacts from GHGs.
State	Executive Order S-21-09	Executive Order S-21-09 directed CARB, under its AB 32 authority, to adopt a regulation by July 31, 2010 that sets a 33 percent renewable energy target as established by Executive Order S-14-08.
State	Executive Order S-01-07	Executive Order S-01-07 set forth a low carbon fuel standard for California, whereby the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Table 1-1	Relevant Federal and State Regulations	
State	California Building Efficiency Standards Title 24 Part 6	The California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods.
State	AB 1493	AB 1493 (Pavley) required, signed into law in 2002, required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks.
State	AB 197	AB 197 (Garcia), signed into law in 2016, creates a legislative committee to oversee CARB and requires CARB to take specific actions when adopting plans and regulations pursuant to SB 32 related to disadvantaged communities, identification of specific information regarding reduction measures, and information regarding existing GHGs at the local level.
State	SB 350	SB 350, signed into law in 2015, requires the state to set GHG emission reduction targets for the load serving entities through Integrated Resource Planning. SB 350 requires an increase in the Renewables Portfolio Standard to 50 percent by 2030 and doubling energy savings in electricity and natural gas end uses.
State	Advanced Clean Cars Program [1]	In January 2012, CARB approved the Advanced Clean Cars program, which combines the control of GHG emissions and criteria air pollutants, as well as requirements for greater numbers of zero-emission vehicles, into a single package of standards for vehicle model years 2017 through 2025.
State	SB X1-2	SB X1-2 of 2011 requires all California utilities to generate 33 percent of their electricity from renewables by 2020. SB X1-2 mandates that renewables supplied to the California grid from sources within, or directly proximate to, California make up at least 50 percent of the total renewable energy for the 2011-2013 compliance period, at least 65 percent for the 2014-2016 compliance period, and at least 75 percent for 2016 and beyond.
State	SB 100	SB 100, signed into law in 2018, provides an update to SB X1-2 and requires California's renewable energy and zero-carbon resources supply 100 percent of electric retail sales to end-use customers and 100 percent of electricity procured to serve state agencies by 2045.

Notes:
[1] In September 2019, the U.S. EPA issued the final rule for Part 1 of the Safer Affordable Fuel-Efficient Vehicle Rule (SAFE Rule). Part 2 of the SAFE Rule, expected issuance in mid-2020, will set revised federal CAFE standards and replace California's Advanced Clean Cars program. During the preparation of this CAP, these new standards have not taken effect.

California Environmental Quality Act Streamlining

The California Environmental Quality Act ("CEQA") is a statute that requires local agencies to identify significant environmental impacts of their actions and avoid or mitigate those impacts, if feasible. In 2007, California's lawmakers enacted SB 97, which expressly recognizes the need to analyze GHG emissions as part of the CEQA process. SB 97 required the Governor's Office of Planning and Research ("OPR") to develop recommended amendments to address GHG emissions as an environmental effect. In response to the mandate of SB 97,

Projects that are consistent with the strategies and measures provided in this CAP and the City's General Plan can avail streamlining benefits in addressing potential project impacts related to climate change.

the CEQA Guidelines (Section 15183.5) establish standards for the content and approval process of plans to reduce GHGs.

This CAP has been prepared consistent with the standards of CEQA Guidelines Section 15183.5 ("Qualified Plan"). Pursuant to the Section, the CAP affords development applicants the opportunity to use CEQA streamlining tools for analysis of GHG emissions and related impacts for projects that are consistent with the CAP. Details on how projects can achieve consistency with the CAP are provided in a separate *Guidance for Demonstrating Consistency with the City of Escondido Climate Action Plan for Discretionary Projects Subject to CEQA,* prepared by Ascent Environmental in 2020.

1.2.2 San Diego Association of Governments

The San Diego Association of Governments ("SANDAG") is the MPO for the San Diego region. At the regional level, SANDAG has identified land use, transportation, and related policy measures that can reduce GHGs from passenger cars and light-duty trucks as part of the *San Diego Forward: The Regional Plan* ("Regional Plan") in compliance with SB 375. The Regional Plan, adopted by SANDAG in October 2015, integrates the RTP and SCS.

SANDAG is currently working with local jurisdictions to help identify opportunities to save and reduce GHGs related to local operations through the Roadmap Program. Since 2010, the Roadmap Program has provided member agencies with voluntary, no-cost energy assessments known as "Energy Roadmaps". Each Energy Roadmap provides strategies unique to each local government, to reduce energy use in municipal operations and in the community. The Roadmap Program is primarily funded through a Local Government Partnership with San Diego Gas & Electric ("SDG&E"). In 2016, the Roadmap Program was expanded to include climate planning.

City and SANDAG staff have worked collaboratively in developing this CAP to ensure that measures are consistent with SANDAG's Regional Climate Action Planning Framework ("ReCAP") and will reduce GHG emissions locally, while assisting the region in achieving its climate goals.

In March 2012, the City approved the City of Escondido Energy Roadmap ("City's Energy Roadmap"), which identifies ways to save energy in government operations and in the community, that would result in municipal cost savings and benefits to the environment. The City's Energy Roadmap includes wide-ranging, cost-effective opportunities to save electricity, natural gas, and transportation fuels, and was used as a resource for implementing goals and policies laid out in the City's General Plan and the 2013 CAP. The Energy Roadmap identifies ways the City could improve energy efficiency through government operations and within the community through the following eight measures:

- Save energy in City buildings and facilities
- Demonstrate emerging energy technologies
- Green the City vehicle fleet
- Develop employee knowledge of energy efficiency
- Promote commuter benefits to employees
- Leverage planning and development authority
- Market energy programs to local residents, schools, and businesses
- Support green jobs and workforce training

1.2.3 San Diego County

San Diego County Office of Emergency Services

The County of San Diego Office of Emergency Services ("OES") has the primary responsibility for preparedness and response activities and addresses disasters and emergency situations within the unincorporated area of San Diego County. The OES serves as staff to the Unified Disaster Council, the governing body of the Unified San Diego County Emergency Services Organization. Emergency response and preparedness plans include the Operational Area Emergency Response Plan and the San Diego County Multi-Jurisdictional Hazard Mitigation Plan. These plans provide for regionwide coordination during hazard events and identify processes and staff needs for which the City would apply to respond to an emergency.

Multi-Jurisdictional Hazard Mitigation Plan

The City of Escondido Hazard Mitigation Plan was prepared by OES as part of the Multi-Jurisdictional Hazard Mitigation Plan ("MHMP"). The purpose of the plan is to inform residents of the natural and manmade hazards that threaten the city's public health, safety, and welfare and provide solutions to help mitigate vulnerabilities to future disasters. Though the MHMP does not directly address climate change, it provides adaptation measures for cities to implement to reduce the impacts of hazards that would be exacerbated by climate change. According to the MHMP, the most destructive hazards to the City include wildland fire, earthquakes, hazardous materials, flooding and dam failure, and terrorism or other anthropogenic hazards. The MHMP sets forth a variety of objectives and actions based on a set of broad goals including: (1) promoting disaster-resistant future development; (2) increasing public understanding and support for effective hazard mitigation; (3) building support of local capacity and commitment to become less vulnerable to hazards; (4) enhancing hazard mitigation coordination and communication with federal, State, local and tribal governments; and (5) reducing the possibility of damage and losses to existing assets, particularly people, critical facilities or infrastructure, and County-owned facilities, due to dam failure, earthquake, coastal storm, erosion, tsunami, landslides, floods, structural fire/wildfire, and manmade hazards.

Source: City of Escondido

San Diego County Department of Environmental Health

The San Diego County Department of Environmental Health ("DEH") protects public health and safeguards environmental quality, informs the public to increase environmental awareness, and implements and enforces local, state, and federal environmental laws. DEH regulates the following: retail food safety; public housing; public swimming pools; small drinking water systems; mobile-home parks; on-site wastewater systems; recreational water; aboveground/underground storage tank and cleanup oversight; and the disposal of medical and hazardous materials and waste. In all development projects, specifically those related to water, wastewater, and solid waste systems, the City coordinates with DEH to ensure activities meet public health and safety requirements.

San Diego County Site Assessment and Mitigation Program

DEH maintains the Site Assessment and Mitigation ("SAM") list of contaminated sites that have previously or are currently undergoing environmental investigations and/or remedial actions. The San Diego County SAM Program's primary purpose is to protect human health, water resources, and the environment within San Diego County by providing oversight of assessments and cleanups in accordance with the California Health and Safety Code and the California Code of Regulations. The SAM's Voluntary Assistance Program ("VAP") also provides staff consultation, project oversight, and technical or environmental report evaluation and concurrence (when appropriate) on projects pertaining to properties contaminated with hazardous substances. As the City implements new development and redevelopment projects, and develops plans to restore natural systems, it will coordinate with DEH to address existing site contamination issues to improve public health.

1.2.4 City of Escondido

General Plan

The City's General Plan, most recently updated in May 2012, guides the City's future growth through a series of goals and policies. The General Plan discusses the City's vision in the following areas: Economic Prosperity, Growth Management, Land Use and Community Form, Housing, Community Health and Services, Community Protection, Mobility and Infrastructure, and Resource Conservation. Multiple elements of the City's General Plan include goals and policies that would be supported by the implementation of this CAP. Below is a summary of the GHG-related goals and policies from these elements. The relationship between General Plan policies and CAP measures is included in **Appendix C**.

Source: City of Escondido

Land Use and Community Form

The Land Use and Community Form element guides citizens, planners, and decision makers on the desired growth pattern, development, and change in the community. The goals of the element emphasize the City's role in being an urban center, while promoting sustainable and economically viable development. Land Use and Community Form policies related to GHGs include promoting compact infill development to increase walkability and alternative modes of transportation; preserving open space; and creating new and maintaining existing recreational opportunities.

Source: City of Escondido

Mobility and Infrastructure

The Mobility and Infrastructure element provides goals and policies for the efficient movement of residents, goods, and services and developing and maintaining safe and reliable infrastructure. This element includes transportation goals and policies to develop a sustainable transportation system through enhanced safety, complete streets, and an

interconnected pedestrian and multimodal transportation system. This element also promotes sustainable and efficient utilities by encouraging water conservation efforts, increasing water supply and supply diversity, reducing and managing waste disposal, and increasing energy efficiency to reduce the subsequent demand of a growing City.

Housing

The Housing element assesses housing needs in the City and provides goals and policies addressing the development of new housing and the improvement of existing housing supply. Goals and policies provided in the element guide encourage sustainable housing development that improve public health and housing affordability. The City's goals and policies emphasize the need to incorporate affordability for balanced jobs-to-housing growth while incorporating efficient urban form to promote accessibility.

Community Health and Services

The Community Health and Services element addresses how the quality and condition of the built environment effects resident's public health. GHG-related goals and policies in this element are directed towards increasing public health by increasing access to healthier foods through community gardens, creating walkable neighborhoods, and providing access to medical facilities. Additional efforts to reduce GHGs include reducing energy and water use in landscaping and developing and maintaining open space areas.

Resource Conservation

The Resource Conservation element guides the City to improve air, water, and natural resources through the expansion of a City trail system and conservation of open space areas. The element provides guidance for new development to be consistent with air quality standards and reduce GHG emissions through use of efficient construction equipment, promotion of efficient land use development patterns, use of clean and efficient alternative modes of transportation, and carbon sequestration.

Measures in this CAP can improve economic prosperity through:

- **the creation of local "green jobs,"**
- **improved building efficiency reducing cooling and heating costs, and**
- **reduced water consumption resulting in lower costs to transport water.**

Economic Prosperity

The Economic Prosperity element provides guidance on maintaining a sustainable local economy that provides a jobs-to-housing balance. In this element the City establishes efforts to work with local service providers to provide infrastructure that supports technologically advanced and "green" businesses and reduces commute distances by providing employment near housing.

Environmental Quality Regulations

The City's Environmental Quality Regulations ("EQR") were established in the City's Municipal Code Chapter 33, Article 47 to provide guidelines on implementing CEQA for developments within the City. The EQR established screening thresholds to evaluate if additional analysis is required to determine whether a project would result in significant impacts under CEQA. City standards related to the CAP are provided in Division 1, Section 33-924 for air quality, GHG emissions, and water and wastewater. The EQR outlines criteria for CEQA projects regarding consistency with the City's Public Facilities Master Plans and General Plan.

2013 Climate Action Plan

In December 2013, the City approved the 2013 CAP to reduce GHG emissions from City government operations and community activities and to support achievement of statewide reduction targets. The 2013 CAP provided an update to the City's previous emissions inventory. The previous inventory, with a baseline year of 2005, was updated based on revised methodology and updated data. Along with this revised 2005 inventory, the 2013 CAP included an inventory with a baseline year of 2010 from which citywide emissions were projected for the years 2020 and 2035, consistent with the City's General Plan horizon years. The 2005 inventory and 2010 baseline emissions level included activities that took place in the City transportation, energy use, area sources, water and wastewater, solid waste, and construction categories. In line with AB 32, the 2013 CAP established a reduction target to reduce emissions to 1990 levels by 2020. Based on methodologies provided by CARB, the City developed a local target, consistent with the State target and based on the 2005 inventory, to reduce emissions to 15 percent below 2005 levels by 2020.

Source: City of Escondido

The City has been implementing the measures identified in the 2013 CAP since its adoption through utilizing screening tables during development project review and conducting GHG inventory updates. The City has retained completed screening tables for development projects to maintain records of the types and levels of implementation of measures. City staff have continuously monitored the implementation of these measures, and have coordinated with SANDAG to provide updated GHG inventories. As shown in **Table 2-3** of **Chapter 2**, the actions to date have reduced GHG emissions in the City to an estimated 789,000 metric tons of carbon dioxide equivalent ("$MTCO_2e$") and is nearly missing the targets adopted in the 2013 CAP. (The 2020 emissions target in 2013 was 788,176 $MTCO_2e$).

Master and Specific Plans

Downtown Specific Plan

In August 2013, the City adopted the Escondido Downtown Specific Plan ("DSP"). The DSP provides a comprehensive strategy to transition to a more urbanized city center while ensuring that its unique character is upheld and enhanced. The DSP includes nine strategic goals that promote a balanced variety of uses, design techniques, and pedestrian features. The DSP provides land use changes and goals that encourage mixed-use development, pedestrian friendly design, and increased use of alternative transportation modes.

The City's Downtown Specific Plan envisions development in the city center to provide for safer streets, wider sidewalks, and access to transit. This vision would assist the City in reducing GHG emissions by increasing walkability and reducing the need for vehicular travel to access destinations.

South Center City Specific Plan

Revised in August 2018, the South Centre City Specific Plan ("SCCSP") promotes improved public health, safety, sustainability, and economic prosperity in the South Centre City area. The SCCSP identifies changes in land use patterns in the area to allow for greater opportunities for strategic growth for both residents and business owners. Sustainability efforts of the SCCSP include supporting implementation of the City's CAP and the protecting water resources through conservation.

Bicycle Master Plan

The City's Bicycle Master Plan, adopted in October 2012, is a policy document that identifies existing circulation patterns for bicyclists, problem areas, and safety concerns. The plan identifies potential efforts the City should undertake to create an interconnected network of bicycle facilities within the city. The Bicycle Master Plan includes bikeway design standards based on California Department of Transportation ("Caltrans") recommendations, conceptual designs for bicycle paths and trails, maps of existing and proposed bicycle facilities, a phasing plan for improvements, potential funding sources, and an implementation plan. Areas of improvement include establishing a multi-modal network by connecting mass transit and bikeways through the development of complete streets. Implementation of the plan will reduce the need for automobile travel and improve air quality and public health.

Master Plan for Parks, Trails, and Open Space

Updated in September 1999, the City of Escondido Master Plan for Parks, Trails, and Open Space sets forth a comprehensive plan to develop an integrated open space and trail system. The plan acknowledges that development is likely to occur within the City and provides policy direction on how to develop land more efficiently while maintaining and increasing open space. Specific planning efforts provided in the plan include increasing outdoor recreational activities, preservation of biodiversity, discouraging sprawl, and improving quality of life.

Source: City of Escondido

City Municipal Code and Ordinances

Historical Resources Ordinance

Article 40 of the City's Municipal Code establishes it as unlawful to tear down, demolish, construct, alter, remove or relocate any historical resource. A Certificate of Appropriateness is required for any new construction, and/or alteration that would affect the exterior appearance of an historical resource listed on the local register or located within an historical overlay district. Additional permits, as well as review by the planning commission, may also be required. Improvements and alterations to properties listed on the Escondido Historic Sites Survey outside a historical overlay district are also subject to staff administrative review to ensure that improvements and alterations do not preclude future listing in the local register. Further, Article 40 requires that all repairs, alterations, constructions, restorations or changes in use of applicable historical resources shall conform to the requirements of the state Historical Building Code and the Secretary of the Interior's Standards for Rehabilitation. Demolitions to such resources would require a permit acquired in accordance with Article 40.

Mature and Protected Tree Ordinance

The City's Mature and Protected Tree ordinance establishes regulations and standards for the preservation, protection, and selected removal of mature and protected trees to conserve the City's tree cover. A City-issued permit is required before clearing, pruning, or destroying vegetation and before any encroachments by construction activities that disturb the root system. Issuance of a vegetation removal permit requires the submittal of a tree survey and, as applicable, a tree protection and/or replacement mitigation plan. Tree protection, removal, and replacement standards are outlined in the City's General Plan and the City's Municipal Code. As directed under the City's General Plan, any oak tree species and other mature trees are considered a significant aesthetic and ecological resource deserving protection within the boundaries of the city.

Urban trees provide benefits to everyone in the City. In addition to improving community character and reducing the urban heat island effect, trees play an important role in reducing local GHG emissions by "sequestering" carbon dioxide.

Local Emergency Code

Chapter 7 of the City's Municipal Code provides plans for the protection of persons and property within the City in the event of an emergency. It also discusses coordination of the emergency functions of the City with all other public agencies, corporations, organizations, and affected private persons. The code includes the forming of the City of Escondido Disaster Council, which is for the development of the City's Emergency Action Plan for City employees. The Emergency Action Plan identifies effective mobilization strategies for all City resources, both public and private, to meet any condition constituting a local emergency, state of emergency, or state of war emergency, and to defines the organizational framework, powers and duties, services, and emergency organization staff.

Weed and Rubbish Abatement Program

The City's Municipal Code, Chapter 11, Article 2, Division 2, establishes the Weed and Rubbish Abatement Program. The purpose of this ordinance is to allow property owners to eliminate public nuisance created by weeds, rubbish and refuse on or around their property, and defines the threshold at which weeds and rubbish are considered a fire hazard.

Wastewater, Stormwater, and Related Matters

Chapter 22 of the Municipal Code establishes regulations related to stormwater management and discharge control, harmful waters and wastes, sewer service charges, private sewage disposal systems, sewer connection fees, sewer-connection laterals, and industrial wastewater. The purpose of the stormwater management and discharge control regulations (Article 2) is to:

- Ensure the health, safety, and general welfare of the citizens of the City by controlling non-stormwater discharges to the stormwater conveyance system;
- Eliminate discharges to the stormwater conveyance system from spills, dumping, or disposal of solid or liquid waste other than stormwater; and
- Prevent, eliminate, or reduce pollutants in urban stormwater discharges to the maximum extent practicable.

Article 5 of Chapter 22 requires all subsurface sewage disposal units and systems to be designed, placed, and maintained in accordance with the rules and regulations of the County of San Diego. The County of San Diego DEH is the primary agency charged with regulating the design, construction, and maintenance of

septic tanks, leach lines, seepage pits, and alternative on-site wastewater treatment systems throughout the county through a delegation from the San Diego Regional Water Quality Control Board.

Article 8 sets industrial water regulations to provide for the maximum possible beneficial public use of the City's wastewater collection and treatment facilities. This article includes regulations and permit requirements governing nonresidential discharges, sets policies to provide for equitable distribution of the City's costs, and defines procedures for complying with requirements placed upon the City by other regulatory agencies.

Street and Sidewalks Code

Chapter 23 of the Municipal Code establishes street and sidewalk standards. This chapter defines standards for:

- public dedication of rights-of-way;
- arrangement for relocation of public utility facilities within sidewalks or streets;
- issuance of building permits for construction in setback areas and rights-of-way; and
- locating pumps, tanks, and fire hydrants within sidewalks, streets, or rights-of-way.

Grading and Erosion Control Ordinance

Article 55 of the City's Municipal Code establishes the grading and erosion control regulations for the City. The article ensures that development occurs in a manner that protects:

- the natural and topographic character and identity of the environment;
- visual integrity of hillsides and ridgelines;
- sensitive species and unique geologic/geographic features; and
- the health, safety, and welfare of the public.

Article 55 regulates grading on private and public property and provides standards and design criteria to control stormwater and erosion during construction activities. The ordinance sets forth rules and regulations to: control excavation, grading, earthwork construction (including fills and embankments), and development on hillsides and along ridgelines; establishes the administrative procedures for the issuance of permits; and provides for approval of plans and inspection of grading construction in compliance with stormwater management requirements.

Waste and Water Plans and Programs

Recycling and Waste Reduction

The City provides multiple programs and partnerships aimed at diverting waste from landfills. Some of these programs include resident and business recycling education, "how to" composting workshops, Christmas tree recycling, and local waste clean-ups. State-advised waste reduction programs adopted by the City include AB 341, requiring commercial and multi-family units to have recycling services, and AB 1826, requiring businesses that generate organic waste to provide organic waste recycling.

Though solid waste is only a small fraction of the City's total GHG emissions, residents and business owners can significantly reduce individual contributions to these emissions by recycling and composting waste instead of sending it to a landfill.

Water Conservation Plan

The City's Water Conservation Plan, most recently updated in 2015, establishes priorities and restrictions during various levels of water shortages, including up to greater than 40 percent reduction in water use. The City's Water Conservation Plan sets forth the following objectives:

- To prevent water supply shortages through aggressive and effective water management programs such as water conservation, water education, and use restrictions and penalties.
- To minimize the impact of a water supply shortage on the City's population and economy.
- To provide first for public health and fire protection and other essential services, then to provide for the economic health of the City, and then to provide for other uses of water.
- To ensure that water users who have implemented exemplary conservation practices during normal-year hydrology and wet-year hydrology are not disadvantaged by the plan during shortages, a "lifeline allowance" will be established by the City Council to reflect the minimum amount necessary to sustain an average household.

The City's Water Conservation Plan includes measures that continuously apply to reduce citywide water consumption, and additional measures that take effect during water shortage conditions. The plan identifies four stages of drought conditions that are set by the City Council in accordance with drought response levels determined by the San Diego County Water Authority.

Water Reclamation Plan

Municipal Code Chapter 31, Article 6 establishes the policy that recycled water shall be used within the jurisdiction wherever its use is economically justified; financially and technically feasible; and consistent with legal requirements and with preservation of the environment and of public health, safety, and welfare. As appropriate, Article 6 designates the City to mandate construction of recycled water distribution systems or other facilities in new and existing developments for current or future recycled water use as a condition of any development approval or continued water service if future reclamation facilities could adequately serve the development.

Urban Water Management Plan

In 1983, the State Legislature enacted the Urban Water Management Planning Act (California Water Code Sections 10610–10656), which requires specified urban water suppliers within California to prepare an Urban Water Management Plan ("UWMP") and update it every five years. Urban water suppliers also must prepare such plans, pursuant to the Urban Water Management Planning Act, to be eligible for State funding and drought assistance. The City most recently updated its UWMP in 2015 using the best available data. The 2015 UWMP includes policies and projects from various divisions of the City's Utilities department and addresses the City's water supply sources, including recycled water, groundwater, surface water, water conservation activities, and projected water demands. The 2015 UWMP presents a comparison of projected water supplies to water demands during normal years, single dry water-years, and multiple dry water-years; provides the framework for long-term water planning within the City; and helps to support regional long-term planning.

1.3 Purpose and Objectives of a Climate Action Plan

The purpose of this CAP is to set future targets for the City to reduce GHG emissions, identify strategies and measures to achieve these targets, develop a framework to successfully implement these measures and monitor progress towards the reduction targets, and identify measures the City can take to adapt to future climate change impacts.

The purpose of this CAP is to reduce GHG emissions locally and adapt to climate change.

The City's 2013 CAP was adopted to support goals, policies, and actions presented in the City's General Plan. The 2013 CAP provided the City with recommended policies and actions that would assist in meeting state and federal reduction targets for GHG emissions, an implementation timeline, and a strategy for tracking and reporting progress towards reduction goals. An example of GHG emissions reducing actions adopted as a component of the 2013 CAP can be found in the City's Bicycle Master Plan.

Emission source categories evaluated in the 2013 CAP have been modified for this CAP to be consistent with the regional emissions categories identified in SANDAG's Regional Climate Action Planning Framework ("ReCAP"). The 2012 baseline year GHG emissions inventory reported in this CAP covers communitywide emissions sources in electricity, natural gas, on-road transportation, off-road transportation, solid waste, water, and wastewater. This CAP also provides communitywide GHG emission reduction targets, to be achieved through local measures implemented by public agencies, businesses, and residents.

The strategies and measures identified in this CAP were developed to meet the City's reduction targets and incorporate input from community members on important actions the City should take to combat climate change.

This CAP provides a comprehensive update to the City's 2013 CAP. Through the preparation of this CAP, the City has established a baseline emissions inventory year of 2012, consistent with best available regional data.

In order to reduce emissions and meet statewide targets, the CAP has established local reduction targets consistent with CARB's 2017 Scoping Plan. To support the achievement of statewide GHG reduction targets and reduce emissions locally, the CAP sets the following emission reductions targets using 2012 levels as a reference point:

- 4 percent below 2012 levels by 2020;
- 42 percent below 2012 levels by 2030; and,
- 52.5 percent below 2012 levels by 2035.

The CAP provides a summary of baseline GHG emissions and the potential growth in these emissions over time. A summary of the City's emissions inventory, emissions projections, and methodology for setting GHG reduction targets is discussed further in **Chapter 2**. The strategies and measures that the City will implement to achieve these targets is discussed in **Chapter 3**.

As part of CAP implementation, each strategy and measure should be continually assessed and monitored. Reporting on the status of implementation of these strategies, periodic updates to the GHG emissions inventory, and other monitoring activities will help ensure that the CAP is making progress towards the identified targets. More information on administering, implementing, and monitoring the CAP is included in **Chapter 4**.

Climate change impacts are already occurring and projected to continue even as the City implements strategies and measures to reduce local GHG emissions. Climate change impacts have the potential for

a wide variety of impacts such as increased average temperatures, increased frequency of extreme weather events, and increased intensity of precipitation. The strategies the City will implement to adapt to climate change impacts are included in **Chapter 5**; however, it is important to note that the GHG emissions reduction measures listed in **Chapter 3** also identify ways to adapt to climate change. By including new cross-cutting priorities in both emissions reductions and adaptation to advance social equity and environmental justice, the chapter(s) also evaluates the ability of the City to build community capacity, address historical under-investment, and mitigate the disproportionate harm faced by the most vulnerable populations.

1.4 Co-Benefits

While the actions and supporting measures included in the CAP are generally geared towards reducing GHG emissions, many will also result in environmental or economic "co-benefits." Environmental co-benefits include improvements to air quality, water supply, or biological resources, and improved public health outcomes. The strategies identified in **Chapter 3** of this CAP would provide a range of co-benefits within the city and region. Co-benefits associated with strategies in this CAP include:

- Improved Air Quality
- Improved Energy Efficiency
- Enhanced Community Character
- Improved Land Use Efficiency
- Improved Public Health
- Restored Natural Ecosystems
- Increased Renewable Energy
- Enhanced Mobility
- Reduced Waste
- Improved Water Quality
- Increased Water Efficiency
- Improved Resiliency to Climate Change Impacts

In addition to these co-benefits, this CAP would provide other benefits to the City. This CAP allows the City to identify and implement GHG reduction strategies that are most advantageous to the City, while also promoting economic competitiveness. The CAP also demonstrates that the City is aligned with State targets for reducing GHG emissions and is consistent with the projections to meet reduction targets consistent with current mandates.

1.5 Community Action and Public Involvement

Community Action

At the local scale, individuals and businesses play an important role in combating climate change. By changing habits to reduce energy consumption, produce less waste, conserve water, and drive less, individuals and businesses can work towards reducing their carbon footprint. The combination of these small, individual efforts can lead to better outcomes for the environment and the community.

Individual actions can play a big role in reducing local GHG emissions. Examples include, but are not limited to:

- **Recycling and composting waste**
- **Driving less**
- **Conserving water**
- **Purchasing and consuming local products**

Effective and long-term climate action and resiliency in the City can only be achieved through efforts that continue to change the way individuals interact with the environment. This CAP serves as a resource to support long-term sustainability efforts and to ensure measure implementation and benefits are inclusive for all City residents.

Community Outreach Plan

The City was committed to hosting community outreach and engagement events providing residents, stakeholders, interested parties, and other agencies and/or individuals with the opportunity to participate in the climate action planning process in two phases. The goals of CAP outreach were to: (1) raise awareness of this CAP's development; (2) inform the public and other organizations about the CAP; (3) provide opportunities for input at the various steps of CAP development; and (4) provide opportunities to influence decision-making.

In preparation of the CAP, the City has prioritized public engagement and outreach to ensure that the CAP provides feasible, equitable, and implementable measures. To engage residents, businesses, and nonprofits, the City intended to follow outreach best practices by:

- Harnessing the networks and reach of existing community organizations such as local school districts, CAFE, Escondido Education COMPACT, and the Escondido Bike/Walk Committee;
- Going to where the people are (e.g., tables at community events or reserved time during existing Home Owner's Association ("HOA") and Neighborhood Association meetings);
- Creating multiple levels and forms of engagement; and
- Crafting creative methods to elicit input.

Through implementation of these best practices, the City developed a series of tools to help engage different parties, such as notification lists, CEQA notices, a dedicated project website, electronic mail notifications, press releases, and handouts. Additional outreach initiatives included establishing a CAP workgroup with City staff, hosting community workshops to engage the public in the planning process, hosting mobile community workshops at public events, informing Planning Commission and City Council through informational meetings, and scheduling Planning Commission and City Council public hearings.

Source: City of Escondido

Summary of Phase 1 Outreach

During the first phase of public involvement, there was a two-month public engagement period, and the City hosted multiple community outreach and engagement events to provide opportunities for residents, business owners, workers, and interested parties to participate in the climate action planning process. Throughout the ongoing outreach process, the City offered online engagement opportunities for all interested parties to provide feedback through surveys if unable to attend an outreach event. A summary of the hosted community outreach event is provided in **Table 1-2**. Other, less formalized, outreach events and activities were also conducted. A detailed summary of community input and involvement in the climate action planning process is included in **Appendix D**. In addition, a public committee was formed to discuss adaptation and social equity issues in the CAP.

Table 1-2 Community Engagement Event Summary

Meeting Date	Location
May 8, 2018	Planning Commission presentation
June 20, 2018	City Council presentation
July 10, 2018	Planning Commission presentation
July 12, 2018	Presentation to Traffic Commission
July 19, 2018	Presentation to Historic Preservation Commission
July 26, 2018	Neighborhood Leadership Group Meeting
July 30, 2018	Public Workshop
August 28, 2018	Planning Commission presentation
October 25, 2018	Neighborhood Leadership Group Meeting

Notes: City = City of Escondido; SDG&E = San Diego Gas & Electric
Source: City of Escondido 2018

Workshop Summary

Source: City of Escondido

As a culmination of the CAP public engagement period, the City hosted a public workshop on July 30, 2018 at City Hall. The workshop was designed to inform residents, businesses, and community members about the CAP and gather community input on proposed CAP measures and climate change issues. Input was provided through a "dot' or "tally" exercise where attendees placed green sticker dots on measures they general supported and red sticker dots on measures the generally did not support. Additional feedback was provided in written from through the "CAP Passport", through which attendees provided additional details for measures they generally supported or did not support, and asked additional questions about measures that were not clear. In total, nearly 50 people provided input at this workshop, and additional responses to the CAP Passport were gathered online. The comments provided at the workshop and online were incorporated into this CAP. Examples of the station boards presented at this workshop and the CAP Passport are provided in **Appendix D**.

Summary of Phase 2 Outreach

After a far-reaching public outreach effort in 2018, significant progress was made to develop the draft CAP content. During the second phase of public outreach, the City focused more continuing to engage the public to both share how the public feedback provided in the first phase of outreach was used to develop the draft CAP; and to gain additional input. Phase 2 began on June 24, 2020, with the release of the draft CAP. Input on the draft CAP was solicited from the general public and stakeholders, mostly building off of previous efforts and existing networks. Detailed input was also provided by the Escondido Environmental Community Advisory Group. City staff also facilitated eight informational work sessions with the Planning Commission to integrate the commission directly into the steps of the decision making process and broaden project awareness and additional participation opportunities. After all input on the draft CAP was collected, reviewed, and considered, City staff made modifications to incorporate many of the comments. A revised draft CAP was prepared and circulated for additional public review and comment, with this step being advertised as an early release document prior to initiating the decision-making process. Phase 2 also consisted of formal public hearings with the Planning Commission and City Council.

ESCONDIDO
City of Choice

Chapter 2

GREENHOUSE GAS EMISSIONS INVENTORY, PROJECTIONS, AND TARGETS

This chapter summarizes the City of Escondido's ("City's") accounting of greenhouse gas ("GHG") emissions from activities within the community and provides an introduction to the primary steps in developing a Climate Action Plan ("CAP"). The climate action planning process is composed of four main steps: identifying and estimating primary sources and annual levels of GHG emissions for a baseline year (i.e. baseline inventory); estimating likely trends and emissions projections in the absence of reduction measures (i.e. projections); setting emissions reduction goals over time to reduce contributions to climate change effects locally (i.e. targets); and determining actions the City can take to reduce emissions from communitywide activities to meet the reduction targets (i.e. reduction strategies and measures).

2.1 Purpose of the GHG Emissions Inventory

An emissions inventory provides a snapshot of the major sources of emissions in a single year, while also providing a baseline used to project emission trends. This inventory is used to inform what local actions are needed to reduce GHG emissions and to develop reduction targets that are consistent with State mandates. The GHG emissions inventory serves as the foundation for strategies and measures outlined in this CAP that the City will implement to reduce GHG emissions to meet its targets.

Assembly Bill ("AB") 32, Senate Bill ("SB") 32, and Executive Orders B-30-15 and S-3-05 set GHG emissions reduction goals for the State by using 1990 levels as a baseline year. Due to the absence of 1990 emissions data at the city level, an inventory was prepared for a 2012 baseline year, which represents the best available data. The 2012 baseline year included in this CAP was prepared consistent with the California Air Resource Board's ("CARB's") guidance and the baseline year as the San Diego Association of Government's ("SANDAG's") Series 13 Regional Growth Forecast.

The GHG emissions inventory baseline is used to:

- **Identify major sources and quantities of GHG emissions from community activities;**
- **Provide an emissions baseline for forecasting and determining necessary reduction targets; and,**
- **Set a baseline to develop, evaluate, and implement strategies to meet reduction targets.**

The City's GHG inventory also provides a framework to track communitywide emissions over time, as the City will prepare updated GHG emissions inventories after the CAP is adopted. The City's previous CAP, adopted in 2013, included a 2010 baseline. The 2012inventory provides an update to the 2010 inventory and is included in **Appendix A**. As part of future CAP updates and as data becomes available for more recent years, the City will prepare updated emissions inventories. These updated inventories can be compared to the 2012 inventory to track the City's progress in CAP implementation.

2.2 GHG Inventory

A baseline inventory provides detailed accounting of the sources and quantities of GHG emissions generated from activities within the city. The inventory provides an estimate of communitywide emissions for a defined set of gases that contribute to climate change. The three primary GHGs quantified include: carbon dioxide ("CO_2"), methane ("CH_4"), and nitrous oxide ("N_2O"). Emissions of these gases are converted to a comparable unit by multiplying each non-CO_2 gas by their global warming potential ("GWP"), reporting emissions in terms of carbon dioxide equivalent ("CO_2e"). This conversion allows consideration of all gases in comparable terms and makes it easier to communicate how various sources and types of GHG emissions contribute to global climate change. A metric ton of CO_2e ("$MTCO_2e$") is the standard measurement of the amount of GHG emissions produced and released into the atmosphere.

2013 CAP GHG Inventory

The *City of Escondido Climate Action Plan*, adopted in 2013 ("2013 CAP"), included a baseline inventory using 2010 communitywide and municipal activities. The 2010 inventory built on and reflected changes in methodology from a 2005 inventory, prepared prior to development of the 2013 CAP. The 2013 CAP set a target to reduce emissions to 15 percent below 2005 levels by 2020, to be consistent with the previous emissions inventory preparation and State requirements at the time.

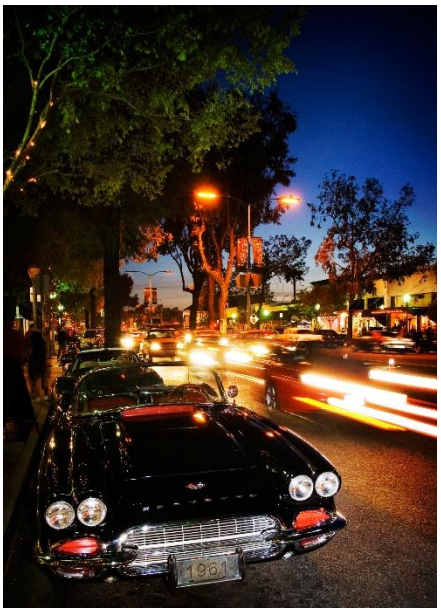
This CAP provides an update to the previous GHG emissions inventories. The previous inventory prepared was for baseline year 2010. This CAP includes a baseline inventory for 2012, based on the most up-to-date inventory methodology.

The 2010 baseline inventory in the 2013 CAP estimated citywide emissions in six categories: transportation (i.e. on-road vehicles); energy (i.e. electricity consumption and natural gas combustion); area sources (i.e. landscaping and wood burning); water (i.e. potable water conveyance and wastewater treatment); waste management (i.e. transfer of solid waste and decomposition at landfills); and construction. This baseline inventory was used to project future citywide emissions in 2020, the year for which the City's reduction target was set, and 2035, representing the buildout year of the City's General Plan. The GHG reduction measures identified in the 2013 CAP were estimated to reduce citywide GHG emissions by approximately 207,000 $MTCO_2e$ in 2030, to 15 percent below 2005 emissions.

2020 CAP GHG Inventory

As described in the 2013 CAP, the City is committed to updating its GHG emissions inventory periodically to reflect changes in methodology and technology, and to set additional reduction targets based on updated State requirements. A 2012 baseline GHG emissions inventory was prepared for this CAP, for which the best available regionwide data was available.

The 2012 GHG inventory updates the emissions categories identified in the 2013 CAP to be consistent with SANDAG's Regional Climate Action Planning Framework ("ReCAP") and State guidance. The emissions categories identified in this CAP are: on-road transportation, electricity, natural gas, off-road transportation, solid waste, and water and wastewater. **Table 2-1** provides a description of emissions associated with each category (organized in order of total contribution to citywide GHG emissions) and the relationship between the categories identified in this CAP and categories defined in the 2013 CAP.



Source: City of Escondido

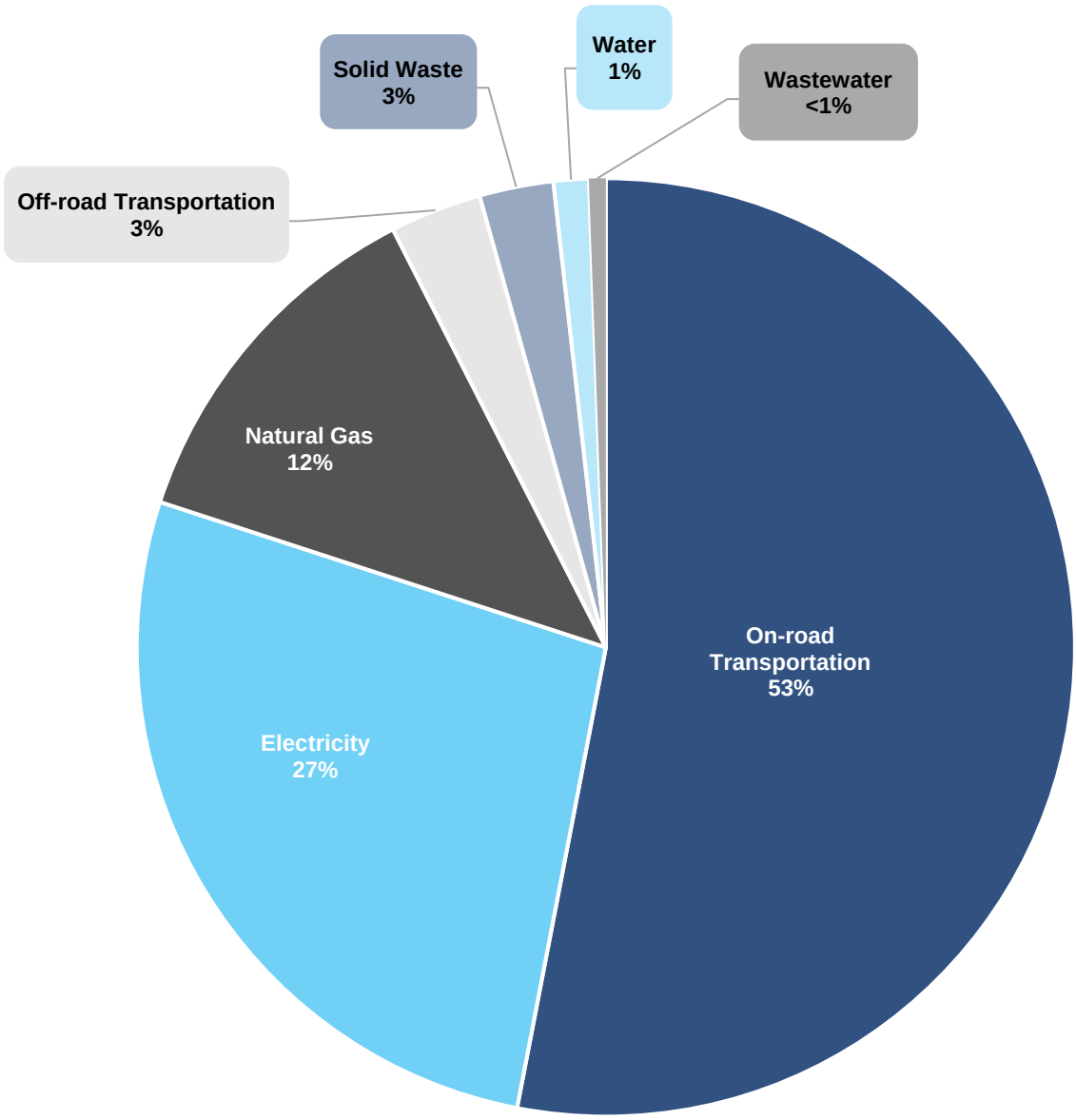
Table 2-1 City of Escondido Emissions Categories

Emissions Category	Description	Relation to 2013 CAP Emissions Categories
On-Road Transportation	On-road transportation emissions associated with gasoline and diesel consumption from motor vehicles on local and regional roadways.	On-road vehicles account for all emissions in the 2013 CAP "Transportation" category.
Electricity	Building energy use emissions associated with electricity use in residential and non-residential buildings.	Electricity was included as a subcategory of "Energy" emissions.
Natural Gas	Building energy use emissions associated with combustion of natural gas in residential and non-residential buildings.	Natural gas was included as a subcategory of "Energy" emissions.
Solid Waste	Waste emissions associated with waste generated by residents and businesses of the city and disposal of mixed and organic waste in landfills.	No change from the "Solid Waste" category.
Off-Road Transportation	Off-road transportation emissions associated with gasoline and diesel fuel use from recreational vehicles, construction equipment, and residential and commercial equipment.	"Construction" emissions, a separate category in the 2013 CAP, are included in this off-road transportation category.
Water	Emissions associated with the water supplied, conveyed, treated, and distributed to residents and businesses within the city.	Water was included as a subcategory of "Water and Wastewater" emissions.
Wastewater	Wastewater treatment fugitive and process emissions consisting of GHGs from combustion of anaerobic digestor gas and operational fossil fuels.	Wastewater was included as a subcategory of "Water and Wastewater" emissions.

Notes: City = City of Escondido; GHG = Greenhouse Gas
Source: EPIC 2018

The 2012 GHG inventory, prepared by the University of San Diego's Energy Policy Initiatives Center ("EPIC"), estimated that community activities within the City generated approximately 943,000 $MTCO_2e$ in 2012. Emissions from on-road transportation account for the greatest contribution to citywide emissions. This category, which includes emissions from vehicular gasoline and diesel consumption, was calculated based on estimated vehicle miles traveled ("VMT") for vehicles traveling within and to/from the city and accounted for approximately 53 percent of citywide emissions in 2012. Electricity and natural gas emissions, collectively referred to as the "energy" category, are the second largest contributors with 27 and 12 percent of total emissions in 2012, respectively. Emissions from off-road transportation, solid waste, water, and wastewater each accounted for no greater than three percent of the city's 2012 baseline emissions. The City's 2012 baseline emissions by category are shown in **Figure 2-1**.

Citywide activities in 2012 generated approximately 943,000 $MTCO_2e$. This is equal the weight of nearly 350 million rainbow trout caught at Dixon Lake.



Source: EPIC 2018.

Figure 2-1 City of Escondido 2012 GHG Emissions

Additional details related to the specific emission categories, data sources, assumptions, and methodologies can be found in **Appendix A.** A summary of the City's estimated emissions in 2012 by category is provided in **Table 2-2**.

Table 2-2 2012 City of Escondido Greenhouse Gas Inventory

Emissions Category	$MTCO_2e$	Percent (%)
On-road Transportation	498,000	53
Electricity	256,000	27
Natural Gas	118,000	12
Off-road Transportation	30,000	3
Solid Waste	24,000	3
Water	11,000	1
Wastewater	6,000	<1
Total	**943,000**	**100**

Notes: Columns may not add to totals due to rounding.
$MTCO_2e$ = metric tons of carbon dioxide equivalent
Source: EPIC 2018.

The City's emissions in 2012, 943,000 $MTCO_2e$, are equivalent to combusting over 106 million gallons of gasoline, or the total combustion from 200,000 passenger vehicles driving continuously for one year. It would require approximately 1.2 million acres of U.S. forests to sequester the $MTCO_2e$ emitted in the city in one year (U.S. EPA 2020).

2.3 Emissions Projections

GHG emissions projections provide an estimate of future levels based on a continuation of current trends in activity, while also accounting for known regulatory actions by federal and State agencies (i.e., "legislative" actions) that can reduce emissions in the future. GHG emissions projections provide insights into the scale of local reductions needed to achieve GHG emission reduction targets.

This CAP uses two projections, referred to as the "business-as-usual" ("BAU") and Legislatively-Adjusted BAU scenarios. Both the BAU and Legislatively-Adjusted BAU assume that population, employment, and transportation activity will grow over time, consistent with estimates in the SANDAG Regional Growth Forecast. The BAU projection is based on a continuation of current trends in activity, assuming that no additional efforts or legislative actions beyond what have already been adopted will be made to reduce GHG emissions in the future.

Source: City of Escondido

Legislatively-Adjusted BAU projections provide a reduction from BAU projections, accounting for federal and State actions that are expected to take place in the future.

Details on how the projections were developed and the activity data used to forecast emissions in each emissions category can be found in **Appendices A** and **B**.

Demographic Trends

GHG emission projections were estimated for 2020, 2030, and 2035 using city-specific demographic and transportation activity projections. The SANDAG Series 13 Regional Growth Forecast was used to estimate transportation activity in the City in the form of VMT. At the time of developing and estimating emissions forecasts, the SANDAG Series 13 Regional Growth Forecast represents the best population, employment, and VMT forecasts available at the city-level, based on 2012 baseline data.

In general, the City is anticipated to experience modest growth by 2020, 2030, and 2035. Based on the data used by EPIC, the City's population is expected to increase by 13 percent by 2020, 17 percent by 2030, and 18 percent by 2035, compared to the 2012 baseline levels. Furthermore, employment is expected to increase by 9 percent by 2020, 14 percent by 2030, and 18 percent by 2035 from 2012 levels. The BAU emissions projections assume activities within the city would continue producing GHG emissions at a similar rate and that these projected demographic trends would continue. Further details on the underlying data used for emissions projections can be found in **Appendix A**.

Source: City of Escondido

Business-as-Usual Projections

Comprehensive GHG emissions projections are developed under a BAU scenario, which assumes the continuation of conventional behaviors without the inclusion of any additional efforts or legislative actions beyond what has already been adopted at the time of the baseline year (i.e., 2012). Therefore, federal, State, and local policies, programs, and regulations designed to take effect in future years, as well as the associated GHG reductions, are not considered.

Business-as-usual projections assume City operations, residents, and businesses would continue operating and acting as they do today. These projections do not account for any changes in existing activities that would reduce GHG emissions.

Citywide GHG emissions projections in 2020 indicate that the City has an overall reduction in annual GHG emissions since 2012, as shown in **Table 2-3**. This observed decrease in BAU emissions is likely due to a combination of State and local actions that result in fewer emissions, including use of improved regionwide renewable energy portfolios, decreased residential and commercial water usage, improved vehicle standards and turnover of vehicle fleets, and implementation of the 2013 CAP. The City's GHG emissions would slowly increase under BAU conditions from 2020 until 2035, as a result of growth in population and employment.

Legislatively-Adjusted Reductions

Source: City of Escondido

The Legislatively-Adjusted BAU scenario accounts for a variety of approved legislative actions that will further reduce BAU emissions from the City by: 1) estimating the impacts of these actions on the various GHG emissions categories in the CAP; and 2) adjusting emissions levels accordingly. While these projections include federal and State actions, they do not include local government actions, such as the implementation of measures identified in this CAP. The legislative actions applied to estimate this scenario include:

- **Federal and State Vehicle Efficiency Standards**: Federal and State agencies have set tailpipe emissions standards through 2025 (in place at the time emissions projections were prepared in 2018), including the California Zero Emissions Vehicle Program.[1]
- **California Renewables Portfolio Standards**: Utilities operating in California are required to meet power mix targets to include increasing percentages of renewable energy. As required by the State's Renewables Portfolio Standard ("RPS"), San Diego Gas & Electric's ("SDG&E's") power mix would include at least 60 percent renewables by 2030.
- **California Energy Efficiency Programs:** The California Public Utilities Commission ("CPUC") sets energy efficiency targets for utilities companies in the state, including SDG&E. Utilities achieve these targets through, but are not limited to, rebate programs and updates to codes and standards.
- **California Solar Policies and Programs:** The State has several policies and programs to encourage customer-owned, behind-the-meter photovoltaics ("PV"), including the California Solar Initiative, New Solar Home Partnership, Net Energy Metering, and updated Building Efficiency Standards.

Legislative actions account for federal and State regulations that will primarily result in GHG reductions in the transportation and energy sectors.

The Legislatively-Adjusted BAU emissions, presented in **Table 2-3**, include all legislative actions provided above. With the application of these legislative actions in the city, the projected citywide emissions would continue to decrease through 2035. Based on these projections, the City's emissions would be 16 percent below 2012 levels in 2020, 37 percent below 2012 levels in 2030, and 40 percent below 2012 levels in 2035.

[1] In November 2019, the U.S. EPA issued the final rule for Part 1 of the Safer Affordable Fuel-Efficient Vehicle Rule ("SAFE Rule"). Part 2 of the SAFE Rule was finalized in March 2020 and sets revised federal Corporate Average Fuel Efficiency standards to replace California's Advanced Clean Cars program. During the preparation of this CAP, these new standards have not taken effect.

Table 2-3 City of Escondido Emissions Projections ($MTCO_2e$)

Emissions Category	2012	2020		2030		2035	
		BAU	Legislatively-Adjusted BAU	BAU	Legislatively-Adjusted BAU	BAU	Legislatively-Adjusted BAU
On-road Transportation	498,000	445,000	430,000	425,000	337,000	427,000	323,000
Electricity	256,000	187,000	163,000	196,000	52,000	199,000	34,000
Natural Gas	118,000	126,000	123,000	131,000	129,000	133,000	131,000
Off-road Transportation	24,000	26,000	26,000	32,000	32,000	33,000	33,000
Solid Waste	30,000	30,000	30,000	31,000	31,000	31,000	31,000
Water	11,000	11,000	11,000	12,000	11,000	12,000	12,000
Wastewater	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Total	**943,000**	**831,000**	**789,000**	**833,000**	**598,000**	**841,000**	**570,000**
Percent change from 2012	-	*-12%*	*-16%*	*-12%*	*-37%*	*-11%*	*-40%*

Notes: Columns may not add to totals due to rounding.
BAU = business as usual; GHG = greenhouse gas emissions; $MTCO_2e$ = metric tons of carbon dioxide equivalent
Source: EPIC 2018, EPIC 2020.

In August 2019, the U.S. Environmental Protection Agency ("EPA") and National Highway Traffic Safety Administration ("NHTSA") jointly published a notice of proposed rulemaking for Part One of the Safer Affordable Fuel-Efficient Vehicle Rule ("SAFE Rule"). The SAFE Rule proposed new and amended CO_2, Corporate Average Fuel Economy ("CAFE"), and GHG emissions standards for passenger cars and light trucks. Further, Part One of this rule proposed to withdraw the State of California's waiver, afforded under the Clean Air Act ("CAA") to set GHG and zero-emission vehicle ("ZEV") standards separate from the federal government. Part One of the SAFE Rule became effective in November 2019. CARB has provided adjustment factors for pollutants, including NO_2, PM_{10} and $PM_{2.5}$, and CO, from light-duty vehicle exhaust to account for Part One of the SAFE Rule. However, corresponding adjustment factors for GHG emissions are not available at this time. In March 2020, EPA and NHTSA announced Part Two of the SAFE Rule, which would set amended fuel economy and CO_2 standards for passenger cars and light trucks for model years 2021-2026. Part Two would become effective 60 days after publication in the Federal Register. The impact of Parts One and Two of the SAFE Rule on GHG emissions factors in California has not been quantified by CARB in the Emissions Factor model ("EMFAC") or related modeling tools. These modeling tools would need to be amended, or corresponding adjustment factors published, to quantitatively assess the impact on City GHG emissions. Therefore, the quantitative methodology used to project Legislatively-Adjusted BAU emissions in this CAP does not include the impact of the SAFE Rule. At the time of this writing, the methodology represents current guidance and best available data from CARB. As more information becomes available from regulatory agencies, the City will continue to monitor the impact of the SAFE Rule, as discussed further in **Chapter 4**.

2.4 Reduction Targets

This CAP focuses on reducing emissions by 2020 and 2030 to be consistent with the legislative State targets, and reducing emissions by 2035 to demonstrate the recommended trajectory to meet the State's 2050 goal. CARB's *California's 2017 Climate Change Scoping Plan* ("2017 Scoping Plan") provides a pathway to achieving State targets as directed in AB 32, SB 32, and Executive Orders B-30-15 and S-3-

05. These targets are consistent with prevailing climate science and the state's role in stabilizing global warming below dangerous thresholds. These goals aim to reduce statewide emissions to:

- 1990 levels by 2020;
- 40 percent below 1990 levels by 2030; and
- 80 percent below 1990 levels by 2050.

To determine an equivalent reduction target at the local level, the 2017 Scoping Plan recommends communitywide GHG reduction goals for local climate action plans that will help the State achieve its 2030 target and 2050 goal (80 percent below 1990 levels). CARB recommends that local governments evaluate and adopt robust and quantitative locally-appropriate goals that align with the State's sustainable development objectives. Estimating equivalent reductions needed from the 2012 GHG inventory, the City will aim to reduce emissions to:

- 4 percent below 2012 levels by 2020;
- 42 percent below 2012 levels by 2030; and
- 52 percent below 2012 levels by 2035.

The City's 2020 goal to reduce emissions to four percent below 2012 levels is equivalent to 907,000 $MTCO_2e$ per year. As shown previously in **Table 2-3**, the City's projected BAU emissions in 2020 would be below this target level. Achievement of this target is largely the result of existing State measures and the City's implementation of the 2013 CAP.

To meet reduction targets, the City will need to reduce emissions to:
- **907,000 $MTCO_2e$ in 2020**
- **547,000 $MTCO_2e$ in 2030**
- **456,000 $MTCO_2e$ in 2035.**

The City's 2030 target is based on State requirements and requires emissions to be reduced to 547,000 $MTCO_2e$ in 2030. The City has set its 2035 target based upon the trajectory necessary to meet the statewide 2050 goal and requires citywide emissions to be reduced to 456,000 $MTCO_2e$ in 2035. A summary of the method used to develop these targets is provided in **Appendix B**.

2.5 Local Emissions Gap

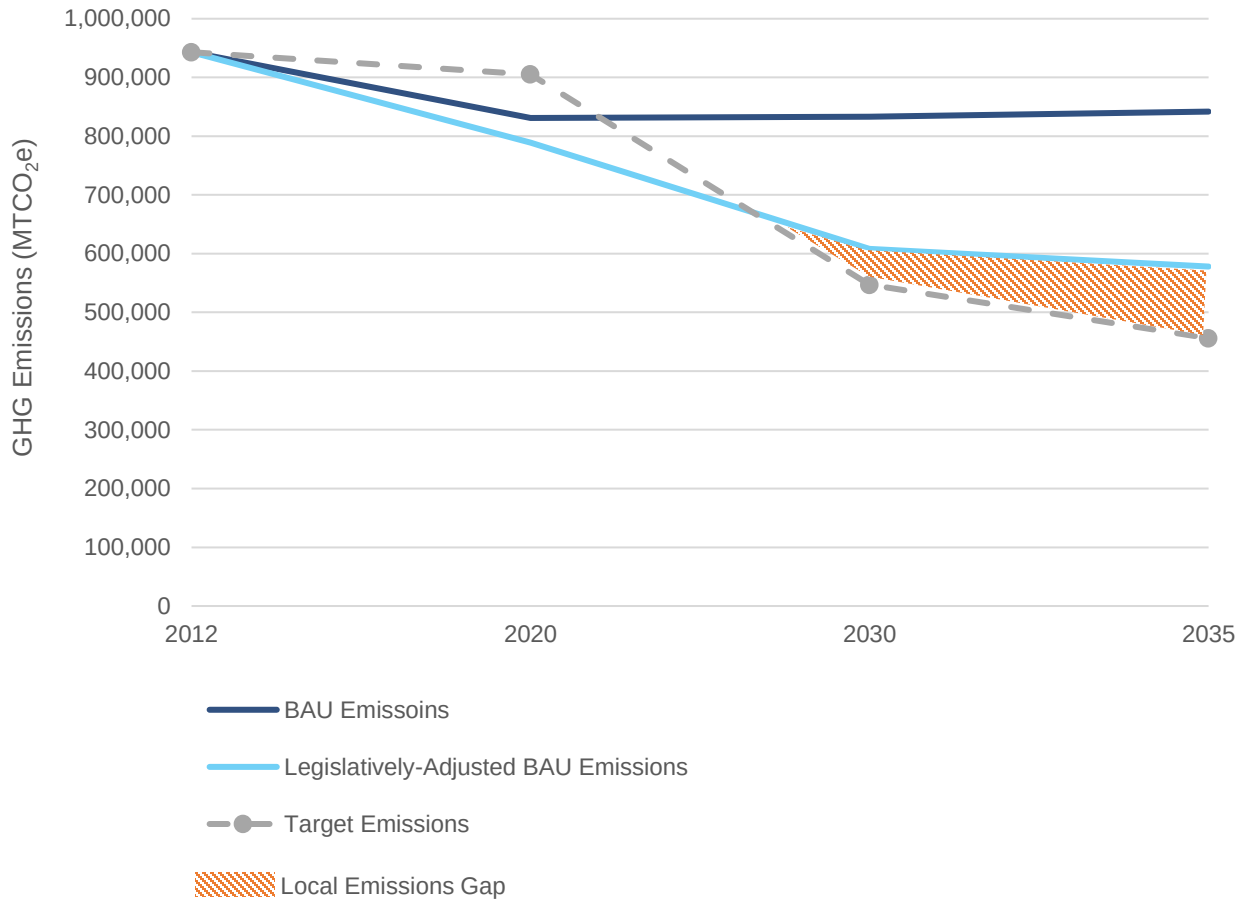
While existing activities would be adequate to meet the City's 2020 target, these activities, along with federal and State legislative actions, would not meet the City's 2030 and 2035 GHG reduction targets. As shown in **Figure 2-2**, with the Legislatively-Adjusted BAU, the City's 2030 emissions under were estimated to be 598,000 $MTCO_2e$, or approximately 51,000 $MTCO_2e$ higher than the City's 2030 target. The City's 2035 emissions under the Legislatively-Adjusted BAU were estimated to be 570,000 $MTCO_2e$, or approximately 114,000 $MTCO_2e$ higher than the City's 2035 target. This additional reduction is referred to as the "local emissions gap." To close this gap, the City would need to implement actions that would reduce approximately 51,000 $MTCO_2e$ in 2030 and 114,000 $MTCO_2e$ in 2035. A detailed description of the calculations and estimates for these emissions projections, targets, and reductions is provided in **Appendix B**.

This CAP identifies strategies and measures that would reduce citywide GHG emissions by at least:

- **499,000 $MTCO_2e$ by 2030, and**
- **456,000 $MTCO_2e$ by 2035**

California's GHG reduction targets have been legislatively adopted for 2030 and 2035, while the 2050 goal is expressed in an executive order. While it is important to create a long-term emissions reduction goal, it would be speculative to demonstrate achievement of a goal for 2050 with the information known today. CARB 's Scoping Plan Update focuses on meeting the 2030 reduction target, as directed in SB 32. Therefore, the CAP aligns with the State in proposing measures to meet the 2030 target, and has set a 2035 target based upon the trajectory for meeting the State's 2050 reductions. As climate change science and policy continues to advance, the City will be able to apply new reductions toward meeting a long-term 2050 GHG emissions reduction goal in future CAP updates, as outlined in **Chapter 4**. Over the coming decades, GHG reductions may come from:

- new innovations and technologies likely to become available in the future
- new methods to quantify measures that are currently unquantifiable
- new State and federal regulations that further reduce emissions in categories currently addressed primarily by local actions and supporting measures.



Source: EPIC 2020.

Figure 2-2 City of Escondido GHG Emissions Forecasts and Targets

It is important to note that should state and federal laws in effect or planned to reduce GHG emissions be reversed, fail to pass, or be incorrectly implemented, then those planned reductions in GHG emissions

will not occur or at the same extent as intended. For example, the City of Escondido would not achieve the same total GHG emissions reductions from state or federal intervention.

It should also be noted that residents, businesses, and organizations make choices daily that produce GHG emissions that may be beyond the influence of the City and the CAP. While the measures identified in the CAP are focused on the City's GHG emissions inventory, individual residents or businesses should not feel limited to measures outlined in the CAP; members of the community can make a number of climate-friendly choices, such as buying locally-grown foods and locally-manufactured products. These actions are not specifically listed in the CAP but further reduce energy use and the local carbon footprint and contribute to helping reverse climate change trends on a global scale.

ESCONDIDO
City of Choice

Chapter 3

GREENHOUSE GAS REDUCTION STRATEGIES AND MEASURES

This chapter outlines strategies and specific measures to be implemented by the City of Escondido ("City") to achieve its greenhouse gas ("GHG") reduction targets over the coming decades. As a complement to legislative actions taken by the State and federal governments, each strategy and measure focuses on local actions developed to reduce emissions and close the City's local emissions gap. The City envisions carbon neutrality by 2045, however this is not set forth herein as a CAP GHG emissions target.

The local strategies and measures were developed to reduce approximately 99,000 $MTCO_2e$ in 2030 and 114,000 $MTCO_2e$ in 2035.

The strategies and measures included in this Climate Action Plan ("CAP") focus on actions taken to reduce GHG emissions at City-managed facilities, at new and existing developments, and through City-led planning activities. Implementation of these strategies and measures will depend on participation of and partnerships with and among residents, businesses, and other organizations. In addition, the CAP includes a focus to address social equity in the implementation of the measures. The strategies and measures identified in this CAP build on the measures included in the City's previous CAP, adopted in 2013, and policies and programs included in the City's General Plan.

Though the primary purpose of these strategies and measures is to reduce GHG emissions, they will also result in additional co-benefits. These co-benefits, briefly discussed in **Chapter 1**, include benefits beyond GHG reductions that would occur through implementation, such as improved environmental quality, improved health outcomes, enhanced community character, address historic underinvestment, and improved resilience to climate change impacts. An overarching goal and co-benefit through investment strategies in the plan is to enable local job opportunities. Implementation of the strategies and measures in this chapter would be adequate to meet the City's reduction targets in 2030 and 2035. However, since the City is already experiencing the effects of climate change, this CAP includes multiple measures to adapt to climate change impacts, discussed in **Chapter 5**.

3.1 Greenhouse Gas Reduction Strategies

GHG reduction strategies are essential to the climate action planning process, as they lay the framework for meeting GHG emission reduction targets. The GHG reduction strategies outlined in this CAP utilize 2012 as the baseline year for measure implementation and progress. As discussed in **Chapter 2**, the City is anticipated to meet its 2020 reduction target under business-as-usual ("BAU") conditions. As the City continues to grow under a BAU scenario and State and federal legislative actions take effect, the City's emissions would decrease over time but would not be adequate to meet the 2030 or 2035 reduction targets. It is the responsibility of the City to develop local GHG reduction strategies to further reduce citywide GHG emissions to meet these targets.

Source: City of Escondido

The strategies and measures proposed in this CAP provide a pathway beyond State and federal legislative actions for new and existing development and activities in the City to reduce GHG emissions and meet the City's 2030 and 2035 targets. Implementation of these strategies and measures proposed demonstrate progress towards supporting the State's 2050 GHG emissions reduction goal.

In developing the strategies and measures in this CAP, City staff reviewed the measures included in the 2013 CAP, identified the potential for future projects in the City, and gathered input from residents, business owners, community organizations, and the Environmental Community Advisory Group. Successful measures from the 2013 CAP were incorporated into the strategies and measures proposed in this CAP. As discussed in **Chapter 2**, the emissions categories included in this CAP are consistent those outlined in the San Diego Association of Government's ("SANDAG's") Regional Climate Action Planning Framework ("ReCAP"). A summary of the relationship between the measures included in this CAP and those included in the 2013 CAP is provided in **Appendix C**. A majority of the 2013 CAP measures were incorporated into new measures in this CAP.

The City hosted public workshops for residents, business owners, and community leaders where they were able to provide input and feedback on proposed measures. Input from these workshops was used to further define measures and identify measure goals. These outreach efforts are briefly described in **Chapter 1** and discussed in further detail in **Appendix D**.

The City values social equity and environmental justice for vulnerable communities in investment strategies that will reduce GHG emissions and assure co-benefits for residents in low-income and vulnerable neighborhoods. The CAP prioritizes investment, enforceable goals, and specific actions related to energy efficiency, clean energy, restoration, urban greening, community gardens, shade trees, transit, etc. to promote neighborhood improvement, social equity, and environmental justice.

3.2 Greenhouse Gas Emissions Reduction Summary

If community emissions in the City were to continue to grow under BAU conditions, the City is anticipated to generate 833,000 metric tons of carbon dioxide equivalent ("$MTCO_2e$") in 2030 and 842,000 $MTCO_2e$ in 2035. While State and federal actions would further reduce emissions in 2030 and 2035, the City would still need to reduce emissions by 51,000 $MTCO_2e$ in 2030 and 114,000 $MTCO_2e$ in 2035 to meet its reduction targets. **Table 3-1** shows the GHG reductions attributable to legislative actions and the measures in this CAP, as well as how anticipated reductions would help the City meet its 2030 and 2035 reduction targets. Further description of the methodology and calculations used to estimate emissions is provided in **Appendix B**.

Table 3-1 Greenhouse Gas Emissions Reductions from Business-as-Usual Conditions

Emissions Projection/Category	2030 Emissions ($MTCO_2e$)	2035 Emissions ($MTCO_2e$)
BAU Emissions Projection	**833,000**	**842,000**
Reductions from Federal and State Actions	235,000	272,000
Legislatively-Adjusted BAU Emissions Projection (BAU Projection – Federal and State Action Reductions)	**598,000**	**570,000**
Target Emissions	**547,000**	**456,000**
Total Reductions from CAP Measures	**99,000**	**114,000**
Reductions from CAP Transportation Measures	25,000	47,000
Reductions from CAP Energy Measures	46,000	35,000
Reductions from CAP Water Measures	4,000	4,000
Reductions from CAP Waste Measures	23,000	27,000
Reductions from CAP Carbon Sequestration and Land Conservation Measures	1,000	1,000
City Emissions with CAP (Legislatively-Adjusted BAU – CAP Reductions)	**499,000**	**456,000**

Notes: Numbers are rounded to the nearest thousand; values and totals may not equal the values summed in other tables or figures.
BAU = business as usual; CAP = Climate Action Plan; City = City of Escondido; $MTCO_2e$ = metric tons of carbon dioxide equivalent
Source: EPIC 2020.

3.3 Reduction Strategies and Measures

In order to close the gap between the City's Legislatively-Adjusted BAU emissions projections and the 2030 and 2035 emission reduction targets, the CAP proposes nine GHG reduction strategies with 31 GHG emission reduction measures, developed based on a combination of factors, including:

The City will reduce GHG emissions through implementation of 31 GHG-reducing measures, organized under nine reduction strategies.

- the feasibility of the measure to be implemented by the City;
- existing policies, actions, or programs that can be expanded;
- proposed policies and plans yet to be adopted;
- feedback from community members and other stakeholders; and
- review of measures included in the 2013 CAP.

Each reduction strategy consists of measures, target year, performance metrics, and GHG reduction potential. Strategies also include supporting actions that will assist in achieving each strategy's performance metric(s) but are not quantifiable and, therefore, not applied towards meeting the City's GHG reduction targets. These terms are further defined below, and additional GHG reduction calculation details are included in **Appendix B**.

Strategy: A strategy is a high-level plan the City will implement to achieve GHG reductions in each category of the GHG inventory. Each category may have one or more associated strategies. This CAP includes nine overall strategies.

Measure: A measure is a program, policy, or project the City will implement that will cause a direct and measurable reduction in GHG emissions.

Source: City of Escondido

Performance Metric: Each measure has a performance metric that serves as the goal by which achievement will be measured in target years. Performance metrics identified in this CAP provide timeframes for implementation of specific activities and identify target years for implementation to track progress towards measure implementation.

GHG Reduction Potential: The GHG reduction potential represents the estimated reduction in GHG emissions from a specific measure, if its performance metric is met. All GHG reduction potential values are shown in terms of $MTCO_2e$ reduced in the 2030 and 2035 target years, selected based on State reduction goals and the City's General Plan horizon. Because the City is anticipated to achieve its 2020 target under BAU conditions, the GHG reduction potential is presented only for 2030 and 2035. Most, but not all, performance metrics have an associated GHG reduction potential. Certain performance metric activities would not directly result in GHG reductions in that year but may facilitate implementation of an action that reduces GHGs in target years.

Supporting Actions: Supporting actions are additional activities that are currently occurring or will occur within the community that may support implementation of the identified strategy and measures.

Co-Benefits: Co-benefits are the additional beneficial outcomes that would occur through the implementation of a GHG reduction strategy. Co-benefits associated with the implementation of the CAP strategies include: improved air quality, improved energy efficiency, enhanced community character, improved land use efficiency, improved public health, improved natural ecosystems, increased renewable energy, enhanced mobility, reduced waste, improved water quality, improved water efficiency, and improved resiliency to climate change impacts.

Where applicable, GHG reduction measures will be targeted and prioritized for funding and implementation in priority investment neighborhoods. These are measures that will improve quality of life, housing stock, health, and quality of life for residents in vulnerable neighborhoods. The priority neighborhoods are those which have been recommended in **Appendix F** based on a ranking in CalEnviroScreen which considers multiple factors in ranking risk and vulnerability. Furthermore, the goal is for the City to facilitate, wherever/however possible, equitable access to the green economy, especially for communities traditionally left out of those opportunities. This seeks to be done through local hiring, minority outreach and training programs, education and outreach to communities of concern, supplier diversity on CAP implementation projects, etc.

Transportation Emissions Category

Transportation is a significant contributor to GHG emissions in the City, accounting for 53 percent of total emissions in 2012. Transportation emissions include emissions from both internal combustion engines of on-road (e.g., passenger vehicles) and off-road (e.g., construction equipment, residential and commercial equipment, and recreational vehicles) sources. Improvements in State and federal vehicle fuel efficiency standards will contribute to reducing transportation emissions by requiring the development of cleaner vehicle fleets. At the local level, the State relies on cities to implement strategies that would reduce the frequency or distance of vehicle travel, reduce the amount of fossil fuels used, and/or reduce the use of internal combustion vehicles by shifting to electric vehicles or alternative modes of transportation (e.g., transit, bicycling). The strategies that will be implemented at the local level include increasing zero-emission or alternative fuel vehicle use, increasing transportation system efficiency for existing and future travel patterns, and increasing the use of alternative travel modes.

Strategy 1: Increase the Use of Zero-Emission or Alternative Fuel Vehicles

This strategy would achieve GHG emissions reductions by reducing the use of gasoline or diesel-powered vehicles and equipment and transitioning to electric or zero-emissions vehicles for residents, workers, and the City's municipal fleet. Reductions from this strategy would occur through municipal projects and development requirements, and partnerships with local businesses and developers. The four measures included under this strategy are estimated to reduce the City's emissions by approximately 4,000 $MTCO_2e$ in 2030 and 7,000 $MTCO_2e$ in 2035. **Table 3-2** provides the measures, performance metrics, and supporting actions associated with this strategy.

Table 3-2 Increase the Use of Zero-Emission or Alternative Fuel Vehicles

Measure T-1.1: Transition to a Clean and More Fuel-Efficient Municipal Fleet.

Increase the number of PHEVs in the City's municipal vehicle fleet and install EV charging stations at the City's Police and Fire Headquarters to support the vehicle charging needs of current City-owned EVs and PHEVs, and future PHEVs.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Adopt a procurement policy for converting all municipal vehicle fleet to EVs and PHEV's.	-
2030	Add 11 new EVs and PHEVs to the City fleet by 2030.	33
	Install 30 EV Charging stations at the Police and Fire Headquarters by 2030.	
2035	Maintain 30 EV charging stations and 11 EVs and PHEVs in the municipal fleet in 2035.	33

Measure T-1.2: Install Electric Vehicle Charging Stations at Park and Ride Lots.

Install Level 2 or better EV charging stations at Park and Ride lots in the City that are available to ride-share commuters and/or transit riders.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Install 181 EV charging stations in Park and Ride lots by 2030.	463
2035	Install 281 EV charging stations in Park and Ride lots by 2035.	737

Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations in Developments.

Adopt an ordinance, effective in 2023, that requires Level 2 or better EV charging stations to be installed in a minimum of 10 percent of total parking spaces provided in new multi-family and new and existing commercial developments.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2022	Adopt an ordinance requiring EV charging station installation in new multi-family and new commercial developments.	-
2023	Adopt an ordinance that requires the installation of EV charging stations in existing, larger commercial developments (consisting of 100 spaces or more).	-
2025	Establish a "Clean Energy Equity Plan" to improve equitable access to clean and sustainable energy in priority investment neighborhoods ("PINs") to increase EV ownership, EV car-sharing, installation of EV chargers in existing multi-family projects, etc.	-
2030	Install 531 EV charging stations in multi-family and commercial developments by 2030.	3,513
2035	Install 802 EV charging stations in multi-family and commercial developments by 2035.	5,732

Measure T-1.4: Require Electric Vehicle Charging Stations at New Model Home Developments.

Adopt an ordinance, effective in 2021, requiring new developments to encourage EV charging station installation in new homes by:

- Installing at least one EV charging station (wall mount or pedestal) in new single-family model homes and multi-family model homes with private garages (e.g. townhouse);
- Including EV charging stations as an add-on option at no cost to new homebuyers in new home subdivisions; and
- Working with the City to waive permitting and installation fees for EV charging stations in these subdivisions.

The City should consider incentives to offset participant costs of the measure's implementation. The detail and scope of the incentives should be discussed at the time of the ordinance's adoption.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Adopt an ordinance requiring EV charging station installation in new single-family homes and townhouses.	-
2030	Install 200 EV charging stations in new single-family homes and townhouses by 2030.	339
2035	Install 300 EV charging stations in new single-family homes and townhouses by 2035.	520

Supporting Actions:

- Identify and secure funding (e.g., through the San Diego Regional Clean Cities Coalition, CARB, CEC, and/or CSE) to purchase/lease low- and zero-emissions fleet vehicles and equipment.
- Identify grants and incentives and educate developers about how to take advantage of available programs.

Notes: CARB = California Air Resources Board; CEC = California Energy Commission; City = City of Escondido; CSE = Center for Sustainable Energy; EV = electric vehicle; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; PHEV = Plug-in hybrid electric vehicle

Source: EPIC 2020.

Strategy 2: Reduce Fossil Fuel Use

Fossil fuel use can be reduced by developing an efficient transportation network that improves traffic flow and by increasing the use of alternative fueled construction equipment. Under this strategy, GHG emissions reductions would be achieved through interagency collaboration to install transportation network improvements in City rights-of-way and working with fleet suppliers to phase out less fuel-efficient equipment. The three measures under this strategy would reduce the City's GHG emissions from fossil fuel use by approximately 1,000 $MTCO_2e$ in 2030 and 4,000 $MTCO_2e$ in 2035. **Table 3-3** provides the framework for this strategy and the supporting actions that promote more fuel-efficient driving approaches.

Table 3-3 Reduce Fossil Fuel Use

Measure T-2.1: Synchronize Traffic Signals.

Synchronize traffic signals at City-maintained intersections to reduce vehicle fuel use through more efficient vehicle movement and reduced idling.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Synchronize traffic signals at 23 City-maintained intersections by 2030.	289
2035	Synchronize traffic signals at 35 City-maintained intersections by 2035.	408

Measure T-2.2: Install Roundabouts.

Install roundabouts at City-maintained intersections to reduce vehicle fuel use by improving vehicle movement efficiency.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2025	Establish a policy that requires the study of roundabouts at intersections with lower average daily trips, whereby the feasibility of roundabouts are evaluated for all new intersections and for existing intersections where where capacity or safety problems have been identified.	-
2030	Install roundabouts at eight City-maintained intersections by 2030.	811
2035	Install roundabouts at 12 City-maintaied intersections by 2035.	1,145

Measure T-2.3: Increase Renewable or Alternative Fuel Construction Equipment.

Adopt an ordinance, effective in 2031, requiring new developments and significant land-moving and construction projects to use electric-powered or alternatively-fueled construction equipment.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2027	Adopt an ordinance requiring electric-powered or alternatively-fueled construction equipment in new developments and land-moving projects, to the extent such equipment is available. Exempt small residential and non-residential projects from this requirement.	-
2035	Reduce fuel consumed by construction equipment and construction fleets by 25 percent by 2035. It is assumed that 50% of new development projects would be exempt from this requirement.	2,508

Supporting Actions:

- Conduct educational campaigns to promote fuel-efficient driving ("eco-driving") practices, such as reduced idling, slower driving speeds, gentle acceleration, and proper tire inflation.
- Update the City's General Plan Mobility and Infrastructure Element to support network build-out and improved traffic flow.
- Medium- and heavy-duty electronic truck sales and usage is expected to increase starting in 2024, consistent with the 2020 Advanced Clean Truck Rule mandated by the Calfiornia Air Resource Board ("CARB"). To support this rule, the City should adopt an ordinance to establish requirements for large truck EV charging stations and work with businesses to increase station access to support the mandate.

Table 3-3 Reduce Fossil Fuel Use

Notes: City = City of Escondido; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent
Source: EPIC 2020.

Strategy 3: Reduce Vehicle Miles Traveled

In addition to using cleaner fuels, reductions can be achieved by reducing the amount individuals drive. This strategy would achieve GHG emission reductions by reducing the amount of vehicle trips and vehicle miles traveled ("VMT"). To reduce VMT, this strategy aims to increase the use of alternative transportation modes (e.g., transit, bicycling); reduce vehicle trips associated with new developments through transportation demand management ("TDM") programs and transit-oriented and/or supportive policies and programs; and increase connectivity between major commercial, retail, and residential areas in the City. The nine measures provided under this strategy require the collaboration from local and regional agencies, residents, and businesses. Reducing VMT provides the most GHG emission reductions under the transportation category, and the implementation of this strategy would reduce emissions 20,000 $MTCO_2e$ in 2030 and 32,000 $MTCO_2e$ in 2035. **Table 3-4** provides the details of the measures, performance metrics, and supporting actions under this strategy to reduce citywide VMT.

Table 3-4 Reduce Vehicle Miles Traveled

Measure T-3.1: Participate in the San Diego Association of Governments' iCommute Vanpool Program.

Promote and encourage businesses to participate in SANDAG's iCommute Vanpool Program.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Maintain a minimum of 36 SANDAG vanpools annually that start or end in the City in 2030.	837
2035	Maintain a minimum of 36 SANDAG vanpools annually that start or end in the City in 2035.	787

Measure T-3.2: Improve Pedestrian Infrastructure in Priority Areas.

Develop an Active Transportation Plan that includes:

- A citywide Pedestrian Master Plan;
- An update to the City's Trail Master Plan;
- A Safe Routes to School Plan;
- A Safe Routes to Transit Plan; and
- Identified "priority areas" for pedestrian infrastructure improvements in the City, such as priority investment neighborhoods ("PINs").

Install new or improve[1] existing pedestrian infrastructure in priority areas (e.g., downtown employment centers, near transit stations, social equity areas, etc.).

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2023	Develop and adopt an Active Transportation Plan that includes a Pedestrian Master Plan, Trails Master Plan, Safe Routes to School Plan, and Safe Routes to Transit Plan.	-
2030	Install or improve at least 5.8 miles of sidewalk in priority areas.	44
2035	Install or improve at least 8.3 miles of sidewalk in priority areas.	59

Measure T-3.3: Implement Safe Routes to School Program at Escondido Union School District.

Develop a Safe Routes to School Plan for inclusion in the City's Active Transportation Plan, continue to work with EUSD to implement the Safe Routes to School Program to increase the number of students walking and riding bicycles to and from school, and complete infrastructure improvement projects, such as:

- Installing new sidewalks;
- Installing intersection and crosswalk signals and high visibility crosswalk upgrades;
- Retrofitting signals to include countdown pedestrian indications at crossings;
- Identifying and implementing other similar projects near schools within the City; and
- Work with NCTD and School Districts for free youth transit passes and electronic school buses.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2023	Develop and adopt an Active Transportation Plan that includes a Safe Routes to School Plan.	-
2030	Increase the percent of students walking to school in the EUSD to 27 percent in 2030.	60
	Increase the percent of students bicycling to school in the EUSD to 2.3 percent in 2030.	
2035	Increase the percent of students walking to school in the EUSD to 30 percent in 2035.	82
	Increase the percent of students bicycling to school in the EUSD to 2.5 percent in 2035.	

[1] Pedestrian infrastructure improvements as defined in the *Methods for Estimating Greenhouse Gas Emissions Reductions in the Escondido Climate Action Plan* include sidewalk improvements (i.e. sidewalk widenings, repair and maintenance programs, and ADA retrofits) and intersection improvements (raised pedestrian crossings, intersection "neck-downs," pedestrian islands, and pedestrian signals).

Measure T-3.4: Develop a Citywide Transportation Demand Management Plan.

Adopt a TDM ordinance, effective in 2022, that requires new non-residential developments and existing businesses in the downtown employment center to develop and implement TDM programs and policies. At a minimum, the TDM ordinance will require new non-residential developments and existing businesses to:

- Provide "end-of-trip" facilities for bicycle commuters (i.e. bicycle parking spaces, showers, lockers);
- Provide discounted monthly NCTD transit passes or transit subsidies;
- Provide informational material to employees for carpool and vanpool ride-matching services;
- Implement parking cash-out policies; and
- Develop alternate workplace, telecommuting, and/or alternate work schedule programs.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Adopt a TDM ordinance, effective in 2022.	-
2023	Develop and implement a wayfinding program with signage and information systems to facilitate walking, biking, and efficient driving and parking	-
2030	Increase bicycle commute mode share to 2.0 percent citywide and 3.5 percent in the downtown employment center in 2030.	533
	Increase transit commute mode share to 4.5 percent citywide and 7.5 percent in the downtown employment center in 2030.	
	Increase carpool commute mode share to 17.0 percent citywide and 15.5 percent in the downtown employment center in 2030.	
2035	Increase bicycle commute mode share to 2.5 percent citywide and 4.0 percent in the downtown employment center in 2035.	820
	Increase transit commute mode share to 5.0 percent citywide and 8.0 percent in the downtown employment center in 2035.	
	Increase carpool commute mode share to 17.0 percent citywide and 16.0 percent in the downtown employment center in 2035.	

Measure T-3.5: Update Bicycle Master Plan.

Update the City's Bicycle Master Plan and install new or improve existing Class II or better bicycle lanes.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2023	Develop an Active Transportation Plan that includes an update to the City's Bicycle Master Plan.	-
2024	Develop and implement a citywide bike rack policy.	-
2025	Complete construction of the Class I Escondido Creek Bike Path, funded through Prop 68, to faciltiate a larger network of active transportation access points and opportunities.	-
2025	Develop and implement a program to incentivize City employees commuting to work by bike or other modes of alternative transport as a model for other local employers.	-
2030	Install at least 19 miles of new Class II or better bicycle lanes by 2030.	231
2035	Install at least 30 miles of new Class II or better bicycle lanes by 2035.	335

Measure T-3.6: Increase Transit Commuters Among New Downtown Residents.

Increase the number of commuters using transit from new residential developments in the Downtown Specific Plan area by:

- Implementing smart growth policies consistent with the Downtown Specific Plan [2];
- Making sure that new development reinforces sustainable land use practices to better connect land use access and mobility options (e.g. develop design policies, standards, or guidelines for transit-oriented development; allow more flexibility for high-density, transit-oriented developments; and/or adjust parking standards or other related incentives for projects adjacent to transit serving areas);
- Supporting affordable housing projects and/or ways to incorporate a mix of affordability levels in new projects;
- Coordinating SANDAG's Five Big Moves of the Regional Transportation Plan and NCTD's Land Use Mobility Plan Update and integrate regional projects and implementation into local transportation opportunities;
- Requiring projects to provide six-month transit passes to new residents if proposing any reduction in parking over 15 percent of required amount;
- Developing a Safe Routes to Transit Plan;
- Implementing projects identified through this the Safe Routes to Transit Plan; and
- Requiring projects to monitor transit use by new residents for the first six months of operation and present monitoring results to the City.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2023	Develop an Active Transportation Plan that includes a Safe Routes to Transit Plan.	-
2024	Develop a downtown parking study and feasibility study to look into multi-level, public/private parking lot(s) and convert surplus city-owned lots to faciltiate redevelopment.	-
2030	Increase the proportion of commuters using transit and living in new residential developments within the Downtown Specific Plan and East Valley area from five percent to eight percent by 2030.	84
2035	Increase the proportion of commuters using transit and living in new residential developments within the Downtown Specific Plan and East Valley area to 10 percent by 2035.	177

[2] Smart Growth Principles, Guidelines and Standards as defined in Section III.A.1 of the City's Downtown Specific Plan.

Measure T-3.7: Develop an Intra-City Shuttle Program.

Assess the feasibility of and implement an intra-city shuttle system that includes:

- Two or more routes;
- Specifically designed to increase land use access and mobility within the Downtown Specific Plan, East Valley area, and/or South Centre City Specific Plan, as well as other priority investment neighborhoods ("PINs");
- Electric shuttle service or clean energy operations;
- Connections between activity centers within the city;
- Routes that do not directly overlap existing transit service routes; and
- High-frequency service (headways of 10-minutes or less) during peak commute periods.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Complete a feasbility study that demonstrates the intra-city shuttle system would reduce interal trips seven percent by 2030 and 10 percent by 2035.	4,463
	Operate two or more shuttle routes with 10-minute headways during commute hours in 2030.	
2035	Operate two or more shuttle routes with 10-minute headways during commute hours in 2035.	6,540

Measure T-3.8: Increase Transit Ridership.

Increase the total number of regional commuters living or working in the City using transit by working with MTS and NCTD to:

- Prioritize funding for affordable, safe, and clean energy transit in priority investment neighborhoods ("PINs");
- Increase service frequency to the city; and
- Increase transit-friendly land uses (i.e., residential and office) near transit stations.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Increase internal-external/external-internal[3] commute transit mode share of four percent by 2030.	7,829
2035	Increase internal-external/external-internal commute transit mode share of eight percent by 2035.	17,099

Measure T-3.9: Develop and Implement a Service Population-Based Vehicle Miles Traveled Threshold.

Develop a service population-based threshold for VMT to apply to new projects to reduce citywide VMT. This threshold would require new projects to demonstrate that project VMT would support a reduction in citywide VMT.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Reduce citywide VMT to 1.8 percent below projected 2030 VMT levels in 2030.	5,829
2035	Reduce citywide VMT to 3.5 percent below projected 2035 VMT levels in 2035.	11,075

Supporting Actions:

- Participate in and promote annual regional commute trip reduction events.
- Incorporate multi-modal improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work.
- Continue to pursue public and private funding to expand and link the City's bicycle and pedestrian network in accordance with both the General Plan Mobility and Infrastructure Element and Trails Master Plans.

[3] Internal-external commute trips are defined as trips occurring during commute hours that originate in the city and end outside of the city. External-internal commute trips are defined as trips occurring during commute hours that originate outside of the city and end in the city.

- Pursue opportunities to utilize existing properties adjacent to transit and employment centers to develop housing affordable to very low-income and low-income households.
- Establish policies, standards, or guidelines for new projects to meet or exceed build-out projections and accommodate service population levels that facilitate actual VMT reductions citywide. Strategies may include smart growth incentives, additional density bonuses, and/or established minimum residential density requirements and required commercial floor area ratios.
- Pursue State grants, such as the Affordable Housing and Sustainable Communities Grant, to support affordable housing projects near transit.

Notes: City = City of Escondido; EUSD = Escondido Union School District; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; MTS = Metropolitan Transit System; NCTD = North County Transit District; SANDAG = San Diego Association of Governments; TDM = Transportation Demand Management; VMT = vehicle miles traveled

Source: EPIC 2020.

Energy Emissions Category

Emissions in the energy category are generated through residential and non-residential electricity and natural gas use. Electricity and natural gas accounted for 27 percent and 12 percent of the City's 2012 emissions inventory, respectively. With a combined emissions contribution of 39 percent, the energy category is the second largest contributor to overall City emissions. Legislative reductions from State energy efficiency and renewable energy programs will contribute to reducing emissions by increasing the amount of utility supplied renewable energy and improving energy efficiency of new buildings. At the local level, GHG emissions reductions would be achieved by improving energy efficiency of existing buildings and improving energy efficiency of new developments beyond State requirements. GHG reductions would also occur from increasing the amount of renewable energy generated locally while reducing the amount of non-renewable energy consumed. Initiatives directed under the energy category rely on efforts by local utilities, organizations, and agencies, with participation from the community.

Strategy 4: Increase Building Energy Efficiency

While State legislative actions provide reductions related to building energy efficiency, additional reductions are achievable by adopting local measures. This strategy aims to reduce emissions by reducing energy consumed by residential and business consumers and in municipal facilities through increased energy efficiency in existing homes and businesses and new projects. The four measures under this strategy would reduce the City's emissions by approximately 1,000 $MTCO_2e$ in 2030 and 1,000 $MTCO_2e$ in 2035. **Table 3-5** outlines the framework to increase building energy efficiency under this strategy and the supporting actions that provide additional potential reductions and funding opportunities.

Table 3-5 Increase Building Energy Efficiency

Measure E-4.1: Require New Residential Developments to Install Alternatively-Fueled Water Heaters.

Adopt an ordinance, effective in 2023, requiring all new single-family and multi-family residential projects and significant remodels to install electric heat pump water heaters.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2022	Adopt an ordinance requiring the installation of alternatively-fueled water heaters effective in 2023 in new developments and significant remodels.	-
2025	Establish incentives for landlords and homeowners to upgrade to electric heat pump water heaters.	-
2030	Approve 995 new residential units served by electric heat pump water heaters by 2030.	629
2035	Approve 1,276 new residential units served by electric heat pump water heaters by 2035.	822

Measure E-4.2: Require New Multi-Family Residential Developments to Install Electric Cooking Appliances.

Adopt an ordinance, effective in 2023, requiring all new multi-family residential units and significant remodels to install only electric cooking appliances.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2022	Adopt an ordinance, effective in 2023, requiring the installation of electric cooking appliances.	-
2025	Establish incentives for landlords and homeowners to upgrade to electric cooking appliances.	-
2030	Install 955 new electric cooking appliances.	143
2035	Install 1,142 new electric cooking appliances.	172

Measure E-4.3: Reduce Electricity Use in Streetlights.

Retrofit City-owned HPS streetlights with LED streetlights, starting in 2021.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Retrofit 300 existing HPS streetlights with LEDs by 2030.	3
2035	Retrofit 450 existing HPS streetlights with LEDs by 2035.	3

Measure E-4.4: Require Non-Residential Alterations and Additions to Install Alternative-Fuel Water Heaters.

Adopt an ordinance, effective in 2023, requiring all non-residential alterations and additions with a permit value of $200,000 or more to install electric heat pump water heaters.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Require the installation of electric heat pump water heaters for a minimum alteration and addition area of 1.08 million sq. ft. of non-residential buildings by 2030.	160
2035	Require the installation of electric heat pump water heaters for a minimum alteration and addition area of 1.755 million sq. ft. of non-residential buildings by 2035.	263

Supporting Actions:

- Encourage energy efficiency improvements through rebates or incentives.
- Evaluate municipal facilities and operations for additional energy savings opportunities through SANDAG's Roadmap Program.
- Promote the the SDG&E Energy Savings Assistance Program for weatherization improvements.
- Evaluate the feasibility of a local home retrofit program and utilize the Clean Energy Equity Plan for reinvestment in priority investment neighborhoods ("PINS"), focusing on the oldest housing stock.

Notes: City = City of Escondido; GHG = greenhouse gas; HPS = high pressure sodium; LED = light-emitting diode; $MTCO_2e$ = metric tons of carbon dioxide equivalent; SANDAG = San Diego Association of Governments; sq. ft. = square feet

Source: EPIC 2020.

Strategy 5: Increase Renewable and Zero-Carbon Energy

GHG emissions reductions would be achieved through implementation of this strategy by reducing the amount of electricity generated from fossil fuels and transitioning to cleaner energy sources such as renewables. Installing more renewable energy systems will provide a reliable local energy supply that is a more sustainable source of electricity. Under this strategy, the City would increase renewable energy locally at municipal and commercial developments and would assess the feasibility of participating in a community choice aggregation ("CCA") program. The four measures included under this strategy would reduce City emissions by approximately 45,000 $MTCO_2e$ in 2030 and 34,000 $MTCO_2e$ in 2035. **Table 3-6** provides details on this strategy and the supporting actions currently in process at municipal renewable facilities.

Table 3-6 Increase Renewable and Zero Carbon Energy

Measure E-5.1: Increase Renewable Energy Generated at Municipal Facilities

Increase on-site renewable generation at municipal facilities and parking lots by installing PV systems.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Install at least 0.8 MW of PV at municipal facilities and parking lots by 2030.	292
2035	Install at least 2.0 MW of PV at municipal facilities and parking lots by 2035.	745

Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy.

Adopt an ordinance, effective in 2023, requiring all new commercial developments to achieve zero net energy.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2022	Adopt a Zero Net Energy ordinance effective in 2023.	-
2030	Approve at least 970,200 sq. ft. of new office and retail space that achieve zero net energy by 2030.	1,618
2035	Approve at least 1,576,575 sq. ft. of new office and retail space that achieve zero net energy by 2035.	2,668

Measure E-5.3: Increase Grid-Supply Renewable and/or Zero-Carbon Electricity.

Join or develop a program to increase grid-supply renewables and zero-carbon electricity to 100 percent.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Complete a CCA/CCE feasibility study.	-
2025	Establish a "Clean Energy Equity Plan" to support low-income residents and small organizations to purchase or obtain renewable energy. Program to include specific goals for local and decentralized renewable energy, rental and homeowner programs and/or system incentives, creation of local green jobs, and local hiring requirements, etc.	
2028	Complete a micro-grid feasibility study with the goal to encourage clean energy development and access in priority investment neighborhoods ("PINs").	-
2030	Achieve 100 percent renewable and zero-carbon electricity supply in 2030.	42,134
2035	Achieve 100 percent renewable and zero-carbon electricity supply in 2035.	29,486

Measure E-5.4: Increase Renewable Electricity Generated at School Sites.

Support the EUSD's efforts to install PV systems on school sites within the City.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Install 2.6 MW behind-the-meter PV at school sites by 2030.	947
2035	Install 2.6 MW behind-the-meter PV at school sites by 2035.	965

Supporting Actions:

- Support the efforts at the Hale Avenue Resource Recovery Facility to create renewable electricity and heat for municipal operations.

Notes: CCA = Community Choice Aggregation; CCE = Community Choice Energy; City = City of Escondido; EUSD = Escondido Union School District; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; MW = megawatt PV = photovoltaic; sq. ft. = square feet
Source: EPIC 2020.

Water and Wastewater Emissions Category

Energy consumed to supply, deliver, and treat water and wastewater results in the generation of GHG emissions. Although emissions from water and wastewater contribute approximately two percent of the City's total emissions in 2012, actions taken by residents and from municipal activities can significantly reduce citywide emissions in this sector. Reducing water use leads to a more reliable water supply that may help the City adapt to climate change impacts.

Strategy 6: Increase Water Efficiency

The measures under this strategy reduce the amount of water consumption for landscaping in both residential and municipal land uses. Reducing the amount of water used would reduce the energy needed to supply, treat, and deliver water and the GHG emissions associated with those processes. The two measures under this strategy would reduce the City's emissions by an estimated 50 $MTCO_2e$ in 2030 and 80 $MTCO_2e$ in 2035. **Table 3-7** outlines the framework for this strategy.

Strategy 6 Co-Benefits

Table 3-7 Increase Water Efficiency

Measure W-6.1: Reduce Municipal Landscape Water Consumption.

Reduce water consumption at City Parks and in the City's LMD by:

- Installing smart irrigation controllers and water efficient rotator nozzles in the City's LMD;
- Requiring all new/replacement irrigation controllers installed at City parks to be smart controllers and/or use install new rotor nozzles; and
- Institutionalize leak detection protocols.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Reduce water use at City Parks and in the City's LMD by 84 acre-feet in 2030.	45
2035	Reduce water use at City Parks and in the City's LMD by 118 acre-feet in 2035.	64

Measure W-6.2: Reduce Landscape Water Consumption in Developments.

Adopt an ordinance, effective in 2022, that reduces water consumed for landscaping at new single-family and townhome model developments, as well as commercial development, by:

- Requiring all single-family and townhouse model homes to be fully equipped with greywater systems and rain barrels (or other rainwater capture systems); and
- Requiring model home developers to offer greywater systems and rain barrels (or other rainwater capture systems) as an add-on option.
- Create water use budgets for new commercial developments (or other similar program) that requires or incentivizes pop-up rotor nozzles, pressure management, leak detection, etc.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Adopt an updated landscape ordinance effective 2022.	**-**
2030	Approve the development of 130 new single-family homes or townhouses with greywater systems and rain barrels by 2030.	**8**
2035	Approve the development of 195 new single-family homes or townhouses with greywater systems and rain barrels by 2035.	**12**

Supporting Actions:

- Encourage water use efficiency improvements through rebates and incentives.
- Continue to support turf conversion or conservation practices and offset costs of landscape conversion to drought tolerant, native or California-friendly plants.

Notes: City = City of Escondido; GHG = greenhouse gas; LMD = Landscape Maintenance District; $MTCO_2e$ = metric tons of carbon dioxide equivalent

Source: EPIC 2020.

Strategy 7: Diversify Local Water Supply

Strategy 7 Co-Benefits

As described under the previous strategy, GHG emissions associated with the water category are from the upstream energy use of supplying, treating, and delivering water. By increasing the City's local water supply, the energy required to transport water throughout the City would be reduced. Under this strategy, the City plans to install a Membrane Filtration/Reverse Osmosis ("MFRO") Facility to produce a high-quality water supply for agricultural purposes and reduce the reliance on water imported from outside of the city. The one measure under this strategy would reduce the City's GHG emissions by approximately 3,000 $MTCO_2e$ in 2030 and 4,000 $MTCO_2e$ in 2035. **Table 3-8** provides details of the measure under this strategy and the supporting actions for additional water conservation efforts.

Table 3-8 Diversify Local Water Supply

Measure W-7.1: Develop a Local Water Supply for Agricultural Water Use.

Construct and operate a new MFRO facility to produce high-quality water supply for local agricultural uses.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2030	Supply 6,721 acre-feet of water to agricultural customers from the MFRO facility in 2030.	3,541
2035	Supply 6,721 acre-feet of water to agricultural customers from the MFRO facility in 2035.	3,571

Supporting Actions:

- Maintain local water supply through water conservation efforts.

Notes: City = City of Escondido; GHG = greenhouse gas; MFRO = Membrane Filtration/Reverse Osmosis; $MTCO_2e$ = metric tons of carbon dioxide equivalent

Source: EPIC 2020.

Solid Waste Emissions Category

GHG emissions associated with the disposal of solid waste are generated from the decomposition and off-gassing of material in landfills. To reduce GHG emissions, the City can work with regional agencies to reduce the amount of solid waste disposed of at landfills by implementing programs that increase recycling and composting. Emissions generated by solid waste contributed approximately three percent of citywide emissions in 2012. Through collaboration with local agencies and waste haulers, and changes in residents' and business owners' behaviors, reductions in solid waste can be achieved.

Strategy 8: Reduce and Recycle Solid Waste

Ways to reduce GHG emissions associated with solid waste disposal involve material recycling or organic material composting. Increased recycling and composting locally can lead to additional benefits, such as increased products created from locally recycled material and fertilizer, and organic waste covering for local agricultural use. Under this strategy, the City would increase the amount of waste diverted away from landfills. Implementation of this strategy would reduce GHG emissions by approximately 24,000 $MTCO_2e$ in 2030 and 26,000 $MTCO_2e$ in 2035. **Table 3-9** provides the framework for solid waste diversion and the supporting actions to develop partnerships and recycle waste generated at construction sites.

Table 3-9 Reduce and Recycle Solid Waste

Measure S-8.1: Increase Citywide Waste Diversion.

Increase citywide waste diversion by:

- Working with the City's franchise waste hauler to prepare a waste diversion plan that identifies steps toward achieving the 2035 waste diversion goal;
- Adopting and implementing an organic waste recycling program to support regional efforts that includes a food scrap compositing program and fully permitted community compost facilities; and
- Adopting a composting and waste diversion ordinance, effective in 2023, to support at-home management of food waste.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Adopt and implement an organic waste recycling program	-
2023	Adopt a composting and waste diversion ordinance	-
2023	Work with the franchise waste hauler and other partners to assess the infrastructure needed to support composting and waste diversion goals. Develop a Zero Waste Plan to support zero waste programs; prioritize community education to priority investment neighborhoods ("PINs"); and start building the necessary infrastructure for diverting waste and processing anaertobic digestor waste.	-
2030	Achieve 80 percent citywide waste diversion in 2030.	23,588
2035	Achieve 90 percent citywide waste diversion in 2035.	27,405

Supporting Actions:

- Explore opportunities with franchise waste hauler and other local business organizations to develop and encourage participation in commercial food scrap collection program.
- Continue to participate in regional waste diversion discussions and monitor mandatory participation levels in other area construction and demolition waste diversion ordinances.

Notes: City = City of Escondido; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent
Source: EPIC 2020.

Natural Systems

Maintaining tree cover and areas of vegetation is essential for the natural carbon cycle and for sustaining life. Through photosynthesis, plants convert carbon dioxide from the atmosphere into oxygen and carbon-based matter. This process of removing atmospheric carbon dioxide through natural processes is referred to as carbon sequestration. Communities can increase the amount of carbon sequestered locally by expanding the urban forest canopy and protecting natural systems to reduce communitywide GHG emissions.

Strategy 9: Carbon Sequestration and Land Conservation

Increasing tree cover and preserving land for agriculture or open space in an urban area is a strategy to sequester carbon locally and reduce citywide GHG emissions. The measures under this strategy focus on implementing programs to increase the number of trees planted at new developments and in public areas. The City will incentivize efficient land development practices by permitting additional development density for projects that also commit to conserve open space and agriculture lands. Implementation of the carbon sequestration and land conservation measures would reduce City emissions by approximately 700 $MTCO_2e$ in 2030 and 1,000 $MTCO_2e$ in 2035. **Table 3-10** provides details on this strategy and supporting actions that incentivize tree planting and vegetation management programs.

Table 3-10 Carbon Sequestration and Land Conservation

Measure C-9-1: Enforce Landscape Tree Requirements at New Developments.

Adopt an updated landscape ordinance, effective in 2022, to increase the number of new trees planted at new developments by requiring:

- Non-residential developments to plant a minimum of one non-invasive and drought tolerant tree for every four parking spaces; and
- New single-family and multi-family residential developments to plant a minimum of one non-invasive and drought tolerant tree per unit, or pay an in-lieu fee so that the tree(s) can be planted elsewhere.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Adopt an updated landscape ordinance and in-lieu tree planting program to fund new tree plantings such as an in-lieu program to offset trees plantings on highly constrained sites.	-
2023	Amend the updated landscape ordinance establish requirments for street and median trees and requirements for tree health (e.g. inspection, enforcement, and maintenance requirements).	-
2030	Plant and maintain 2,802 new trees at new developments by 2030.	183
2035	Plant and maintain 4,076 new trees at new developments by 2035.	239

Measure C-9.2: Develop a Citywide Urban Forestry Program.

Develop, adopt, and implement an Urban Forestry Program to plant new trees and track tree planting and maintenance in public areas (i.e. City facilities, public parks, and public rights-of-way), including standards to right-size trees to minimize pruning and support hydrozoning techniques.

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2021	Pursue grant funding opportunities to fund the development of an Urban Forestry Program.	-
2025	Adopt an Urban Forestry Program with the goal of having one tree per resident in year 2088, which includes the following:. ▪ Complete an assessment of existing conditions and calcuate canpory coverage percentage for the City and for priority investment neighborhoods ("PINs"). ▪ Establish a tree planting and replacement program to achieve coverage of at least 25 percent in residential areas and 15 percent in commercial and industrial areas. ▪ Develop an urban heat island reduction program that includes an urban forest program or plan for priority investment neighborhoods ("PINs") that achieves a tree planting coverage of at least 35 percent. Expand and focus tree plantings in low-canopy neighborhoods and neighborhoods at a higher risk of adverse outcomes of urban heat island effects. ▪ Encourage urban agriculture through edible landscapes within some publicly accessible areas.	-
2030	Plant and maintain 1,010 new trees in public areas by 2030.	36
2035	Plant and maintain 1,347 new trees in public areas by 2035.	48

Measure C-9.3: Develop an Agricultural Land and Open Space Conservation Program.

Develop programs and policies that would conserve agricultural land and/or open space, including:

- Consider various agricultural land and open space conservation strategies that allow developers to preserve lands and/or increase residential development density in smart growth infill areas by removing development potential of lands;
- Target stream restoration programs and riparian restoration strategies for carbon sequestration, natural heat relief, water quality improvements, and/or wildlife habitat mitigation;
- Adopting a Community Gardening Ordinance, effective in 2023;
- Adopting a Williamson Act incentive program, effective in 2023, to encourage the continuation of agricultural operations; and
- Adopting an Open Space Conservation program, effective in 2023, that implements policies for the loss of key natural habitat areas by increasing goals and metrics for "avoided conversion."

Target Year	Performance Metric	GHG Reduction Potential ($MTCO_2e$)
2023	Adopt a Williamson Act Incentive Program.	-
2023	Adopt a Community Gardening Ordinance.	-
2023	Adopt an Open Space Conservation Program.	-
2025	Update the Jurisdictional Runoff Management Plan to develop stream and riparian restoration program strategies and work to naturalize and/or protect creek watershed areas.	-
2030	Remove the development potential for at least 257 residential units on agricultural lands and open sapce areas by 2030.	515
2035	Remove the development potential for at least 400 residential units on agricultural lands and open space areas by 2035.	762

Supporting Actions:

- Continue turf management practices which specify the top-dressing of compost to increase carbon sequestration at City parks.
- Help identify incentives and programs for "carbon farming" or agricultural best practices to reduce GHG emissions and protect Escondido agriculture such as the State Office of Environmental Farming and Innovation, or California Department of Food and Agriculture's Health Soils Program, etc.
- Partner with SANDAG, other agencies, and North San Diego County cities for funding or acquisition and management of lands conserved for habitat protection and/or agricultural use.
- Collaborate with CSE and SDG&E in developing shade tree give-away program or other incentives to encourage planting of shade trees for existing residential and non-residential sites.
- Incentivize tree planting on private property by giving away tree seedlings during Arbor Day or other events.

Notes: City = City of Escondido; CSE = Center for Sustainable Energy; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; SDG&E = San Diego Gas and Electric; VMT = vehicle miles traveled

Source: EPIC 2020.

Updates to Previous CAP Measures

This CAP was developed to update the goals of and build upon the General Plan policies related to climate change and reducing GHGs, and measures identified in the City's previously adopted 2013 CAP. As discussed in **Chapter 1**, the City's 2013 CAP includes GHG reduction measures that reduce emissions from government operations, energy, transportation, area sources, water, solid waste, and construction categories. The measures that were developed for this CAP were derived from a review of the measures included in the 2013 CAP and organized using guidance from SANDAG's ReCAP. Several measures from the 2013 CAP were updated and included in this CAP. Similarly, the measures in this CAP were developed to be consistent with related General Plan policies. A summary of the relationship between the measures in this CAP, measures included in the 2013 CAP, and General Plan policies is provided in **Appendix C**.

ESCONDIDO
City of Choice

Chapter 4

IMPLEMENTATION AND MONITORING

This chapter outlines how the City of Escondido ("City") will implement and monitor the Climate Action Plan ("CAP") strategies and measures over time to reduce greenhouse gases ("GHGs"). To achieve the GHG emissions reductions described in **Chapter 3**, strategies and measures must be reviewed, maintained, and implemented in a consistent manner to successfully serve the CAP's purpose.

Detailed steps for implementation were created as part of the City's previous CAP, prepared in 2013 ("2013 CAP"). The information presented in this chapter serves as an update to the implementation steps identified in the 2013 CAP and provides a framework for the City to monitor strategy and measure implementation.

Successful implementation of this CAP will require ongoing monitoring and review to ensure measures are effective. City staff will identify the feasibility of each measure's implementation and will monitor implementation progress in meeting the City's GHG reduction targets.

Implementing this CAP will involve the City Council, Planning Commission, a full time Sustainability or Climate Coordinator to lead planning and coordination across City departments, the establishment of a new Climate Commission, and coordination with other boards and commissions. The Climate Commission will include representative stakeholders and experts to provide ongoing program support and guidance, identification of potential funding sources, facilitate partnerships, and monitor implementation. The City will need to collaborate with the San Diego Association of Governments ("SANDAG"), the County of San Diego, other public and private agencies, and adjacent cities to implement strategies and measures requiring regional collaboration. The limited resources annually available to the City do not allow every strategy and measure to be funded and implemented simultaneously. The CAP's effective implementation will require a process to prioritize its strategies and measures periodically. Further, the City will develop an early strategy for implementing the CAP in a manner that promotes social equity and environmental justice.

Implementation of measures identified in this CAP would meet the City's GHG reduction targets based on the analysis presented. As the City implements these measures, it will continue to examine additional efforts that could be taken to further reduce citywide GHG emissions. Such additional efforts may include the City's exploration of and participation in a regional offset program or fund, or creation of an Escondido climate action fund to continue investment in mitigation and adaptation measures. A regional offset program or local climate action fund would provide new developments proposed in the City the opportunity to reduce their GHG emissions beyond feasible onsite actions. The program would consist of a fund or a list of GHG-reducing projects that new developments would be permitted to buy into to receive "credit" for emissions reductions from associated projects. Local climate action fund projects could include solar panel installation on existing buildings, electric vehicle purchasing for large vehicle or bus fleets, or energy retrofits for existing homes. Any "credits" generated through such a program would need to be additional to the strategies and measures identified in the CAP, or quantified GHG reductions identified in and associated with other regulatory programs or actions. This CAP does not rely on implementation of an offset program to meet GHG reduction targets.

4.1 Implementation Strategy

The implementation strategy presented in this chapter would ensure that the overall direction set forth in the CAP is translated into City and community actions. The purpose of this implementation strategy is to describe the specific actions the City will require of new developments, and will undertake itself, or will pursue via ordinance and/or funding source to achieve communitywide reductions in GHG emissions. Continuous management, oversight, and staffing is required for the implementation of the GHG reduction measures. Ensuring that measures translate to on-the-ground results and reductions in GHG emissions

is critical to the success of the CAP. Success of the City's CAP and GHG emissions reduction measures will depend on the participation of City departments, residents, and businesses.

This CAP's implementation strategy identifies which measures require the most significant effort to implement and require the earliest implementation to achieve the GHG reductions identified in this CAP.

To achieve GHG reduction targets, an implementation strategy is required to determine the priority of the strategies described in **Chapter 3**. Priorities are determined by a variety of factors, including effectiveness or measures in reduction GHG emissions, impact on priority investment neighborhoods ("PINs"), staff resources needed, required level of department/agency collaboration, and timeframe of implementation. To continue successful implementation of the CAP strategies, the City will further expand on this initial examination once implementation has begun. Implementation of this CAP will be achieved through two primary efforts: environmental review for new developments and City-led implementation activities.

4.1.1. New Development Environmental Review

The California Environmental Quality Act ("CEQA") requires lead agencies to identify significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Most proposals for physical developments are subject to the provisions of CEQA. The City has adopted local Environmental Quality Regulations that set thresholds for determining significance. As part of the development of this CAP, the City has updated these thresholds for determining significance for impacts related to GHG emissions. This CAP meets the criteria identified in Section 15183.5 of the CEQA Guidelines and, therefore, is considered a "qualified" CAP and may be used for the specific purpose of streamlining the analysis of GHG emissions for subsequent projects. The methodology for determining these thresholds is included in **Appendix C**.

CEQA Streamlining

New developments that are consistent with growth projections and applicable GHG reduction measures of the CAP are eligible for streamlining under the CEQA, per the provisions of the State's CEQA Guidelines Section 15183.5. Under these provisions, a project that is subject to discretionary review and is consistent with the City's General Plan growth projections can show consistency with applicable GHG reduction measures in a CAP, and the level of analysis for the project required under CEQA can be streamlined. Furthermore, a project's incremental contribution to cumulative GHG emissions may be determined not to be cumulatively considerable. The City has established a GHG screening threshold (set at 500 metric tons carbon dioxide equivalent ["$MTCO_2e$"] per year) for new development projects to determine if a project would need to demonstrate consistency with the CAP through the Checklist (**Appendix E**). New development projects that are consistent with the General Plan and are expected to generate fewer than 500 $MTCO_2e$ annually would not have a cumulative impact and would not be required to provide additional analysis.

New development projects that are expected to generate greater than 500 $MTCO_2e$ annually, but are consistent with the General Plan land use designation and zoning, may be determined to have a less than significant cumulative impact if they are determined to be consistent with the CAP. A project's consistency with the CAP will be determined through the CAP Consistency Review Checklist ("Checklist"). The Checklist contains GHG reduction measures applicable to development projects that are required to be implemented on a project-by-project basis to ensure that the specific emission targets identified in the CAP are achieved. New development projects will need to incorporate all potential applicable CAP measures to demonstrate consistency with the CAP. **Table 4.1** provides a summary of

the CAP measures included in the Checklist as well as the new development types to which they are applicable.

Table 4-1 Applicability of CAP Checklist Items to New Developments

Measure		Applicability
T-1.3	Adopt an Ordinance to Require EV Charging Stations at New Developments	New multi-family and commercial developments
T-1.4	Require EV Charging Stations at New Model Home Developments	New single-family homes and townhouses
T-3.2	Improve Pedestrian Infrastructure in Priority Areas	All new developments in priority areas
T-3.4	Develop a Citywide TDM Ordinance	New non-residential developments
T-3.5	Update Bicycle Master Plan	All new developments that also propose/require roadway improvements [1]
T-3.6	Increase Transit Commuters Among New Downtown Residents	New residential developments within the Downtown Specific Plan area
E-4.1	Require New Residential Developments to Install Alternatively-Fueled Water Haters	New residential developments
E-4.2	Require New Multi-Family Residential Developments to Install Electric Cooking Appliances	New multi-family residential developments
E-5.2	Require New Commercial Developments to Achieve ZNE	New office and retail developments
W-6.2	Reduce Landscape Water Consumption at New Model Home Developments	New single-family homes and townhouses
C-9.1	Enforce Landscape Tree Requirements at New Developments	All new developments

Notes: CAP = Climate Action Plan; EV = electric vehicle; TDM = transportation demand management; ZNE = zero net energy

[1] Further detail regarding measure applicability to new developments are provided in the *Climate Action Plan Consistency Review Checklist*.

Source: Ascent Environmental 2020.

New development projects that are not consistent with General Plan land use designations and zoning would be required to develop a project-specific GHG analysis. The requirements of this analysis would be determined by the Director of Community Development and confirmed by the decision-making authority on a project-by-project basis. As the CAP is updated, the Checklist may also be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP and/or local, State, or federal laws and/or regulations. By incorporating applicable GHG reduction measures in the Checklist into project designs or conditions of approval, the City will ensure that new development is consistent with applicable GHG reduction measures in the CAP and will contribute its “fair share” in achieving the identified GHG reduction targets.

4.1.2. City-Led Implementation Activities

The City will implement strategies and measures of the CAP through several types of programs and activities that can be grouped into categories. The categories identified for implementation activities include: Municipal Operations; New Ordinances and Code Updates; Planning; Partnerships; and Education and Outreach. While each measure identified in the CAP would fall into one of these categories, some measures overlap and belong to more than one category. For example, increasing citywide waste diversion (**Measure S-8.1**) first requires partnerships with existing waste haulers to ensure solid waste is handled appropriately, but would also require education to inform residents on proper solid waste sorting and reduction strategies. Detailed descriptions of each category are provided below.

Several CAP measures will require the City to develop and implement new ordinances, update the City's code, and collaborate with other local or regional agencies to achieve GHG reductions.

Municipal Operations: Certain measures included in this CAP require specific City actions to update and make municipal operations more efficient. Examples include increasing the amount of renewable energy generated at municipal facilities (**Measure E-5.1**) and increasing the efficiency of streetlights (**Measure E-4.3**). These measures would be implemented by the City and would reduce emissions specifically related to municipal operations.

New Ordinances and Code Updates: Several measures in the CAP would be implemented through new ordinances or amended regulations adopted by the City. Examples of measures that require municipal approval include requiring new developments to install electric vehicle ("EV") charging stations (**Measure T-1.3**) and requiring new residential developments to install alternatively-fueled water heaters (**Measure E-4.1**). New ordinances will ensure that the City requirements are in place to achieve the objectives of the CAP.

Planning: Measures that are more programmatic in nature require visioning and a larger planning effort to realize GHG reductions. Examples of implementation or development of planning documents or programs include an update to the City's Bicycle Master Plan (**Measure T-3.4**) and an Urban Forestry Program (**Measure C-9.2**).

Financing and Incentives: Identifying mechanisms for funding and allocating resources will help ensure that the CAP is successfully implemented. Strategies and measures identified in the CAP would be implemented by community residents, business owners, and developers with opportunities and incentives to contribute to citywide GHG reductions. Promoting financing and incentive programs, like SANDAG's iCommute program (**Measure T-3.1**), increases the participation in achieving citywide reduction goals.

Partnerships: Interagency coordination and partnerships with other organizations are critical to ensuring implementation of certain measures. This includes collaboration with SANDAG on developing an intra-city shuttle program (**Measure T-3.7**) and implementation of a Safe Routes to School Program with the Escondido Unified School District (**Measure T-3.3**). Other measures include collaboration with other government agencies, transportation agencies, and waste haulers in the region.

Education and Outreach: Educational efforts about the objectives of the CAP will help create support for the CAP and involve the community in its implementation. Informing residents and business owners about the co-benefits of GHG reduction measures would encourage participation and awareness of the goals of the CAP. A priority will be on neighborhoods with

higher impact rankings in the Social and Health Index Map and designated as priority investment neighborhoods ("PINs").

4.1.3. Implementation Timeframe

The timeframe over which strategies are implemented varies between both short-term (i.e. within a couple years) and long-term (i.e. within several years). These implementation timeframes were developed consistent with the implementation efforts identified in the 2013 CAP. Continuation of similar implementation definitions between CAPs assists in comparing the implementation efforts required for various measures over time. Prioritization of the measures is based on the timeframe over which measures can be implemented. Certain measures should be prioritized early because they require more effort and take longer to implement. Assigning such measures a higher implementation priority would allow the City to allocate resources appropriately. Generally, timeframes associated with each measure can be categorized as follows:

- **Ongoing:** Implementation is already occurring
- **Short-term:** Implementation will occur within the next three years
- **Mid-term:** Implementation will occur within approximately four to ten years

In general, all measures included in this CAP will require initial implementation actions to occur within the first few years after CAP adoption. Following initial short- or mid-term implementation actions, implementation of projects, programs, and plans will require ongoing management, communication, monitoring, and administration. The implementation timeframes provided in the implementation strategy matrix (**Table 4-3**) reflect the timeframe during which initial implementation of a measure would occur and if ongoing implementation is required.

4.1.4. Implementation Effort

While implementation of some measures can be achieved by existing staff, others will require the City to assign staff from various departments to assist with measure implementation or coordinate with staff from other agencies.

Levels of effort required to implement measures are based on cost and ease of implementation and effectiveness in reduction GHG emissions. The implementation effort of each CAP measure is based on a scale of low, medium, or high. Consideration of staff implementation costs and the overall feasibility of implementation is needed to guide CAP measure prioritization. Staff implementation costs are based on the anticipated levels of resources, staffing, and timeframe required to implement each measure. Implementation costs are not intended to represent the relative costs of compliance for residents and businesses, but rather focuses on the City's relative costs to facilitate program development and implementation. Ease of implementation is based on whether there are already existing programs that are related, coordination between different departments or agencies, and a comparison between existing and proposed strategies.

Sample criteria used to define the implementation efforts for each measure are shown in **Table 4-2**. It is possible for a measure to have a mix of implementation effort levels (i.e. have low staff implementation costs and high ease of implementation). In addition, the City will reflect in the prioritization of the measures to achieve the reductions. These measures will be ranked higher in the matrix.

Table 4-2 Implementation Effort Sample Criteria

Implementation Effort Level	Staff Implementation Costs	Ease of Implementation
Low	▪ Requires limited resources of current staff ▪ Existing staff can implement but will require reprioritization of workload	▪ Existing programs in place to support implementation ▪ Limited external and internal coordination required ▪ Limited revisions to policy or code
Medium	▪ Requires staff resources beyond current capacity ▪ Requires new part-time staff or contracts to implement	▪ Requires external and internal coordination ▪ Involves policy or code revisions ▪ The amount of funding needed for implementation is known and it can be acquired
High	▪ Requires extensive staff resources ▪ Requires a significant number of new staff or contracts to implement	▪ Requires revisions to the General Plan or development of new policies, programs, or codes ▪ Requires robust outreach programs to residents and businesses ▪ Requires regional cooperation ▪ Requires securing long-term funding

Source: Ascent Environmental 2020.

4.1.5. Implementation Strategy Matrix

The implementation strategy matrix, outlined below in **Table 4-3**, provides a summary of the initial prioritization and categorization of the CAP's strategies and measures. The matrix includes an implementation activity type, responsible department or agency, implementation timeframe, level of implementation cost, effectiveness in GHG emissions reductions, and ease of implementation for each measure. Following adoption of the CAP, this implementation strategy matrix will serve as initial guidance for City staff. Future updates to the CAP will require the matrix to be adjusted according to feasibility and legislative requirements. Key staff in each department or agency will facilitate and oversee measure implementation, allocate staff resources, and secure funding, as needed.

Source: City of Escondido

Following approval of this CAP, the City will begin examining the actions that required to implement CAP measures. Additional implementation steps for each measure will build upon the implementation costs included in this CAP and further develop the information presented in this chapter. The specific steps required to implement each CAP strategy will serve as a reference document for City staff to identify implementation tasks, timelines, and responsible departments. Through the implementation process, City staff may need to revisit identified implementation steps to reflect adjusted timeframes, changes in budget availability, or development of new technologies.

Table 4-3 Implementation Strategy Matrix

Measure	Title	Category	Responsible Department/ Agency	Implementation Timeframe	Staff Implementation Costs	Ease of Implementation
Strategy 1: Increase Use of Zero-Emission or Alternative Fuel Vehicles						
T-1.1	Transition to a Clean and More Fuel-Efficient Municipal Vehicle Fleet.	Municipal Operations	PW	Mid-Term	Low	Low
T-1.2	Install EV Charging Stations at Park and Ride Lots.	Planning	CD; PW	Short-Term	Medium	Medium
T-1.3	Adopt an Ordinance to Require EV Charging Stations at New Developments.	New Ordinances and Code Updates	CD; PW	Short-Term	Low	Medium
T-1.4	Require EV Charging Stations at New Model Home Developments.	New Ordinances and Code Updates	CD	Mid-Term	Low	Medium
Strategy 2: Reduce Fossil Fuel Use						
T-2.1	Synchronize Traffic Signals.	Municipal Operations	PW	Ongoing	Low	Medium
T-2.2	Install Roundabouts.	Planning	CD	Ongoing	Medium	Medium
Strategy 3: Reduce Vehicle Miles Traveled						
T-3.1	Participate in the SANDAG iCommute Vanpool Program.	Partnerships	CM; CD	Ongoing	Low	Low
T-3.2	Improve Pedestrian Infrastructure in Priority Areas.	Planning	CD	Ongoing	Low	Low
T-3.3	Implement the Safe Routes to School Program.	Education and Outreach	CD; EUSD	Ongoing	Low	Low
T-3.4	Develop a Citywide TDM Plan.	Planning	CD	Short-Term	Medium	Medium
T-3.5	Update Bicycle Master Plan.	Planning	CD	Ongoing	Medium	Medium
T-3.6	Increase Transit Commuters Among New Downtown Residents.	Education and Outreach	CD	Ongoing	Low	Low
T-3.7	Develop an Intra-City Shuttle Program.	Planning; Partnerships	CD; PW	Mid-Term	High	Medium
T-3.8	Increase Transit Ridership.	Planning; Partnerships	CD; SANDAG	Mid- to Long-Term	Medium	Medium

Table 4-3 Implementation Strategy Matrix

Measure	Title	Category	Responsible Department/ Agency	Implementation Timeframe	Staff Implementation Costs	Ease of Implementation
T-3.9	Develop and Implement a Service Population-Based VMT Threshold.	Planning	CD	Short-Term	Low	Low
Strategy 4: Increase Building Energy Efficiency						
E-4.1	Require New Residential Developments to Install Alternatively-Fueled Water Heaters.	New Ordinances and Code Updates	CD	Short-Term	Low	Low
E-4.2	Require New Multi-Family Residential Developments to Install Electric Cooking Appliances.	New Ordinances and Code Updates	CD	Short-Term	Low	Low
E-4.3	Reduce Electricity Use in Streetlights.	Municipal Operations	PW	Ongoing	Low	Medium
E-4.4	Require Non-Residential Alterations and Additions to Install Alternative-Fuel Water Heaters.	New Ordinances and Code Updates	CD	Short-Term	Low	Low
Strategy 5: Increase Renewable and Zero Carbon Energy						
E-5.1	Increase Renewable Energy Generated at Municipal Facilities	Municipal Operations	ES; PW	Ongoing	Low	Medium
E-5.2	Require New Commercial Developments to Achieve ZNE.	New Ordinances and Code Updates	CD	Ongoing	Medium	High
E-5.3	Increase Grid-Supply Renewable and/or Zero-Carbon Electricity.	Financing and Incentives; Partnerships; Education and Outreach	CD; CM	Ongoing	Medium	High
E-5.4	Increase Renewable Electricity Generated at School Sites.	Partnerships	EUSD	Ongoing	Medium	High
Strategy 6: Increase Water Efficiency						
W-6.1	Reduce Municipal Landscape Water Consumption.	Municipal Operations	ES; PW	Ongoing	Low	Medium
W-6.2	Reduce Landscape Water Consumption in Developments.	Planning	CD	Ongoing	Low	Low

Table 4-3 Implementation Strategy Matrix

Measure	Title	Category	Responsible Department/ Agency	Implementation Timeframe	Staff Implementation Costs	Ease of Implementation
Strategy 7: Diversify Local Water Supply						
W-7.1	Develop a Local Water Supply for Agricultural Water Use.	Planning	CD; ES; U	Mid-Term	Medium	High
Strategy 8: Reduce and Recycle Solid Waste						
S-8.1	Increase Citywide Waste Diversion.	Partnerships; Education and Outreach	CD; PW; U	Mid-Term	Medium	High
Strategy 9: Carbon Sequestration						
C-9.1	Enforce Landscape Tree Requirements at New Developments.	New Ordinances and Code Updates; Education and Outreach	CD; PW	Short-Term	Low	Medium
C-9.2	Develop a Citywide Urban Forestry Program.	Planning	CD; PW	Short-Term	Low	Medium
C-9.3	Develop an Agricultural Land and Open Space Conservation Program.	Planning	CD	Mid-Term	Medium	Low

Notes: CD = Community Development Department; CM = City Manager's Office; ES = Engineering Services; EUSD = Escondido Unified School District; EV = electric vehicle; PW = Public Works Department; SANDAG = San Diego Association of Governments; TDM = transportation demand management; U = Utilities Department; VMT = vehicle miles traveled; ZNE = zero net energy

Source: Ascent Environmental 2020.

4.2 Monitoring and Updates

Implementation of the CAP will require routine updates and maintenance if it is to remain relevant and effective. City staff will need to evaluate and monitor CAP performance and make alterations or amendments if modifications are needed to help achieve the proposed reduction targets. This will include conducting periodic GHG emissions inventory updates and analyzing measure performance.

Inventory Updates

Upon CAP adoption, the City will begin implementing GHG reduction measures, tracking implementation efforts, and applying the CAP Checklist for CEQA streamlining. City staff will annually present summaries of CAP progress to City Council, Climate Commission, and Planning Commission on achievements to date and provide transparency and promote engagement with the public after CAP adoption. Through the climate planning services offered via its Roadmap Program, SANDAG will assist the City in developing updated GHG emissions inventories every two years. These inventories will be developed using the same methodology provided in this CAP to estimate citywide emissions and will be used to track the City's overall progress in reducing GHG emissions.

Monitoring Reports

City staff will prepare an annual monitoring report that provides updates on CAP implementation progress, GHG reductions achieved to date, and other important milestones in the CAP implementation process. As technologies and markets change and the City implements the measures in the CAP, these reports will be used to track progress and identify measures that need to be improved, adjusted, or removed. The report will also serve to inform City Council, Planning Commission, and the general public about implementation progress on measures, as well as overall progress towards the City's GHG reduction targets.

Full implementation of the GHG reduction measures in this CAP will require City staff to further evaluate the cost, effectiveness, and benefits of each individual measure. Evaluating CAP measure performance entails monitoring the level of community participation, costs, and potential barriers to implementation, as well as actual reductions in fuel consumption, vehicle miles traveled, energy usage, water usage, landfilled waste, or other activities that result in GHG emissions reductions. This evaluation of measure effectiveness in reducing local GHG emissions will assist the City when it updates this CAP to maintain successful measures and reevaluate or replace under-performing ones.

CAP Update

The City will prepare a CAP update every five years, beginning in 2026. CAP updates would reflect the findings and recommendations of the monitoring reports and inventory updates. Future CAP updates would be necessary to account for any new State or federal legislation that may affect the CAP, and to focus on GHG reduction strategies that may have been difficult to implement previously due to a lack of appropriate technologies or high upfront implementation costs.

Figure 4-1 outlines the CAP implementation and monitoring schedule.

Implementation and Monitoring Schedule

2021	**CAP Adopted** City Council adopts plan and staff begins to implement CAP measures.
	Initial Set-up Staff performs initial start-up tasks and develops tools and methodologies for tracking implementation efforts and achievements. Staff will begin administering the CAP Checklist for environmental review of applicable projects.
	Climate Commission Established The City should establish a formal advisory group early in the implementation period to help provide ongoing program support and guidance, identify potential funding sources and partnerships, and monitor implementation.
2021 & 2022	**Update GHG Emissions Inventory** In coordination with SANDAG, the City will receive an updated 2018 GHG inventory in 2021. If funding is available, SANDAG will continue to provide updated GHG inventories every two years. However, if funding is not available, City staff will work on the development of an updated emissions inventory for the year 2021, to be published by 2022.
2021 - 2025	**Monitoring Reports** City staff will prepare an annual monitoring report and present the report to City Council and Planning Commission. Each monitoring report will identify CAP implementation efforts to date, assess the CAP's performance in achieving targets, and set implementation milestones for the following year.
2025	**Measure Review and CAP Review** Based on findings from the monitoring report and inventory updates, City staff will review the performance of each individual measure, evaluate the effectivness of maintaining existing measures into the future, and identify new technologies and methodologies that did not exist at the time of CAP adoption.
2026	**CAP Update** Through the review of CAP measures and monitoring, the City

Source: Ascent Environmental. 2020.

Figure 4-1 **Climate Action Plan Implementation and Monitoring Schedule**

4.3 Ongoing Engagement

Continued engagement and participation from the community is critical for implementation of the CAP. This includes individual residents and business, community organizations, developers, property owners, other local and regional government agencies, and others. While this CAP focuses on measures in which the City has a role, many of the measures require partnerships, collaboration, and active engagement. Specific measures, such as increasing transit ridership (**Measure T-3.8**) or increasing citywide waste diversion, (**Measure S-8.1**) require the public to adopt new daily habits that reduce GHG emissions.

The City is also committed to educating the public about the important role individuals play in combating climate change. Effective and long-term climate action and resilience in the City can only be achieved through efforts that continue to change the way individuals interact with the environment. The creation of Climate Ambassadors or other such programs to educate residents in priority areas is a key strategy for achieving equity on the CAP implementation. Many of the measures in **Chapter 3** are focused on increasing community awareness and participation in existing programs or connecting the community with new information, tools, funding, or resources to take action. Thus, this CAP serves as a resource that supports community-based action.

Most measures will require ongoing public input to achieve maximum GHG reductions. Measures aimed at reducing waste generation, transitioning to alternative modes of transportation, and developing/updating plans will require public input and support.

4.4 Funding Sources

Implementation of GHG reduction measures to increase energy efficiency and reduce the use of non-renewable resources will result in substantial cost-savings for the City and its residents in the long term. The City will incur initial start-up, ongoing administration, staffing, and enforcement costs. The City will be proactive in seeking cost-effective implementation and strategic funding opportunities and developing partnerships to share costs. All measures with potential for significant costs will be brought to City Council for consideration and approval.

To reduce the cost burden of implementation, a variety of funding sources are available to the City. A preliminary summary of funding and financing options are summarized in **Table 4-4**; however, these funding sources and programs are subject to change over time. As the CAP is updated and monitored, the City will need to reevaluate its overall costs and funding sources available. Leveraging funding opportunities would facilitate successful implementation of the GHG reduction measures.

The State's Climate Change Funding Wizard website provides updates for funding available to cities, residents, and businesses for projects and activities that reduce GHG emissions and improve local resiliency.

Table 4-4 Potential Funding Sources to Support Greenhouse Gas Reduction Measures

Funding Source	Description
For City Operations	
California Department of Resources Recycling and Recovery ("CalRecycle")	CalRecycle grant programs allow jurisdictions to assist public and private entities in management of waste streams. Incorporated cities and counties in California are eligible for funds. Program funds are intended to: ▪ Reduce, reuse, and recycle all waste. ▪ Encourage development of recycled-content products and markets.

Table 4-4 Potential Funding Sources to Support Greenhouse Gas Reduction Measures

Funding Source	Description
	▪ Protect public health and safety and foster environmental sustainability.
California Air Resources Board ("CARB")	CARB offers several grants, incentives, and credit programs to reduce on-road and off-road transportation emissions. Residents, businesses, and fleet operators can receive funds or incentives depending on the program. The following programs can be utilized to fund local measures: ▪ Air Quality Improvement Program (Assembly Bill ["AB"] 118); ▪ Loan Incentives Program; and ▪ California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project
Transportation-Related Federal and State Funding	For funding measures related to transit, bicycle, or pedestrian improvements, the following funding sources from the Southern California Association of Governments ("SCAG") may be utilized: ▪ Sustainability Planning Grant Program; ▪ Fixed Guide Way Capital Investment Grants; ▪ Job Access and Reverse Commute and New Freedom Programs; and ▪ Enhanced Mobility of Seniors & Individuals with Disabilities
New Development Impact Fees	These types of fees may have some potential to provide funding for proposed programs and projects, but such fees are best implemented when the real estate market and overall regional economic conditions are strong.
General Obligation Bond	A general obligation bond is a form of long-term borrowing and could be utilized to fund municipal improvements.
Other Funding Mechanisms for Implementation	Grants may be available from the Strategic Growth Council ("SGC") or the State Department of Conservation ("DOC") to fund sustainable community planning, natural resource conservation, and development, and adoption.
For Community Operations	
San Diego Gas & Electric ("SDG&E")	SDG&E is one of the utilities participating in the Go Solar initiative. A variety of rebates are available for existing and new homes. Photovoltaics, thermal technologies, and solar hot water projects are eligible. Single-family homes, commercial development, and affordable housing are eligible.
Property-Assessed Clean Energy ("PACE")	The PACE finance program is intended to finance energy and water improvements within a home or business through a land-secured loan, and funds are repaid through property assessments. Municipalities are authorized to designate areas where property owners can enter into contractual assessments to receive long-term, low-interest loans for energy and water efficiency improvements, and renewable energy installation on their property. Financing is repaid through property tax bills. SANDAG has implemented the Home Energy Renovation Opportunity ("HERO"; a PACE program) in San Diego County to assist residents in financing residential energy efficiency and solar retrofits.
Clean Vehicle Rebate Project	Individual, fleet operators, local government entities, and businesses can apply for rebates for purchases of plug-in electric hybrids ("PHEVs"), battery electric vehicles ("BEVs"), fuel-cell electric vehicles ("FCEVs"), and other non-highway, motorcycle and commercial BEVs.
Energy Upgrade California	Program is intended for home energy upgrades. Funded by the American Recovery and Reinvestment Act, California utility ratepayers, and private contributions. Utilities administer the program, offering homeowners the choice of one of two upgrade packages—basic or advanced. Homeowners are connected to home energy professionals and can receive up to $4,000 back on an upgrade through the local utility. Rebates, incentives, and financing are available.

Table 4-4 Potential Funding Sources to Support Greenhouse Gas Reduction Measures

Funding Source	Description
Federal Tax Credits for Energy Efficiency	Tax credits for energy efficiency can be promoted to residents.
Energy Efficient Mortgages ("EEM")	An EEM is a mortgage that credits a home's energy efficiency in the mortgage itself. Residents can finance energy saving measures as part of a single mortgage. To verify a home's energy efficiency, an EEM typically requires a home energy rating of the house by a home energy rater before financing is approved. EEMs typically are used to purchase a new home that is already energy efficient, such as an ENERGY STAR® qualified home.
Private Funding	Private equity can be used to finance energy improvements, with returns realized as future cost savings. Rent increases can fund retrofits in commercial buildings. Net energy cost savings can fund retrofits in households. Power Purchase Agreements ("PPA") involve a private company that purchases, installs, and maintains a renewable energy technology through a contract that typically lasts 15 years. After 15 years, the company would uninstall the technology or sign a new contract. On-Bill Financing ("OBF") can be promoted to businesses for energy-efficiency retrofits. Funding from OBF is a no-interest loan that is paid back through the monthly utility bill. Lighting, refrigeration, heating, ventilation, and air conditioning, and light-emitting diode streetlights are all eligible projects.
Community Choice Aggregation ("CCA") Revenue	Revenue generated by a local CCA program may be used to fund or incentivize GHG reduction measures.
Housing Rehabilitation Loan Programs	Critical Home Repair Program through Habitat for Humanity provides home improvements for low-income homeowners to improve home efficiency, safety, and accessibility. The U.S. Department of Housing and Urban Development ("HUD") Community Development Block Grant ("CDBG") program provides communities with resources to address redevelopment needs, specifically for home rehabilitation. HUD also administers the HOME program, providing grants to improve affordable housing opportunities and conditions.
U.S. Department of Energy ("DOE")	The Weatherization Assistance Program reduces energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring their health and safety. It is the nation's largest whole-house energy efficiency program. The program has created an industry, producing new jobs and technologies, all the while helping the most vulnerable families.
Department of Food and Agriculture	The Healthy Soils Program stems from the California Healthy Soils Initiative, a collaboration of state agencies and departments to promote the development of healthy soils on California's farmlands and ranchlands. The Healthy Soils Incentives Program provides financial assistance for implementation of conservation management that improve soil health, sequester carbon and reduce GHG emissions. The Healthy Soils Demonstration Projects showcase California farmers and rancher's implementation of Healthy Soils Practices.
California Public Utilities Commission	The Solar on Multifamily Affordable Housing ("SOMAH") program provides financial incentives for installing photovoltaic ("PV") energy systems on multifamily affordable housing in California. The program will deliver clean power and credits on energy bills to hundreds of thousands of the state's affordable housing residents. SOMAH's unique, community-based approach ensures long-term, direct financial benefits for low-income households, helps catalyze the market for solar on multifamily housing and creates jobs, job training for local tenants, and tenant protections..

Table 4-4 Potential Funding Sources to Support Greenhouse Gas Reduction Measures

Funding Source	Description
California Department of Community Services and Development	California's Low-Income Weatherization Program ("LIWP") provides low-income households with solar photovoltaic ("PV") systems and energy efficiency upgrades at no cost to residents. The program plays an important role in ensuring that all Californians have the opportunity to benefit from California's Climate Investments and services. LIWP funds energy efficiency upgrades and solar for low-income single-family homes and multifamily affordable housing. These upgrades improve the livability of housing and contribute to the health of communities through improved air quality. They also help lower operating costs for affordable housing administrators, helping to preserve valuable below-market housing for low-income families.
CAL Fire	Through the California Climate Investments ("CCI") Urban & Community Forestry Grant Program, CAL FIRE works to optimize the benefits of trees and related vegetation through multiple-objective projects as specified in the California Urban Forestry Act of 1978 (Public Resources Code 4799.06-4799.12). These projects result in a net GHG benefit, and provide environmental services and cost-effective solutions to the needs of urban communities and local agencies. Co-benefits of the projects include increased water supply, clean air and water, reduced energy use, flood and storm water management, recreation, urban revitalization, improved public health, and producing useful products such as bio-fuel, clean energy, and high quality wood.
General Funding and Staff Capacity	
CivicSpark Program	Supports sustainability-focused research, planning, and implementation projects throughout California by providing public agencies and other organizations with capacity building support and community engagement. This program provides volunteer engagement through AmeriCorps fellows to provide added staff capacity for eleven months
California Climate Investments ("CCI")	CCI is the statewide initiative that provides funds from the Cap-and-Trade program for GHG reducing projects and programs. Funds can support a variety of projects including affordable housing, renewable energy, public transportation, zero-emission vehicles, environmental restoration, sustainable agriculture, recycling, and more. Numerous State programs listed above are funded by CCI; however, the program continues to evolve and is updated by the State periodically to include new or modified programs.

Source: Ascent Environmental 2020

ESCONDIDO
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Chapter 5

CLIMATE ADAPTATION

This chapter summarizes climate change-related impacts that may affect the City of Escondido ("City") in the future and evaluates how these impacts would potentially affect the community's population, functions, and structures. Following identification of potential climate change—related impacts, this chapter outlines key strategies for improving community resiliency and adaptation, and addresses and provides equitable resilience and hazard mitigation for everyone in the community. The City is committed to ensuring socially equitable climate change outcomes by building on GHG emissions reduction strategies and through the implementation of adaptation strategies and measures.

5.1 Introduction

Long-term climate trends are not dependent on any single extreme event. A single large storm event or even a single wet or dry year may just be a normal fluctuation in atmospheric conditions. However, continuing changes that are sustained year after year can be attributed to a climate change. While there is general consensus that global climate change is occurring, there is less certainty as to the timing and potential consequences of climate change, particularly at the local level. Based on a climate system that is no longer staying within a stationary range of extremes, weather-related emergencies and climate hazards are expected to increase (Hay 2016). Our changing climate can affect every aspect of the local, natural environment – and each of these impacts often causes chain-reaction changes that affect people, places, resources, and other aspect of the ecosystem. If we hope to limit the negative impacts of climate change in Escondido, we must assess the range of possibilities, likelihoods, and consequences of climate risk and explore strategies for their prevention.

> **"Adaptation planning" is a process of identifying climate risks and opportunities, assessing the options to manage those risks and opportunities, and implementing actions to sustain and even improve the quality of life.**

This chapter of the Climate Action Plan ("CAP") provides a range of adaptation strategies and measures that the City can implement to be better prepared for and adapt to climate change. Through "adaptation planning" the City is undertaking a process of identifying climate risks and opportunities, assessing the options to manage these risks and opportunities, and implementing actions to sustain and even improve the community's quality of life. However, this CAP is about much more than climate change. Rather than being indifferent to the reality that groups are situated differently relative to their exposure to pollution and access to resources and opportunity, our vision for a climate-positive future starts when we address existing disparities and advance more equitable outcomes. Not only will the City adapt and become more resilient to unavoidable impacts from climate change, the City will also position itself for a more positive future – one that addresses social equity and environmental justice to help mitigate the disproportionate harm faced by certain groups and classes in the city. This CAP has established a series of cross-cutting priorities to build thriving and resilient neighborhoods for all. Because the climate will keep changing over time, and our responses change with it, the adaptation strategies and measures identified in this chapter will be continuously monitored and updated by the City.

Section 5.4, *Adaptation Measures and Next Steps*, outlines the strategies and measures the City will implement to adapt to climate change, as well as the next steps in this implementation process. These strategies, measures, and next steps will be continually reviewed and refined over time to address changing climate impacts and understanding of adaptation. The City's adaptation approach outlined within this chapter is based upon best available science, currently known adaptation practices, and a snapshot understanding of the city's existing vulnerabilities. Additional background information on the methodology used to develop the adaptation measures is included in **Appendix F**. In the future, the City

will reevaluate the feasibility and necessity of adaptation options as appropriate, continuing to use best available data, with reference to current State adaptation planning guidance.

5.2 Vulnerability Assessment

In the San Diego region, as well as throughout California, climate change is already affecting and will continue to affect the physical environment. It is the responsibility of all to prepare for increased temperatures, more frequent extreme weather events, and changes in precipitation patterns. Because impacts of climate change vary by location and other social and economic characteristics, it is important to specifically identify the projected severity of these impacts on the city and the surrounding area. Consideration of how the City can respond effectively to mitigate that risk, or how the City can and should respond to increasing future risk would make the community more prepared for projected climate impacts. The goal of this section is to increase the understanding of the vulnerabilities associated with what is projected to happen in Escondido and encourage consideration of these impacts without creating further vulnerabilities or liabilities. The direct, or primary, changes analyzed for the city include increased temperatures, increased frequency of extreme weather events, and increased intensity and frequency of precipitation. Secondary impacts, which can occur because or one or more primary changes, are also assessed and include increased risk for wildfire, flooding, and landslides.

Source: City of Escondido

To begin assessing potential climate change impacts over time, Cal-Adapt (a climate change scenario-planning tool developed by the California Energy Commission [“CEC”] and the University of California Berkeley Geospatial Innovation Facility) was used. To address the uncertainty in future emissions of greenhouse gases (“GHGs”), Cal-Adapt uses Representative Concentration Pathways (“RCPs”), which encapsulate different possible future GHG emissions scenarios; a “medium” RCP emissions scenario that models a future where communities attempt to reduce GHG emissions and a business as usual (“BAU”) RCP scenario. The BAU emissions scenario predicts GHG emissions will continue to rise over the 21st century. The medium GHG emissions scenario predicts GHG emissions will level off in the middle of the 21st century (approximately 2040) and decrease to lower than 1990 levels by the end of the century (CAL ADAPT 2020). In consideration of “vulnerabilities” and the possible range of GHG emissions scenarios, it is important to assess how future GHG emissions and climate change conditions might impact populations differently. A significant health risk associated with climate change is exacerbation of health risks especially for communities with existing higher cumulative pollution exposures. Cumulative impacts are exposures and public health or environmental effects from all sources of pollution in a geographic area. Cumulative impacts also take into account groups of people that are especially sensitive to pollution’s effects, such as young children and people with asthma, etc.; and socioeconomic factors, such as poverty, race and ethnicity, and education. In particular, air pollution worsens as temperatures rise, stressing both the heart and lungs. A growing body of research into pollution and climate change is finding that minorities bear a disproportionate share of risks. Heat-island effects coupled with pollution sources are most likely to impact communities of color. The GHG emissions contributing to climate

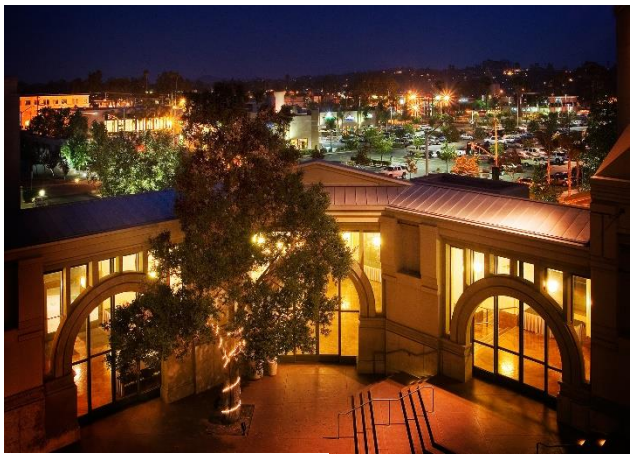
change are linked with increased hospitalizations and deaths from cardiovascular disease and are connected with more asthma attacks and other respiratory problems (Scientific American 2019).

An important tool in assessing risks associated with pollution exposure and community vulnerabilities is the Office of Environmental Health Hazard Assessments statewide database, CalEnviroScreen. This model, which is periodically updated, identifies communities that are most affected by many sources of pollution, and where people are often especially vulnerable to pollution's effects. CalEnviroScreen uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. Inclusion of CalEnviroScreen data (incorporated and reproduced fully as the Social Equity and Health Index Map in **Appendix F**) is part of the City's determination of vulnerable neighborhoods needing additional focus and priority.

5.2.1. Increased Temperatures

Temperature affects the smallest details of our daily life. It influences how you dress to stay comfortable, whether you enjoy outside activities, stay inside, or retreat to safer areas during weather-related emergencies and climate hazard events. It also has been found to affect the living organisms in various ways, including the physiology, behavior, growth, and distribution of plants and animals. Increases in average temperatures can have many impacts on the environment. For example, temperature plays an important part in the life cycle of insects. Many insects die during the colder winter months, but if temperature increases by just a couple of degrees, some of these insects would persist. This could lead to an increase in the insect population or a change in insect breeding habits, which could be devastating to farming practices and/or the agricultural crop industry and forest health. In addition, increased air temperatures can result in stagnant air masses, which could retain pollution from vehicles and industry for extended periods of time and would increase the frequency and intensity of conditions conducive to smog formation. A June 2020 study reported links to climate change and harm to newborn and unborn children. The study found a relationship with heat or air pollution linked to birth outcomes such preterm births, birth weights, and stillbirths (NY Times 2020). Children and the elderly are particularly vulnerable to respiratory, cardiovascular, and heat-related illnesses exacerbated by increased average temperatures, especially in areas already exposed to higher burdens of indoor and outdoor air pollution. Furthermore, numerous research studies have shown that indoor air temperature and circulation can impact one's level of productivity, as well as one's ability to learn, concentrate and remember important information (Schneider 2016). Warmer lakes, rivers, and streams threaten aquatic species by disrupting reproductive cycles, displacing cold-water species, through acidification, and/or creating dead zones in deep lakes. Warmer air temperatures may put inland communities at risk by expanding dry areas and their propensity to fuel wildfires.

Some areas of the city will also experience heat island effects. An urban heat island or a heat island effect is an urban or built-up area that is significantly warmer than its surrounding rural areas despite having similar climate systems. The temperature difference is usually due to human activities and from the modification of land surfaces. The temperature difference is usually larger at night than during the day and is most apparent when winds are weak. The City developed a mapping tool to identify at-risk areas. The 2020 Heat Vulnerability Map is provided in **Appendix F** and is referenced in Section 5.4, *Adaptation Measures and Next Steps*.



Source: City of Escondido

The greenhouse effect, described in **Chapter 1**, has already begun to heat the atmosphere beyond normal levels and will continue to do so over the next century, even if the City's emission reduction targets are met. From 1900 to 2000, the average global daily maximum temperature increased approximately 1.0 degrees Fahrenheit ("°F") (Nature 2019). Within the last 20 years, the average global temperature has increased by an additional 1.0 °F. Using Cal-Adapt, it was predicted there would be an average temperature increase of 3.0 to 10.0°F by 2099 worldwide (CAL ADAPT 2020). It is important to note that the tipping point to many of the aforementioned climatic changes is an increase of 1.0 to 2.0°F. Although future climate-risks depend on the rate and duration of the "warming," in the aggregate they are expected to be irreversable or irrecoverable if temperatures exceed 2.7°F (IPCC 2018). Using baseline observed temperatures in the city from 1960 to 2000, the collective projections from Cal-Adapt show an average maximum temperature increase of 3.9 to 4.9°F by 2050, and 5.4 to 9.6°F by 2099, depending on a range of GHG emissions scenarios.

5.2.2. Extreme Weather Events

Extreme weather events include extreme heat and storms. Extreme heat events generally include extreme heat days and heat waves. Extreme heat days are days in which the temperature is significantly greater than the historic average temperature and can be further exacerbated when combined with high relative humidity. Heat waves can occur when high daily temperatures persist for several days and if nighttime temperatures do not drop significantly enough to reduce nighttime cooling Extreme heat events can further exacerbate the threat of wildfire by increasing the drying of vegetation. The frequency of extreme heat days, heat waves, and warm nights are a threat because they induce injury, illness, and death from the resulting heat waves and wildfires. Heat stroke and dehydration can occur during extreme heat and hazardous weather can cause injuries and, in some cases, death. Warmer climates have increased levels of harmful air pollutants, such as ground-level ozone, which can damage lung tissue, inflame airways, impair respiratory health, and aggravate lung diseases, which are amplified during extreme weather events. Extreme weather events also impact the transmission of food, water, and animal-borne diseases. Prolonged drought in dry areas can lead to property and infrastructure damage. Power outage, road surface deterioration, railroad track buckling, and bridge damage are some of the types of resource or asset failures that have occurred during extreme weather events.

Extreme weather events include extreme heat, heat waves, and extreme storms. These events can be extremely harmful to human populations, especially vulnerable populations, such as low-income communities and children.

Disruptions in daily life caused by property and infrastructure damage can mean lost work and school days and harm commercial trade. Extreme weather-related health risks also reduce productivity, such as when extreme heat curtails construction, or when more potent allergens and more air pollution lead to lost work and school days.

Cal-Adapt loosely defines extreme heat days at or above the 98th percentile daily maximum temperature for a given area based on observed historical climate data. For the city, an extreme heat day is a day in which the average temperature is greater than 97.1°F, and historical observations show an average of five extreme heat days per year from 1961 to 2000. The frequency of extreme heat days are projected to increase as average temperature increases, rising to 15 to 20 extreme heat days per year by 2050, and 21 to 40 extreme heat days per year by 2100 (CAL ADAPT 2020). Warm nights, defined by the 98th percentile daily minimum temperature, are project to increase as well. For the city, a warm night is a night during which average temperature is greater than 66.4°F. Historical observations show an average of five warm nights per year from 1961 to 2000, and projections show an average of 25 to 37 extreme heat nights by 2050, and 36 to 91 extreme heat nights by 2100 (CAL ADAPT 2020).

Source: City of Escondido

While the world is experiencing an overall warming trend, more significant changes are occurring in winter months beyond temperature — snowfall and large storms depend on moisture in the atmosphere, which is increasing as a result of climate change. Snowy weather patterns depend on the large-scale flow of the atmosphere, which is changing, too. A phenomenon, called “winter temperature dipole”, is shifting winter weather patterns. This phenomenon yields a severe temperature contrast between eastern and western North America, where cold periods in the winter have been increasing in their frequency, as arctic air is pushed into areas further south than where it has historically flowed. Many extreme temperature conditions that redistribute heat and produce some combination of clouds, precipitation, and wind are becoming more common. These atmospheric conditions will affect snowstorms, derechos, hailstorms, rainstorms, blizzards, low-pressure systems, lightning storms, hurricanes, typhoons, and twisters. Scientific studies indicate that extreme weather events, like large storms, are likely to become more frequent and/or more intense with climate change. Tropical storm activity in the Atlantic Ocean, the Caribbean, and the Gulf of Mexico has increased during the past 20 years (Earth Observatory 2020). Storm intensity is closely related to variations in sea surface temperature in the tropical Atlantic. Although Escondido is unlikely to experience snowstorms and derechos, climate change may result in changes to the atmospheric processes that could result in increased frequency of damaging winds, hailstorms, rainstorms, lightning storms, and hurricanes or other tropical storm systems.

5.2.3. Frequency and Intensity of Precipitation

Both the amount and distribution of precipitation are likely to change over the coming years. Southern California already experiences highly variable precipitation patterns, and climate change will further increase this volatility. The range of precipitation extremes will likely expand, resulting in fewer wet days and more dry days. More intense rainstorms could occur, distributing precipitation over a smaller window of time, followed by longer periods of minimal precipitation or drought.

The city is anticipated to experience more frequent extreme precipitation events and greater variability in the amount of rainfall from year to year.

The Cal-Adapt projections do not show a significant increase or decrease in the average annual precipitation for Escondido, which is observed to be 15.3 inches per year using the 1961 to 2000 baseline. However, as a result of increased climate variability, annual averages may not best represent the climate change-related impacts that would occur. For example, the average annual precipitation in Escondido from 1996 to 1999 was 15.3 inches, which is equal to the observed baseline average (CAL ADAPT 2020). The recorded precipitation for those years were 13.1, 14.0, 27.4, and 6.8 inches, respectively (CAL ADAPT 2020). Thus, while the average precipitation for those years suggests normalcy, the recorded rainfall for each year suggests the city is experiencing significant precipitation variability. The Cal-Adapt projections show yearly precipitation highs of 40 inches and lows of two to three inches, highlighting the variability and uncertainty of the projections on a year to year basis.

Extreme precipitation events can delay planting and harvesting, cause power outages, reduce transportation system efficiency, delay air travel, induce soil erosion and mudslides, and otherwise make it difficult for people to go about their daily business. The expansion of flood-prone areas, flood plains, and inundation zones could put more people and property at risk within the city. Higher year-to-year variability can change overall water availability, even if the yearly average does not change significantly over time. Wetter years will see a higher proportion of water lost to runoff, along with higher risk of flooding. Drier years will increase water demand, while also losing more to evaporation. Overall, these factors will lead to less water capture by constructed and natural environments, depleting the local water supply. It could also lead to more water entering the lakes from the surrounding watershed, bringing with it pesticides and invasive species.

5.2.4. Wildfire Risk

Wildfires in open, wildland areas typically display a range of fire behavior and fire characteristics that depend on factors such as vegetation fuel, terrain, types of past management, stage of succession after previous fires or other disturbances, and climate and weather patterns (including prevailing wind factors). Fire regimes (i.e. the general pattern of natural wildfire occurrence in a particular geography) may also be affected by terrain features and slope exposure. The city's environment consists of a broad mixture of urban settings, semi-urban settings, rural areas, and open space areas characterized by shrubs, native trees, and high fire fuel areas with steep topography. During the dry months, the wildfire risk in these open, vegetated areas can increase when exacerbated by occasional Santa Ana winds and high temperatures. Additionally, extreme weather conditions, such as high temperature, low humidity, and/or winds of extraordinary force, may cause an ordinary, localized fire to expand into one that is more intense and difficult to contain. Currently, about 43,388 homes within Escondido are located in the Fire Regime II & IV; this includes the wildland-urban interface, which is characterized by zones of transition between wildland and developed areas and often include heavy fuel

Wildfire occurrence would be exacerbated by climate change impacts including increased frequency of droughts, extreme heat days, and heat waves

loads that increase wildfire risk (City of Escondido 2018). The potential loss of these homes is valued at over 12 billion dollars. The City also has 426 critical facilities and infrastructure assets in these areas. The potential exposure of these assets is valued at over 1.9 billion dollars (City of Escondido 2018).

Increased temperatures and changes in precipitation patterns associated with climate change are expected to increase the risk of wildfire. Cal-Adapt's Wildfire Tool is a useful modeling tool to help predict the potential amount of area at risk of burning through the year 2100. According to Cal-Adapt's Wildfire Tool, because of the City's diverse environment, the amount of area at risk of burning will increase anywhere from 1.5 to 28.3 percent (based on different location attributes) (CAL ADAPT 2020). Even though areas with greater population are inherently more vulnerable than areas with less population, it is anticipated that fire behaviors and fire characteristics in urban areas are different than more fire prone, open space areas. Based on CalAdapt's Wildfire Tool, an increase in burn rates is most likely to occur within the eastern portions of the city, which include much of the unincorporated and open space lands.

The California Department of Forestry and Fire Protection ("CAL FIRE"), in collaboration with the City, has developed the City's Fire Hazard Severity Zone Map identifying Very High Fire Hazard Severity Zones that are included in the City's Local Responsibility Area ("LRA") (**See Appendix F**). The map identifies areas in the City included in the different fire hazard areas. Due to topography and vegetation, properties located within and surrounding the Very High Fire Hazard Severity Zones have increased risks of wildfires and associated hazards than that of most areas within the city.

Source: City of Escondido

In addition to increased threats to human safety, the increased frequency of wildfire results in the release of harmful air pollutants into the atmosphere, which dissipate and can affect the respiratory health of residents across a broad geographical scope. Particulate matter (soot and smoke), carbon monoxide, nitrogen oxides, and other pollutants are emitted during the burning of vegetation, and can cause acute (short-term) and chronic (long-term) cardiovascular and respiratory illness, especially those suffering from pre-existing cardiovascular or respiratory conditions. The issue may be even more complicated with an increased burden in specific, vulnerable populations such as the elderly, children, homeless, minorities and non-English speaking populations, and agricultural and outdoor workers. The complex interplay between social and economic factors that these groups and classes experience cause them to generally be more susceptible to certain systemic illnesses because of a lack of targeted health care policies and/or lack of access to adequate health care.

5.2.5. Flooding and Landslides

Several factors determine the severity of floods, including rainfall intensity and duration. Along with reductions in the amount of snowpack and accelerated snowmelt, scientists project greater storm intensity. Climate change is predicted to vary the frequency, intensity, and duration of extreme storm events, such as sustained periods of heavy precipitation and increased rainfall intensity during precipitation, resulting in more direct runoff. Flash floods occur when a large amount of rain falls over a short period of time. The city's flooding potential will also be exacerbated when experiencing atmospheric rivers, or narrow streams of warm, concentrated precipitation, often resulting in considerable rainfall over a short period of time. Under higher emissions scenarios, the intensity and magnitude of atmospheric rivers are expected to become more severe, resulting in increased regional and localized flooding. With the added potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following wildfires, which will increase sediment loads and impact water quality. Floodwaters during storm events can interact with sources of pollution and distribute hazardous pollutants locally and regionally. The resulting water contamination may lead to human health impacts, as well as degradation of ecosystems.

Source: City of Escondido

Currently, the city experiences localized flooding in several areas during heavy rainfall and extreme weather events. Historically, the city has experienced property-related losses and damage because of localized flooding. As variability in precipitation frequency and intensity occurs, what is currently considered a 100-year flood may occur more often than projected, further increasing the risk of flooding to communities already located in these areas. Currently, there are 1,399 homes in the city located within the 100-year floodplain mapped areas. As these floodplain maps are updated and revised to account for increased flooding as a result of climate change, it is anticipated more homes in the city would be located within these areas of risk. The potential exposure or loss of residential buildings currently located within the 100-year floodplain is valued at $393,819,000 (City of Escondido 2018). During flooding events, infrastructure (e.g., roadways, power lines) may be damaged, resulting in disruptions to communications, energy transmission, public services, and transportation systems. There are 37 critical facilities and City assets within the 100-year floodplain, with an asset value of $43,352,000 (City of Escondido 2018). Flood events can also cause considerable property damage from extended exposure to water, and structural damage from erosion and mudslides. There are approximately 76 homes at high risk and 22 homes at moderate risk, with a potential exposure or loss value of $27,587,000 (City of Escondido 2018). A snapshot assessment of potential home threat exposure is provided in the City's 2018 Multi-Jurisdictional Hazard Plan, with tabular excerpts provided in **Appendix F.**

5.3 Social Equity and Environmental Justice

Environmental issues are almost always rooted in economic and social issues. In fact, climate change is a direct product of extended environmental and social policies. An ironic, yet unfortunate, aspect of climate change is that the individual, businesses, agencies, or organizations most responsible for

This City's vision of climate justice is where solutions begin with addressing the needs of those who are most vulnerable to climate change and/or experiencing disparate outcomes.

causing climate change are often the ones that are the least affected by it. The world's richest households, businesses, and industries generate more than half of the GHG emissions and the poorest half contribute just 10 percent of all emissions (The Guardian 2015). Even though all residents and businesses will all be affected by a changing climate, they will be impacted in different ways. The interactions between climate change and health are numerous. Not only will climate change have significant health impacts, but how we prepare to, mitigate, and adapt to our changing climate will also influence human health. Preparing and responding to climate change is a powerful opportunity to improve the health of Escondido's residents. To do this, the City will need to determine the scope and extent of existing social and economic vulnerabilities and disparities and identify ways to make the community less susceptible to, or able to cope with, the adverse effects of climate change.

Social equity, as a term, is more than just the fair, just, and equitable distribution of public services and implementation of public policy; it also means understanding and giving people what they need to enjoy full and healthy lives. If properly incorporated into planning efforts, social equity ensures traditionally disadvantaged and under-represented groups equally experience the positive outcomes of these planning efforts. This involves being inclusive of both dominant and marginalized groups, and ensuring that the benefit to one does not result in the detriment to the other. Planning for equity does not stifle growth or impede development. Instead, it expands opportunities to all members of a community and builds local resiliency.

Source: City of Escondido

This City's vision of climate justice is where solutions begin with addressing the needs of those who are most vulnerable to climate change and/or experiencing disparate outcomes. This CAP proposes a concrete approach for addressing social equity in implementation. Using the map and analysis discussed below, the City will prioritize neighborhoods with a 50 percent ranking in the State Office of Environmental Health Hazard Assessment ("OEHHA") CalEnviroScreen for priority investments and early implementation of focused measures to support social equity and environmental justice. By focusing efforts on vulnerable neighborhoods and populations, the City will provide equitable protection from environmental hazards and burdens. Climate adaptation planning efforts must involve all social groups and classes in the development and implementation of environmental policies, and ensure equitable benefits to all community members from projects funded and directed by the City (a snapshot assessment of Escondido's unique socio-economic profile is provided in **Appendix F**).

5.3.1. Social Equity and Health Index Map

Climate adaptation measures should not be implemented without consideration of wider social equity and environmental justice concerns. Understanding these vulnerability factors and the populations affected is critical for crafting climate change adaptation measures. Although disaster impacts can vary from hazard to hazard, vulnerability indicators – or measurable variables – allow for the quantification and comparison of climate risk within cities, counties, or sub-regions. The City created a mapping tool, called a Social Equity and Healthy Index Map to use data from the State OEHHA CalEnviroScreen to designate priority investment neighborhoods ("PINs") to measure the degree to which climate change would impact different geographical areas and to evaluate levels of access to opportunity within a census tract. The data-backed mapping tool created a heat map of related risk factors. All indicators fall into one of five

broader categories: housing, mobility, economic, environmental, community characteristics, and health. The overlap of these risk factors highlight areas of greater cumulative risk that should be prioritized when implementing corresponding adaptation strategies. As a result, a significant majority of the adaptation actions include implementation steps that will require the City to prioritize these actions in areas of highest need. The 2020 Social Equity and Healthy Index Map is provided in **Appendix F** and is referenced in Section 5.4, *Adaptation Measures and Next Steps*.

5.4 Adaptation Measures and Next Steps

The CAP provides evidence-based measures to reduce GHG emissions and preventative measures to address the negative outcomes of climate change. In implementing the measures listed in this section, this CAP also outlines how the City will adapt and improve its resilience to existing and future climate change impacts. As documented in this chapter and **Appendix F**, the City's sensitivity and vulnerability to climate change is influenced by diverse demographic and socio-economic factors. The City will strive to achieve climate justice (the concept that no group of people should disproportionately bear the burden of climate impacts or the health costs of adaptation) by addressing these factors. The City's most vulnerable communities will be considered as a priority for investments in adaptation to assure near-term co-benefits of improved quality of life while contributing to GHG reduction targets. As this is the beginning of the City's process of developing its adaptation strategies and measures, many early initiatives are exploratory in nature and aim to identify potential changes or actions to respond to the impacts of concern. The City will begin responding to climate change impacts through the initiation of two climate adaptation strategies.

Strategy A-1: Become a "Climate Smart" Leader

Table 5-1 Strategy A-1: Become a "Climate Smart" Leader

Measure A-1.1: Fully anticipate, plan for, and mitigate the risks of climate change and seize the opportunities associated with the social and environmental change.

Recognize climate impact variables as a risk in how the City manages programs, projects, and infrastructure.

Target Year	Adaptation Action
2020	Annually monitor climate change research and best practices to improve the understanding of local climate change, weather-related emergencies and climate hazards, and to support climate change preparation efforts in local, state, and federal partners.
2023	Adopt established methods for projecting the lifecycle carbon emissions of land use and transportation investments and begin to prioritize projects that have the greatest potential to sustain future changes and changing weather-related emergencies and climate hazards.
2023	Assess climate impacts in the 2023 MJHMP update, incorporate social equity and environmental justice concepts to the extent practicable, and develop system wide approach to prepare for and respond to changing weather-related emergencies and climate hazard events.
2024	Complete planning and establish priorities for plantings, materials, and infrastructure specifications that will be resilient to climate change hazards and be cost-effective over the lifetime of the asset in infrastructure design.
2025	Update the "2020 Escondido Climate Adaptation Study".

Table 5-1 Strategy A-1: Become a "Climate Smart" Leader

Measure A-1.2: Make sure that everyone is given the opportunity to be prepared for the current and future risks that are exacerbated by climate impacts.

Develop and build capacity for a transparent and inclusive education and outreach processes and design a decision-making framework to achieve equitable access and other climate health-related goals.

Target Year	Adaptation Action
2020	Designate point of contact(s) to establish and maintain staff ability and capacity to ensure effective implementation and equitable outcomes of climate action efforts. Initiate interdepartmental education and planning with City staff to motivate and seek opportunities for creative partnerships to jumpstart priority actions.
2022	Identify and create collaborative partnerships with community-based organizations including vulnerable populations to broaden and diversify community engagement, and to support community-based initiatives that align with climate action planning priorities.
2023	Partner with interested organizations to develop a climate change adaptation public outreach and education program. Engage typically underrepresented vulnerable populations by creating neighborhood climate ambassador liaisons ("Climate Ambassadors"). Climate Ambassadors can conduct outreach and secure commitment in priority investment neighborhoods ("PINs") to support climate actions, initiate major initiatives, and coordinate investments, etc.
2025	Provide quality information and/or "how-to" resources for local climate adaptation using interactive approaches that may include competition, feedback, and recognition. Activities may include: ▪ Provide free technical assistance to businesses. ▪ Develop working groups with workforce development and training organizations to integrate green jobs into existing work. ▪ Develop and implement a local green business program to provide recognition for business achievements. ▪ Partner with business groups to conduct Fix-It Fairs or participate in street-fairs by engaging under-served businesses in learning about sector opportunities ▪ Hold regular workshops with building contractors on green building best practices.
2026	Minimize health issues and disparities caused by weather-related emergencies and climate hazard events (such as extreme heat days), especially for populations most vulnerable to these impacts, by improving the preparation for and response from health, community service, public safety, and emergency staff, resources, and/or services. Actions may include: ▪ Leverage partnerships and support organizations to provide assistance to vulnerable populations in high fire hazard areas. ▪ Advertise outdoor worker protection measures, including heat safety and employment security. ▪ Develop a cool zone plan in consultation with resident, business, and community groups and provide updates in conspicuous locations online and on social media when cool zones are activated. ▪ Educate homeowners and tenants of multi-family housing about weatherization projects and the cost savings gained from energy efficient homes through training programs. ▪ Develop evacuation assistance plans and advertise their availability to vulnerable populations in hazard areas and be prepared to implement these plans as part of climate hazard-related emergency operations. ▪ Utilize citywide publication and social media to reach a broad audience to advertise preparedness, risks of potential climate hazard events, and/or implementation status of these measures.

Measure A-1.3: Hardwire social equity and environmental justice into new programs and projects.

Focus planning and intervention programs in priority investment neighborhoods ("PINs") that currently experience social or environmental injustice and/or bear a disproportionate burden of potential public health impacts.

Target Year	Adaptation Action
2020	Develop a specific strategy or plan to redress social equity disparities by prioritizing and targeting CAP implementation projects into the most vulnerable areas as defined by the "2020 Social Equity and Health Index Map".
2020	Maximize mitigation benefits locally by prioritizing Escondido community specific (i.e. local) mitigation for GHG emissions and biological impacts/habitat loss. If no local mitigation credits or mitigation opportunities are available, allow project applicants to seek out regional solutions first. If no regional solutions are available then State solutions, with a preference to proximity.
2023	Consider establishing equity considerations for recreation/parks programming, planning, engineering, and public works projects, such as: ▪ Does the proposed action generate burdens either directly or indirectly to vulnerable populations? If yes, are there opportunities to avoid, minimize, or reduce those impacts? ▪ Can the benefits of the proposed action be targeted in ways to reduce vulnerable population disparities? ▪ Are the benefits of the proposed action broadly accessible to residents or businesses of vulnerable populations?

Measure A-1.4: Develop working relationships with other agencies and continue to analyze climate impacts.

Establish working groups and collaborate with regional and State agencies and groups to promote becoming "Climate Smart" and promote complementary adaptation strategy development.

Target Year	Adaptation Action
2020	Work with SANDAG and NCTD to make the regional transportation network more resilient, incorporate consideration of climate impacts as part of infrastructure planning and development, and prioritize transportation investments that have the capacity to adapt to climate change, while promoting social equity and environmental justice.
2022	Work with law enforcement, CAL FIRE, City of San Marcos, County of San Diego, City of Vista, and City of Poway to ensure updates for wildfire hazard maps and reduce risk from high fire hazard areas. ▪ Model future climate conditions to identify at-risk areas. ▪ Develop effective response mechanisms and evacuation scenarios. ▪ Identify areas within General Plan planning area where future development should be avoided, reconsidered, or mitigated, due to fire hazards.

Notes: CAL FIRE = California Department of Forestry and Fire Protection; City = City of Escondido; GHG = greenhouse gas; MJHMP = Multi-Jurisdictional Hazard Mitigation Plan; NCTD = North County Transit District; SANDAG = San Diego Association of Governments

Source: City of Escondido 2020.

Strategy A-2: Build Thriving and Resilient Neighborhoods

Table 5-2 Strategy A-2: Build Thriving and Resilient Neighborhoods

Measure A-2.1: Make sure that everyone has equitable access to healthy environments in which to live, work, and play.

Recognize the importance of the ecosystem in improving personal, environmental, and economic health

Target Year	Adaptation Action
2022	Identify and create collaborative partnerships with community-based organizations (e.g. San Diego Food System Alliance, California Food Link, San Diego New Farmers Guild, etc.) to develop equitable programmatic resources to increase the production and consumption of home grown and locally sourced food by supporting farmers' markets; expanding community gardens on public and private lands; and other forms of urban agriculture to: ▪ Support more resilient local agriculture on school campuses and at other public institutions or assembly spaces (e.g. church grounds, etc.) to help mitigate climate change and adapt to its impacts. ▪ Facilitate "Farm-to-School" programs for small farm-based businesses. ▪ Create local food maps and food distribution plans to preserve the affordability of local and sustainable food systems to ensure food security, nutrition, and public health. ▪ Support existing programs and/or create new programs to reduce investment risk and facilitate sustainable farming practices to connect more people to more local, farm-fresh foods.
2022	Establish partnerships with local businesses and groups to provide educational opportunities for residents to gain skills in organic gardening, fruit production, composting, food preservation, and cooking healthy foods.
2023	Review and update heat response plans to: ▪ Coordinate operations of readily accessible cooling centers. ▪ Recommend potential ways for property managers and homeowners' associations to implement Cool Zones. ▪ Develop an "early warning system" and response plans that alert residents, businesses, and community members, especially those most vulnerable to heat, when projected heat conditions exceed 100 degrees.
2024	Develop incentives to increase the planting of fruit trees in appropriate areas on private property.
2024	Use regulatory and voluntary tools to increase access to neighborhood parks, passive parklands, parklets, and/or pop-up recreation programs to increase parkland coverage and/or expand equitable access to recreational opportunities.
2025	Consider ways to improve equitable access to clean and sustainable energy. This could include the creation of a Clean Energy Equity Plan to support low-income residents and small organizations to purchase or obtain renewable energy. Also develop a program to engage with the Solar on Multi-Family Housing Program ("SOMAH") to support local green job training.

Measure A-2.2: Create "climate safe and decent" housing options.

Support more comfortable and resilient homes and buildings to proactively adapt to changing weather-related emergencies and climate hazard events.

Target Year	Adaptation Action
2020	Increase the use of public and private roofs for rooftop gardens. Provide education on how private property owners can use rooftop gardens as an eco-friendly alternative to: bring greenery into a sterile space, provide a place to relax

Table 5-2	Strategy A-2: Build Thriving and Resilient Neighborhoods
	or grow food, delay stormwater runoff, and cool the building to reduce energy consumption. Expand green roof installations through outreach and incentives, such as the Stormwater Credit Fee.
2023	Update the building code to require new private buildings to have operable windows, providing choice levels of light, and wall-to-wall ventilation.
2023	Update the building code to mandate the installation of cool roofs on all new and retrofitted roofs on multi-family projects.
2025	Pursue a green jobs plan component to the Clean Energy Equity Plan.
2027	Develop and implement a mitigation plan for power outages, which may include the following: ▪ Adopt an ordinance that requires new senior housing or large care facilities to install air conditioning in all units and on-site home energy batteries and energy storage. The ordinance shall also require conversion projects to provide adequate on-site temperature-controlled spaces in indoor common areas, if any. ▪ Adopt an ordinance that requires new affordable housing projects to install air conditioning in all units. Require affordable rehabilitation projects or other conversions to provide adequate on-site temperature-controlled spaces in indoor common areas, if any.
2028	Consider ways to reduce reliance on centralized sources for energy including: ▪ Facilitate access to local, decentralized renewable energy by incorporating renewable energy projects into CCA or other community-wide renewable programs. ▪ Complete a micro-grid feasibility study and begin implementation.
Measure A-2.3: Build capacity for adaptive neighborhoods.	
Reduce risks and impacts from increased temperatures, exacerbated air pollution risks, drought conditions, and precipitation variability in the areas around homes and businesses.	
Target Year	**Adaptation Action**
2022	Utilize the "2020 High Fire Hazard Map" to better manage the risk of wildfires as a result of drier summers, especially in areas where homes are next to natural open space areas: ▪ Enforce statutory standards for provision of defensible space inhibiting wildfire spread on private properties, and implement brush clearing and fuel breaks to manage the potential spread of wildfire. Fuel breaks should be implemented in areas where they make sense with efforts to avoid or minimize impact to important habitat unless it is necessary to protect structures. Evaluate other ways to reduce risks in and around wildland-urban interface areas that are rated as high fire hazard areas, such as improving the quality and plant palette around wildfire prone areas, and/or other ways to reduce risks in and around high fire hazard areas. ▪ Partner with SANDAG, other agencies, and North San Diego County cities for funding or acquisition and management of lands conserved for habitat protection and/or agricultural use. ▪ Develop opportunities to transfer development rights from very high fire hazard areas to less at-risk areas (e.g. urban infill areas, etc.) and/or seek other regulatory ways to incentivize land conservation or open space preservation. ▪ When analyzing new residential projects in very high fire hazard areas, incorporate evacuation route planning into the analysis. Evaluate brush fire spread and wildland fire behavior characteristics that utilize a 60 mph prevailing wind factor at a minimum, or higher wind speeds, if documented, as necessary.
2024	Adopt plant palettes in the Landscape Ordinance to withstand drought conditions and promote plant-type resilience (in street and park trees, green roofs, etc.). Adopt a new tree code in the Landscape Ordinance that considers tree

Table 5-2	Strategy A-2: Build Thriving and Resilient Neighborhoods
	selections so that tree plantings are known to perform well in the general climate conditions, are climate resilient trees, and will increase canopy or vegetative cover. As part of the next CAP update, monitor tree canopy changes due to development and determine if policy and rule changes are needed.
2024	Utilize the "2020 Heat Vulnerability Map" to identify at-risk areas and help inform decisions and priorities about implementing ways to cool the urban environment. When evaluating programs, projects, and infrastructure in at risk areas and priority investment neighborhoods ("PINs"), prioritize efforts that decrease the urban heat island effect, especially in areas with populations most vulnerable to heat, through strategies like revegetation, tree preservation, new plantings, depaving and porous pavement, green infrastructure, and site specific development design.
2025	Coordinate a more integrated approach to flood or water-surge event planning and consider new innovative ways to adapt to climate impacts, including the following: ▪ Update the Jurisdictional Runoff Management Plan to develop stream and riparian restoration program strategies and work to naturalize and/or protect creek watershed areas. ▪ Implement a program that systematically identify areas with underserved storm drains and secure funding for their upsizing. ▪ Increase resilience of natural systems by keeping natural resources areas and establish a fund to acquire or protect land in particularly vulnerable areas.
2027	Develop, adopt, and implement integrated plans for mitigating climate impacts in wildland-urban interface areas that include, but are not limited to the following: ▪ Collaborate with agencies managing public lands to identify, develop, or maintain corridors and linkages between undeveloped areas. ▪ Use purchase of development rights or conservation easements to protect climate-vulnerable habitats. ▪ Develop, adopt, and implement integrated plans for mitigating wildfire impacts in the wildland-urban interface. ▪ Assess the financing capabilities and implementation feasibility of the Multiple Habitat Conservation Plan ("MHCP") or open space management.
Measure A-2.4: Build a sustainable and resilient transportation network.	
Align the transportation system improvements with quality of life and enable a variety environmentally friendly choices that feature green infrastructure and have the capacity to adapt to climate impacts.	
Target Year	**Adaptation Action**
2023	Work with NCTD to build more bus shelter amenities to help prevent health effects from long sun exposure and incentivize usage of public transportation.
2024	Evaluate and pursue stable funding sources and financing strategies to accelerate and sustain natural and green infrastructure within the public right-of-way.
2025	Conduct walk audits around prioritized schools, transit boarding areas, and parks to encourage Safe Routes to Schools, Transit, and Parks.
2026	Give greater weight to investing in improvements to transportation infrastructure that are projected to be affected by multiple climate changes and/or build in flexible options that can adapt to changing conditions.

Notes: CCA = community choice aggregation; City = City of Escondido; NCTD = North County Transit District; mph = miles per hour
Source: City of Escondido 2020.

ESCONDIDO
City of Choice

Chapter 6

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Appendix A

Greenhouse Gas Emissions Inventory and Projections

City of Escondido Greenhouse Gas Emissions Inventory and Projections

July 2018

Prepared for the City of Escondido

Prepared by the Energy Policy Initiatives Center

About EPIC

The Energy Policy Initiatives Center (EPIC) is a non-profit research center of the USD School of Law that studies energy policy issues affecting California and the San Diego region. EPIC's mission is to increase awareness and understanding of energy- and climate-related policy issues by conducting research and analysis to inform decision makers and educate law students.

For more information, please visit the EPIC website at www.sandiego.edu/epic.

Prepared in partnership with the San Diego Association of Governments (SANDAG) and the Roadmap Program. This Program is partially funded by California utility customers and administered by San Diego Gas & Electric Company under the auspices of the California Public Utilities Commission.

Table of Contents

1 OVERVIEW

This document presents a summary of the greenhouse gas (GHG) emissions for the City of Escondido (referred to as Escondido or the City) from 2012 to 2014, and the business-as-usual (BAU) emissions projections for 2020, 2030, 2035, and 2050. This BAU projection demonstrates emissions growth in the absence of any new policies and programs and does not consider future impacts of adopted Federal and State policies. GHG reductions from these policies, are considered later in the climate action planning process and are referred to as the "legislatively-adjusted BAU".

Section 2 describes the background sources and common assumptions used for the inventory and projections. Section 3 provides the results of the GHG emissions inventory for 2012 to 2014. The methods used to prepare each category of the inventory are provided in Section 4. Section 5 provides a summary of the emissions projections for 2020, 2030, 2035, and 2050, and the methods used to prepare each category of projections.

2 BACKGROUND

2.1 Greenhouse Gases

The primary GHGs included in the emissions estimates presented here are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Each GHG has a different capacity to trap heat in the atmosphere, known as its global warming potential (GWP), which is normalized relative to CO_2 and expressed in carbon dioxide equivalents (CO_2e). In general, the 100-year GWPs reported by the Intergovernmental Panel on Climate Change (IPCC) are used to estimate GHG emissions. The GWPs used in this inventory are from the IPCC Fourth Assessment Report (AR4),[1] provided in Table 1.

Table 1 Global Warming Potentials Used in Escondido GHG Emission Inventory & Projections

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298

2.2 Categories of Emissions

The U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (U.S. Community Protocol)[2] requires a minimum of five basic emissions-generating activities to be included in a Protocol-compliant community-scale GHG inventory. These categories are: electricity, natural gas, on-road transportation, water and wastewater, and solid waste. GHG emissions are calculated by multiplying activity data (e.g., kilowatt-hours of electricity, tons of solid waste) by an emission factor (e.g., pounds of CO_2e per unit of electricity). For these five categories, methods used in this inventory were based on the U.S. Community Protocol standard methods and modified with regional- or City-specific data when available.

[1] IPCC Fourth Assessment Report: Climate Change 2007: Direct Global Warming Potentials (2013).
[2] ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012).

Additionally, GHG emissions from off-road transportation were included in the inventory and projections, based on the methods and models used by California Air Resources Board (CARB) in the statewide GHG emission inventory.[3]

All activity data and GHG emissions reported in this document are annual values, and all emission factors reported in this document are annual average values, unless stated otherwise.

2.3 Demographics

The San Diego Association of Governments (SANDAG) estimates and forecasts population and employment for all jurisdictions in the San Diego region. The population and jobs estimate from 2012 to 2014 for Escondido are provided in Table 2.[4]

Table 2 Population and Jobs Estimates (Escondido, 2012-2014)

Year	Population	Jobs
2012	146,781	48,874
2013	148,522	49,456
2014	149,362	50,038
SANDAG, 2013 and 2017; Energy Policy Initiatives Center, 2017.		

2.4 Rounding of Values in Tables and Figures

Rounding is used only for the final GHG value within the tables and figures throughout the document. Values are rounded to the nearest integer of a higher order of magnitude. Values are not rounded in the intermediary steps in the actual calculation. Because of rounding, some totals may not equal the exact values summed in any table or figure.

3 SUMMARY OF GHG EMISSIONS INVENTORY

The total GHG emissions from Escondido in 2012 were estimated at 943,000 metric tons CO_2e (MT CO_2e), distributed into categories as shown in Figure 1.

[3] California Air Resources Board (CARB): California Greenhouse Gas Emission Inventory – 2016 Edition (June 2016).
[4] 2012–2014 Population are from SANDAG's Demographic & Socio-Economic Estimates (March 9, 2017 Version). Jobs in 2012 are from SANDAG's Series 13 Regional Growth Forecast (October 2013). Jobs in 2013 and 2014 are interpolated linearly based on 2012 and 2020 jobs estimates. The number of jobs is for civilian jobs only and does not include military jobs, SANDAG Data Surfer, accessed on November 15, 2017.

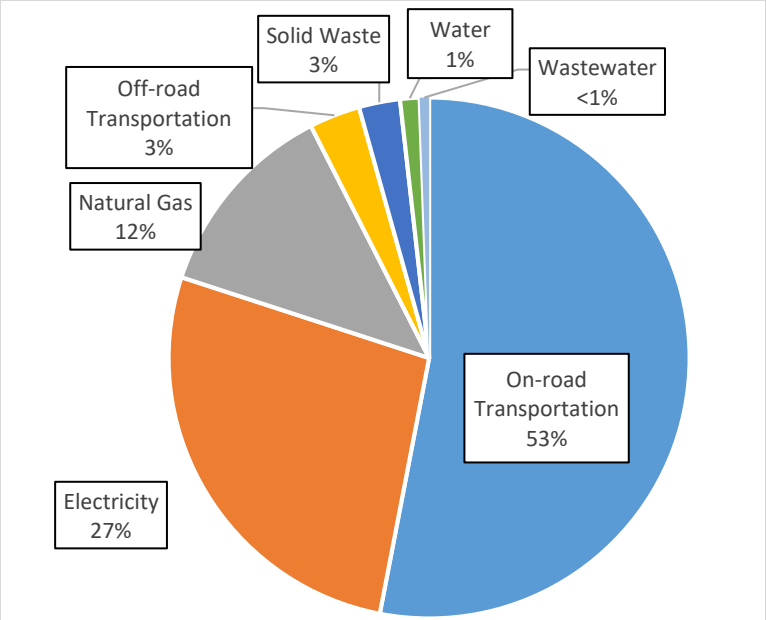


Figure 1 Breakdown of GHG Emissions in Escondido (2012)

The total GHG emissions in each year 2012, 2013, and 2014 are provided in Table 3. The 2013 estimate was 927,000 MT CO_2e and the total GHG emissions in 2014 were estimated at 874,000 MT CO_2e, 7% lower than the total emissions in 2012. Both the 2013 and 2014 GHG emissions have similar distributions among the emissions categories as the 2012 GHG emissions. The on-road transportation category contributed the most (53%) to the overall GHG emissions in 2012, while the wastewater category contributed the least (<1%). The totals and breakdown of emissions by category are presented in Table 3.

Table 3 Total and Breakdown of Estimated GHG Emissions in Escondido (2012–2014)

Emissions Category	2012 GHG Emissions (MT CO_2e)	2013 GHG Emissions (MT CO_2e)	2014 GHG Emissions (MT CO_2e)
On-Road Transportation*	498,000	490,000	479,000
Electricity	256,000	245,000	215,000
Natural Gas	118,000	121,000	108,000
Off-Road Transportation	30,000	29,000	29,000
Solid Waste	24,000	25,000	25,000
Water	11,000	12,000	13,000
Wastewater	6,000	5,000	5,000
Total	943,000	927,000	874,000

Sum may not add up to totals due to rounding.
GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.
*Based on SANDAG Series 13 vehicle miles traveled (VMT) estimates. 2012 is the Base Year.
Energy Policy Initiatives Center, 2018

4 METHODS TO CALCULATE EMISSIONS INVENTORY

4.1 On-Road Transportation

The emissions associated with on-road transportation in Escondido are calculated by multiplying the estimated vehicle miles traveled (VMT) and the average vehicle emission rate in the San Diego region in a given year. Average weekday VMT data were provided by SANDAG based on its activity-based model and the Origin-Destination (O-D) method.[5] The O-D VMT method is the preferred method proposed by the U.S Community Protocol in 'TR.1 Emissions from Passenger Vehicles' and 'TR.2 Emissions from Freight and Service Trucks' that estimates miles traveled based on where a trip originates and where it ends to better attribute on-road emissions to cities and regions of miles traveled (Figure 2).[6]

[5] SANDAG (2015). San Diego Forward: The Regional Plan. Appendix T Travel Demand Model Documentation. SANDAG (2013). Vehicle Miles Traveled Calculation Using the SANDAG Regional Travel Demand Model. Technical White Paper.
[6] ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012), Appendix D: Transportation and Other Mobile Emission Activities and Sources.

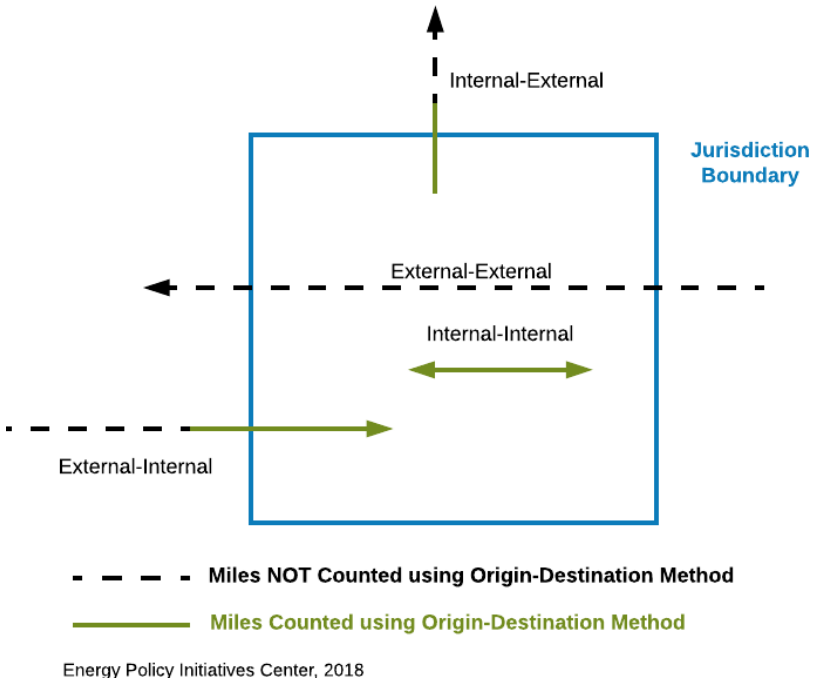


Figure 2 Components of O-D Method for VMT Calculation

O-D VMT data include all the miles traveled for trips that originate and end within a boundary (in this case, within Escondido city limits, referred to as Internal-Internal), and half of the miles traveled of the trips that either begin within the boundary and end outside the boundary (referred to as Internal-External), or vice versa (referred to as External-Internal). In accordance with the methodology, VMT from trips that begin and end outside the boundary that only pass through Escondido (referred to as External-External) are not included in the total City VMT.

The average weekday O-D VMT data for each trip type in 2012 and 2014 were provided by SANDAG, and 2013 VMT were interpolated linearly using 2012 and 2014 values (Table 4).[7]

Table 4 O-D VMT and Trip Types (Escondido, 2012-2014)

Year	Internal-Internal Trips (Miles/Weekday)	External-Internal/Internal-External Trips (Miles/Weekday)	External-External Trips* (Miles/Weekday) (Information only, excluded from City VMT)
2012	588,461	4,763,045	1,085,989
2013	582,385	4,761,943	1,156,606
2014	576,309	4,760,840	1,227,223
*Miles from External-External trips (pass-through trips) are the portion within the City boundary, not the entire trip. Based on SANDAG Series 13 VMT estimates. 2012 is the Base Year. 2013 is linearly interpolated between 2012 and 2014. SANDAG, 2018; Energy Policy Initiatives Center, 2018.			

[7] Series 13 2012 (Base Year) and 2014 average weekday VMT estimates were provided by SANDAG (March 28, 2017 and November 07, 2017). 2013 VMT were interpolated linearly between 2012 and 2014 VMT. Original data tables provided by SANDAG are in Appendix A.

In accordance with the methodology, estimated and projected Internal-External and External-Internal miles associated with Escondido are divided in half to allocate the miles between Escondido and all other outside jurisdictions (see Appendix A for source data). The total average weekday VMT is multiplied by 347 to adjust from average weekday VMT to average annual VMT, which includes weekends.[8]

The average annual vehicle emission rate expressed in grams of CO_2e per mile driven (g CO_2e/mile) were derived from the statewide mobile source emissions model EMFAC2014, developed by the California Air Resources Board (CARB).[9] EMFAC2014 was used to generate average emission rates for the San Diego region for all vehicle classes, model years, speeds, and fuel types.[10] The average emission rates (g CO_2e/mile) were calculated based on the VMT distribution of each vehicle class and its emission rate. The average vehicle emission rate was adjusted from g CO_2/mile to g CO_2e/mile, to account for total GHG emissions, including CO_2, CH_4, and N_2O.[11] This report assumes Escondido has the same distribution of vehicle types as the region.

The total VMT, average vehicle emission rates, and corresponding GHG emissions from the on-road transportation category from 2012 to 2014 are given in Table 5.

Table 5 VMT, Emission Rate and GHG Emissions from the On-Road Transportation Category (Escondido, 2012-2014)

Year	Average Vehicle Emission Rate (g CO_2e/mile)	Total VMT		GHG Emissions (MT CO_2e)
		Average Weekday Miles*	Average Annual Miles	
2012	483	2,969,984	1,030,584,328	498,000
2013	476	2,963,356	1,028,284,646	490,000
2014	467	2,956,729	1,025,984,963	479,000

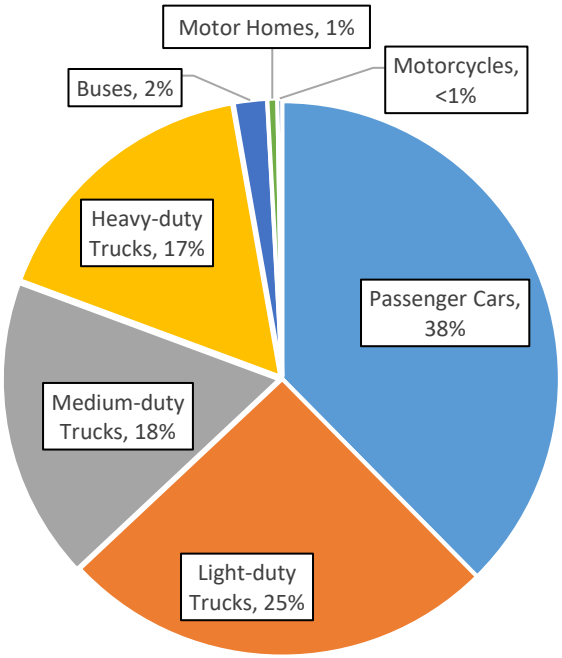
*Consistent with the methodology, this is the sum of internal-internal and half of both external-internal and internal-external VMT from Table 4. Weekday miles are converted to annual average before converting to GHG emissions.
Based on SANDAG Series 13 VMT estimates. 2012 is the Base Year. 2013 is linearly interpolated between 2012 and 2014.
GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.
CARB, 2015; SANDAG, 2018; Energy Policy Initiatives Center, 2018.

The decrease in the emission rate is likely due to the vehicle turnover rate in the San Diego region and improved vehicle emission standards of new vehicles.

Figure 3 gives the breakdown of emissions by vehicle class in 2012, based on the EMFAC vehicle class distribution in the San Diego region. This report assumes Escondido has the same distribution of vehicle

[8] The conversion of 347 weekdays to 365 days per year as used by CARB. CARB: California's 2000-2014 Greenhouse Gas Emission Inventory Technical Support Document (2016 Edition) p. 41 (September 2016).
[9] CARB: EMission FACtors model, EMFAC2014 (2015).
[10] EMFAC2014 Web Database: Emission Rates for SANDAG. Download date: January 22, 2016. The vehicle classes in EMFAC2014 are the same as the vehicle classes in the previous model EMFAC2011.
[11] The conversion factor, 1.01, was calculated based on the ratio of CO_2 emissions to total GHG emissions (CO_2, CH_4, and N_2O expressed as CO_2e) using methods from EPA GHG Equivalencies Calculations and References. Emissions were from mobile fossil fuel combustion in the transportation end-use category in 2013 (the latest available data year), on-road emissions. EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013.* (2015). Table 3-12 to 3-14.

types as the region. Passenger cars and light duty trucks contribute the most to the City's on-road transportation emissions (63%), while motorcycles contribute the least with smaller than 1%.[12]



EMFAC2014. Energy Policy Intiatvies Center, 2017
Percentages may not add to totals due to rounding.
*EMFAC vehilce categorization is different from Enviromental Protect Agency (EPA) Emission Standards categorization.

Figure 3 On-Road Transportation Emissions by Vehicle Class in the San Diego Region

4.2 Electricity

Emissions from electricity use in Escondido were estimated using the Built Environment (BE.2) method from the U.S Community Protocol.[13] Annual metered electricity sales by the local utility, San Diego Gas & Electric (SDG&E) to Escondido customers[14] were adjusted by 1) a loss factor[15] of 1.07[16] to account for transmission and distribution losses; and 2) subtracting electricity use associated with water distribution, which is allocated to the water category emissions.

[12] In California's EMFAC2014, passenger cars are all cars and fuel types designated as Light Duty Automobiles (LDAs). Light Duty Trucks (LDTs) are divided into LDT1 and LDT2, where LDT1 includes gas, diesel, and electric fuel vehicles, while LDT2 does not include electric vehicles. Medium-duty trucks included medium duty vehicles (MDV with Gross Vehicle Weight Rating (GVWR) 5751-8,500 lbs), and heavy-duty trucks (HDTs), with GVWR larger than 8,500 lbs. Under the EPA Emission Standard category vehicles with GVWR under 8,500 lbs are considered light-duty trucks/vehicles.

[13] ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012), Appendix C: Built Environment Emission Activities and Sources.

[14] 2012–2016 metered electricity sales were provided by SDG&E to EPIC (December 16, 2017).

[15] The transmission and distribution loss factor is used to scale end-use demand or retail sales to produce net energy for load. L. Wong. *A Review Of Transmission Losses In Planning Studies*, CEC Staff Paper (2011)

[16] California Energy Commission (CEC): *California Energy Demand 2016–2026 Final Forecast Mid-Case Final Baseline Demand Forecast Forms*, SDG&E Mid. The transmission and distribution loss factor is calculated based on the ratio of net energy for load (total sales + net losses) and total sales from SDG&E Form 1.2 Mid.

Emissions are calculated by multiplying the adjusted net energy for load (electricity sales + losses) by the corresponding City-specific electricity emission factor, given in Table 6, expressed in pounds of CO_2e per megawatt-hour (lbs CO_2e/MWh). For a given year, the City-specific electricity emission factor is estimated based on the specific power mix of bundled power[17] and Direct Access (DA) power,[18] and their respective emission factors. The SDG&E bundled emission factors are calculated using Federal Energy Regulatory Commission (FERC) Form 1[19] data, the California Energy Commission (CEC) Power Source Disclosure Program,[20] data on SDG&E-owned and purchased power, and U.S. EPA Emissions and Generating Resource Integrated Database (eGRID)[21] on specific power plant emissions. The DA emission factor is taken from the California Public Utilities Commission (CPUC) Decision D.14-12-037.[22]

The differences in the electricity emission factors from 2012 to 2014 reflect in part the change in the electricity power mix in the City and in SDG&E's service territory. The emission factor increased in 2012 due to the shutdown of the zero-emissions electricity supply from the San Onofre Nuclear Generation Station (SONGS) and replacement by other natural gas-fired power plant sources.[23] In the later years, more renewable resources were included in the power mix that resulted in a lower electricity emission factor. SDG&E had 32% renewable sources in the electricity supplied to its bundled customers in 2014, an increase from 19% in 2012.[24]

The net energy for Escondido's load (electricity sales + losses), electricity emission factors, and corresponding GHG emissions from the electricity category for the years 2012-2014 are given in Table 6.

Table 6 Net Energy for Load, Emission Factor and GHG Emissions from Electricity Category (Escondido, 2012–2014)

Year	Net Energy for Load (electricity sales + losses) (MWh)	Emission Factor (lbs CO_2e/MWh)	GHG Emissions (MT CO_2e)
2012	742,143	760	256,000
2013	729,519	741	245,000
2014	735,224	646	215,000
GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. SDG&E, 2018; Energy Policy Initiatives Center, 2018.			

[17] SDG&E bundled power includes the electricity from SDG&E-owned power plants and the electricity from its net procurements.
[18] The SDG&E Direct Access Program includes electricity that customers purchased from non-SDG&E electric service providers (ESPs), but SDG&E still provides transmission and distribution services.
[19] Federal Energy Regulatory Commission (FERC): Form 1- Electricity Utility Annual Report, download date: July 20, 2015
[20] California Energy Commission (CEC) Power Source Disclosure Program under Senate Bill 1305. SDG&E annual power source disclosure report (2012-2014) were provided by CEC staff to EPIC.
[21] U.S. EPA. eGRID 2012 (2015) and eGRID 2014 v2 (2017).
[22] Decision 14-12-037, December 18, 2014 in Rulemaking 11-03-012 (Filed March 24, 2011). The recommended emission factor is 0.379 MT CO_2e/MWh (836 lbs CO_2e/MWh).
[23] SONGS is partially owned by SDG&E and historically accounted for approximately 15–20% of SDG&E power generation. SONGS was permanently closed in 2013 and the energy generation was replaced by other sources, including non-renewable sources, which increased the emission factor of SDG&E-generated electricity.
[24] California Energy Commission: Utility Annual Power Content Label.

Electricity use fluctuated between 2012 and 2014, but GHG emissions from the electricity category decreased 16% from 2012 to 2014. This may be partly attributed to the increase of renewable content in the electricity supply, as reflected in the decrease in the electricity emission factor.

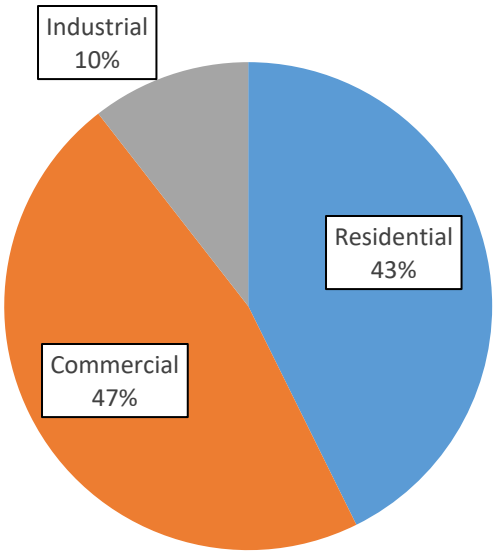
The net energy for load does not include self-serve renewable supply, such as customer-owned behind-the-meter photovoltaic (PV) systems, or self-serve non-renewable supply. The estimated cumulative PV capacity in Escondido at the end of 2014 was 7.7 MW, more than double the cumulative PV capacity at the end of 2012 (3 MW), corresponding to an estimated total of 37,843 MWh of behind-the-meter solar generation. The number of newly added PV systems in each year from 2012 to 2014 is also shown in Table 7.[25] Electricity generation from PV systems is assumed to have no associated GHG emissions.

Table 7 Behind-the-meter PV Systems and Electricity Generation (Escondido, 2012–2014)

Year	New PV Systems		Cumulative PV Systems since 2000		Estimated Behind-the-meter Solar Generation (MWh)
	Number of Systems	Capacity (MW_{dc})	Number of Systems	Capacity (MW_{dc})	
2012	320	3.0	1,107	9.7	16,619
2013	655	4.7	1,762	14.3	24,618
2014	1,040	7.7	2,802	22.0	37,843

The emissions from the electricity category can be broken down further into residential, commercial and industrial customer classes. In 2012, 47% of emissions were attributed to commercial electricity use, 43% were attributed to residential electricity use, and 10% from industrial use, as shown in Figure 4.

[25] NEM Interconnection Data Set (current as of May 31, 2017), download date: September 12, 2017. Based on date of NEM interconnection applications approved. Solar capacities are reported as direct current (DC). Electricity generation is converted from capacity (power) to energy using an average solar PV system capacity factor of 20% and an annual system degradation rate of 1%.



Energy Policy Initiatives Center, 2018

Figure 4 Electricity Emissions by Customer Class (Escondido, 2012)

4.3 Natural Gas

Emissions from natural gas end-use in Escondido were estimated using method Built Environment (BE.1) from the U.S Community Protocol.[26] Annual metered natural gas sales were provided by SDG&E. Natural gas end-use does not include the natural gas used for utility-level electric generation (UEG) because those emissions are included in the electricity category.[27]

To estimate emissions from the combustion of natural gas, fuel use was multiplied by an emission factor for natural gas based on data from the CARB.[28] The total natural gas use and corresponding GHG emissions from the natural gas category for the years 2012-2014 are given in Table 8.

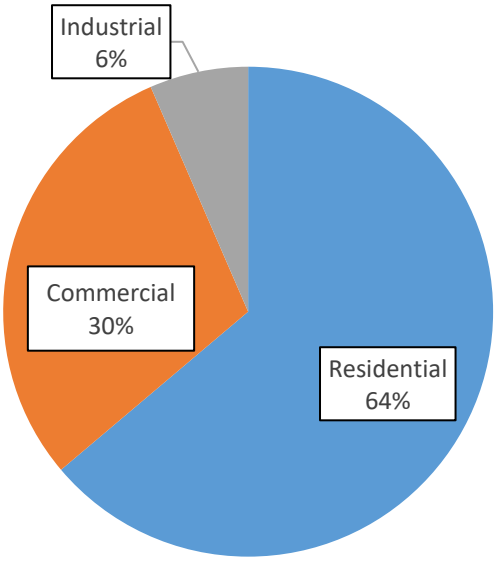
Table 8 Natural Gas Use and GHG Emissions from Natural Gas Category (Escondido, 2012–2014)

Year	Natural Gas Use (Million Therms)	GHG Emissions (MT CO_2e)
2012	21.6	118,000
2013	22.1	121,000
2014	19.7	108,000

GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.
SDG&E, 2018; Energy Policy Initiatives Center, 2018.

[26] ICLEI– Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012), Appendix C: Built Environment Emission Activities and Sources.
[27] 2012–2016 metered natural gas sales were provided to EPIC by SDG&E (December 16, 2017 and March 13, 2018). The natural gas used for utility-level electric generation (UEG) was excluded from the data by SDG&E (March 2018). However, for the UEG facilities in Escondido, the natural gas NOT associated with electricity generation is still included in the natural gas data.
[28] Emission factor for natural gas: 0.0554 million metric tons CO_2e/Million therms. CARB: Documentation of California's GHG Inventory – Index.

Emissions from the natural gas category can be broken down further into residential, commercial, and industrial customer classes. In 2012, 64% of emissions resulted from residential natural gas use, and the remaining 30% and 6% were from commercial and industrial natural gas use respectively, as shown in Figure 5.



Energy Policy Initiatives Center, 2018

Figure 5 Natural Gas Emissions by Customer Class (Escondido, 2012)

4.4 Off-Road Transportation

The emissions from off-road transportation in Escondido, such as gasoline and diesel fuel use for off-road vehicles and equipment, were estimated based on CARB off-road models. OFFROAD2007 is the main model for estimating off-road transportation emissions.[29] After the release of OFFROAD2007, CARB has been developing inventories and models for each sub-category based on specific regulatory requirements.[30] For example, the recreational equipment category in OFFROAD2007 was replaced by RV2013.[31] In this section, new inventories and models were used if available; otherwise, OFFROAD2007 was used.

Due to the lack of jurisdiction-specific data from CARB models, the emissions or fuel consumption from the CARB model outputs for the San Diego region were scaled to the City based on sub-category-specific scaling factors. The off-road activity sub-categories that are relevant to Escondido and the scaling factors are given in Table 9.[32]

[29] CARB: Off-Road Motor Vehicles, OFFROAD 2007.
[30] CARB: Mobile Source Emissions inventory – Off-Road Diesel Vehicles.
[31] CARB: Off-Road Gasoline-Fueled Equipment. Recreational Vehicles, RV2013 (Inventory Model Database).
[32] The sub-categories listed in this table are not the comprehensive off-road mobile sources listed in CARB, as some of the sub-categories are not relevant to Escondido, such as airport ground support, pleasure craft, commercial marine vessels, etc.

Table 9 Sub-Categories Included in the Off-Road Transportation Categories

Sub-Category	Model Source	Common Equipment Type	Scaling Factor
Recreational Vehicles	CARB RV2013	Terrain vehicles, golf carts, minibikes, off-road motorcycles	Population
Lawn and Garden Equipment	CARB OFFROAD2007	Lawn mowers, trimmers, brush cutters, chainsaws, leaf blowers/ vacuums	Population
Light Commercial Equipment	CARB OFFROAD2007	Generator set, pumps, welders	Commercial Jobs
Construction and Mining	CARB In-Use Off-Road Equipment 2011 Inventory	Excavators, off-highway tractors, loaders, paving equipment	Construction Jobs
Industrial	CARB In-Use Off-Road Equipment 2011 Inventory	Aerial lifts, forklifts, sweepers/scrubbers	Industrial Jobs
Diesel-Fueled Portable Equipment	CARB Portable Equipment 2017	Compressors, generators, pumps	Jobs

In the RV2013 model, the GHG emissions from recreational vehicles in the San Diego region were reported in tons per day and converted to annual emissions. In the Portable Equipment 2017 model and In-Use Off-Road Equipment 2011 Inventory, the fuel consumptions for the equipment in the San Diego region were reported in gallons per year and converted to annual GHG emissions. For other sub-categories, the OFFROAD2007 model outputs are annual emissions for the San Diego region. The scaling factors and the corresponding GHG emissions from the off-road transportation category in 2012 to 2014 are given in Table 10.[33]

[33] The population scaling factors were calculated based on Escondido 2012–2014 populations compared to the regional population. The regional population is from the SANDAG Demographic & Socio Economic Estimates (Updated in September 2015), download date: October 29, 2015. Regional commercial jobs in 2012 is from the SANDAG Series 13 Regional Growth Forecast (Updated in October 2013), download date: March 29, 2017, SANDAG Data Surfer. Commercial jobs include all employment types other than agriculture and mining, construction and manufacturing. The jobs estimate in 2013 is interpolated linearly based on the 2012 and 2020 jobs estimates.

Table 10 GHG Emissions from Off-Road Transportation Category (Escondido, 2012–2014)

Sub-Category	Scaling Factor	San Diego Region (Million MT CO_2e)			Escondido (MT CO_2e)		
		2012	2013	2014	2012	2013	2014
Recreational Vehicles	5%	0.004	0.004	0.004	178	170	171
Lawn and Garden Equipment	5%	0.095	0.094	0.093	4,450	4,428	4,349
Light Commercial Equipment	3%	0.103	0.102	0.102	3,459	3,428	3,397
Construction and Mining	10%	0.184	0.185	0.186	18,651	18,301	17,905
Industrial	6%	0.012	0.012	0.013	684	709	734
Diesel-Fueled Portable Equipment	4%	0.070	0.064	0.065	2,548	2,319	2,330
Total					30,000	29,000	29,000

Only total GHG emissions are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.
CARB, 2007, 2011, 2013 and 2017; Energy Policy Initiatives Center, 2018.

4.5 Solid Waste

Emissions from solid waste disposed by Escondido were estimated using method Solid Waste (SW.4) from the U.S. Community Protocol.[34] To estimate emissions, the amount of waste disposed by a city in a given year is multiplied by an emission factor for mixed solid waste. Solid waste disposal data were retrieved from the California Department of Resources Recycling and Recovery (CalRecycle) Disposal Reporting System (DRS).[35]

The emission factor of mixed solid waste depends on the percentage of each waste type within the waste stream disposed in a landfill. The City of San Diego's 2012–2013 Waste Characterization Study was used as a reasonable proxy for Escondido's waste composition to determine the percentage of each waste type within the mixed solid waste and applied to 2012–2014 waste disposal for the emission calculation.[36] Only the CH_4 emissions from waste degradation are considered non-biogenic and included in this category in accordance with the methodology. The CO_2 emissions from waste degradation are considered biogenic and not included in this category.

The default capture rate of CH_4 emissions from landfills is 75% based on the U.S. Community Protocol; any CH_4 emissions above this are accounted for as emissions from the solid waste category. The total and per-capita solid waste disposal and the corresponding GHG emissions from the years 2012–2014 are given in Table 11.

[34] ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012), Appendix E: Solid Waste Emission Activities and Sources.
[35] CalRecycle: Disposal Reporting System (DRS): Jurisdiction Disposal and Alternative Daily Cover (ADC) Tons by Facility. 2012–2014 solid waste disposal data from CalRecycle were confirmed by City staff. Download date: January 11, 2018.
[36] City of San Diego 2014, *Waste Characterization Study 2012–2013 Final Report*. Emission factor, 0.744 MT CO_2e/short ton calculated based on waste distribution and emission factor for each waste type in *Version 13 Waste Reduction Model (WARM)*

Table 11 Solid Waste Disposal and GHG Emissions from Solid Waste Category (Escondido, 2012–2014)

Year	Solid Waste Disposal (MT/year)	Per Capita Solid Waste Disposal (kg/person/day)	GHG Emissions (MT CO_2e)
2012	131,056	2.4	24,000
2013	133,712	2.5	25,000
2014	134,804	2.5	25,000
GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. CalRecycle, 2017; Energy Policy Initiatives Center, 2018.			

4.6 Water

The City of Escondido provides both potable and recycled water service within the City, however the water service area does not align exactly with the City's boundaries. The City is a member agency of the San Diego County Water Authority (SDCWA).[37] The City has an emergency-only treated water connection with neighbor agency Rincon Del Diablo Municipal Water District (Rincon MWD) which has not been used in the past five years.[38]

The potable water supply for Escondido comes from two sources: 1) imported untreated water from SDCWA; and 2) local surface water from the San Luis Rey River watershed. It is assumed that the percentage of water from each source supplied within the City's boundaries is the same as that of the water service area. The potable water supplied in Escondido and the percentage of water from each source are given in Table 12.[39]

Table 12 Potable Water Supplied and Supply Source (Escondido, 2012–2014)

Year	% of Potable Water from each Water Supply		Potable Water Supplied (Acre-Feet)
	SDCWA Untreated Water	Local Surface Water	
2012	85%	15%	21,837
2013	92%	8%	21,660
2014	98%	2%	21,896
Escondido, 2017.			

The energy used to produce and provide potable water from each supply of water is different due to the different source type and its location. Emissions from water use in Escondido were estimated using method Wastewater and Water (WW.14) from the U.S. Community Protocol.[40] The method considers each segment of the water system (upstream supply and conveyance, water treatment, and local water distribution) individually, as described below.

[37] Escondido 2015 Urban Water Management Plan (June 2016).
[38] Personal Communication between EPIC and City of Escondido Staff (March 02, 2017). The past five years cover all inventory years 2012–2014.
[39] Potable water supplied within the City of Escondido (2010–2015) only and the water production sources for the entire water service area (2010–2015) were provided by City staff on March 02, 2017 and March 23, 2017.
[40] ICLEI – Local Governments for Sustainability USA: U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, Version 1.0 (2012), Appendix F: Wastewater and Water Emission Activities and Sources.

Upstream Supply and Conveyance – This is defined as supply and conveyance of water from the raw sources to the local service area. The upstream supply and conveyance energy use for SDCWA untreated water consists of conveyance of water from the State Water Project and the Colorado River through Metropolitan Water District's service area up to SDCWA's service area and onto the member agency take-over point.

Local Water Treatment – This is the energy used for water treatment plant operations. Escondido and Vista Irrigation District (VID) jointly own the Escondido-Vista Water Treatment Plant (EVWTP), and the City of Escondido operates the plant. EVWTP treats both SDCWA untreated water and local surface water to potable water standards.

Local Water Distribution – This is defined as the energy required to move treated water from water treatment plants to end-use customers. Distribution energy use includes energy use for water pump stations and/or pressure reduction stations, water tanks, etc. The City maintains five main pump stations within the boundaries.

The energy intensity per unit of water for each segment of the water-use cycle is given in Table 13.

Table 13 Energy Intensity for Each Segment of Water-Use Cycle (Escondido, 2012–2014)

Year	Upstream Supply and Conveyance - SDCWA untreated water (kWh/Acre-Foot)[41]	Local Water Treatment Energy Intensity (kWh/Acre-Foot)[42]	Local Distribution Energy Intensity (kWh/Acre-Foot)[43]
2012	1,755	56	33
2013			
2014			

For upstream supply and conveyance emissions, the amount of water from SDCWA was multiplied by the upstream energy intensity to get the total electricity use from upstream supply. The electricity use was multiplied by the average California electricity emission factor to calculate the GHG emissions.[44] Because the electricity use and GHG emissions associated with upstream supply and conveyance are outside the City boundary and would not be included in the electricity category, they are accounted for in this water category.

[41] Upstream supply and conveyance energy intensity for SDCWA untreated water includes conveyance from the State Water Project and Colorado River water to MWD's distribution system, distribution from MWD to MWD's member agencies, and SDCWA's conveyance of raw water supplies to SDCWA's member agencies.
[42] The energy intensity at the Escondido-Vista Water Treatment Plant in 2015 was used as a proxy for 2012–2014. The entire plant's operational electricity use (SDCWA untreated and local surface water) for treatment in 2015 was provided by the City staff in March 2017. The amount of water (SDCWA untreated and local surface water) treated at the EVWTP in 2015 was provided by the City of Escondido and VID (through the City of Vista). The energy intensity at the plant in 2015 was calculated by dividing electricity use (1,940,751 kWh) by volume of water treated (34,591 acre-foot).
[43] The distribution energy intensity in 2015 was used as a proxy for 2012–2014. The distribution energy intensity was calculated by dividing the electricity use at five pump stations within the City boundary (590,683 kWh) by volume of water delivered within the City (17,766 acre-foot). Both electricity use and water delivered were provided by City staff in March 2017.
[44] The Western Electricity Coordinating Council (WECC) CAMX (eGRID Subregion) emission rate from eGRID was used as a proxy for the average California electricity emission rate for upstream electricity. U.S. EPA eGRID 2012 (2015) and eGRID 2014 v2 (2017).

For water treatment emissions, the water used by Escondido was multiplied by the water treatment energy intensity and SDG&E's electricity emission factor to obtain GHG emissions associated with water treatment. Because the EVWTP is located in the City, the electricity use associated with its water treatment is included in the electricity use for Escondido. The electricity and GHG emissions have been subtracted from the electricity category, as they are accounted for in this water category.

For water distribution emissions, potable water used by Escondido was multiplied by the energy intensity for local water distribution and the SDG&E electricity emission factor. The electricity and GHG emissions associated with water distribution occur within the City boundary and have been subtracted from the electricity category, as they are accounted for in this water category.

In addition to providing potable water, the City also produces and delivers recycled water. The recycled water is treated at the City's Hale Avenue Resource Recovery Facility (HARRF). In addition to customers within Escondido, the City also provides recycled water to Rincon MWD customers and the Palomar Energy Center. The recycled water energy intensity of 588 kWh/acre-foot based on a regional analysis for the North San Diego Water Reuse Coalition (NSDWRC) is used as proxy for the City.[45] Because the HARRF is in the City, the electricity use associated with recycled water treatment is included in the electricity use for Escondido. The electricity and GHG emissions have been subtracted from the electricity category, as they are accounted for in this water category.

In 2012, 93% of the GHG emissions in the water category were from upstream supply and conveyance. The breakdown of emissions for the water category is given in Figure 6.

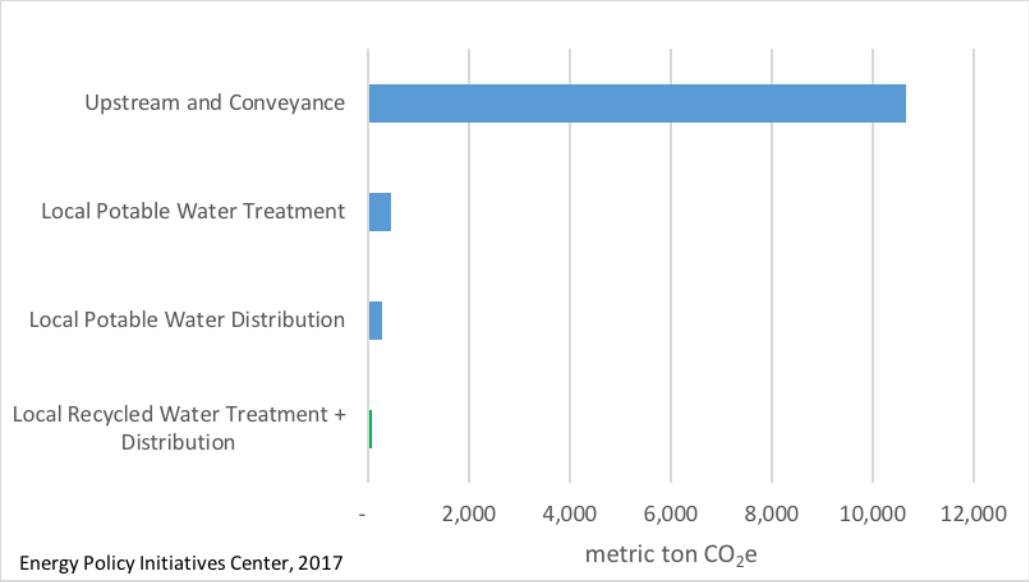


Figure 6 Emissions from the Water Category by Water System Segment (Escondido, 2012)

The total potable and recycled water supplied, as well as the corresponding GHG emissions from the water category for the years 2012–2014 are given in Table 14.

[45] City of Escondido is a member of the NSDWRC, which is a coalition of water and wastewater agencies in the Northern San Diego County. Escondido 2015 Urban Water Management Plan (June 2016), Section 5 and Section 9.3 Water Sector Energy Intensity.

Table 14 Water Supplied and GHG Emissions from the Water Category (Escondido, 2012–2014)

Year	Potable Water Supplied (Acre-Feet)	Recycled Water Supplied (Acre-Feet)	GHG Emissions (MT CO_2e)
2012	23,698	401	11,000
2013	24,266	565	12,000
2014	24,047	626	13,000
GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. Energy Policy Initiatives Center, 2018.			

Emissions associated with water end-use, such as water heating and cooling, are included in the electricity and natural gas category, and not in this water category, as data are not available to separate out those values.

4.7 Wastewater

The emissions from wastewater generated by Escondido were estimated by multiplying the total amount of wastewater generated in a given year with the emission factor of the wastewater treatment processes.

The City owns and operates its own wastewater treatment and disposal facility, HARRF. HARRF treats wastewater from the City of Escondido, as well as the City of San Diego's Rancho Bernardo community. The wastewater treatment emission factor at HARRF was not available; therefore, the emission factor at Encina Water Pollution Control Facility (Encina WPCF) was used as a proxy. The wastewater treatment GHG emissions and total wastewater flow for the Encina WPCF were provided by the Encina Wastewater Authority. In 2013, the Encina WPCF treated an average of 22.8 million gallons per day (MGD) with annual 11,359 MT CO_2e emissions. This resulted in an emission factor of 1.37 MT CO_2e/million gallons treated, which consists of emissions from: 1) stationary combustion of anaerobic digester gas; 2) process emissions from wastewater treatment with nitrification and denitrification; and 3) direct anaerobic digester gas. The wastewater emission factor derived from the Encina WPCF was applied to all wastewater flow in the City of Escondido. As similar data were not available for the other years, the emission factor was used as an estimate for all inventory years. The direct CO_2 from combustion of anaerobic digester gas is considered biogenic, while the other two components of CO_2 emissions are considered non-biogenic emissions.

The total wastewater treated at the centralized wastewater treatment plant, as well as the corresponding GHG emissions are given Table 15.[46]

Table 15 Wastewater Generated and Treated at Centralized Treatment Plant (Escondido, 2012–2014)

Year	Total Wastewater Generated (Million Gallons/year)	GHG Emissions (MT CO_2e)
2012	3,675	5,034
2013	3,587	4,914
2014	3,443	4,717

[46] 2010–2015 wastewater (million gallons) flow from the City to HARRF was provided by City staff (March 2017).

In addition to wastewater collected and treated at the centralized treatment plant, approximately 1,500 homes (4,800 persons) within the City are on septic systems,[47] the commonly used on-site wastewater treatment systems.[48] The GHG emissions were estimated based on Method WW.11 (Methane Emissions from Septic Systems) from the U.S. Community Protocol. CH_4 emissions were calculated based on the total population served by septic systems (4,800) and a septic system CH_4 emissions factor (10.7 grams CH_4/person/day).[49]

The total GHG emissions from the wastewater category are provided in Table 16.

Table 16 GHG Emissions from Wastewater Category (Escondido, 2012–2014)

Year	GHG Emissions from Centralized Wastewater Treatment (MT CO_2e)	GHG Emissions from Septic Systems (MT CO_2e)	Total GHG Emissions (MT CO_2e)
2012	5,034	469	6,000
2013	4,914	469	5,000
2014	4,717	469	5,000
GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. CARB, 2017; City of San Diego, 2017; Energy Policy Initiatives Center, 2018.			

5 BUSINESS-AS-USUAL GHG EMISSIONS PROJECTIONS

To inform the development of GHG reduction strategies within a jurisdiction's Climate Action Plan (CAP), GHG emissions are projected using the baseline year from the GHG inventory, as well as estimates for population, housing, and job growth. This is used to develop a business-as-usual (BAU) projection, which demonstrates emissions growth in the absence of any new policies and programs. The latest year with available data may be different for different inventory categories. Next, emissions from federal and State policies and programs are applied in the future, creating a legislatively-adjusted BAU. Figure 7 provides an illustrative example of the difference between a BAU and a legislatively-adjusted BAU. Only the BAU projection is discussed in this document; GHG reductions from the policies and programs included in the legislatively-adjusted BAU are considered later in the climate action planning process.

[47] The number of septic systems were estimated by City staff. From 2012 to 2014, on average the City has 3.2 persons per household based on the SANDAG Demographic & Socio-Economic Estimates (March 8, 2017 Version).
[48] U.S. Environmental Protection Agency (EPA), Septic Systems. For a septic system, wastewater is treated through physical settling and biological activities only.
[49] CARB: Documentation of California's Greenhouse Gas Inventory (8th Edition) (2015). IPCC 4D1 Domestic Wastewater Treatment and Discharge: Septic Systems.

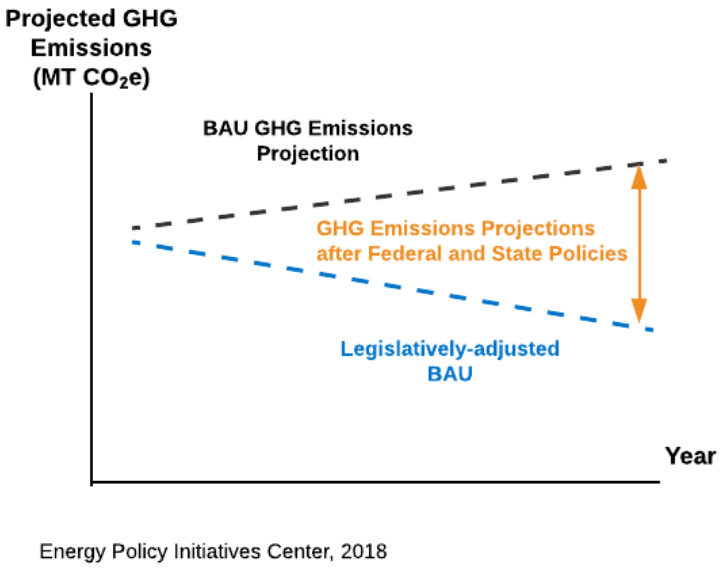
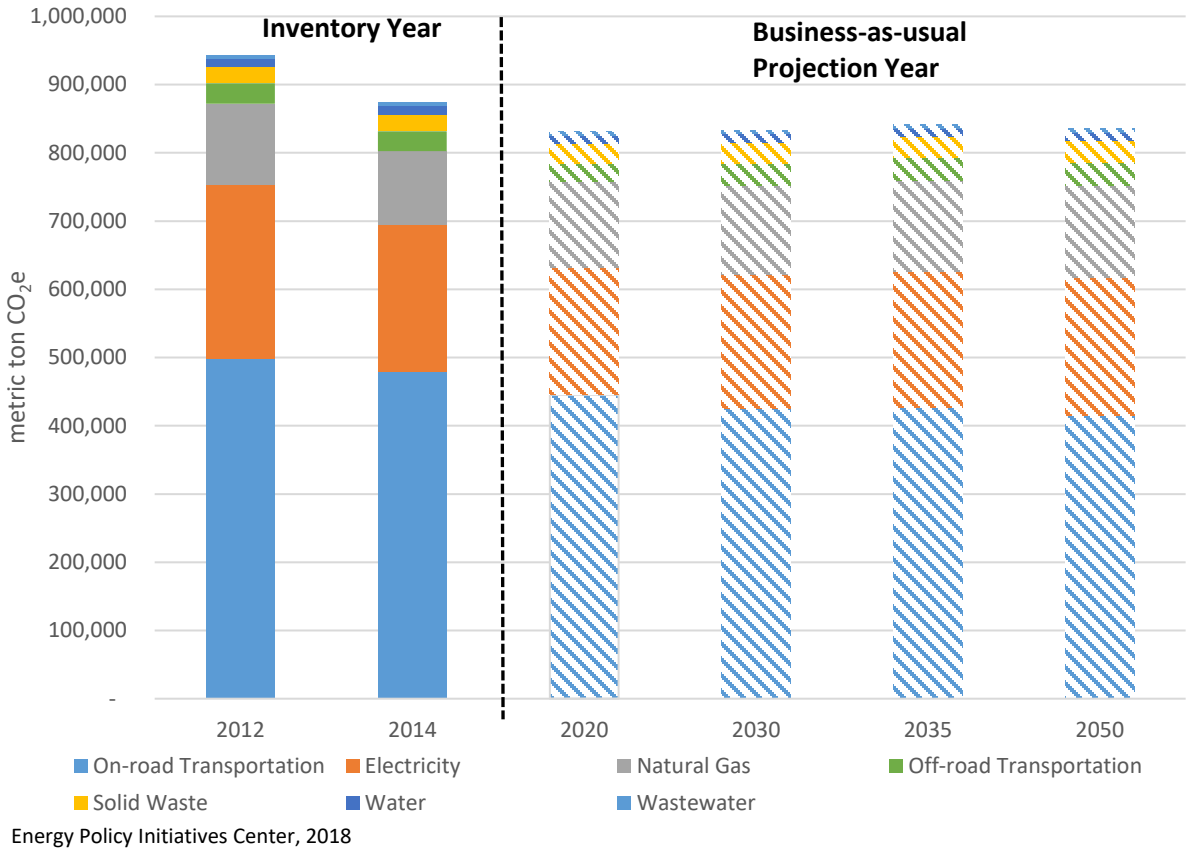


Figure 7 Illustrative Example Only: BAU and Legislatively-adjusted BAU Emissions Projections

Section 5.1 provides a summary of the BAU emissions projections for years 2020, 2030, 2035, and 2050, and Section 5.2 provides the projection methodologies used for each category.

5.1 Emissions Projections for 2020, 2030, 2035, and 2050

The total GHG emissions in 2020 are projected to be 831,000 MT CO_2e, 12% lower than the 2012 emissions level and 5% lower than the 2014 emissions level. The total GHG emissions in 2030, 2035, and 2050 are projected to be approximately 833,000 MT CO_2e, 842,000 MT CO_2e, and 836,000 MT CO_2e respectively. Figure 8 below shows a comparison of the emissions breakdown by category for the inventory years (2012 and 2014) and projection years (2020, 2030, 2035, and 2050).



Energy Policy Initiatives Center, 2018

Figure 8 BAU GHG Emissions Projections (Escondido, 2020, 2030, 2035, and 2050)

As shown in Figure 8, the on-road transportation category contributes the most to the overall emissions in each projection year. Emissions from on-road transportation are expected to decline through 2025 and then rise again but are not projected to be higher than the on-road transportation emissions in 2012 and 2014. One of the reasons for the decline of on-road transportation emissions is likely due to the decline of average vehicle emission rates as newer, more efficient vehicles replace old vehicles in the region. The total and distribution of projected emissions by category are presented in Table 17.

Table 17 Projected Total and Category-GHG Emissions in Escondido (2020, 2030, 2035, and 2050)

Year	Projected GHG Emissions (MT CO_2e)							
	On-Road Transportation	Electricity	Natural Gas	Solid Waste	Off-Road Transportation	Water	Wastewater	Total
2020	445,000	187,000	126,000	30,000	26,000	11,000	6,000	831,000
2030	425,000	196,000	131,000	31,000	32,000	12,000	6,000	833,000
2035	427,000	199,000	133,000	31,000	33,000	12,000	6,000	842,000
2050	415,000	203,000	135,000	31,000	34,000	12,000	6,000	836,000

Sum may not add up to totals due to rounding.
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.
Energy Policy Initiatives Center, 2018

5.2 Methods to Project GHG Emissions

The SANDAG Series 13 Regional Growth Forecast was used as the basis of population and job growth in Escondido, as shown in Table 18.[50] The methods used to project future emissions are provided below for each emissions category.

Table 18 SANDAG Population and Job Growth Forecast (Escondido, 2020, 2030, 2035, and 2050)

Year	Population	Commercial Jobs	Industrial Jobs
2020	165,214	44,227	9,060
2030	172,332	46,702	9,214
2035	172,892	48,224	9,314
2050	173,625	49,532	9,361

SANDAG, 2013; Energy Policy Initiatives Center, 2018.

5.2.1 On-Road Transportation

Average weekday O-D VMT forecast for each trip type in 2020, 2030, 2035, and 2050 were provided by SANDAG based on its Series 13 activity-based model, as shown in Table 19 (see Appendix A for the original data tables provided).[51]

[50] Population and jobs data are from the SANDAG Series 13 Regional Growth Forecast (Updated in October 2013). The number of jobs is for civilian jobs only and do not include military jobs. Industrial jobs include the job categories construction and manufacturing. Commercial jobs include all job categories except agriculture, construction and manufacturing. SANDAG Data Surfer, accessed on November 15, 2017.
[51] Series 13 2020, 2030, 2035, and 2050 VMT average weekday projections were provided by SANDAG (March 23, 2017 and November 7, 2017). Original data tables provided by SANDAG are in Appendix A.

Table 19 Projected O-D VMT and Trip Types (Escondido, 2020, 2030, 2035, and 2050)

Trip Type (miles/average weekday)	2020	2030	2035	2050
Internal-Internal	646,168	650,422	675,570	639,253
Internal-External/External-Internal	4,932,304	5,171,618	5,186,164	5,064,096
External-External* (Information only, excluded from VMT and GHG calculations)	1,143,650	1,258,382	1,305,508	1,403,432
*Miles from External-External trips are the portion within the City boundary, not the entire trip. SANDAG, 2018.				

To convert VMT of each type to total VMT, the method discussed in Section 4.1 was used. The VMT was multiplied by the adjusted average vehicle emission rate derived from EMFAC2014 for each projection year. Two adjustments were made to the EMFAC2014 emission rates for the projections: 1) the electric vehicle penetration rate in 2016 was kept constant for all projection years;[52] and 2) for all new vehicles entering the fleet after 2016, the emission rates are equal to the emission rates of new model year 2016 vehicles with the same vehicle class and fuel type.[53]

The projected total VMT, average vehicle emission rates, and corresponding GHG emissions from the on-road transportation category are given in Table 20.

Table 20 Projected VMT, Average Vehicle Emission Rate and GHG Emissions from On-Road Transportation Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected Total VMT		Average Vehicle Emission Rate (g CO_2e/mile)	Projected GHG Emissions (MT CO_2e)
	Average Weekday Miles	Average Annual Miles		
2020	3,112,320	1,079,974,943	412	450,000
2030	3,236,231	1,122,972,282	379	430,000
2035	3,268,652	1,134,222,071	377	431,000
2050	3,171,301	1,100,441,424	377	419,000
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. CARB, 2015; SANDAG, 2018; Energy Policy Initiatives Center, 2018.				

As newer, more efficient vehicles replace older, less efficient vehicles in the region, the average vehicle emission rate decreases.

5.2.2 Electricity

Electricity use in the City was projected separately for the residential, commercial and industrial customer classes. For the residential customer class, the per-capita electricity use (metered electricity sales) in 2016 (1,733 kWh/person/year), the latest year with available SDG&E data, was calculated by

[52] This uses a fixed 2016 electric vehicle penetration rate of about 2% of light duty vehicles instead of using the estimated impact of the state Zero Emission Vehicle (ZEV) program on BAU emissions. The 2016 electric vehicle penetration rate is based on EMFAC2014 Technical Documentation, Section 3.2.2.4.3. The ZEV program requires auto manufacturers to make and sell ZEVs that will increase VMTs driven by ZEVs.

[53] This uses a fixed actual emission rate of the new 2016 models instead of the effect of adopted federal and state vehicle efficiency standards 2017–2025 for light-duty and heavy-duty vehicles.

dividing the total electricity sales in the residential class by the population in 2016. The per-capita electricity use is held constant and used to project BAU total electricity use for a future year by multiplying by the SANDAG Series 13 population forecast for the future year. The projected total electricity use was multiplied by the City-specific electricity emission factor in 2016 (560 lbs CO_2e/MWh), held constant, for a projected total GHG emission. The City-specific electricity emission factor in 2016 is significantly lower than that of 2012 and 2014 because SDG&E has since reached 43% renewable energy in its power mix.[54]

A similar method was used for the commercial and industrial class. The total commercial BAU electricity use was projected based on Series 13 commercial job growth and the per-commercial job electricity consumption in 2016 (7,666 kWh/commercial job/year) held constant for all future years. The total industrial BAU electricity use was projected based on Series 13 industrial job growth and the per-industrial job electricity consumption in 2016 (7,144 kWh/industrial job/year) held constant for all future years.

The total projected net energy for load (electricity sales + transmission and distribution losses) and corresponding GHG emissions from the electricity category are given in Table 21.[55]

Table 21 Projected Net Energy for Load and GHG Emissions from the Electricity Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected Net Energy for Load (electricity sales + losses) (MWh)	Projected GHG Emissions (MT CO_2e)
2020	736,869	187,000
2030	771,497	196,000
2035	785,790	199,000
2050	798,241	203,000
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.		

5.2.3 Natural Gas

The projection method for the natural gas category is similar to that for the electricity category. The natural gas use in residential, commercial and industrial classes are calculated separately. The per-capita residential natural gas consumption (80 therms/person/year), per-commercial job natural gas consumption (170 therms/commercial job/year), and per-industrial job natural gas consumption (264 therms/industrial job/year) in 2016 were held constant with Series 13 population and job growth for the BAU projection. The natural gas emission factor used in Section 4.3 was held constant for future years. The projected total natural gas use and corresponding GHG emissions from the natural gas category are given in Table 22.

[54] 2016 renewable content in SDG&E bundled power is based on SDG&E's 2016 power source disclosure report submitted to the California Energy Commission (CEC). The 2016 report was provided by CEC staff to EPIC in July 2017.
[55] The net energy for load of each future year is adjusted using the method described in Section 4.2. The net energy for load does not include self-serve renewable supply, such as electricity generation from behind-the-meter PV systems.

Table 22 Projected Natural Gas Use and GHG Emissions from Natural Gas Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected Total Natural Gas Use (Million Therms)	Projected GHG Emissions (MT CO_2e)
2020	23.1	126,000
2030	24.1	131,000
2035	24.5	133,000
2050	24.7	135,000
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. Energy Policy Initiatives Center, 2018.		

5.2.4 Off-Road Transportation

In the off-road transportation category, the direct output of OFFROAD2007 (lawn and garden equipment and light commercial equipment), RV2013 model (recreational equipment), and diesel-fueled portable equipment for the San Diego region were used and scaled down to Escondido based on the scaling factor as determined in Section 4.4. For the construction and industrial equipment sub-category, the In-Use Off-Road Equipment 2011 Inventory does not include emissions outputs after 2030. For the projection years 2020 and 2030, the direct output for the San Diego region from the model was used and scaled down to Escondido. For the years 2035 and 2050, the emissions were estimated based on the commercial and industrial job growth. The projected total and sub-category off-road transportation emissions are given Table 23.

Table 23 Projected GHG Emissions from Off-Road Transportation Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected GHG Emissions (MT CO_2e)						
	Recreational Equipment	Lawn and Garden Equipment	Light Commercial Equipment	Construction and Mining	Industrial	Diesel-Fueled Portable Equipment	Total
2020	235	4,206	3,222	14,832	876	2,362	26,000
2030	277	4,720	3,400	19,707	1,030	2,845	32,000
2035	291	4,934	3,498	20,071	1,042	3,130	33,000
2050	293	5,150	3,391	20,401	1,047	3,435	34,000
Only total GHG emissions are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. CARB, 2007, 2011, 2013 and 2017; Energy Policy Initiatives Center, 2018.							

5.2.5 Solid Waste

The BAU solid waste disposal by Escondido was projected using the population growth and the per-capita solid waste disposed in 2016 (2.7 kg/person/day), held constant for future years, to be consistent with other categories. The projected emissions from the disposal were calculated by multiplying the disposal amount with the emission factor for mixed solid waste, provided in Section 4.5. The projected total waste disposal and corresponding GHG emissions from the solid waste category are given in Table 24.

Table 24 Projected Solid Waste Disposal and GHG Emissions from Solid Waste Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected Solid Waste Disposal (MT)	Projected GHG Emissions (MT CO_2e)
2020	161,248	30,000
2030	168,196	31,000
2035	168,742	31,000
2050	169,458	31,000
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. Energy Policy Initiatives Center, 2018.		

5.2.6 Water

The total water use for all BAU projection years was based on the fixed 2015 per-capita water use (as 2016 per-capita water use was not available) and Series 13 projected population growth. It is assumed that the current percentage of water from each supply source (SDCWA untreated water and local surface water) remains unchanged for the BAU projection. It is also assumed that no new recycled water sources or new potable water sources are developed under the BAU projection.

The per-capita potable water supplied in 2015 was 117 gallons/person/day, significantly lower than the amounts in 2012 and 2014 (144 gallons/person/day). The recycled water supplied in 2015, 531 acre-foot, was held constant for all projection years. The energy intensity for each segment of the water system (Table 13) and the electricity emission factor were held constant for all projection years. The projected total water supply and corresponding GHG emissions from the water category are given in Table 25.

Table 25 Projected Potable Water and GHG Emissions from the Water Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected Potable Water Supply (Acre-Feet)	Projected Recycled Water Supply (Acre-Feet)	Projected GHG Emissions (MT CO_2e)
2020	21,739	531	11,000
2030	22,675	531	12,000
2035	22,749	531	12,000
2050	22,845	531	12,000
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation. Energy Policy Initiatives Center, 2018.			

5.2.7 Wastewater

The total wastewater generation for all BAU projection years was based on the fixed 2015 per-capita wastewater generation use (62 gallons/person/day, as 2016 per-capita was not available) and Series 13 projected population growth. The emission factor derived from data based on the Encina Wastewater Authority (Section 4.7) was held constant for all projection years. It is assumed that the 1,500 homes that currently have on-site septic systems for wastewater treatment still use the systems and no new homes use septic systems in future years under the BAU projection.

The projected total wastewater treated at the centralized WWTP and the GHG emissions from the wastewater category are given Table 26.

Table 26 Projected Wastewater Generated and GHG Emissions from the Wastewater Category (Escondido, 2020, 2030, 2035, and 2050)

Year	Projected Wastewater treated at Centralized WWTP (Million Gallons)	Projected GHG Emissions from Centralized Wastewater Treatment (MT CO_2e)	Projected GHG Emissions from Septic Systems (MT CO_2e)	Projected GHG Emissions (MT CO_2e)
2020	3,726	5,104	469	6,000
2030	3,886	5,324	469	6,000
2035	3,899	5,342	469	6,000
2050	3,915	5,364	469	6,000
Projected GHG emissions for each category are rounded to the nearest thousands. Values are not rounded in the intermediary steps in the calculation.				

Appendix A. ESCONDIDO VMT BY TRIP TYPE

Average weekday VMT data tables were provided by SANDAG (from SANDAG ABM Series 13, Release 13.3.0). Revenue Constrained refers to the transportation network scenario adopted in San Diego Forward: The 2015 Regional Plan.[56] Emphasis (red squares and text) was added by EPIC.

2012 Base Year

JURISDICTION	TOTAL VMT	TOTAL City of Escondido VMT	Two Trip End City of Escondido VMT	One Trip End City of Escondido VMT	NON-City of Escondido VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E - E
CARLSBAD TOTAL	3,112,152	53,042	-	53,042	3,059,110
CHULA VISTA TOTAL	3,516,790	9,915	-	9,915	3,506,875
CORONADO TOTAL	403,272	860	-	860	402,412
DEL MAR TOTAL	77,408	1,034	-	1,034	76,374
EL CAJON TOTAL	1,895,381	5,250	-	5,250	1,890,131
ENCINITAS TOTAL	1,798,580	13,755	-	13,755	1,784,825
ESCONDIDO TOTAL	2,644,325	1,558,336	588,461	969,875	1,085,989
External TOTAL	173,565	2,312	-	2,312	171,253
IMPERIAL BEACH TOTAL	92,302	63	-	63	92,239
LA MESA TOTAL	1,529,813	4,928	-	4,928	1,524,885
LEMON GROVE TOTAL	790,802	633	-	633	790,169
NATIONAL CITY TOTAL	1,545,814	7,043	-	7,043	1,538,771
OCEANSIDE TOTAL	2,675,329	89,111	-	89,111	2,586,218
POWAY TOTAL	868,020	32,427	-	32,427	835,593
SAN DIEGO TOTAL	36,928,711	1,454,531	-	1,454,531	35,474,180
SAN MARCOS TOTAL	1,838,277	573,853	-	573,853	1,264,424
SANTEE TOTAL	947,195	11,584	-	11,584	935,611
SOLANA BEACH TOTAL	603,987	2,649	-	2,649	601,338
Unincorporated TOTAL	16,372,880	1,356,289	-	1,356,289	15,016,591
VISTA TOTAL	1,610,610	173,891	-	173,891	1,436,719
REGIONWIDE TOTAL	79,425,213	5,351,506	588,461	4,763,045	74,073,707

Figure A-1 Estimated Escondido 2012 VMT by Trip Type

2014 Estimates

JURISDICTION	TOTAL VMT	TOTAL City of Escondido VMT	Two Trip End City of Escondido VMT	One Trip End City of Escondido VMT	NON-City of Escondido VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E - E
CARLSBAD TOTAL	3,203,488	52,597	-	52,597	3,150,891
CHULA VISTA TOTAL	3,692,997	9,703	-	9,703	3,683,294
CORONADO TOTAL	411,739	918	-	918	410,821
DEL MAR TOTAL	78,343	1,066	-	1,066	77,277
EL CAJON TOTAL	1,995,802	5,266	-	5,266	1,990,536
ENCINITAS TOTAL	1,847,350	13,301	-	13,301	1,834,049
ESCONDIDO TOTAL	2,773,383	1,546,160	576,309	969,851	1,227,223
External TOTAL	207,246	2,724	-	2,724	204,522
IMPERIAL BEACH TOTAL	92,994	76	-	76	92,918
LA MESA TOTAL	1,574,973	4,642	-	4,642	1,570,331
LEMON GROVE TOTAL	826,374	590	-	590	825,784
NATIONAL CITY TOTAL	1,587,714	6,669	-	6,669	1,581,045
OCEANSIDE TOTAL	2,812,792	90,598	-	90,598	2,722,194
POWAY TOTAL	875,057	32,808	-	32,808	842,249
SAN DIEGO TOTAL	37,907,376	1,439,716	-	1,439,716	36,467,660
SAN MARCOS TOTAL	1,896,873	568,582	-	568,582	1,328,291
SANTEE TOTAL	973,959	11,189	-	11,189	962,770
SOLANA BEACH TOTAL	623,215	2,645	-	2,645	620,570
Unincorporated TOTAL	17,593,241	1,373,114	-	1,373,114	16,220,127
VISTA TOTAL	1,667,838	174,785	-	174,785	1,493,053
REGIONWIDE TOTAL	82,642,754	5,337,149	576,309	4,760,840	77,305,605

Figure A-2 Estimated Escondido 2014 VMT by Trip Type

[56] San Diego Forward: The 2015 Regional Plan was adopted by the SANDAG Board of Directors on October 9, 2015.

2020 Revenue Constrained					
JURISDICTION	TOTAL VMT	TOTAL City of Escondido VMT	Two Trip End City of Escondido VMT	One Trip End City of Escondido VMT	NON-City of Escondido VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E
CARLSBAD TOTAL	3,472,327	54,956	-	54,956	3,417,371
CHULA VISTA TOTAL	4,092,102	9,869	-	9,869	4,082,233
CORONADO TOTAL	412,772	752	-	752	412,020
DEL MAR TOTAL	75,193	944	-	944	74,249
EL CAJON TOTAL	1,999,957	5,249	-	5,249	1,994,708
ENCINITAS TOTAL	1,881,627	12,894	-	12,894	1,868,733
ESCONDIDO TOTAL	2,805,409	1,661,759	646,168	1,015,591	1,143,650
External TOTAL	194,117	2,434	-	2,434	191,683
IMPERIAL BEACH TOTAL	91,844	56	-	56	91,788
LA MESA TOTAL	1,596,128	4,609	-	4,609	1,591,519
LEMON GROVE TOTAL	822,920	569	-	569	822,351
NATIONAL CITY TOTAL	1,620,907	6,851	-	6,851	1,614,056
OCEANSIDE TOTAL	2,854,499	86,703	-	86,703	2,767,796
POWAY TOTAL	925,978	34,034	-	34,034	891,944
SAN DIEGO TOTAL	39,019,437	1,470,663	-	1,470,663	37,548,774
SAN MARCOS TOTAL	1,971,319	604,019	-	604,019	1,367,300
SANTEE TOTAL	1,027,915	11,628	-	11,628	1,016,287
SOLANA BEACH TOTAL	643,319	2,947	-	2,947	640,372
Unincorporated TOTAL	17,470,061	1,433,986	-	1,433,986	16,036,075
VISTA TOTAL	1,666,374	173,550	-	173,550	1,492,824
REGIONWIDE TOTAL	84,644,205	5,578,472	646,168	4,932,304	79,065,733

Figure A-3 Projected Escondido 2020 VMT by Trip Type

2030 Revenue Constrained					
JURISDICTION	TOTAL VMT	TOTAL City of Escondido VMT	Two Trip End City of Escondido VMT	One Trip End City of Escondido VMT	NON-City of Escondido VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E - E
CARLSBAD TOTAL	3,612,571	56,248	-	56,248	3,556,323
CHULA VISTA TOTAL	4,707,744	11,916	-	11,916	4,695,828
CORONADO TOTAL	420,504	725	-	725	419,779
DEL MAR TOTAL	76,025	1,027	-	1,027	74,998
EL CAJON TOTAL	2,161,077	5,927	-	5,927	2,155,150
ENCINITAS TOTAL	1,924,315	12,522	-	12,522	1,911,793
ESCONDIDO TOTAL	2,972,011	1,713,629	650,422	1,063,207	1,258,382
External TOTAL	222,083	2,738	-	2,738	219,345
IMPERIAL BEACH TOTAL	95,177	61	-	61	95,116
LA MESA TOTAL	1,755,104	4,872	-	4,872	1,750,232
LEMON GROVE TOTAL	867,490	491	-	491	866,999
NATIONAL CITY TOTAL	1,777,980	7,692	-	7,692	1,770,288
OCEANSIDE TOTAL	3,048,427	97,904	-	97,904	2,950,523
POWAY TOTAL	966,180	35,196	-	35,196	930,984
SAN DIEGO TOTAL	41,736,278	1,502,520	-	1,502,520	40,233,758
SAN MARCOS TOTAL	2,215,056	661,113	-	661,113	1,553,943
SANTEE TOTAL	1,097,287	11,937	-	11,937	1,085,350
SOLANA BEACH TOTAL	667,909	2,748	-	2,748	665,161
Unincorporated TOTAL	19,108,612	1,504,590	-	1,504,590	17,604,022
VISTA TOTAL	1,829,342	188,184	-	188,184	1,641,158
REGIONWIDE TOTAL	91,261,172	5,822,040	650,422	5,171,618	85,439,132

Figure A-4 Projected Escondido 2030 VMT by Trip Type

2035 Revenue Constrained

JURISDICTION	TOTAL VMT	TOTAL City of Escondido VMT	Two Trip End City of Escondido VMT	One Trip End City of Escondido VMT	NON-City of Escondido VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E
CARLSBAD TOTAL	3,668,094	56,594	-	56,594	3,611,500
CHULA VISTA TOTAL	4,783,453	12,701	-	12,701	4,770,752
CORONADO TOTAL	414,244	805	-	805	413,439
DEL MAR TOTAL	74,771	900	-	900	73,871
EL CAJON TOTAL	2,198,458	5,690	-	5,690	2,192,768
ENCINITAS TOTAL	1,951,056	12,462	-	12,462	1,938,594
ESCONDIDO TOTAL	3,050,942	1,745,434	675,570	1,069,864	1,305,508
External TOTAL	234,505	2,891	-	2,891	231,614
IMPERIAL BEACH TOTAL	99,513	62	-	62	99,451
LA MESA TOTAL	1,785,371	4,717	-	4,717	1,780,654
LEMON GROVE TOTAL	864,461	574	-	574	863,887
NATIONAL CITY TOTAL	1,772,554	7,862	-	7,862	1,764,692
OCEANSIDE TOTAL	3,136,145	99,104	-	99,104	3,037,041
POWAY TOTAL	990,763	35,680	-	35,680	955,083
SAN DIEGO TOTAL	42,048,607	1,449,034	-	1,449,034	40,599,573
SAN MARCOS TOTAL	2,248,294	677,128	-	677,128	1,571,166
SANTEE TOTAL	1,108,219	11,589	-	11,589	1,096,630
SOLANA BEACH TOTAL	666,221	2,507	-	2,507	663,714
Unincorporated TOTAL	19,851,083	1,543,391	-	1,543,391	18,307,692
VISTA TOTAL	1,882,346	192,609	-	192,609	1,689,737
REGIONWIDE TOTAL	92,829,100	5,861,734	675,570	5,186,164	86,967,366

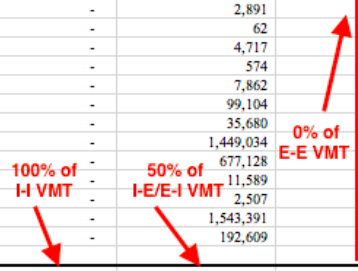


Figure A-5 Projected Escondido 2035 VMT by Trip Type

2050 Revenue Constrained

JURISDICTION	TOTAL VMT	TOTAL City of Escondido VMT	Two Trip End City of Escondido VMT	One Trip End City of Escondido VMT	NON-City of Escondido VMT
		I-I, I-E and E-I	I-I	I-E and E-I	E-E
CARLSBAD TOTAL	3,704,263	51,482	-	51,482	3,652,781
CHULA VISTA TOTAL	5,166,857	10,859	-	10,859	5,155,998
CORONADO TOTAL	373,132	579	-	579	372,553
DEL MAR TOTAL	76,244	768	-	768	75,476
EL CAJON TOTAL	2,334,183	5,333	-	5,333	2,328,850
ENCINITAS TOTAL	1,998,017	10,445	-	10,445	1,987,572
ESCONDIDO TOTAL	3,114,735	1,711,303	639,253	1,072,050	1,403,432
External TOTAL	288,176	3,051	-	3,051	285,125
IMPERIAL BEACH TOTAL	94,796	67	-	67	94,729
LA MESA TOTAL	1,917,041	4,784	-	4,784	1,912,257
LEMON GROVE TOTAL	995,434	703	-	703	994,731
NATIONAL CITY TOTAL	1,861,500	7,907	-	7,907	1,853,593
OCEANSIDE TOTAL	3,160,389	97,017	-	97,017	3,063,372
POWAY TOTAL	1,053,962	35,720	-	35,720	1,018,242
SAN DIEGO TOTAL	43,463,581	1,385,338	-	1,385,338	42,078,243
SAN MARCOS TOTAL	2,324,131	668,486	-	668,486	1,655,645
SANTEE TOTAL	1,158,599	9,922	-	9,922	1,148,677
SOLANA BEACH TOTAL	683,810	1,909	-	1,909	681,901
Unincorporated TOTAL	21,846,046	1,516,114	-	1,516,114	20,329,932
VISTA TOTAL	1,932,093	181,562	-	181,562	1,750,531
REGIONWIDE TOTAL	97,546,989	5,703,349	639,253	5,064,096	91,843,640

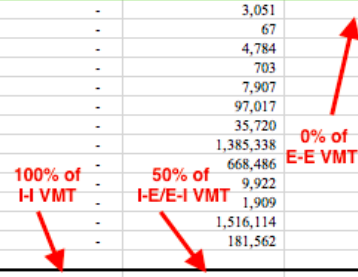


Figure A-6 Projected Escondido 2050 VMT by Trip Type

Appendix B. SOURCE DATA FOR THE SOLID WASTE EMISSION FACTOR

Waste Component	Waste Distribution (%)[1]	Landfill Gas Emissions	
		CH_4 without LFG Recovery (MT CO_2e/short ton)	Source[2]
Paper	16.8%	-	-
Corrugated Containers/Cardboard	*5.0%*	2.36	Exhibit 3-27, WARM v14 Containers /Packaging
Newspaper	*0.8%*	0.95	Exhibit 3-27, WARM v14 Containers /Packaging
Magazine	*0.6%*	1.08	Exhibit 3-27, WARM v14 Containers /Packaging
Mixed Paper (general)	*10.4%*	2.14	Exhibit 3-27, WARM v14 Containers /Packaging
Plastic	8.9%	-	-
Glass	1.7%	-	-
Metal	3.5%	-	-
Organics	38.9%	-	-
Food	*15%*	1.57	Exhibit 1-49, WARM V14 Organic Materials
Tree	*5.3%*	0.77	Exhibit 2-11 WARM V14 Organic Materials
Leaves and Grass	*6.8%*	0.59	Exhibit 2-11 WARM V14 Organic Materials
Trimmings	*3.5%*	0.59	Exhibit 2-11 WARM V14 Organic Materials
Mixed Organics	*8.3%*	0.53	Exhibit 2-11 WARM V14 Organic Materials
Electronics	0.6%	-	-
Construction & Demolition	24.6%	-	-
Household Hazardous Waste	0.2%	-	-
Special Waste	3.1%	-	-
Mixed Residue	1.6%	0.53	
Mixed Waste Emission Factor		**0.744**	

Source: 1) City of San Diego 2014.
2) EPA Waste Reduction Model (WARM) Version 14 (2016)

Appendix B

Greenhouse Gas Emissions Reduction Targets and Measures

Methods for Estimating Greenhouse Gas Emissions Reductions in the Escondido Climate Action Plan

October 2020

Prepared for the City of Escondido

Prepared by the Energy Policy Initiatives Center

EPIC
ENERGY POLICY INITIATIVES CENTER
UNIVERSITY OF SAN DIEGO SCHOOL OF LAW

About EPIC

The Energy Policy Initiatives Center (EPIC) is a non-profit research center of the USD School of Law that studies energy policy issues affecting California and the San Diego region. EPIC's mission is to increase awareness and understanding of energy- and climate-related policy issues by conducting research and analysis to inform decision makers and educate law students.

For more information, please visit the EPIC website at www.sandiego.edu/epic.

Prepared in partnership with the San Diego Association of Governments (SANDAG) and the Roadmap Program. This Program is partially funded by California utility customers and administered by San Diego Gas & Electric Company under the auspices of the California Public Utilities Commission.

Table of Contents

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Figures

1 OVERVIEW

The City of Escondido's Climate Action Plan ("CAP") Greenhouse Gas ("GHG") Reduction Methods (document) provides a summary of the methods used to calculate GHG emissions reductions for the strategies and measures included in the City of Escondido's (referred to as "the City" or "Escondido") CAP.

Section 2 of the document details the emission reduction targets for Escondido in the years 2020, 2030, and 2035. Section 3 provides a summary of emissions reduction estimates from federal and State (California) actions, as well as nine CAP strategies, used to meet 2030 and 2035 targets. Section 4 outlines the common data sources and methods used throughout the document, while Sections 5 and 6 detail the methods used to estimate emissions reductions from each specific strategy and measure.

Unless stated otherwise, all activity data and GHG emissions reported in this document are annual values for the calendar year, and all emission factors reported in this document are annual average values for the calendar year.

1.1 Rounding of Values in Tables and Figures

Rounding is used for the final GHG values within the tables and figures throughout the document. Values are not rounded in the intermediary steps in any calculation. Because of rounding, some totals may not equal the values summed in any table or figure.

2 EMISSION REDUCTION TARGETS

California has a statewide target of reaching the 1990 GHG emissions levels, equal to an annual value of 431 million metric tons of carbon dioxide equivalent (MMT CO_2e), by 2020. At the State level, the emissions reduction target for 2020 can be calculated from any previous year for which a State inventory is available. For example, the State 2020 target is 4 percent below its 2012 inventory value, and 11 percent below its 2005 inventory value. Based on California's long-term climate goals, all state agencies with jurisdiction over sources of GHG emissions were directed to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 targets as set forth in Executive Orders S-3-05 and B-30-15. The State target for 2030 is 40 percent below its 1990 level, or 260 MMT CO_2e.[1] This is equivalent to 42 percent below its 2012 inventory value, and 47 percent below its 2005 value. Similarly, the 2035 goal is 52 percent below its 2012 inventory value. Such equivalencies are illustrated in Figure 1.[2] It is important to note that these mid-term targets are critical to help frame the suite of planning efforts and strategies in clean technology and infrastructure (energy, transportation, agriculture, water, waste management, etc.) needed to continue driving down emissions to meet the 2050 goal of reducing emissions to 80 percent below 1990 levels. Implementing this type of methodology would put the City of track to reach the long-term sector target established by Executive Order S-3-05, to reduce emissions in year 2050 to 80 percent below 1990 levels, although no specific recommendations are made.

[1] AB 32 (Nunez) (Chapter 488, Statutes of 2006): California Global Warming Solutions Act of 2006. SB 32 (Pavley) (Chapter 249, Statutes of 2016): California Global Warming Solutions Act of 2006: emissions limit (2015–2016).

[2] California Air Resources Board (CARB): California Greenhouse Gas Inventory for 2000–2016 (June, 2018), accessed on December 13, 2018.

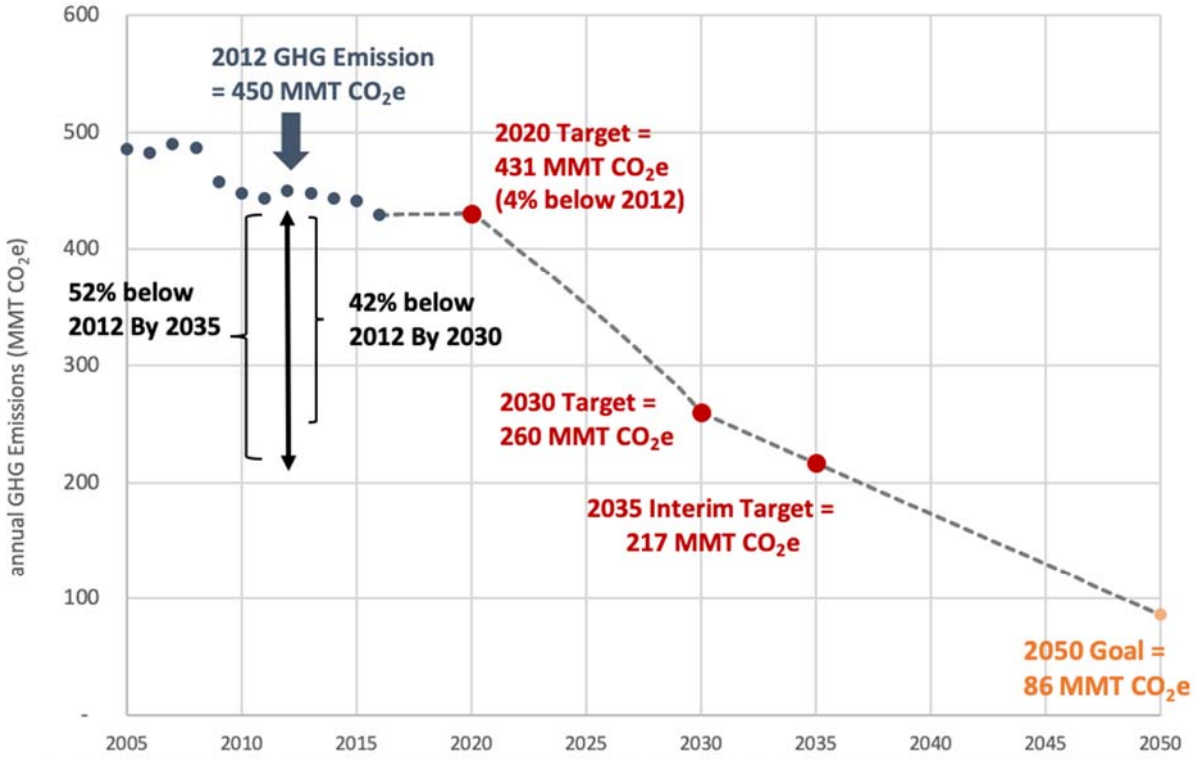


Figure adapted from California's 2017 Climate Change Scoping Plan Figure 6 that shows a linear, straight-line path to the 2030 target.
The 2050 goal is calculated based on 80% below 1990 level (80% below 431 MMT CO2e).
Source: California Air Resources Board California Greenhouse Gas Emission Inventory - 2018 Edition (June 2018).
and 2017 Climate Change Scoping Plan

Figure 1 California Statewide GHG Inventory and Emissions Reduction Targets

The Escondido CAP utilizes a baseline year of 2012 for the purposes of calculating targets. As emissions from transportation account for more than half of the City's total emissions, the inventory year should align with the best available transportation data, which is from 2012. Therefore, the target emissions levels for Escondido are set at 4 percent below the 2012 emissions level by 2020, 42 percent below the 2012 emissions level by 2030, and 52 percent below 2012 emissions level by 2035. These mass reduction targets are consistent with the emissions reduction targets at the State level, explained above.

Table 1 shows the business-as-usual (BAU) emissions projections, which represent emissions levels in the absence of any new policies and programs, targets, as well as CO_2e reductions needed in 2020, 2030, and 2035 to achieve the target levels.[3]

[3] The method to project emissions is provided in *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).

Table 1 Emissions Projections, Targets, and Emissions Reductions Needed

Year	Business-as-usual Projection (MT CO_2e)	Target Emissions Level (% below baseline)	Target Emissions Level (MT CO_2e)	Emissions Reduction Needed to Meet Target (MT CO_2e)
2012	943,000	-	-	-
2020	831,000	-4%	907,000	none
2030	833,000	-42%	547,000	286,000
2035	842,000	-52%	456,000	386,000

Emissions projection and reduction values are rounded.
Energy Policy Initiatives Center 2019.

No local actions are needed for Escondido to reach its 2020 target. A reduction of 286,000 MT CO_2e is needed to meet the 2030 target, and a reduction of 386,000 MT CO_2e is needed to reach the 2035 target. This document focuses on the State and local measures needed to reach the 2030 and 2035 targets. Implementing this plan would help the City achieve its 2035 target consistent with state goals.

3 SUMMARY OF EMISSIONS REDUCTION ESTIMATES

This section summarizes the GHG emissions reductions from strategies and measures included in the Escondido CAP. Table 2 below presents a summary of emissions reductions from the nine local strategies in the Escondido CAP, as well as the reductions from federal and State actions.

Table 2 Summary of 2030 and 2035 GHG Emissions Reduction by Strategy in the Escondido CAP

CAP Strategies	Emissions Reduction (MT CO_2e)	
	2030	2035
Strategy 1: Increase the Use of Zero-Emission or Alternative Fuel Vehicles (T)	4,348	7,021
Strategy 2: Reduce Fossil Fuel Use (T)	6,421	10,584
Strategy 3: Reduce Vehicle Miles Traveled (T)	19,910	36,751
Strategy 4: Increase Building Energy Efficiency (E)	935	1,260
Strategy 5: Increase Renewable and Zero-Carbon Energy (E)	44,992	33,864
Strategy 6: Increase Water Efficiency (W)	53	76
Strategy 7: Diversify Local Water Supply (W)	3,541	3,571
Strategy 8: Reduce and Recycle Solid Waste (S)	23,588	27,405
Strategy 9: Carbon Sequestration and Land Conservation (C)	734	1,049
Total Reduction from Federal and State Regulations	235,062	272,044
Total Reduction (Federal, State and CAP Measures)*	340,000	394,000

T – Transportation, E – Energy, W – Water, S – Solid Waste, and C – Carbon Sequestration
*Total emissions reduction values in 2030 and 2035 are rounded.
Energy Policy Initiatives Center 2019.

Each strategy has several measures. Table 3 presents a detailed summary of the emissions reductions from each CAP measure and from each federal and State action.

Table 3 Summary of 2030 and 2035 GHG Emissions Reductions from Measures in Escondido CAP

CAP Strategies	CAP Measures	Emissions Reduction (MT CO_2e)	
		2030	2035
Strategy 1: Increase the Use of Zero-Emission or Alternative Fuel Vehicles (T)	T-1.1 Transition to a clean and more fuel-efficient municipal fleet	33	33
	T-1.2 Install electric vehicle charging stations at Park and Ride Lots	463	737
	T-1.3 Adopt an ordinance to require electric vehicle charging stations at new developments	3,513	5,732
	T-1.4 Require electric vehicle charging stations at new model home developments	339	520
Strategy 2: Reduce Fossil Fuel Use (T)	T-2.1 Synchronize traffic signals	289	408
	T-2.2 Install Roundabouts	811	1,145
	T-2.3 Increase renewable or alternative fuel construction equipment	5,321	9,032
Strategy 3: Reduce Vehicle Miles Traveled (T)	T-3.1 Participate in the San Diego Association of Governments' iCommute Vanpool Program	837	787
	T-3.2 Improve pedestrian infrastructure at priority areas	44	59
	T-3.3 Continue to implement Safe Routes to School Program at Escondido Union School District	60	82
	T-3.4 Develop a citywide Transportation Demand Management Plan	533	820
	T-3.5 Update Bicycle Master Plan	231	335
	T-3.6 Increase transit commuters among new downtown residents	84	177
	T-3.7 Develop an intra-city shuttle program	4,463	6,540
	T-3.8 Increase transit ridership	7,829	16,875
	T-3.9 Develop and implement a service population-based vehicle miles traveled threshold	5,829	11,075
Strategy 4: Increase Building Energy Efficiency (E)	E-4.1 Require new residential developments to install alternatively-fuel water heaters	629	822
	E-4.2 Require new multi-family residential developments to install electric cooking appliances	143	172
	E-4.3 Reduce electricity use in streetlights	3	3
	E-4.4 Require non-residential alterations and additions to install alternatively-fuel water heaters	160	263
Strategy 5: Increase Renewable and Zero-Carbon Energy (E)	E-5.1 Increase renewable energy generated at municipal facilities	292	745
	E-5.2 Require new commercial developments to achieve zero net energy	1,618	2,668
	E-5.3 Increase grid-supply renewable and/or zero-carbon electricity	42,134	29,486
	E-5.4: Increase renewable electricity generated at school sites	947	965
Strategy 6: Increase Water Efficiency (W)	W-6.1 Reduce municipal landscape water consumption	45	64
	W-6.2 Reduce landscape water consumption at new model home developments	8	12
Strategy 7: Diversify Local Water Supply (W)	W-7.1 Develop a local water supply for agricultural water use	3,541	3,571
Strategy 8: Reduce and Recycle Solid Waste (S)	S-8.1 Increase citywide waste diversion	23,588	27,405
Strategy 9: Carbon Sequestration and Land Conservation (C)	C-9.1 Enforce landscape tree requirements at new developments	183	239
	C-9.2 Develop a citywide Urban Forestry Program	36	48
	C-9.3 Develop an Agricultural Land and Open Space Conservation Program	515	762
Federal and State Regulations	Federal and California Vehicle Efficiency Standards	87,981	103,866
	California Energy Efficiency Programs	16,778	15,836

CAP Strategies	CAP Measures	Emissions Reduction (MT CO_2e)	
		2030	2035
	Renewables Portfolio Standard	79,088	99,932
	California Solar Policy, Programs and 2019 Mandates	51,215	52,411
Total Reduction from Federal and State Regulations		235,062	272,044
Total Reduction from CAP Measures		104,521	121,582
Total Reduction (Federal, State and CAP Measures)*		340,000	394,000
T – Transportation, E – Energy, W – Water, S – Solid Waste, and C – Carbon Sequestration *Total emissions reduction values in 2030 and 2035 are rounded. Energy Policy Initiatives Center 2019.			

Figure 2 provides a visualization of the emissions trend for the CAP horizon year through 2035.

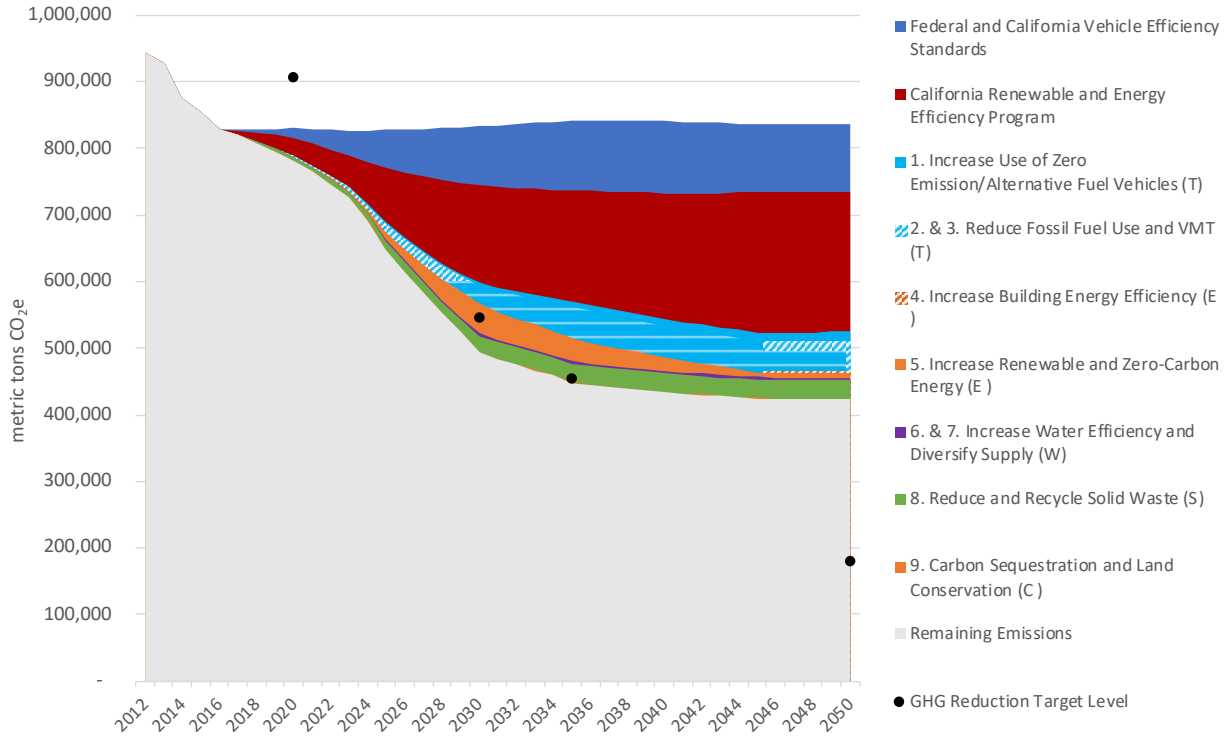


Figure 2 Escondido GHG Emissions Trend (2012–2035)

In Figure 2, the BAU emissions projection is represented along the top of the graph. The black dots represent the target emissions levels in 2020, 2030, and 2035 and the emissions goal in 2050. The colored wedges represent the reduction from each local CAP strategy and from federal and State actions. Each wedge represents the cumulative GHG reduction from each strategy from when the strategy is initiated through 2035. The grey area beneath the colored wedges represents the remaining emissions after all the actions have taken place. As shown in Figure 2, the City meets its 2020, 2030, and 2035 targets with the federal and State actions and local measures identified in the CAP.

4 BACKGROUND AND COMMON ASSUMPTIONS

A set of common assumptions and sources was used to calculate potential emissions reductions for many of the measures included in the CAP. The following section describes the assumptions that are applied to measures related to electricity, natural gas, and on-road transportation. Measures related to other categories do not have common assumptions. The detailed methods and data for each measure are provided in Sections 5 and 6.

4.1 Common Background Data

Table 4 presents a summary of common data used to estimate overall GHG emissions levels and the reduction estimates across several CAP measures.

Table 4 Common Data Used for the Escondido CAP

Year	2012	2030	2035
Population[4]	146,781	172,332	172,892
Labor Force[5]	69,300	79,608	81,903
Vehicle Miles Traveled (VMT) (annual miles)[6]	1,856,972,636	2,020,248,005	2,034,021,525
Electricity Gross Generation (GWh)[7]	762	890	909
VMT projections are based on the SANDAG Series 13 forecast. 2012 is the Series 13 Base Year. Data in 2012 are historical data and data in 2030 and 2035 are the latest available forecasted data. The next version of SANDAG forecast will revised based on updated historical information, market trends, and new housing accommodation requirements provided by the Regional Housing Needs Assessment. Energy Policy Initiatives Center 2019.			

4.2 Common Assumptions and Methods for Calculating Electricity Emissions Reductions

The following overall assumptions and methods are used in the calculation of emissions reductions related to electricity, including both those from federal and State actions and local CAP measures. Details for the calculation of each action are provided in Sections 5 and 6.

4.2.1 GHG Emission Factor for Electricity

The GHG emission factor for electricity for a city, expressed in pounds of CO_2e per megawatt-hour (lbs CO_2e/MWh), is specific to each city and depends upon the sources of electricity supplied to the city.

[4] The 2012 population is from SANDAG's Demographic & Socio-Economic Estimates (March 9, 2017 version). The population in 2030 and 2035 are from SANDAG's Series 13 Regional Growth Forecast (Updated in October 2013). SANDAG Data Surfer, accessed on November 15, 2017. Series 13 has a base year of 2012. Projections from 2012 may differ from more recent estimates by the State, such as from the Department of Finance (DOF).

[5] The 2012 labor force is from the California Employment Development Department (EDD) Database, accessed on August 2, 2019. The 2030 and 2035 labor force are based on the SANDAG Series 13 forecast for civilian jobs estimates in 2030 and 2035, and the ratio of the 2012 labor force and 2012 SANDAG Series 13 civilian jobs estimate (2012 is the forecast base year). SANDAG's Series 13 Regional Growth Forecast (Updated in October 2013). SANDAG Data Surfer, accessed on November 15, 2017.

[6] Based on SANDAG Series 13 Origin-Destination weekday VMT, provided by SANDAG (March 23, 2017 and November 7, 2017). Weekday VMT were converted to annual VMT using the methods described in *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).

[7] Gross generation is the sum of the forecasted utility electricity sales, electricity generated from behind-the-meter PV systems, additional load from electric vehicles and transmission and distribution losses.

Therefore, for the purpose of estimating GHG reductions, the GHG emission factor for electricity in Escondido is the weighted average emission factor of gross generation from four sources of supply: San Diego Gas & Electric (SDG&E), other electric retail suppliers for SDG&E's Direct Access (DA) customers, a local renewables and zero-carbon program, and behind-the-meter photovoltaic (PV) systems. This citywide emission factor is needed to estimate the effects of State actions and local CAP measures that increase the grid-supply of renewable and zero-carbon electricity, as well as the impact of adding behind-the-meter PV systems and increasing building energy efficiency.

The citywide emission factor is calculated based on the percentage of renewable and zero-carbon content in, and the percentage of, gross generation from each source of supply as described below. This method is applied to 2016, the starting year for emissions projections, as well as to each year included in the CAP horizon.[8] As the percentage of renewable and zero-carbon supply in the mix increases, the weighted average emission factor of electricity supply decreases.

4.2.1.1 Supply from SDG&E

SDG&E's power mix includes electricity generated from SDG&E's own power plants and electricity procured by SDG&E (both specified and unspecified sources), known as bundled power. As of 2016, SDG&E's bundled power mix is 43 percent renewable.[9] SDG&E has already met the 2020 mandate of 33 percent renewable energy required by the Renewables Portfolio Standard (RPS) under SB 100 (de León) (Chapter 312, Statutes of 2016).[10] It is assumed that SDG&E will be at 60 percent renewable by 2030 and beyond 73percent renewable by 2035, in line with the mandates in SB 100.[11] These mandates are discussed in Section 5.1.

4.2.1.2 Supply from Electric Retail Suppliers of SDG&E Direct Access Customers

Like SDG&E, electric retail suppliers of SDG&E DA customers are required to meet RPS targets.

4.2.1.3 Supply from Renewables and Zero-Carbon Program

Under CAP Measure E-5.3, the City would present options to the City Council to increase grid-supply renewable and zero-carbon electricity. As of this writing, the City is pursuing a joint, Community Choice Energy feasibility study, with the Cities of San Marcos and Vista, which, if implemented, would accomplish this goal. It is assumed that such a program, Community Choice Energy or other commensurate program, would increase the renewable and zero-carbon electricity to 100 percent in and after 2030, or 40 percent beyond the current RPS mandates for 2030.

The renewable and zero-carbon content of the program would affect the citywide weighted average emission factor. Because the RPS requires all of California's retail electricity suppliers to meet the RPS requirement, a portion of the emissions reduction from RPS compliance is credited to State actions. The remaining portion of reductions, beyond 60 percent in 2030 and 73 percent in 2035, is attributed to the City under Measure E-5.3.

[8] The method to project emissions is provided in the *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).
[9] California Energy Commission (CEC): 2016 Power Content Label San Diego Gas & Electric.
[10] SB 100 (de León) California Renewables Portfolio Standard Program: emissions of greenhouse gases (2017–2018). The interim RPS targets are 44 percent by 2024 and 52percent by 2027 from eligible renewable energy resources.
[11] 73 percent renewable by 2035 target is linearly interpolated between the 60percent renewable mandate by 2030 and the 100 percent renewable and zero-carbon mandate by 2045 under SB 100.

4.2.1.4 Supply from behind-the-meter PV Systems

Electricity generation from behind-the-meter PV systems, including residential and non-residential PV systems, is considered a part of the overall electricity supply. Electricity generation from PV is considered 100 percent zero-carbon (i.e., GHG-free). The State's solar policies and programs, the 2019 California Building Energy Efficiency Standards (Title 24, Part 6) residential PV mandates, and CAP Measure E-5.1*: Increase Renewable Energy Generated at Municipal Facilities,* Measure E-5.2*: Require New Commercial Developments to Achieve Zero Net Energy,* and Measure E-5.4*: Increase Renewable Electricity Generated at School Sites* all increase behind-the-meter PV systems in the City; they are discussed in Section 6.5.

Considering behind-the-meter PV as a source that contributes to the citywide emission factor helps to calculate the effects of energy efficiency programs that may reduce behind-the-meter electricity use, or from additional electric vehicle (EV) charging load, which may come from behind-the-meter electricity sources and not just from grid supply.

4.2.1.5 Weighted Average GHG Emission Factor for Electricity

The weighted average GHG emission factor for electricity is based on the percentage of gross generation from each previously referenced supply, as well as the percentage of renewable and zero-carbon content in each supply.

Table 5 shows the contribution from each supply to gross generation and its renewable and zero-carbon content, as well as the resulting overall citywide annual weighted average emission factors for 2016, 2030, and 2035.

Table 5 2016 and Projected 2030 and 2035 GHG Emission Factor for Electricity in Escondido

Year		2016	2030	2035
Renewables and Zero-Carbon Program	% of Gross Generation Supplied	-	57%	57%
	Zero-Carbon Content in Supply	-	100%	100%
Other Electric Retail Suppliers	% of Gross Generation Supplied	10%	8%	8%
	Renewable Content in Supply	21%	60%	73%
SDG&E	% of Gross Generation Supplied	79%	7%	7%
	Renewable Content in Supply	43%	60%	73%
Behind-the-meter PV	% of Gross Generation Supplied	11%	29%	29%
	Renewable Content in Supply	100%	100%	100%
Overall Citywide	Citywide Renewable and Zero-Carbon Supply	47%	94%	96%
	Electricity Emission Factor (lbs CO_2e/MWh)	486	53	36

2016 is the latest year with utility data available. The 2016 electricity emission factor is used for BAU emissions projections in future years, including 2030 and 2035.
2030 and 2035 data are projections based on CAP assumptions, current status, and future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

In 2016, SDG&E and other electric retail suppliers supplied accounted for 89 percent of the gross generation, and behind-the-meter PV systems supplied the remainder. SDG&E's 2016 bundled emission factor was 525 lbs CO_2e/MWh, resulting in a citywide emission factor of 486 lbs CO_2e/MWh in 2016.[12]

In 2030, the projected electricity supply from behind-the-meter PV systems is estimated to be 29 percent of gross generation. To comply with the 2030 RPS target, the renewable content in the supply of both SDG&E and other electric retail suppliers will increase to 60 percent; this document assumes the renewable supply is fixed at the RPS mandate level to avoid overestimating the emissions reductions from their renewable supplies. The renewables and zero-carbon program (CAP Measure E-5.3) is assumed to have 100 percent renewable and zero-carbon sources in 2030. Based on these supply contributions, the citywide annual weighted electricity emission factor in 2030 is projected to be 253 lbs CO_2e/MWh (94 percent renewable or zero-carbon).[13] Using the same method, the projected overall citywide electricity emission factor in 2035 would be 36 lbs. CO_2e/MWh (94 percent renewable or zero-carbon).

These annual weighted citywide electricity emission factors are used to calculate the GHG reductions from CAP measures that both increase renewable and zero-carbon supply or reduce electricity use.

4.2.2 Allocation of GHG Emissions Reductions from Actions that Increase Renewables in Electricity to State Actions and Local CAP Measures

The projected citywide electricity emission factor is used to estimate the GHG emissions reductions from any measures that increase the overall renewable and zero-carbon supply. The total reduction resulting from State and local CAP measures to increase renewable and zero-carbon supply is given in Table 6. It is calculated using the projected gross generation in target years, as well as the difference in the 2030 and 2035 citywide emissions and BAU emission factors.

Table 6 Emissions Reductions from All Actions Increasing Renewable and Zero-Carbon Supply in Escondido

Year	Gross Generation (GWh)	BAU Projections		Projections with State and Local Actions in Increasing Renewable and Zero-Carbon Supply		Emissions Reduction from Increased Renewable and Zero-Carbon Supply (MT CO_2e)
		BAU Electricity Emission Factor (lbs CO_2e/MWh)	BAU Emissions from Electricity (MT CO_2e)	Projected Electricity Emission Factor (lbs CO_2e/MWh)	Projected Emissions from Electricity (MT CO_2e)	
2030	890	486	196,254	53	21,218	175,036
2035	909	486	200,484	36	14,693	185,791

The projections with increasing renewable and zero-carbon supply are based on CAP assumptions and State policies and programs. Energy Policy Initiatives Center 2019.

The BAU emission factor for 2016 (Table 5) is kept constant through the year 2035, as opposed to using the emission factor for the 2012 baseline year. This is because the additional renewable content in

[12] The SDG&E bundled emission factor is calculated by EPIC and the methodology is reported in the SANDAG Regional Climate Planning Framework (ReCAP) Technical Appendix I, Table 6 (2018).

[13] Starting with SDG&E's 2016 bundled emission factor of 525 lbs CO_2e/MWh (43 percent renewable), the projected 2030 SDG&E and other electric retail provider's emission factor is 368 lbs CO_2e/MWh (60 percent renewable) and the projected 2030 local program emission factor is zero (100 percent renewable or zero-carbon). The 2030 citywide emission factor is then 368 lbs CO_2e/MWh*15 percent.

SDG&E's supply and behind-the-meter PV supply in 2016 are already included in the BAU emissions projection.[14]

The total emissions reduction from increasing renewable and zero-carbon supply, as calculated above (Table 6), is attributed to each supply based on its renewable (or zero-carbon, if beyond the RPS mandate) contribution to the total citywide renewable content. This attribution and impact on GHG reductions from each supply are shown in Table 7.

Table 7 Attribution of Emissions Reductions to Supplies that Increase Renewable and Zero-Carbon Supply in Escondido

Year	Electricity Supply	Total	Renewables and Zero-Carbon Program	Other Electric Retail Suppliers	SDG&E	Behind-the-meter PV
2030	% of Gross Generation Supplied by Renewables and Zero-Carbon Sources	94%	57%	5%	4%	29%
	Emissions Reduction from Increased Renewables and Zero-Carbon Supply (MT CO_2e)	175,036	105,336	8,576	7,310	53,814
2035	% of Gross Generation Supplied by Renewables and Zero-Carbon Sources	96%	57%	6%	5%	29%
	Emissions Reduction from Increased Renewables and Zero-Carbon Supply (MT CO_2e)	185,791	109,209	10,923	9,286	56,373
2030 and 2035 data are the projections based on CAP assumptions and the future impact of State policies and programs. Energy Policy Initiatives Center 2019.						

4.3 Common Assumptions and Methods for Calculating Natural Gas Emissions Reductions

The default emission factor of 0.0054 MT CO_2e per therm is used for all years to estimate the emissions reductions for the CAP measures related to reducing natural gas use.[15]

4.4 Common Assumptions and Methods for Calculating On-Road Transportation Emissions Reductions

The following assumptions and methods are used to calculate emissions reductions for strategies related to on-road transportation, including federal and State actions and local CAP measures.

4.4.1 GHG Emission Factor for On-Road Transportation

The GHG emission factor for on-road transportation, expressed in grams of CO_2e per mile (g CO_2e/mile), is used in several ways throughout the document. It is used to estimate the effect of State actions to increase the vehicle fuel efficiency standard, the impact of reduced VMT, and the effect of State and local actions to increase the miles driven by EVs.

[14] The method to project emissions is provided in the *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).
[15] Emission factor for natural gas is from CARB, Documentation of California's GHG Inventory – Index.

The default outputs of CARB's Mobile Source Emissions Inventory EMFAC2014 model are used to determine the average vehicle emission rates for the San Diego region.[16] The average vehicle emission rates for the San Diego region were used as proxies for Escondido. The EMFAC2014 model outputs include effects of all key federal and State regulations related to tailpipe GHG emissions reductions that were adopted before the model release date in 2015. The regulations embedded in the outputs are:

- For passenger cars and light-duty vehicles – Federal Corporate Average Fuel Economy (CAFE) standards and California Advanced Clean Car (ACC) Program[17]
- For heavy-duty vehicles (heavy-duty trucks, tractors, and buses) – U.S. Environmental Protection Agency's Phase-I GHG Regulation and CARB Tractor-Trailer GHG Regulation[18]

Using the EMFAC2014 default output, the average vehicle emission rates (g CO_2/mile) are calculated based on the distribution of VMT for each vehicle class and its emission rate. The results are adjusted to convert from g CO_2/mile to g CO_2e/mile to account for total GHG emissions, including CO_2, CH_4, and N_2O.[19] The average vehicle emission rates (Table 8) are used to estimate the GHG emissions reduction impact of policies that increase vehicle efficiency and increase the number of zero emission vehicles (ZEVs) on the road.[20]

Table 8 Average Vehicle Emission Rate in the San Diego Region

Year	Average Vehicle Emission Rate–with the Impact of all Adopted State and Federal Policies (g CO_2e/mile)
2016	446
2030	297
2035	279
Based on CARB EMFAC2014 model. The model includes all key federal and State regulations related to tailpipe GHG emissions reductions that were adopted before the model release date in 2015. CARB 2015, Energy Policy Initiatives Center 2019.	

The projected average vehicle emission rates in Table 8 are also used to estimate the emissions reductions from CAP measures that reduce VMT. Because vehicle efficiency improves and the population of ZEVs increase over time, the average vehicle emission rate decreases. Therefore, measures that reduce the same amounts of VMT would lead to decreasing amounts of GHG emissions throughout the CAP horizon.

[16] CARB: Mobile Source Emissions Inventory. EMFAC2014 was the latest model available at the beginning of the CAP development process (early 2018). The latest model is EMFAC2017 released in March 2018.
[17] The ACC program includes additional standards for vehicle model years 2017–2025, and the Zero Emission Vehicle (ZEV) program requires manufacturers to produce increasing numbers of ZEVs and plug-in hybrid electric vehicles for 2017–2025 model year vehicles. CARB: EMFAC2014 Technical Documentation, Section 1.4 (v1.0.7 May 2017).
[18] EPA's Phase-I GHG regulation includes GHG emission standards for heavy-duty vehicle model years 2014–2018. CARB's Tractor-Trailer GHG Regulation includes the aerodynamic and tire improvements requirements to reduce GHG emissions from heavy-duty trucks. CARB: EMFAC2014 Technical Documentation, Section 1.4.
[19] The calculation and adjustment method are described in Section 4.1 of the *Appendix A: City of El Cajon Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).
[20] EVs are ZEVs, however, ZEVs may include vehicles with other technologies such as fuel cell vehicles. EMFAC2014 only models the impact of EVs as ZEVs, therefore, in this document EVs and ZEVs are interchangeable.

4.4.2 GHG Emissions Reduction from Increasing Zero Emission Vehicles

CAP Measure T-1.2*: Install Electric Vehicle Charging Stations at Park and Ride Lots*, Measure T-1.3*: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments,* and Measure T-1.4*: Require Electric Vehicle Charging Stations at New Model Home Developments* all assist in the implementation of the State ZEV program that requires manufacturers to produce increasing numbers of ZEVs and plug-in hybrid electric vehicles (PHEVs).

The total effect of the ZEV program in future years is estimated by comparing the emissions rate in the BAU projection with no additional policy impacts after 2016 (a fixed 2016 ZEV penetration rate for the CAP horizon) and the emissions rate with the impact of the ZEV program (EMFAC2014's default ZEV penetration rate), as shown in Table 9.[21] The BAU projection is based on the year 2016, not the 2012 baseline year, to be consistent with the projection methodology in the electricity category. The additional 2016 model year vehicle fuel efficiency and ZEVs are already taken into consideration in the BAU emissions projection.

Table 9 Emissions Reduction from Increasing Miles Driven by Zero Emission Vehicles

Year	Projected VMT (annual million miles)	BAU Projection - With No Policy Impact after 2016		With Impact of Adopted ZEV Program		Total Emissions Reduction from ZEVs (MT CO_2e)
		BAU Average Vehicle Emission Rate* (g CO_2e/mile)	BAU Emissions from On-Road Transportation (MT CO_2e)	Average Vehicle Emission Rate (g CO_2e/mile)	Emissions from On-Road Transportation (MT CO_2e)	
2030	1,123	379	425,403	361	405,002	20,401
2035	1,134	377	427,295	355	402,718	24,577

*Despite the absence of additional policies and programs to increase vehicle efficiency, the BAU average vehicle emission rate decreases with natural turnover of the fleet as newer vehicles replace old vehicles.
The 2030 and 2035 VMT projection is based on the SANDAG Series 13 Growth Forecast. The projected emission rates are the projections under CAP assumptions, including future impact of State policies and programs used in the CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

Portions of the total emissions reduction from ZEVs (20,401 MT CO_2e in 2030 and 24,577 MT CO_2e in 2035) are attributed to Measures T-1.2 through T-1.4 in proportion to each measure's contribution of electric vehicle miles (e-VMT). Table 10 provides the key assumptions and results of the attribution.

[21] The method to project emissions is provided in the *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).

Table 10 Allocation of GHG Emissions Reduction from Increasing Zero Emission Vehicles

Year	Projected e-VMT of Total VMT	Projected e-VMT Due to (annual million miles)				Emissions Reduction from EVs Due to ($MT CO_2e$)			
		ZEV Program	Measure T-1.2	Measure T-1.3	Measure T-1.4	ZEV Program	Measure T-1.2	Measure T-1.3	Measure T-1.4
2030	7.6%	85	1.9	14.7	1.4	20,401	463	3,513	339
2035	8.9%	101	3.0	23.5	2.1	24,577	737	5,732	520

e-VMT: electric vehicle miles
Measure T-1.2: Install Electric Vehicle Charging Stations at Park and Ride Lots, Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments, and Measure T-1.4: Require Electric Vehicle Charging Stations at New Model Home Developments
Projected e-VMT percent of total VMT is based on the assumptions in the CARB EMFAC2014 model for the San Diego Region.
The emissions reduction from EVs is the projection under the CAP assumptions, including future impact of State policies and programs used in the CARB EMFAC2014 model and assumptions used for local CAP actions.
Energy Policy Initiatives Center 2019.

Based on the EMFAC2014 model assumptions, in 2030, 7.6 percent of all VMT in the San Diego region will be driven by EVs, corresponding to 85 million e-VMT in Escondido. The requirement through Measure T-1.2 would result in about 1.9 million e-VMT in 2030. Therefore, 2.3 percent (the ratio of 1.9 million miles to 85 million miles) of emissions reductions from the ZEV program are attributed to Measure T-1.2. The emissions reductions from Measures T-1.3 and T-1.4 and target year 2035 are attributed using the same method.

5 FEDERAL AND STATE ACTIONS

Federal and State actions are expected to reduce emissions significantly over the CAP horizon. This section provides a summary of the methods used to estimate the emissions reductions associated with the following federal and State actions to increase renewable electricity, building energy efficiency, and clean and efficient transportation:

- California RPS
- California Solar Programs, Policies and 2019 Mandates
- California Energy Efficiency Programs
- Federal and California Vehicle Efficiency Standards

5.1 California Renewables Portfolio Standard

SB 100, the 100 Percent Clean Energy Act of 2018, adopts a 60 percent RPS for all of California's retail electricity suppliers by 2030; this increases the current RPS standard from 50 percent to 60 percent. The legislation also provides goals for the intervening years before 2030 and establishes a State policy requiring that "zero-carbon" resources supply 100 percent of all retail electricity sales to end-user customers and all State agencies by December 31, 2045.[22] If interpolated linearly between 60 percent renewables in 2030 and 100 percent zero-carbon in 2045, the interim 2035 target would be 73 percent renewables. The SB 100 renewables and zero-carbon targets are shown in Figure 3 below.

[22] SB 100 (de León): California Renewables Portfolio Standard Program: emissions of greenhouse gases (2017–2018). The interim RPS targets are 44 percent by 2024 and 52 percent by 2027 from eligible renewable energy resources.

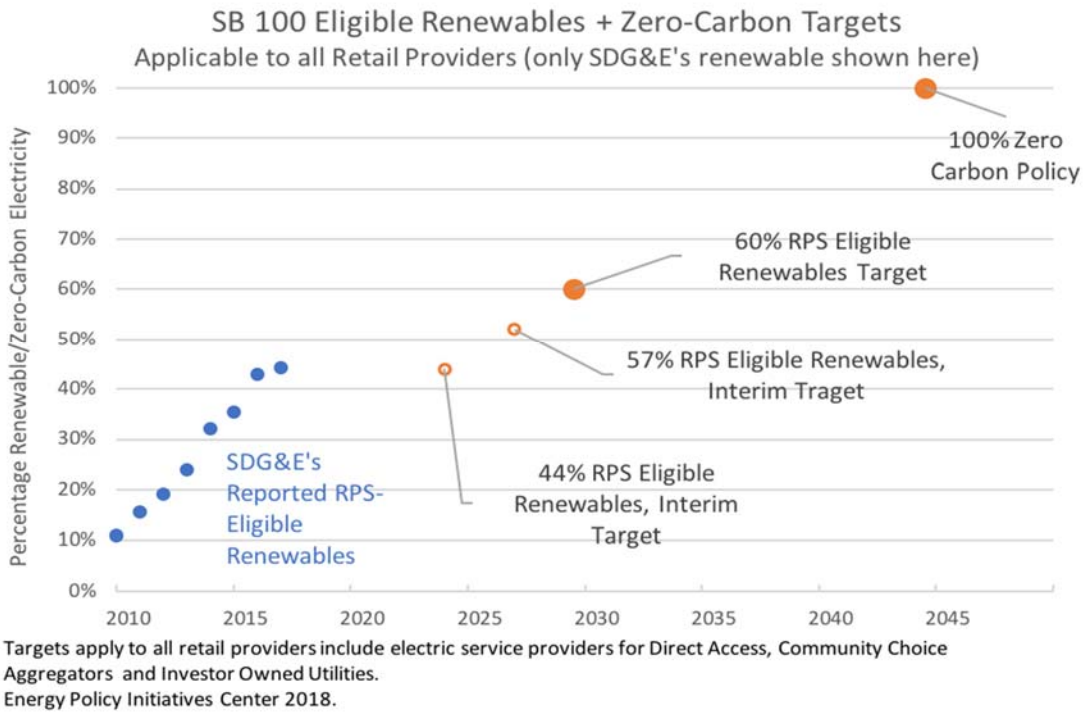


Figure 3 SB 100 Renewables and Zero-Carbon Targets

All retail electricity suppliers are required to meet the State's RPS requirements, including SDG&E, retail electricity suppliers for SDG&E's DA customers, and any other renewables and zero-carbon programs. In this document, a conservative approach is taken which assumes all providers for current utility customers, including electricity sales to DA customers, will meet, but not surpass, the RPS requirements for 2030 and 2035. Under this assumption, all emissions reductions from SDG&E and electric retail suppliers reaching 60 percent renewables in 2030 and 73 percent renewables in 2035 are credited to the State under the RPS requirements.

For the renewables and zero-carbon program considered under Measure E-5.3, the target is to reach 100 percent renewables and zero-carbon in 2030. A portion of the emissions reductions from the program will be credited to the State under RPS compliance, and the remaining reduction will be attributed to local Measure E-5.4, as described in Section 6.5.3. Table 11 shows results from RPS mandates in target years.

Table 11 Electricity Suppliers and Projected Emissions Reduction from California Renewables Portfolio Standard

Year	(a) RPS-Related Emissions Reduction from the Utility* (MT CO_2e)	(b) RPS-Related Emissions Reduction from Renewables and Zero-Carbon Program Under Measure E-5.3 (MT CO_2e)	(a + b) All RPS-Related Emissions Reductions (MT CO_2e)
2030	15,886	63,201	79,088
2035	20,209	79,723	99,932

*Includes SDG&E and electric retail suppliers of SDG&E Direct Access customers.
2030 and 2035 data are projections under the CAP based on current status, future impact of State policies and programs, and CAP measures assumptions.
Energy Policy Initiatives Center 2019.

5.2 California Solar Programs, Policies and 2019 Mandates

5.2.1 Solar Policies and Programs

California has several policies and programs to encourage customer-owned, behind-the-meter PV systems, including the California Solar Initiatives, New Solar Home Partnership, Net Energy Metering, and electricity rate structures designed for solar customers.

The California Energy Demand 2018–2030 Revised Forecast, developed by the CEC, has projections for behind-the-meter PV generation in the SDG&E planning area through 2030. The demand forecast provides three cases: high-demand, mid-demand, and low-demand. The PV projection from 2018–2030 in the SDG&E planning area mid-demand case is used to forecast the PV generation in Escondido.[23]

The California Distributed Generation (DG) Statistics database includes capacities of behind-the-meter PV systems interconnected in a jurisdiction in a given year for each of the three Investor Owned Utility (IOU) planning areas, including SDG&E. The DG Statistics database also provides detailed information about the behind-the-meter PV systems installed in a jurisdiction from the start year of incentive programs through the current year. This provides a historical record used to determine the capacity in GHG inventory years and can also help determine trends in PV installation.

A comparison of the estimated capacity and electricity generation from PV systems in Escondido and in the SDG&E planning area are given in Table 12.[24]

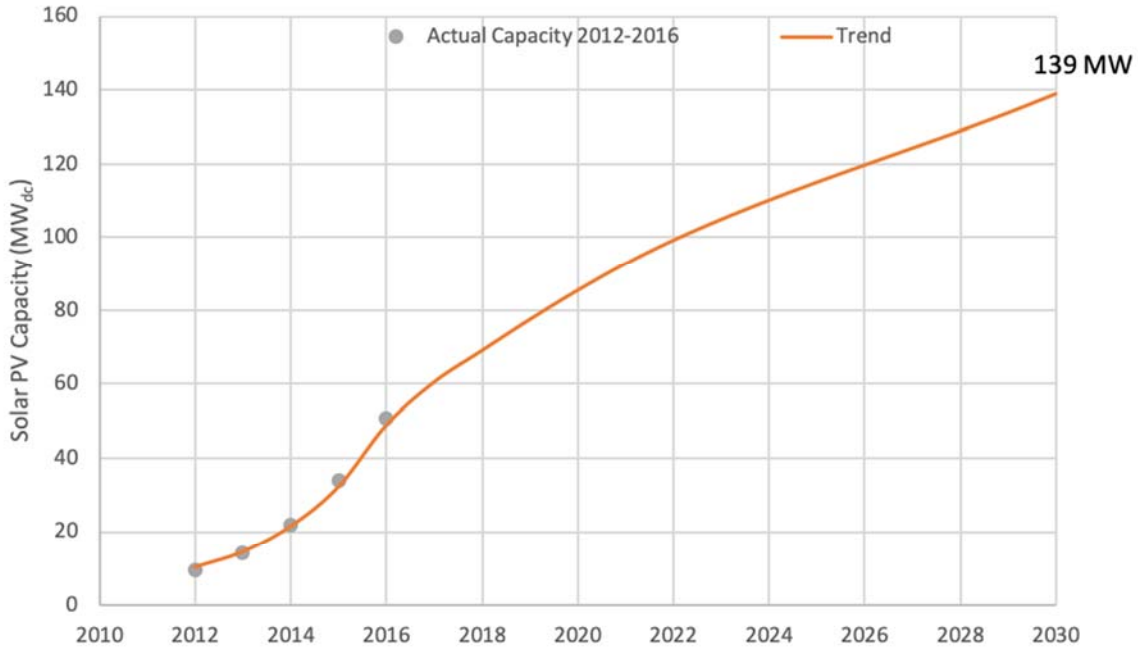
[23] Kavalec et al., 2018. Mid Case Revised Demand Forecast (February 2018). CEC, Electricity Assessments Division. Publication Number: CEC-200-2018-002-CMF, accessed July 11, 2018.
[24] The capacity of all interconnected PV systems in Escondido are from the California Distributed Generation Statistics NEM Currently Interconnected Data Set (current as of May 31, 2017), download date: September 12, 2017.

Table 12 Behind-the-meter PV Capacity and Estimated Electricity Generation

Year	Escondido*		SDG&E Planning Area**	Historical Ratio of Electricity Generation from PV (Escondido to SDG&E)
	PV Capacity (MW)	Estimated Electricity Generation (GWh)	Estimated Electricity Generation (GWh)	
2012	9	17	238	7.0%
2013	14	25	335	7.4%
2014	22	38	496	7.7%
2015	34	59	744	8.0%
2016	51	89	1,129	7.9%
			Average	7.6%

*Estimated electricity generation based on PV capacity and 20% capacity factor.
**California Energy Demand 2018–2030 Revised Forecast mid-demand case (February 2018 version).
California Distributed Generation Statistics 2017, CEC 2018, Energy Policy Initiatives Center 2019.

For future years, the electricity generation and capacity of behind-the-meter PV systems in the City are estimated based on the PV generation in CEC's mid-demand forecast for SDG&E's planning area, and the average ratio of PV generation in the City to that of SDG&E's planning area from 2012–2016 (7.6 percent). Because of California's solar programs and policies, the estimated PV capacity in 2030 in Escondido is projected to be 139 megawatts (MW). It is assumed the PV capacity from State programs will remain at 139 MW due to the lack of statewide PV projections beyond 2035. The trend of behind-the-meter PV in the City is shown in Figure 4.



Source of historical capacity: California Distributed Generation Statistics, 2017.
Source of capacity trend: California Energy Demand 2018-2030 Revised Forecast in San Diego planning area, mid-demand scenario (Feburary 2018 version).
The forecast does not include the additional PV installation due to 2019 Title 24 PV mandates or local CAP measures.
Energy Policy Initiatives Center, 2018.

Figure 4 Behind-the-meter PV Historical and Projected Trend in Escondido (2012–2030)

5.2.2 2019 Building Energy Efficiency Standards PV Mandates

The new California 2019 Building Energy Efficiency Standards, which went into effect on January 1, 2020, require all newly constructed single-family homes, low-rise multi-family homes, and detached accessory dwelling units (ADUs) to have PV systems installed, unless the building receives an exception.[25]

The San Diego Association of Governments (SANDAG) Series 13 Forecast assumes that 254 new single-family homes and 2,431 new multi-family homes will be added in Escondido from 2020 to 2035.[26] In this document, it is assumed that all new single-family and low-rise multi-family homes are subject to the mandate. For the PV system size requirement of each housing unit type, the minimum size required by the 2019 Building Energy Efficiency Standards is calculated based on the average unit size of the housing type, as shown in Table 13.[27]

[25] CEC: 2019 Building Energy Efficiency Standards – 2019 Residential Compliance Manual (December 2018). For the requirements on newly constructed single-family and low-rise multi-family homes, see Section 7.2 Prescriptive Requirements for Photovoltaic System. For the requirements on newly constructed and detached ADU, see Section 9.3.5 Accessory Dwelling Units.
[26] SANDAG Series 13 Regional Growth Forecast (October 2013). SANDAG Data Surfer, accessed November 15, 2017.
[27] Average unit size based on 2019 Building Energy Efficiency Standard Computer Compliance Program (CBECC-Res 2019.1.0) prototype homes.

Table 13 Estimated PV Requirement for New Homes after 2020 in Escondido

Housing Unit Type	Average Size of Unit (sq. ft.)*	Minimum PV Required for the Unit Size (kW_{dc})**
Single-family 1	2,700	3.1
Single-family 2	2,100	2.7
Average of Single-family		2.9
Multi-family	870	2.0

* Based on the prototype home, multi-family prototype is 8,760 sq. ft. with eight units
** Calculated based on unit size (sq. ft.) and 2019 Building Energy Efficiency Standards Residential Compliance Manual Equation 7-1 and Table 7-1. Escondido is in Climate Zone 10.
Energy Policy Initiatives Center 2019.

It is assumed that 20 percent of the new homes would be exempt for other reasons, which is consistent with the assumptions in the CEC's mid-demand case for additional achievable PV.[28] The Energy Demand 2018–2030 Revised Forecast (Revised Forecast) already assumes that a certain percentage of new single-family homes will install PV systems regardless of these mandates; therefore, the result of the PV mandate is assumed to be the additional installation not captured in the Revised Forecast and beyond the baseline assumption for single-family PV installation. The number of new homes with PV systems as a result of the PV mandate, as well as the estimated minimum system capacity, are given in Table 14. The number of new homes with PV systems and estimated system capacity are those added between 2020 and 2030, and between 2020 and 2035.

Table 14 New Homes with PV Systems after 2020 in Escondido due to PV Mandates

Year	New Single-family Homes after 2020 with PV Systems due to State Mandates		New Multi-family Homes after 2020 with PV Systems due to State Mandates		All New Homes after 2020 with PV Systems due to State Mandates	
	Number of Additional Homes with PV Systems	PV System Capacity (kW)	Number of Homes with PV Systems	PV System Capacity (kW)	PV System Capacity (MW)	Estimated Electricity Generation (MWh)
2030	83	240	1,779	3,559	3.8	6,655
2035	166	481	1,945	3,890	4.4	7,658

PV system capacities are the additional capacities in 2030 and 2035 from all systems added to new homes after 2020 as a result of PV mandates. The capacities do not include existing PV, PV installation at new single-family homes already shown in the projection in Figure 4, or PV added on other new non-residential projects.
Energy Policy Initiatives Center 2019.

5.2.3 All Solar Policies, Programs and Mandates

The California Energy Demand 2018–2030 Revised Forecast, discussed in Section 5.2.1, does not include the additional impact of the 2019 PV mandates; therefore, the PV installation trend shown in Figure 4

[28] This approach is consistent with the CEC's additional achievable PV forecast mid-case scenario for single-family homes. CEC's forecasts do not model the impact of PV mandates on low-rise multi-family homes. Personal communication with CEC staff, December 14, 2018.

does not include the additional MW PV capacity from new homes after 2020.[29] The total estimated PV capacity in Escondido resulting from California solar policies, programs, and PV mandates is projected to be 142.9 MW in 2030 and 143.3 MW in 2035.

Through CAP Measure E-5.2*: Require New Commercial Developments to Achieve Zero Net Energy*, the City plans to require PV installation at new non-residential developments. Like the residential PV mandates, this measure is not captured in the Revised Forecast and would result in additional PV installations. CAP Measure E-5.1*: Increase Renewable Energy Generated at Municipal Facilities* includes the PV installation goal for 2035; since the Revised Forecast only includes projections up to 2030, this results in additional PV capacity. However, for CAP Measure E-5.4*: Increase Renewable Electricity Generated at School Sites*, the PV installations started in 2019 and are projected to be completed by 2020; therefore, they are likely captured in the Revised Forecast. As a result, the estimated PV capacities of Measures E-5.1 E-5.2 would be 4.5 MW in 2030 and eight MW in 2035, as discussed in detail in Sections 6.5.1 and 6.5.2. This brings the projected total PV capacity in the City to 147 MW in 2030 and 151 MW in 2035.

The emissions reductions from all State and City CAP measures that increase behind-the-meter renewable supply are 53,814 MT CO_2e in 2030 and 56,373 MT CO_2e in 2035, as shown in Table 7 (Attribution of Emissions Reductions to Supplies that Increase Renewable and Zero-Carbon Supply in Escondido). The total reduction is allocated based on estimated capacity (MW) that would result from each action. As shown in Table 15, GHG emissions reductions are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 15 Key Assumptions and Results for California Solar Policies, Programs and Mandates

Year	State or City Action	Total	Measure E-5.1: Increase Renewable Energy Generated at Municipal Facilities	Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy*	Measure E-5.4: Increase Renewable Electricity Generated at School Sites	California Solar Polices, Programs, and Mandates**
2030	Projected Behind-the-meter PV Capacity (MW)	147	0.8	3.7	2.6	**140.2**
	Projected Emissions Reduction (MT CO_2e)	53,814	292	1,360	947	**51,215**
2035	Projected Behind-the-meter PV Capacity (MW)	151	2.0	6.0	2.6	**140.8**
	Projected Emissions Reduction (MT CO_2e)	56,373	745	2,252	965	**52,411**

*Does not represent all emissions reduction from Measure E-5.2
**Solar policies, programs and mandates include the impact of the PV mandates from the 2019 Building Energy Efficiency Standard. The projected capacity and emissions reductions based on current conditions, the future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

In 2030, 95 percent (140.2 MW out of 147 MW) of the projected citywide PV capacity will be due to State polices, programs, and mandates; therefore, 95 percent of the total emissions reduction from

[29] The 2018–2030 Revised Forecast assumes a percentage of new single-family homes will install PV systems without the mandates. The 2020–2030 percentages vary by year. However, it does not model the impact of PV mandates on low-rise multi-family homes. Personal communication with CEC staff, December 14, 2018.

increasing behind-the-meter PV (53,814 MT CO_2e) is attributed to this State action (51,215 MT CO_2e). The reductions and attribution from other measures and in target year 2035 are calculated using the same method.

5.3 California Energy Efficiency Program

In September 2017, the California Public Utilities Commission (CPUC) adopted energy efficiency goals for ratepayer-funded energy efficiency programs (Decision 17-09-025); these went into effect in 2018. The adopted energy saving goals for SDG&E's service territory are given in the Decision on an annual basis from 2018 to 2030.[30] The sources of the energy savings include, but are not limited to, rebated technologies, building retrofits, behavior-based initiatives, and codes and standards.[31]

To evaluate the impact of the energy efficiency program on Escondido, the total energy savings in SDG&E's service territory by 2030 are allocated to the City using a ratio of the City's natural gas and electricity demand to those of SDG&E's entire service territory. In the past three years, the ratios have been 4.5 percent for electricity and 4.3 percent for natural gas.[32] SDG&E's service territory electricity and natural gas savings were allocated accordingly to Escondido, as shown in Table 16.[33]

Table 16 Estimated Energy Savings from California Energy Efficiency Program

Year	Electricity Savings* (GWh)		Natural Gas Savings (Million Therms)	
	SDG&E Service Territory	Allocation of Savings to Escondido	SDG&E Service Territory	Allocation of Savings to Escondido
2030	3,564	123	60	3

*Include transmission and distribution losses.
SDG&E service territory savings are the cumulative savings after 2018 based on the 2018–2030 annual saving goals in CPUC Decision 17-09-025.
Energy Policy Initiatives Center 2019.

The utility's energy efficiency goal is not estimated by the CPUC beyond 2030; therefore, it is assumed the electricity and natural gas savings in 2035 from energy efficiency programs will be the same as in 2030. Emissions reductions from electricity savings are calculated by multiplying the electricity savings by the citywide GHG emission factor for electricity, discussed in Section 4.2.1 (GHG Emission Factor for Electricity) and shown in Table 5 (2016 and Projected 2030 and 2035 GHG Emission Factor for Electricity in Escondido). As the renewable and zero-carbon content in electricity increases, the emissions reduction from the electricity portion of the energy efficiency program decreases. Emissions reductions from natural

[30] CPUC: Decision 17-09-025, Adopting Energy Efficiency Goals for 2018–2030, accessed December 12, 2018. SDG&E's electricity service territory is larger than San Diego region.
[31] Navigant Consulting: Energy Efficiency Potential and Goals Study for 2018 and Beyond (August 2017), accessed December 12, 2018. Rebated technologies are the energy efficiency technologies from the utility's historic incentive programs, including equipment and retrofits.
[32] SDG&E's service territory demand is from California Energy Demand 2018–2030 Revised Forecast, SDG&E's planning area load 2014–2016. 2016 is the latest year with historical data in the demand forecast. Electricity and natural gas demand in Escondido were provided to EPIC by SDG&E for the GHG inventory. *Appendix A: City of Escondido Greenhouse Gas Emissions Inventory and Projection* (EPIC, 2018).
[33] CPUC: Decision 17-09-025, Adopting Energy Efficiency Goals for 2018–2030, accessed December 12, 2018. The 2018 and beyond goals are given on an annual basis for each year from 2018 to 2030, different from previous studies, in which the cumulative goals are given. The cumulative savings in 2030 from 2018 are the sum of the annual savings.

gas savings were calculated using the natural gas savings amount and natural gas emission factor. Table 17 summarizes the energy savings and GHG emissions reductions in the years 2030 and 2035.

Table 17 Emission Reductions from California Energy Efficiency Programs

Year	Electricity Savings			Natural Gas Savings			Total Emissions Reduction (MT CO_2e)
	Electricity Savings (GWh)	Emission Factor (lbs CO_2e/MWh)	GHG Reduction from Electricity Savings (MT CO_2e)	Natural Gas Savings (million therms)	Emission Factor (MT CO_2e/therm)	GHG Reduction from Natural Gas Savings (MT CO_2e)	
2030	123	53	2,925	2.5	0.0055	13,854	16,778
2035	123	36	1,983	2.5	0.0055	13,854	15,836

The emissions reductions are projected based on CAP assumptions and future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

5.4 Federal and California Vehicle Efficiency Standards

As discussed in Section 4.4 (Common Assumptions and Methods for Calculating On-Road Transportation Emissions Reductions), CARB's EMFAC2014 model includes all key federal and State regulations related to tailpipe GHG emissions reductions for both light-duty and heavy-duty vehicles that were in place before the 2015 model release date.

Table 18 compares the average vehicle emission rate and emissions from on-road transportation under the BAU projection, as well as with the impact of policies that increase vehicle efficiency and ZEVs. As discussed in Section 4.4.2 (GHG Emissions Reduction from Increasing Zero Emission Vehicles), to avoid double-counting, the maximum emission reductions related to all measures in the CAP facilitating ZEV-driven miles are set at the amount expected from statewide programs and policies.

In order to attribute these reductions to the City, the effects of CAP Measure T-1.2*: Install Electric Vehicle Charging Stations at Park and Ride Lots,* Measure T-1.3*: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New* Developments, and Measure T-1.4*: Require Electric Vehicle Charging Stations at New Model Home Developments* are subtracted from the maximum emissions reductions from State policies. Table 18 summarizes the key assumptions and results. The GHG emissions reductions are the projected reduction amount in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 18 Key Assumptions and Results for Federal and California Vehicle Efficiency Standards

Year	Projected City VMT (annual million miles)	BAU Projection – With No Policy Impact after 2016		With Impact of Adopted Statewide Policies		Emissions Reduction (MT CO_2e)		
		Average Vehicle Emission Rate* (g CO_2e/mile)	Emissions from On-Road Transportation (MT CO_2e)	Average Vehicle Emission Rate (g CO_2e/mile)	Emissions from On-Road Transportation (MT CO_2e)	With Impact of Adopted Statewide Policies	From CAP Measure T-1.2 through T-1.4	Remaining from Statewide Policies
2030	1,123	379	425,403	297	333,108	92,295	4,314	87,981
2035	1,134	377	427,295	279	316,441	110,853	6,988	103,866

*Despite the absence of additional policies and programs to increase vehicle efficiency, the BAU average vehicle emission rate decreases with natural fleet turnover as new vehicles replace old vehicles
Measure T-1.2: *Install Electric Vehicle Charging Stations at Park and Ride Lots*, *Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments*, and *Measure T-1.4: Require Electric Vehicle Charging Stations at New Model Home Developments*
The 2030 VMT projections are based on SANDAG's Series 13 Growth Forecast. The emission rates and emissions reductions are projected based on CAP assumptions and future impact of State policies and programs used in the CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

6 CAP STRATEGIES AND MEASURES

The following section describes the methods used to estimate the GHG reductions from local CAP measures, which are organized into the following nine strategies:[34]

- Strategy 1: Increase the Use of Zero-Emission or Alternative Fuel Vehicles (T)
- Strategy 2: Reduce Fossil Fuel Use (T)
- Strategy 3: Reduce Vehicle Miles Traveled (T)
- Strategy 4: Increase Building Energy Efficiency (E)
- Strategy 5: Increase Renewable and Zero-Carbon Energy (E)
- Strategy 6: Increase Water Efficiency (W)
- Strategy 7: Diversify Local Water Supply (W)
- Strategy 8: Reduce and Recycle Solid Waste (S)
- Strategy 9: Carbon Sequestration and Land Conservation (C)

6.1 Strategy 1: Increase the Use of Zero-Emission or Alternative Fuel Vehicles (T)

The goal of this strategy is to reduce on-road transportation fossil fuel use by increasing the use of ZEVs or alternative fuel vehicles (AFVs) citywide through the following four measures.

6.1.1 Measure T-1.1: Transition to a Clean and More Fuel-Efficient Municipal Fleet

The City's Public Works Department is currently pursuing the installation of electric vehicle charging stations (EVCSs) at its Policy and Fire Headquarters. The plan is to set up approximately 30 EVCSs which will be used to support the vehicle charging needs of current EVs and PHEVs on order and allow for charging of approximately 20 additional PHEVs. As of February 2020, the City has installed 9 EVCSs at the Police and Fire Headquarters and has purchased or is going through the requisition process to have a total of 44 gasoline hybrid vehicles, one diesel hybrid trucks, 11 PHEVs, 9 all electric utility charts, and two all-electric forklifts, and 1 electric vehicle.

[34] Transportation (T), Energy (E), Water (W), Solid Waste (S) and Carbon Sequestration (C).

The average annual fuel use for a hybrid sedan in the fleet is 375 gallons of gasoline per year.[35] Assuming the 11 PHEVs will have similar use profile, the GHG emissions reductions in 2030 and 2035 are shown in Table 19.[36]

Table 19 Key Assumptions and Results for Measure T-1.1: Transition to a Clean and More Fuel-Efficient Municipal Fleet

Year	Number of New PHEVs	Gasoline Reduction *(gallons)	Gasoline Carbon Content** (lbs CO_2/gallon)	GHG Emission Reduction (MT CO_2e)
2030	11	4,125	17.8	33
2035	11	4,125	17.8	33
*Annual fuel saving per vehicle is 375 gallons **California gasoline blend has 10% ethanol. The emissions reduction is based on the projection under the CAP assumptions. Energy Policy Initiatives Center 2019				

6.1.2 Measure T-1.2: Install Electric Vehicle Charging Stations at Park and Ride Lots

Currently, there are nine active Park and Ride parking lots within Escondido, which offer parking spaces for ride share (carpool and vanpool) and transit commuters. The Park and Ride lots are owned and operated by California Department of Transportation (CalTrans), North County Transit District (NCTD), SANDAG, or private organizations. Some Park and Ride lots are available for transit riders only, and others are available for both transit riders and ride share commuters.[37]

The City plans to add 281 EVCSs (approximately 25 percent of all nine Park and Ride lots' parking spaces) by 2035 that will be available for ride share commuters and/or transit riders. It is assumed that Level 2, or better, chargers will be installed and that the EVCSs will be available when the Park and Ride lot is available.[38] However, because not all parking spaces at the Park and Ride lots are utilized on an average workday, EVCSs are assumed to have the same utilization rate (53 percent) as an average parking space in a Park and Ride lot.[39] One EVCS will be used to support one commuter's personal vehicle, either a battery electric vehicle (BEV) or a PHEV, per workday, and the vehicle is assumed to be fully charged by the end of the workday. The vehicle charging load depends on the electric range of the EV, 210 miles for a BEV and 40 miles for a PHEV.[40] Currently, 60 percent of all EVs are BEVs, and the rest are PHEVs; assuming that ratio continues, the e-VMT charged a Park and Ride lot EVCS is 142 miles per workday.[41]

[35] Fuel use per vehicle and list of alternative fuel vehicles were provided by City (June 2019).
[36] Gasoline carbon content is based on estimates from U.S. Energy Information Administration. Frequently Asked Questions, accessed on October 24, 2018. CEC: Ethanol in California, accessed November 26, 2019.
[37] California Department of Transportation (CalTrans): San Diego Park and Ride Facilities, accessed June 26, 2019. The list of Park and Ride lots in the San Diego region and their locations, status, number of parking spaces and utilization rates were provided by SANDAG (October 2018), current as of August 2018.
[38] Some Park and Ride lots are available 9am to 6pm, while others are available all day.
[39] Average utilization rate across all Park and Ride lots in Escondido. The utilization rate varies from 16 percent to 94 percent, which were estimated based on data from 2014 to 2017. Utilization rates were provided by SANDAG (October 2018), current as of August 2018.
[40] Bedir et al., 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017–2025. CEC. Publication Number: CEC-600-2018-001. The electric range assumptions are for model year 2025 vehicles, which are higher than current EVs on the market and kept constant through CAP horizon.
[41] CEC: IEPR Lead Commissioner Workshop Preliminary Transportation Energy Demark Forecast, July 22 2019. Presentation: Light-Duty Vehicle Demand Forecast.

The GHG emissions reduction is estimated based on the ratio of projected e-VMT due to Measure T-1.2 compared with the total e-VMT from EMFAC2014 model estimates, as discussed in Section 4.4.2 (GHG Emissions Reduction from Increasing Zero Emission Vehicles) and shown in Table 10 (Allocation of GHG Emissions Reduction from Increasing Zero Emission Vehicles). It is assumed that not all e-VMT from the vehicles charging at Park and Ride lot EVCSs will result in miles driven only in Escondido. The e-VMT allocated to Escondido is based on Origin-Destination VMT allocation methods and assumes trips driven by EVs will have at least one trip-end within Escondido. The number of EVCSs, projected e-VMT, and GHG emissions reductions in 2030 and 2035 are shown in Table 20.

Table 20 Key Assumptions and Results for Measure T-1.2: Install Electric Vehicle Charging Stations at Park and Ride Lots

Year	Total Number of Park & Ride Parking Spaces*	% of Parking Spaces with EVCS	Number of Parking Spaces with EVCS	Average Number of EVCSs Utilized per workday**	e-VMT from Charging at the EVCSs (miles per workday)	e-VMT from Charging at the EVCSs (miles per year)	Escondido e-VMT from Charging at the EVCSs*** (miles per year)	Emissions Reduction (MT CO_2e)
2030	1,125	16%	181	96	142	3,492,860	1,939,717	463
2035	1,125	25%	281	150	142	5,433,338	3,017,338	737

*Spaces at all nine active Park & Ride lots within Escondido as of 2018 **Utilization rate the same as the rest of parking spaces (53%) *** The difference between the "e-VMT from Charging at the EVCSs" and the "Escondido e-VMT from Charging at the EVCSs" is due to the allocation of miles to jurisdictions in the methodology. Not all the charging will result in miles driven only in Escondido. 56% of all EV miles are allocated to Escondido based on the Origin-Destination VMT allocation methods, assuming trips driven by EVs will have at least one trip-end within Escondido.
255 Workdays per year.
The emissions reduction is projected based on CAP assumptions and future impact of State policies and programs used in the CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

6.1.3 Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments

To facilitate the increasing demand of EV infrastructure at commercial developments and multi-family homes, the City will adopt an ordinance requiring new multi-family and commercial developments to install EVCSs at 10 percent of parking spaces provided. The estimated effective year of the ordinance is 2023.

Based on recent permitting data, approximately 134,750 square feet (sq. ft.) of new commercial development would have been subject to the EV requirement on average per year.[42] The Escondido Municipal Code off-street parking regulations require, on average, one parking space per 250 sq. ft. gross floor area of commercial, retail, and office use; therefore, approximately 539 parking spaces will be added every year at these new commercial developments.[43]

[42] The average annual new non-residential development sq. ft. is calculated based on new office spaces (86,000 sq. ft. in last two years) and new retail commercial spaces (183,500 in last two years) square footage, as provided by the City (June 2019). The sq. ft. is new gross floor area.
[43] Escondido Municipal Code: Off-street Parking Requirement (Section 33-765), accessed on August 1, 2019. The minimum parking requirements for commercial, office, restaurant/food, retail, etc., are different, the average is used here.

For the EVCSs to be installed at the new developments parking spaces, it is assumed that Level 2 chargers, or better, will be installed. The e-VMT resulting from the EVCSs are estimated based on the charging capacity of a Level 2 charger, EV drive efficiency, and hours in use, as shown in Table 21.[44] On average, it is assumed that 70,628 e-VMT per year are attributed to charging at an EVCS, and the EVCS would be at least a high-capacity Level 2 charger.

Table 21 Electric Vehicle Charging Efficiency by Level 2 Charger Type

Type of Charging (Level 2)	Capacity (kW)*	Hours in Use per Day	EV load (kWh/day)	Vehicle Drive Efficiency (kWh/mile) **	EV miles per Day of Charge	EV miles per Year per Commercial EVCS
Low	3.3	5	20	0.25	66	24,090
Medium	6.6	5	40	0.25	132	48,180
High	9.6	5	58	0.25	192	70,080
Highest	19.2	5	115	0.25	384	140,160
					Average	70,628

*Based on Electric Vehicle Charging Station Installation Best Practice, Center for Sustainable Energy, 2016.
**Based on CEC Plug-in Electric Vehicle Infrastructure Projections: 2017–2025 vehicle driven efficiency assumptions.
Assume chargers are used 365 days per year.
Energy Policy Initiatives Center 2019.

The estimated number of new EVCSs and e-VMT due to the requirement for new commercial developments in Measure T-1.3 are shown in Table 22.

Table 22 Assumptions for New Commercial Electric Vehicle Charging Stations under Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments

Year	New Annual Non-Residential Development Space Added after 2023* (sq. ft. per year)	Total Number of New Parking Spaces at Commercial Developments after 2022	% of Parking Spaces with EVCSs	Number of New EVCSs after 2023	Annual e-VMT Charged at the EVCSs (Miles per year)	Annual Escondido e-VMT due to the EVCS** (Miles per year)
2030	134,750	4,312	10%	388	24,668,208	13,699,189
2035	134,750	7,007	10%	631	40,085,838	22,261,182

*New gross floor area. Based on recent years' new development data.
** The difference between the "e-VMT from Charging at the EVCSs" and the "Escondido e-VMT from Charging at the EVCSs" is due to the allocation of miles to jurisdictions in the methodology. Not all the charging will result in miles driven only in Escondido. 56% of all EV miles are allocated to Escondido based on the Origin-Destination VMT allocation methods, assuming trips driven by EVs will have at least one trip-end within Escondido.
The number of parking spaces is based on Escondido off-street parking requirements and assumes 10% of new non-residential development would qualify for an exemption of the requirement. The projections are based on the current conditions and CAP assumptions.
Energy Policy Initiatives Center 2019.

[44] The Level 2 charger capacity range comes from the Center for Sustainable Energy: Electric Vehicle Charging Station Installation Best Practice (June 2016). The vehicle drive efficiency assumption is based on Bedir et al., 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017–2025. CEC. Publication Number: CEC-600-2018-001.

For multi-family developments in Escondido, SANDAG Series 13 projects that 1,061 new multi-family units will be added from 2023 to 2030, and an additional 207 units will be added from 2030 to 2035.[45] The Escondido Municipal Code off-street parking regulations require, on average, 1.5 parking spaces for each multi-family unit.[46] At new multi-family developments, the EVCSs will be used to charge the residents' personal EVs. Based on the EMFAC2014 model, approximately 35 miles per day are driven by an average EV in the San Diego region.[47] The estimated number of new EVCSs and e-VMT are shown in Table 23.

Table 23 Assumptions for New Multi-family Electric Vehicle Charging Stations under Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments

Year	Number of New Multi-Family Units after 2023*	Number of New Parking Spaces at Multi-Family Developments after 2023	% of Parking Spaces with EVCSs	Number of New EVCSs after 2023	Annual e-VMT Charged at the EVCSs (Miles per year)	Annual Escondido e-VMT due to the EVCS** (Miles per year)
2030	1,061	1,592	10%	143	1,830,517	1,016,555
2035	1,268	1,903	10%	171	2,187,514	1,214,809

*Based on SANDAG Series 13 Regional Growth Forecast.
** The difference between the "e-VMT from Charging at the EVCSs" and the "Escondido e-VMT from Charging at the EVCSs" is due to the allocation of miles to jurisdictions in the methodology. Not all the charging will result in miles driven only in Escondido. 56% of all EV miles are allocated to Escondido based on the Origin-Destination VMT allocation methods, assuming trips driven by EVs will have at least one trip-end within Escondido.
The number of parking spaces is based on Escondido off-street parking requirements and assumes 10% of new multi-family developments would qualify for exemption of the requirement. The projections are based on the current conditions and CAP assumptions.
Energy Policy Initiatives Center 2019.

The GHG emissions reduction from this measure is estimated based on the ratio of projected e-VMT due to this Measure T-1.3 to the total e-VMT from EMFAC2014 model estimates, as discussed in Section 4.4.2 (GHG Emissions Reduction from Increasing Zero Emission Vehicles) and shown in Table 10 (Allocation of GHG Emissions Reduction from Increasing Zero Emission Vehicles). The total number of parking spaces with EVCSs, projected e-VMT, and GHG emissions reductions are shown in Table 24. The GHG emissions reductions are the projected reduction amounts in 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

[45] SANDAG Series 13 Regional Growth Forecast (October 2013). SANDAG Data Surfer, accessed November 15, 2017. The annual new multi-family units added from 2023 and 2030 are estimated using linear interpolation between 2020 and 2030.
[46] Escondido Municipal Code: Off-street Parking Requirement (Section 33-765), accessed on August 1, 2019. The minimum parking requirements are different for studio and other apartments, the average is used here.
[47] CARB: Mobile Source Emissions Inventory. EMFAC2014 San Diego County 2020–2030 estimates.

Table 24 Key Assumptions and Results for Measure T-1.3: Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments

Year	Number of EVCS added due to the Ordinance	Annual Escondido e-VMT due to the EVCSs (Miles per year)	Emissions Reduction (MT CO_2e)
2030	531	14,715,744	3,513
2035	802	23,475,992	5,732
The emissions reduction is projected based on CAP assumptions and future impact of State policies and programs used in the CARB EMFAC2014 model. Energy Policy Initiatives Center 2019.			

6.1.4 Measure T-1.4: Require Electric Vehicle Charging Stations at New Model Home Developments

The 2019 California Green Building Standards Code, Title 24, Part 11 (CALGreen 2019) requires new single-family units and townhouses with attached private garages to have "EV capable" parking spaces for each unit.[48] To further advance EV infrastructure, the City will require each single-family model home, including townhouse model homes, to be fully equipped with one EVCS. The developers would also be required to provide information about having EVCS installation as an add-on option to potential homebuyers. The estimated effective year of this requirement is 2021.

Having model homes equipped with EVCS will encourage homebuyers to choose the add-on EVCS option. To further facilitate installation, the City will allow for no-fee permitting for developers and a waiver of fees for homebuyers of that subdivision at initial occupancy. On average, it is assumed that 20 EVCSs would be installed at new single-family homes due to this requirement each year: 12 through model home construction, and eight through the homebuyer add-on option.[49]

Like the assumption for EVCS usage at multi-family homes (Measure T-1.3), the EVCSs at single-family homes will be used to charge the residents' personal EVs. The GHG emissions reduction from this measure is estimated based on the ratio of projected e-VMT due to this (Measure T-1.4) compared to the total e-VMT from EMFAC2014 model estimates, as discussed in Section 4.4.2 (GHG Emissions Reduction from Increasing Zero Emission Vehicles) and shown in Table 10 (Allocation of GHG Emissions Reduction from Increasing Zero Emission Vehicles). The total number of parking spaces with EVCSs, projected e-VMT, and GHG emissions reductions are shown in Table 25. The GHG emissions reductions are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

[48] 2019 California Green Building Standards Code, Title 24, Part 11: Section 4.106.4 Electric vehicle (EV) charging for new construction, accessed December 12, 2019.
[49] Assumptions were provided by the City (October 2019).

Table 25 Key Assumptions and Results for Measure T-1.4: Require Electric Vehicle Charging Stations at New Model Home Developments

Year	Annual Number of EVCSs added at New Single-Family Homes due to T-1.4*	Number of EVCS due to T-1.4 after 2021	Annual e-VMT Charged at the EVCSs (miles per year)	Annual Escondido e-VMT due to the EVCS** (miles per year)	Emissions Reduction (MT CO_2e)
2030	20	200	2,555,000	1,418,888	339
2035	20	300	3,832,500	2,128,332	520

Measure T-1.4: Require Electric Vehicle Charging Stations at New Model Home Developments
*EVCSs added through model home construction requirements and homebuyer optional add-on interest do not include homeowners or developers installing EVCSs on their own
** The difference between the "e-VMT from Charging at the EVCSs" and the "Escondido e-VMT from Charging at the EVCSs" is due to the allocation of miles to jurisdictions in the methodology. Not all the charging will result in miles driven only in Escondido. 56 percent of all EV miles are allocated to Escondido based on the Origin-Destination VMT allocation methods, assuming trips driven by EVs will have at least one trip-end within Escondido.
The projections are based on the current status and CAP assumptions.
Energy Policy Initiatives Center 2019.

6.2 Strategy 2: Reduce Fossil Fuel Use (T)

The goal of this strategy is to reduce on-road transportation fossil fuel use by improving traffic flow and to reduce off-road vehicle and equipment fuel use through increasing renewable or alternative fuel use. The strategy includes the following three measures.

6.2.1 Measure T-2.1: Synchronize Traffic Signals

The City maintains traffic signals on city corridors, while CalTrans maintains signals located at freeway ramps and along State highways within Escondido city limits. The City maintains a traffic signal priority list that identifies where new or modified traffic signals are needed.[50] The goal is to synchronize traffic signals at 35 intersections by 2035 to obtain more efficient fuel use through smoother traffic flow.[51] It is important to note that this estimate (35 intersections) is conservative; however, it is a base of analysis to estimate emission reductions.

The effect of traffic signal synchronization on fuel reduction depends on the traffic volume, number of intersections, and size of the intersections on the arterials. Based on a study of a project of similar size, the annual fuel savings per intersection is around 2,400 gallons.[52] However, as the vehicles in the region become more efficient and the number of ZEVs increases, fuel savings per synchronized intersection will decrease. Assuming the 2,400 gallons of annual fuel savings per intersection could be realized in the 2012 CAP baseline year, the increase in vehicle fuel efficiency would reduce the fuel savings per intersection to approximately 1,500 gallons in 2030 and 1,400 gallons in 2035.[53] The GHG emissions reductions in 2030

[50] Escondido: Traffic Signal Priority List, January 29, 2014, accessed June 26, 2019.
[51] Generally, the City completes traffic signal synchronization of 5–10 signals each year, assuming on average 2–4 signals at each intersection, City will complete the signal synchronization at approximately two intersections a year.
[52] Sunkari: The Benefits of Retiming Traffic Signals (2004). The Jacksonville traffic signal retiming project at a 25-intersection section resulted in estimated annual fuel savings of 65,000 gallons.
[53] The average vehicle emission rate in 2030, 297 g CO_2e/mile, is 39 percent less than that in 2012, 483 g CO_2e/mile, as discussed in Section 4.4.

and 2035 from traffic signal synchronization are shown in Table 26.[54] The GHG emissions reductions are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 26 Key Assumptions and Results for Measure T-2.1: Synchronize Traffic Signals

Year	Number of Intersections with Traffic Signal Synchronization	Increase in Vehicle Fuel Efficiency Comparing with Baseline Year 2012	Equivalent Fuel Saving per Intersection (Gallons per year)	Fuel Saving from All Intersections (Gallons per year)	GHG Emission for Fuel* (lbs CO_2e/gallon)	GHG Emissions Reduction (MT CO_2e)
2030	23	39%	1,474	34,383	18.5	289
2035	35	42%	1,386	48,508	18.5	408

*Emissions per gallon of fuel use for an average vehicle in the San Diego region, regardless of fuel type, vehicle type, or fuel economy. Increases in vehicle fuel efficiency in 2030 and 2035 compared with 2012 are based on the decreases in the average vehicle emission rates in the San Diego region. The 2012 annual fuel saving per intersection is assumed to be about 2,400 gallons.
The emissions reduction is based on the CAP assumptions, including future impact of State policies and programs used in CARB EMFAC2014 model and CAP assumptions.
Energy Policy Initiatives Center 2019.

6.2.2 Measure T-2.2: Install Roundabouts

Through Measure T-2.2, the City plans to install 12 roundabouts by 2035. The effect of roundabouts on fuel reduction depends on the traffic volume and size of the intersections on the arterials. Based on a study of small roundabouts with similar sizes, the annual fuel savings per roundabout is around 19,000 gallons.[55] Similar to estimating the impact of traffic signal synchronization, as vehicles get more efficient and the number of ZEVs increases, the fuel savings per intersection in 2030 would be less than those in previous years. Assuming the gallons of annual fuel savings per roundabout could be realized in the 2012 CAP baseline year, the increase in vehicle fuel efficiency would reduce the fuel savings to approximately 12,000 gallons in 2030.[56]

The GHG emissions reductions in 2030 and 2035 from traffic signal synchronization are shown in Table 26.[57] The GHG emissions reductions are the projected reduction amounts in 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

[54] Emissions per gallon of fuel use for an average vehicle calculated based on 2030 CO_2 emissions from on-road transportation and total vehicle fuel use.
[55] Varhelyi: The Effects of Small Roundabouts on Emission and Fuel Consumption: A Case Study (2002). The study estimated the traffic volume of the intersection and the fuel consumption before and after the roundabout. The traffic volume is 23,500 vehicles per day and the fuel savings are approximately 144 kg per day after the roundabout installation.
[56] The average vehicle emission rate in 2030, 289 g CO_2e/mile, is 40 percent less than that in 2012, 483 g CO_2e/mile, as discussed in Section 4.4.
[57] Emissions per gallon of fuel use for an average vehicle calculated is based on 2030 CO_2 emissions from on-road transportation and total vehicle fuel use.

Table 27 Key Assumptions and Results for Measure T-2.2: Install Roundabouts

Year	Number of New Roundabouts	Increase in Vehicle Fuel Efficiency Baseline Year 2012	Equivalent Fuel Saving per Intersection (Gallons per year)	Fuel Saving for All Intersections (Gallons per year)	GHG Emission for Fuel* (lbs CO_2e/gallon)	GHG Emissions Reduction (MT CO_2e)
2030	8	39%	12,074	96,595	18.5	811
2035	12	42%	11,357	136,278	18.5	1,145

*Emissions per gallon of fuel use for an average vehicle in the San Diego region, regardless of fuel type, vehicle type, or fuel economy.
Increase in vehicle fuel efficiency in 2030 compared with 2012 is based on the decrease of the average vehicle emission rate in San Marcos. It is assumed that the annual fuel savings per intersection is about 19,000 gallons in 2012.
The emissions reduction is projected under the CAP assumptions, including future impact of State policies and programs used in CARB EMFAC2014 model, as well as CAP assumptions.
Energy Policy Initiatives Center 2019.

6.2.3 Measure T-2.3: Increase Renewable or Alternative Fuel Construction Equipment

Through the construction permitting process, the City will require a certain percentage of fuel reduction from construction equipment in new developments through the use of electric-powered or alternatively-fueled. The standard would require 30 percent fuel reduction in 2030, and 50 percent in 2035, which would yield an approximately 30 percent reduction in construction GHG emissions in 2030, and 50 percent reduction in 2035.[58] The method to project 2030 and 2035 construction emissions are based on CARB's In-Use Off-Road Equipment 2011 Inventory and the number of construction jobs in Escondido.[59] The GHG emissions reductions in 2030 and 2035 are shown in Table 28.

Table 28 Key Assumptions and Results for Measure T-2.3: Increase Renewable or Alternative Fuel Construction Equipment

Year	Projected Emissions from Construction Equipment (MT CO_2e)	Percent Reduction in Emissions	GHG Emissions Reduction (MT CO_2e)
2030	19,707	30%	5,321
2035	20,071	50%	9,032

The construction emissions are projected based on San Diego region's construction emissions and the ratio of construction jobs in Escondido to those in the region. It is assumed that 10% of new developments would qualify for an exemption of the requirement.
CARB 2011, Energy Policy Initiatives Center 2019.

6.3 Strategy 3: Reduce Vehicle Miles Traveled (T)

The goal of this strategy is to reduce the labor force commute VMT citywide by increasing alternative modes of transportation, which avoid use of single-occupancy vehicles (SOVs), and to reduce household VMT by encouraging transit-oriented development (TOD). The strategy includes the following measures.

[58] The requirement would be based on the construction equipment's horsepower.
[59] The method to project construction emissions is provided in *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).

6.3.1 Measure T-3.1: Participate in the SANDAG's iCommute Vanpool Program

SANDAG's iCommute Vanpool Program provides a convenient way for groups of five or more people to get to work in and around the San Diego region. The Vanpool Program provides a subsidy of up to $400 per month to offset the vehicle lease cost, and vanpool participants share the remaining vehicle lease and gas cost. Vanpools generally exceed average commute distance of approximately 25 miles round trip.[60] The number of vanpools that are in operation varies from year to year. On an annual average, from 2015 to 2018, 36 SANDAG vanpools were in operation that either started or ended within Escondido.[61] Through this measure, the City would promote the SANDAG Vanpool Program through the CAP target years to Escondido residents and business-owners to encourage ongoing participation. The specific goal is to maintain the 36 SANDAG vanpools that start or end in Escondido through 2035.

The vanpools in the program have different commute distances, trip frequencies, and number of participants. The estimated average commute distance, commute VMT avoided due to vanpools, and the GHG emissions reductions are shown in Table 29.[62]

Table 29 Projected SANDAG Vanpools in Escondido and GHG Emissions Reductions from Avoiding Single-Occupancy Vehicle Trips

Year	Number of SANDAG Vanpools	Average Number of Passengers in the Vanpool*	Average Vanpool Distance* (Miles per roundtrip per workday)	Annual VMT Avoided due to Vanpool (Miles per year)	Annual Escondido VMT Avoided due to Vanpool** (Miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	36	7	102	6,733,940	3,737,208	297	1,109
2035	36	7	102	6,733,940	3,737,208	279	1,043

*Average number of passengers and commute distance of the SANDAG vanpools in recent years. 255 workdays per year.
** The difference between the "Annual VMT Avoided due to Vanpool" and the "Annual Escondido VMT Avoided due to Vanpool" is due to the allocation of miles to jurisdictions in the methodology. Not all miles are driven only in Escondido. 56% of all miles are allocated to Escondido based on the Origin-Destination VMT allocation methods.
The emissions reduction is projected under the CAP, including future impact of State policies and programs used in CARB EMFAC2014 model, as well as CAP assumptions.
Energy Policy Initiatives Center 2019.

A portion of the emissions avoided from reducing SOV trips is offset by the emissions from operating the vanpool vehicles. As the vehicle fleet becomes more efficient, the fuel economy of a potential vanpool vehicle also improves. Assuming the average fuel economy (miles per gallon, or "MPG") of the vanpool vehicle is 20 MPG in 2019 and that it will improve to 29 MPG in 2035 due to more stringent vehicle efficiency standards, there will be reduced fuel use and reduced GHG emissions from operating the vanpool vehicles.[63] GHG emissions resulting from vanpool vehicles are shown in Table 30.

[60] SANDAG: iCommute Vanpool.
[61] SANDAG Vanpool Program: active vanpools as of November 16, 2018. 2006 to 2018 vanpool data were provided by SANDAG to EPIC (November 2018). If the vanpool has an origin or a business city identified as Escondido, they are accounted for here. All Escondido vanpools as of November 2018 started in Escondido.
[62] SANDAG Vanpool Program: active vanpools as of November 16, 2018. 2006 to 2018 vanpool data were provided by SANDAG to EPIC (November 2018). The average number of passengers are estimated based on van capacity and the 80 percent capacity requirement. All vanpools start or end in Escondido run from Monday to Friday, therefore, the 255 workdays to year conversion is used.
[63] Based on the SANDAG Vanpool Program data the most common vanpool vehicles are Ford Traverse, Dodge Grand Caravan, and Buick Enclave. The 2019 new vehicle fuel economy of these vehicle models are approximately 20 MPG. U.S. Department of

Table 30 GHG Emissions Added from Projected SANDAG Vanpools in Escondido

Year	Number of SANDAG Vanpools	Average Fuel Economy of Vanpool Vehicle (Miles per gallon)	Average Fuel Use of Vanpool Vehicle (Gallons per year)	Carbon Content of Vanpool Gasoline Use* (lbs CO_2e/gallon)	GHG Emissions Resulting from Vanpools (MT CO_2e)
2030	36	28	936	17.8	272
2035	36	29	880	17.8	256

*California gasoline has 10% ethanol.
Vehicle fuel economy in 2030 and 2035 are based on the decreases in the average vehicle emission rates in San Diego and the 2019 vanpool vehicle fuel economy. Annual fuel use is calculated based on commute distance of the SANDAG vanpools in recent years (64 mile per roundtrip per workday) and 255 workdays per year.
The emissions reduction is projected under the CAP, including future impact of State policies and programs used in CARB EMFAC2014 model, as well as CAP assumptions.
Energy Policy Initiatives Center 2019.

The net GHG emissions reductions in 2030 and 2035, which combine the reductions from avoiding SOV trips and emissions resulting from vanpool vehicles, are shown in Table 31.

Table 31 Results for Measure T-3.1: Participate in the SANDAG's iCommute Vanpool Program

Emissions Reduction from SANDAG Vanpool Program	GHG Emissions Reduction (MT CO_2e)	
	2030	2035
Emissions Reduction from Avoiding Single Occupancy Vehicle Commute	1,109	1,043
Emissions Resulting from Operating Vanpool Vehicles	-272	-256
Net Emissions Reduction due to SANDAG Vanpool Program	837	787

The emissions reduction is projected under the CAP, including future impact of State policies and programs used in CARB EMFAC2014 model, as well as CAP assumptions.
Energy Policy Initiatives Center 2019.

6.3.2 Measure T-3.2: Improve Pedestrian Infrastructure at Priority Areas

From 2016 to 2018, the City installed an average of 2,600 linear feet (0.5 miles) of sidewalk annually.[64] Through Measure T-3.2, City plans to continue new sidewalk installation and improvements at 0.5 miles per year, and identify priority areas (e.g., at downtown employment centers, near transit stations) for the pedestrian infrastructure improvements.

Walking trips will have an impact on VMT only if they replace vehicle travel. Therefore, walking solely for recreation does not have an impact on VMT reduction. The impact of pedestrian improvement on VMT reduction depends on the street characteristics (e.g., sidewalk width, coverage), pedestrian environment quality (e.g., street crossings, topography), and neighborhood type (e.g., neighborhood density, proximity

Energy: Fuel Economy Estimates, accessed January 10, 2019. The San Diego regional average vehicle emission rate in 2030, 297 g CO_2e/mile, is 28 percent less than that in 2019, 410 g CO_2e/mile. EMFAC2014. The ratio of emission rates is used to estimate 2030 MPG, and similar method is used to calculate 2035 MPG.

[64] Sidewalk data from 2016 to 2018 were provided by the City (June 2019).

to destinations). Based on various studies, the elasticity of a 1 percent increase in sidewalk coverage is a 0.27 percent increase in walk mode choice.[65] At the time of CAP development, the specific priority areas for sidewalk improvement were not identified. It is assumed that pedestrian infrastructure will be added to Escondido's downtown employment centers, and the additional sidewalk coverage is calculated based on the ratio of the length of new sidewalks added and the length of local roads. Once the priority areas are determined, the impact may be re-evaluated based on the number of employees and percentage of employees eligible to commute by walking in the areas. The goal, 0.5 miles new sidewalk per year, translates to 0.6 percent sidewalk coverage at the Escondido's downtown employment centers.[66] For this measure, only the impact on avoiding commute VMT is quantified due to data availability. However, pedestrian infrastructure improvements also encourage non-commute trips by walking rather than by car.

The avoided VMT are estimated based on the number of additional downtown employees walking to work and miles avoided per trip. Miles avoided were converted to GHG emissions reductions using the average vehicle emission factors discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 32.[67]

Table 32 Key Assumptions and Results for Measure T-3.2: Improve Pedestrian Infrastructure at Priority Areas

Year	Annual Average Miles of New or Improved Sidewalk (Miles per year)	Cumulative Miles of New or Improved Sidewalk (Miles)	New or Improved Sidewalk Cover in Downtown Employment Center Area (%)	Increase in Walk Commuters (%)	Number of Additional Employees Commute by Walking*	Miles Avoided (Miles per year)**	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	0.5	5.8	7%	2%	301	149,064	297	44
2035	0.5	8.3	10%	3%	427	211,174	279	59

*15,130 employees as of 2019 **Average VMT avoided by commuting by walking is assumed to be 1.1 mile one-way per workday based on Escondido Centre City employment center data, with 255 workdays per year.
The emissions reduction is the projection under the CAP, including future impact of State policies and programs used in CARB EMFAC2014 model, and CAP assumptions.
Energy Policy Initiatives Center 2019.

6.3.3 Measure T-3.3: Continue to Implement Safe Routes to School Program at the Escondido Union School District

The City has an ongoing effort with the Escondido Union School District (EUSD) to implement the Safe Routes to School (SRTS) program. In the last three years, the City has completed infrastructure improvement projects near Juniper Elementary School (ES), Central ES, Farr Avenue ES, Rose ES, and Glen View ES. The infrastructure improvement projects include installation of new sidewalks, signals and high visibility crosswalk upgrades, countdown pedestrian indications at crossings, and other similar projects.[68]

[65] CARB: Policy Brief on the Impacts of Pedestrian Strategies on Passenger Vehicle Use and Greenhouse Gas Emissions, September 30, 2014, accessed June 29, 2019. Multiple studies are reviewed in the policy brief. The elasticity from Ewing et al. (2009) is used here because of the similarity in the study area, sidewalk characteristics and Escondido data availability.
[66] The total miles of local road segment (centerline) at the Escondido downtown employment center, including major roads, arterial or collectors, local streets, and alleys, is 39.6. Assuming sidewalks are in both directions of the roads, the miles of roads (both directions) is 79.2 miles. Mileage estimated by EPIC using SANGIS "Roads_all" data, assessed July 31, 2019.
[67] SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.
[68] Information on completed SRTS programs were provided by the City (June 2019).

Through Measure T-3.3, the City will continue the implementation of the SRTS program at all schools in EUSD to increase the number of students walking and riding bicycles to and from school. The SRTS program would include infrastructure improvements surrounding schools that are similar to those completed, as well as educational programs (e.g., develop pedestrian and bicycle safety education curriculum, organize safety trainings, and safety awareness campaigns) at schools.

Assuming the City completes an SRTS program at all EUSD schools by 2035, the numbers of additional students walking or riding bicycles to school are shown in Table 33.[69]

Table 33 Number of Additional Escondido School District Students Walking or Riding Bicycles to School

Year	Number of Students in Escondido School District*	Students Walking to School			Students Riding Bicycle to School		
		Baseline (%) **	With Safe Routes to School (%)	Number of Additional Students Walking to School	Baseline (%) **	With Safe Routes to School (%)	Number of Additional Students Riding Bicycle to School
2030	15,377	21%	27%	999	2.0%	2.3%	51
2035	15,377	21%	30%	1,453	2.0%	2.5%	74

* 2018–2019 Escondido Union School District enrollment statistics ** The baseline assumption is based on a San Diego Unified School District 2015–2016 student-parent survey.
Energy Policy Initiatives Center 2019.

The avoided VMT were estimated based on the number of additional students walking or riding bicycles to school and miles avoided per trip. Miles avoided per year were converted to GHG emissions reductions using the average vehicle emission factors, discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 34.[70]

Table 34 Key Assumptions and Results for Measure T-3.3: Continue to Implement Safe Routes to School Program at the Escondido Union School District

Year	VMT Avoided from Students Walking or Riding Bicycles to School* (miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	202,659	297	60
2035	294,777	279	82

*Assumes a one-mile roundtrip distance for students walking to school and a 2.5-mile roundtrip distance for students riding bicycles to school, based on a San Diego Unified School District 2015–2016 student-parent survey, and 180 school days per year.
The emissions reduction is the projection under CAP assumptions, including future impact of State policies and programs used in CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

[69] The current percentage of students who walk or ride bicycles to school in EUSD schools is not available. The results are based on a San Diego Unified School District 2015–2016 student-parent survey (EPIC), unpublished. The percent increase in walking and riding bicycles to school are based on Stewart, et al., 2014: Multistate Evaluation of Safe Routes to School Program, accessed August 10, 2019. Student population is from 2018–2019 school district population, accessed July 31, 2019.
[70] The current trip distance of students who walk or ride bicycles to school in EUSD is not available. The results are based on a San Diego Unified School District 2015–2016 student-parent survey (EPIC), unpublished.

6.3.4 Measure T-3.4: Develop a Citywide Transportation Demand Management (TDM) Plan

Through this measure, the City would develop a Transportation Demand Management (TDM) Plan that will include: 1) adoption of a TDM ordinance that would specify alternative modes of transportation required at new non-residential developments; and 2) working with Escondido downtown employment center businesses to develop TDM policies. The TDM plan would require new non-residential developments or existing Escondido downtown employment center businesses to include a list of TDM activities. The list of TDM activities at new non-residential development is required to lead to a 5 percent increase in alternative travel modes from employee commuting; the list of TDM activities at existing downtown employment center businesses is required to lead to a 7 percent increase in alternative travel modes.

Table 35 lists potential TDM activities that would lead to an increase in alternative modes of transportation. However, other TDM activities may be recommended or required in the ordinance.[71] The ordinance is anticipated to be effective in 2022. The TDM plan may also include a list of potential designated areas for transportation network company (TNC) vehicles (e.g., Uber, Lyft) to pick-up and drop-off. However, the impact of this policy on alternative modes cannot be estimated due to limited available information.

Table 35 Examples of TDM Activities and Effects on Increasing Alternative Transportation Modes

TDM Activity Number	Activity Details	Effect on Alternative Transportation Modes	Source
TDM-1	Provide "end-of-trip" facilities for bicycle riders including secure bicycle parking spaces or bicycle racks, showers and clothes lockers (Number of amenities will be based on occupied floor areas and/or number of employees)	2% of additional employees will bicycle to work	CAPCOA - SDT-6 and SDT-7 San Francisco TDM Ordinance Active - 2 and 3
TDM-2	Provide discounted monthly NCTD transit passes or provide at least 25% transit fare subsidies to employees (if employees are using daily or multi-day MCTD transit pass)	2% of additional employees will use mass transit to work	CAPCOA - TRT-4 San Francisco TDM Ordinance HOV - 1
TDM-3	Provide transportation marketing services and communication campaigns including carpool and vanpool ride-matching services	1% of additional employees will carpool to work	San Francisco TDM Ordinance INFO - 1
TDM-4 for downtown employees only	Develop a parking cash out policy. That is if employer offer subsidized parking, for the employees not using parking spot, the employer would provide cash payment equivalent to cost of parking spaces will be provided to the employees.	2% of employees will not drive alone to work	San Francisco TDM Ordinance PKG-3
CAPCOA – California Air Pollution Control Officers Association. CAPCOA 2010, City of San Francisco 2018.			

[71] TDM activities and their impacts are from California Air Pollution Control Officers Association's GHG mitigation measure and San Francisco's TDM Program Measures. CAPCOA: Quantifying Greenhouse Gas Mitigation Measures (2010). City of San Francisco: TDM Program Standards Appendix A: TDM Measures, updated June 7, 2018, access November 19, 2018.

Although TDM activities may also lead to additional VMT reductions (e.g., reduce business trip VMT), the reduction in employee commute VMT can be more readily monitored (e.g., commuter surveys). Therefore, only avoided commute VMT is quantified for this measure.

Increasing each type of alternative transportation mode leads to different reductions in VMT. For example, the commute distance by a bicycle rider and by a vanpooler are different. The estimated VMT reduction as a result of said mode are shown in Table 36.[72]

Table 36 VMT Reduction from the Examples of TDM Activities

Increase in Alternative Modes of Transportation	Goal (% Increase)	Miles Avoided per Workday*	Miles Avoided per Year**	Escondido Miles Avoided per Year***
Commute by Bicycle	2%	6	1,305	1,305
Commute by Mass Transit	2%	21	4,635	2,577
Commute by Carpool	1%	21	4,680	2,602
Alternative Modes to Avoid Drive Alone	2%	21	4,680	2,602
Not commute by drive alone is referring to commuters carpooling, vanpooling, or taking mass transit instead of driving a single-occupied vehicle. *Based on SANDAG activity-based travel model results for Escondido Centre City employment center. **225 workdays per year. ***Miles associated with commuting by bicycling are all within Escondido and miles associated with the rest of the modes are allocated to Escondido based on Origin-Destination VMT allocation methods. Energy Policy Initiatives Center 2019.				

To calculate emissions avoided in 2030 and 2035, miles avoided per year were converted to GHG emissions reductions using the number of new commuters using alternative modes of transportation and the average vehicle emission factors, discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 37.[73]

[72] SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.
[73] Number of employees in Escondido employment center are based on SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.

Table 37 Key Assumptions and Results for Measure T-3.4: Develop a Citywide Transportation Demand Management (TDM) Plan

Year	New Labor Force			Downtown Employees			Total	
	Labor Force Added after 2022	New Commuters Using Alternative Modes of Transportation	VMT Avoided from Increasing Alternative Modes (miles per year)	Number of Employees in Escondido Employment Center	New Commuters Using Alternative Modes of Transportation	VMT Avoided from Increasing Alternative Modes (miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	3,344	167	346,649	15,130	652	1,449,713	297	533
2035	5,638	282	584,471	15,130	1,059	2,355,784	279	820

The emissions reduction is the assumption under the CAP, including future impact of State policies and programs used in CARB EMFAC2014 model, and CAP assumptions.
Energy Policy Initiatives Center 2019.

6.3.5 Measure T-3.5: Update Bicycle Master Plan

Bicycle facilities are categorized as follows: 1) Class I bicycle paths, which have a completely separated right-of-way designed for the exclusive use of bicycles and pedestrians; 2) Class II separated bicycle lanes, typically designated with striping; 3) Class III bicycle routes, where bicyclists share streets with motor traffic; and 4) Class IV cycle tracks, that provide a right-of-way designated exclusively for bicycle travel which are physically protected from vehicular traffic.

Through this measure, the City plans to update the existing Bicycle Master Plan and add or improve/upgrade 15 miles of new Class II, or better, bicycle lanes by 2035 (an average of one mile per year), as well as bicycle parking standards for all residential and commercial zones. The 15 miles represents the length of roadway segments for which two-way bicycle lanes would be added. Bicycle lanes are used for both recreational and commuting purposes. For this measure, only the impact on avoiding commute VMT is quantified. The increase in percentage of bicycle commuters is assumed to be proportional to the increase in bicycle lane miles per square mile. The elasticity of adding one additional mile of Class II, or better, bicycle lane per square mile is roughly one percent for commuters.[74] In other words, one additional mile of Class II, or better, bicycle lanes per square mile would lead to roughly one additional percent of commuters riding bicycles to work. In 2035, Escondido's developed area will be approximately 27 square miles in 2035, and new bicycle lanes would lead to an additional 1.1 mile of bicycle lane per square mile, assuming the new bicycle lanes are installed in both directions.[75]

To calculate annual commute VMT avoided, the increase in the percentage of commuters by bicycle was multiplied by the average commute distance avoided per workday (5.8 miles), assuming bicycle commuters are traveling within Escondido. The avoided VMT is converted to GHG emissions reductions using the average vehicle emission factors, discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 38.[76]

[74] Dill and Carr (2013): Bicycle Commuting and Facilities in Major U.S. Cities: If you build them, commuters will use them – another look.
[75] Developed based on SANDAG's Series 13 Regional Growth Forecast (Updated in October 2013). SANDAG Data Surfer, accessed on November 15, 2017.
[76] SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.

Table 38 Key Assumptions and Results for Measure T-3.5: Update Bicycle Master Plan

Year	Labor Force	Additional Bicycle Lanes Added (bicycle lane miles per square mile)	% of Additional Labor Force Using Bicycle to Commute	Additional Labor Force Using Bicycles to Commute	Commute VMT Avoided (miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	79,608	0.7	0.7%	597	778,878	297	231
2035	81,903	1.1	1.1%	921	1,201,986	279	335
The average VMT avoided by commuting by bicycle is assumed to be 5.8 miles per workday (roundtrip) based on Escondido Centre City employment center data, with 255 workdays per year. The emissions reduction is projected based on CAP assumptions and future impact of State policies and programs used in the CARB EMFAC2014 model. Energy Policy Initiatives Center 2019.							

6.3.6 Measure T-3.6: Increase Transit Commuters among New Downtown Residents

The City's Downtown Specific Plan, adopted in 2013, identifies a range of residential developments (e.g., multi-family, mixed use, shopkeeper, artisan lofts) and adopts smart growth policies to take advantage of the convenient access to the nearby Escondido Transit Center and high-density urban residential developments.[77] To further encourage more transit riders in the downtown area, the City will develop a Safe Routes to Transit program that improves accessibility around transit areas and rider amenities at boarding areas. For projects in the Downtown Specific Plan area, any reduction in parking over 15 percent will be required to provide six-month transit pass purchase program at initial occupancy. The goal is to increase commuting by transit among downtown residents by five percent.

The Downtown Specific Plan area accommodates up to 5,275 residential units. As of late 2019, 2,025 units have built, with 3,250 units remaining.[78] Assuming the remaining units will be built by 2035 with an average of 1.3 commuters per household, the number of new commuters in the Downtown Specific Plan area will be 4,348.[79]

To calculate annual avoided VMT, the number of new commuters was multiplied by the percent increase in commuting by transit and miles avoided per transit trip, then converted to GHG emissions reductions using the average vehicle emission factor described in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 39.

[77] City of Escondido: Downtown Specific Plan, adopted August 2013, accessed December 13, 2019.
[78] The balance of units was provided by the City (October 2019).
[79] Average commuters per household is calculated using total workers 16 years and over who do not work at home (71,591) divided by the number of households in Escondido (53,516) from the American Community Survey (ACS). ACS: 2018 1-year Estimates, accessed November 13, 2019. Number of households in Escondido from other sources is available, however, to ensure consistency with the number of workers data, the number of households from ACS is used.

Table 39 Key Assumptions and Results for Measure T-3.6: Increase Transit Commuters among New Downtown Residents

Year	Number of New Units in Downtown Specific Plan Area after 2019	Number of New Commuters Live in Downtown Specific Plan*	Increase in Commuting by Transit (%)	Number New Commuters Taking Transit	Annual Total VMT Avoided** (Miles per year)	Annual Escondido VMT Avoided*** (Miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	2,167	2,898	3%	97	507,518	282,178	297	84
2035	3,250	4,348	5%	217	1,141,915	634,901	279	177

*Assumes average 1.3 commuters per household in Escondido **Assumes 10.3 mile one-way per workday based on Escondido Centre City employment center data, with 255 workdays per year. ***Miles avoided are allocated to Escondido based on Origin-Destination VMT allocation methods.
The emissions reduction is the projection under CAP assumptions, including future impact of State policies and programs used in the CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

6.3.7 Measure T-3.7 Develop an Intra-City Shuttle Program

Through Measure T-3.7, the City plans to develop an intra-city shuttle system that operates multiple routes to reduce miles driven from internal city trips. The goal is to reduce the projected 2035 VMT within city boundaries by 10 percent, or 23 million miles, in 2035.

The potential routes and the schedule of the intra-city shuttle system have not yet been identified. The City would work with proprietors, including NCTD, residents and businesses to explore the feasibility of an intra-city shuttle program and the efficiency of routes and times selected. However, to be able to achieve the goal, the shuttle system would need to include multiple routes that connect activity centers within the city, not overlap with existing transit service area, and run on high-frequency (with at least 10 minutes headways during peak periods).

To avoid double-counting with other measures in the CAP that increase mass transit ridership, the miles avoided per passenger trip may not include the full miles avoided by commuters using the intra-shuttle to connect mass transit (SPRINTER or bus service) to or from other cities. The miles avoided per passenger trip will have to be all internal miles within city boundaries and account for the miles the passengers would otherwise have to drive to the destination. The passengers would instead take the shuttle alone or take the shuttle combined with other modes of transportation (e.g., shuttle and bicycle, shuttle and bus within the City).

The avoided VMT is converted to GHG emissions reductions using the average vehicle emission factor, discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reduction in 2030 is shown in Table 40.

Table 40 Key Assumptions and Results for Measure T-3.7 Develop an Intra-City Shuttle Program

Year	Miles from Escondido Internal Trips* (Miles per weekday)	% Reduction from Internal Trip Miles	VMT Avoided due to Intra-City Shuttle (Miles per weekday)	VMT Avoided due to Intra-City Shuttle** (Miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	650,422	7%	43,361	15,046,437	297	4,463
2035	675,570	10%	67,557	23,442,262	279	6,540

*SANDAG Series 13 Forecast with base year 2012 **347 weekdays per year conversion
The emissions reduction is the projection under CAP assumptions, including future impact of State policies and programs used in CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

6.3.8 Measure T-3.8: Increase Transit Ridership

Escondido is served by both San Diego Metropolitan Transit System (MTS) and NCTD. MTS only provides bus service; MTS Route 235 from Downtown San Diego to Escondido has one of the highest ridership among buses serving Escondido. NCTD has both bus and light rail (SPRINTER) services in the City. The NCTD bus routes in Escondido with the highest ridership are Route 350 (from Del Lago Station to Escondido Transit Center) and Route 351/352 loop within the city. These mass transit services bring commuters to or from Escondido and currently make up approximately two percent of mode share. [80] Under Measure T-3.8, the City will work with MTS and NCTD to optimize ridership by coordinating land use and mobility planning for operations and more frequent services. The goal is to increase the mode share for commuters traveling to and from work or on mass transit to eight percent by 2035.

In 2017, the two SPRINTER stations in Escondido (Escondido Transit Center and Nordahl Road Station) served a total of 3,291 passengers on an average weekday, and all the bus routes in Escondido served a total of 8,228 passengers on an average weekday. Assuming 70 percent of SPRINTER passengers and 50 percent of bus passengers are commuters travelling to and from work, the baseline number of mass transit commuters is approximately 6,417 per weekday.[81] The VMT avoided are calculated based on the number of mass transit commuters, assumed to increase by three times by 2035 with Measure T-3.8, and the miles avoided per trip. The VMT avoided are then converted to GHG emissions reductions using the average vehicle emission factors discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 39.[82]

[80] ACS: 2018 1-year Estimates, Means to Work, Escondido City. accessed November 13, 2019.
[81] FY2017 mass transit ridership by routes and stops were provided to EPIC by SANDAG (November 2018). The percentage of Sprinter passengers that are commuters are based on MTS trolley (similar light rail service) passenger boarding data by hour and assume that peak hour passengers are commuters. MTS: Community Impact and Performance Report 2016, accessed September 3, 2019.
[82] SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.

Table 41 Key Assumptions and Results for Measure T-3.8: Increase Transit Ridership

Year	Target Mass Transit Mode Share* (%)	Travel to and from Work by Bus		Travel to and from Work or Colleges by Sprinter		Miles Avoided (Miles per year)	Total	
		Number of Commuters - Baseline**	Number of Additional Commuters with Target Mode Share	Number of Commuters - Baseline**	Number of Additional Commuters with Target Mode Share		Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	4%	4,114	6,689	2,304	3,746	26,891,635	297	7,977
2035	8%	4,114	15,245	2,304	8,537	61,287,912	279	17,099

*The current mass transit mode share is 2%. **2017 fiscal year ridership is used as the baseline, assuming 70% Sprinter riders and 50% bus riders travel to work.
The average VMT avoided by mass transit commuters is assumed to be 20.6 miles per workday based on Escondido Centre City employment center data, with 255 workdays per year. VMT is allocated to Escondido based on Origin-Destination VMT allocation methods, assuming trips will have at least one trip-end within Escondido.
The emissions reduction is the projection under the CAP assumptions, including future impact of State policies and programs used in CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

To avoid potential double counting with Measure T-3.6: Increase Transit Commuters among New Downtown Residents, the GHG reductions in 2030 and 2035 are adjusted to 7,829 and 16,875 MT CO_2e.

6.3.9 Measure T-3.9: Develop and Implement a Service Population-Based Vehicle Miles Traveled Threshold

To close the emissions reduction gap in 2035, the City will implement additional actions to reduce projected 2035 VMT. The goal is to reduce projected 2035 VMT by 3.5 percent. The additional actions would require the City to develop and monitor a VMT threshold of significance on a jurisdiction-wide basis, and/or attempt to reach a significance conclusion on a project-by-project basis. This new way to look at new development projects will allow the City to consider how to mitigate for VMT-based impacts, and how those mitigation measures differ from traditional LOS-based measures.

After implementation, the City would be able to assess how the project increase in the total daily vehicle miles traveled per service population (population plus employment) (VMT/SP) above the baseline level for the jurisdiction. The GHG emissions reductions in 2030 and 2035 are shown in Table 42.[83]

Table 42 Key Assumptions and Results for Measure T-3.9: Develop and Implement a Service Population-Based Vehicle Miles Traveled Threshold

Year	Reduction from Projected VMT (%)	VMT Avoided (Miles per weekday)	VMT Avoided (Miles per year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	1.8%	56,634	19,652,015	297	5,829
2035	3.5%	114,403	39,697,772	279	11,075

The emissions reduction is the projection under the CAP assumptions, including future impact of State policies and programs used in CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

[83] SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.

6.4 Strategy 4: Increase Building Energy Efficiency (E)

The goal of this strategy is to increase building energy efficiency and reduce building electricity and natural gas use through the following four measures.

6.4.1 Measure E-4.1 Require New Residential Developments to Install Alternatively-Fuel Water Heaters

To reduce reliance on natural gas end-use at residential buildings, the City will develop and implement an ordinance requiring new single-family and multi-family residential units to install non-natural gas water heaters. The anticipated effective year of the ordinance is 2023.

The energy savings from installing a non-natural gas water heater assumes replacement of a natural gas storage water heater with an electric heat pump water heater (HPWH). The energy use of these two water heaters is shown in Table 43.[84]

Table 43 Residential Water Heater Energy Use Comparison

Residential Type	Natural Gas Use from a Gas Storage Water Heater		Electricity Use from a Heat Pump Water Heater	
	(Therms/year)	(MMBtu/year)*	(kWh/year)	(MMBtu/year)*
Single-Family 1	137	14	813	2.8
Single-Family 2	146	15	925	3.2
Single-Family (Average of 1&2)	142	14	869	3.0
Multi-Family	117	12	559	1.9

*99,976 Btus per therm and 3,312 Btus per kWh.
Residential types are based on prototypes developed by the CEC for the Title 24 2019 Building Energy Efficiency Standard. The two single-family prototypes have different floor areas (square footage) and number of stories, therefore different water heating energy use.
Energy use are modeled with CEC CBECC-Res tool, March 2018 version, for Climate Zone 10 where Escondido is located.
Energy Policy Initiatives Center 2019.

While HPWH is used as an example here, other types of non-natural gas water heater may be used as a replacement water heater.[85] In Escondido, SANDAG Series 13 projects that 1,061 new multi-family units will be added from 2023 to 2030, and an additional 207 multi-family units will be added from 2030 to 2035. Similarly, for single-family developments in Escondido, 45 new multi-family units will be added from 2023 to 2030, and an additional 104 single-family units will be added from 2030 to 2035.[86] All units will be subject to this requirement beginning in 2023. Assuming 10 percent of the units will be exempt from the requirement due to certain limitations, the emissions reduced from natural gas savings and emissions added from electricity use are shown in Table 44 and Table 45.

[84] CEC: CBECC-Res , version dated March 9, 2018, model run by EPIC.
[85] Other options include, but are not limited to, instantaneous electric, tank-based electric water heater, solar water heater with HPWH back up, and solar water heater with electric tank back up.
[86] SANDAG Series 13 Regional Growth Forecast (October 2013). SANDAG Data Surfer, accessed November 15, 2017. The annual new units added from 2023 and 2030 are estimated using linear interpolation between 2020 and 2030.

Table 44 Emissions Reduction from Natural Gas Savings for Measure E-4.1 Require New Residential Developments to Install Alternatively-Fuel Water Heaters

Year	Residential Unit Type	Total New Alternative-Fuel Water Heater after 2023*	Natural Gas Savings Per Alternative-Fuel Water Heater (Therms/year)	Total Natural Gas Savings (Therms/year)	Natural Gas Emission Factor (MT CO_2e/Therm)	Emissions Reductions from Natural Gas Savings (MT CO_2e)
2030	Single-Family	40	142	5,705	0.0054	31
	Multi-Family	955	117	111,765	0.0054	612
2035	Single-Family	134	142	18,950	0.0054	104
	Multi-Family	1,142	117	133,563	0.0054	731

*Assumes 10% of water heaters will be exempt from this requirement due to limitations.
The natural gas savings and emissions reduction are the projections under the CAP assumptions, including the future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

Table 45 Emissions from Electricity use for Measure E-4.1 Require New Residential Developments to Install Alternatively-Fuel Water Heaters

Year	Residential Unit Type	Total New Alternative-Fuel Water Heaters after 2023*	Electricity Added from Alternative-Fuel Water Heaters** (kWh/year)	Total Electricity Use (kWh/year)	Electricity Emission Factor (lbs CO_2e/MWh)	Emissions from Additional Electricity Use (MT CO_2e)
2030	Single-Family	40	869	35,038	53	1
2030	Multi-Family	955	559	533,990	53	13
2035	Single-Family	134	869	116,376	36	2
2035	Multi-Family	1,142	559	638,132	36	10

*Assumes 10% of water heaters will be exempt from this requirement due to limitations. **The alternatively-fueled water heater type used here is heat pump water heater.
The projected electricity use and emissions added are the projections under the CAP based on current status, future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

The net emissions reductions from Measure E-4.1 in 2030 and 2035 are shown in Table 46. The GHG emissions reductions are the projected reduction amounts in 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 46 Key Assumptions and Results for Measure E-4.1 Require New Residential Developments to Install Alternatively-Fuel Water Heaters

Year	Residential Unit Type	Emissions Reductions from Natural Gas Savings (MT CO_2e)	Emissions from Additional Electricity Use (MT CO_2e)	Net Emissions Reduction* (MT CO_2e)
2030	Single-Family	31	1	30
	Multi-Family	612	13	599
			Total	629
2035	Single-Family	104	2	102
	Multi-Family	731	10	721
			Total	822

*Net emissions reductions are emissions reductions from natural gas savings minus emissions from additional electricity use. The emissions reductions are the projections under the CAP assumptions, including the future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

6.4.2 Measure E-4.2: Require New Multi-Family Residential Developments to Install Electric Cooking Appliances

Another way to reduce reliance on natural gas end-use at residential buildings is to switch to electric cooking appliances. The City will develop and implement an ordinance requiring new multi-family residential units to install electric cooking appliances. The anticipated effective year of the ordinance is 2023.

As discussed in Section 6.4.1 above, SANDAG Series 13 projects that 1,061 new multi-family units will be added from 2023 to 2030, and an additional 207 units will be added from 2030 to 2035.[87] All units will be subject to the requirement beginning in 2023, and assuming 10 percent of units will be exempt from the requirement due to certain limitations, the emissions reduced from natural gas savings and emissions added from electricity use are show Table 47 and Table 48.[88]

[87] SANDAG Series 13 Regional Growth Forecast (October 2013). SANDAG Data Surfer, accessed November 15, 2017. The annual new units added from 2023 and 2030 are estimated using linear interpolation.
[88] KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study. California Energy Commission. Publication Number: CEC- 200-2010-004. Table 2-5 and Table 2-21. Statewide results are used instead of SDG&E area results, because only statewide results have the breakdown of residence type. 5+ Unit Apartment is the multi-family residence type used here.

Table 47 Emissions Reduction from Natural Gas Savings for Measure E-4.2: Require New Multi-Family Residential Developments to Install Electric Cooking Appliances

Year	Total Electric Cooking Appliances at New Multi-Family Units after 2023	Natural Gas Use per Natural Gas Cooking Appliance at Multi-Family Units* (Therms/year)	Total Natural Gas Savings (Therms/year)	Natural Gas Emission Factor (MT CO_2e/Therm)	Emissions Reductions from Natural Gas Savings (MT CO_2e)
2030	955	28	26,747	0.0054	146
2035	1,142	28	31,964	0.0054	175

*Natural gas range/oven, assume multi-family units are in 5+ unit apartment buildings
The natural gas savings and emissions reduction are projections under the CAP assumptions including the future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

Table 48 Emissions from Electricity Use for Measure E-4.2: Require New Multi-Family Residential Developments to Install Electric Cooking Appliances

Year	Total Electric Cooking Appliances at New Multi-Family Units after 2023	Electricity Added Per Electric Cooking Appliance at Multi-Family Units* (kWh/year)	Total Electricity Use (kWh/year)	Electricity Emission Factor (lbs CO_2e/MWh)	Emissions from Electricity Use (MT CO_2e)
2030	955	165	157,618	53	4
2035	1,142	165	188,357	36	3

*Electric range/oven, assume multi-family units are in 5+ unit apartment buildings
The electricity use and emissions added are projections under the CAP assumptions including the future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

The net emissions reductions are 143 MT CO_2e in 2030 and 172 MT CO_2e in 2035.

6.4.3 Measure E-4.3: Retrofit High Pressure Sodium Street Lights to LED Lights

The City plans to reduce electricity use from City-owned street lights by converting the current high-pressure sodium (HPS) lights to LED lights. The goal is to retrofit 450 lights by 2035 or 30 lights per year starting in 2021. It is important to note that this estimate (450 lights) is conservative, as the City already has 750 lights retrofitted; however, it is a base of analysis to estimate emission reductions.
A streetlight inventory or energy use audit was not available at the time of CAP development. Based on a street lights retrofit study, the estimated annual electricity savings from replacing a 100-Watt HPS light with an LED light of similar lumens is 372 kWh.[89] Reductions from electricity savings are calculated by multiplying the electricity savings by the GHG emission factor for electricity, discussed in Section 4.2.1 (GHG Emission Factor for Electricity) and Table 5 (2016 and Projected 2030 and 2035 GHG Emission Factor for Electricity in Escondido). As the renewable and zero-carbon content in electricity increases, the emissions reduction decreases correspondingly. The GHG emissions reductions in 2030 and 2035 are shown in Table 49.

[89] Replace a 100-W HPS light with a 50 W-LED light. Lighting retrofits data from Escondido were not available at the time of CAP development. The lighting retrofit savings were the estimated savings from a Solana Beach Municipal Retrofit Report on street lights retrofits (unpublished).

Table 49 Key Assumptions and Results for Measure E-4.3: Retrofit High Pressure Sodium Street Lights to LED Lights

Year	Annual Number of Streetlights Retrofitted to LED	Total Number of Streetlights Retrofitted to LED after 2021	Electricity Savings* (kWh per year)	Electricity Emission Factor (lbs CO_2e/MWh)	Emissions Reductions from Electricity Savings (MT CO_2e)
2030	30	300	111,600	53	3
2035	30	450	167,400	36	3

*Assumes retrofit of a 100 W HPS streetlight to LED with the same lumens and the electricity saving is 31 kWh per month
The emissions reductions are the projection under the CAP assumptions.
Energy Policy Initiatives Center 2019.

6.4.4 Measure E-4.4: Require Non-Residential Alterations and Additions to Install Alternatively-Fuel Water Heaters

To reduce reliance on natural gas end-use at non-residential buildings, the City will develop and implement an ordinance requiring all non-residential alterations or additions with permit value of $200,000 or more to install alternatively-fueled water heaters. The anticipated effective year of the ordinance is 2023. This ordinance does not include requirements for new construction, because new construction will have separate and more stringent requirements under the ordinance proposed through Measure E-5.2*: Require New Commercial Developments to Achieve Zero Net Energy*, discussed in Section 6.5.2.

Energy savings from installing a non-natural gas water heater are calculated based on using a HPWH on a per-gross floor area basis. As of November 2019, the City of Carlsbad was the only jurisdiction in the San Diego region to have a water heating ordinance related to non-residential projects. However, the ordinance only covers non-residential new construction, and Carlsbad is in a different Climate Zone (Climate Zone 7) from Escondido.[90] Therefore, the energy savings from the ordinance proposed under Measure E-4.4 are modified based on the difference in energy uses in Climate Zones 7 and 10, as well as the difference in energy uses at newly constructed versus existing buildings, as shown in Table 50.[91]

Table 50 Potential Energy Savings from Measure E-4.4: Require Non-Residential Alterations and Additions to Install Alternatively-Fuel Water Heaters

Commercial Building Type	Building Size (sq. ft.)	Electricity Added with HPWH (kWh per year)	Electricity Added with HPWH (kWh/year/ sq. ft.)	Natural Gas Savings with HPWH (Therms per year)	Natural Gas Savings with HPWH (Therms/year /sq. ft.)
New Construction Small Office with HPWH (Climate Zone 7)	5,502	1,241	0.23	249	0.05
New Construction Medium Office with HPWH (Climate Zone 7)	53,628	6,311	0.12	433	0.01
Average of New Construction Office with HPWH	-	-	0.17	-	0.03

[90] City of Carlsbad: Nonresidential Photovoltaic & Water Heating Ordinances, adopted by Carlsbad City Council on March 2019 and approved by CEC on August 2019, accessed August 12, 2019.
[91] City of Carlsbad: Energy Conservation Ordinance Cost Effectiveness Analysis, February 20, 2019, accessed November 18, 2019. The cost effectiveness analysis was done based on 2016 Energy Code, however, there is no significant difference in the water heating section of the 2016 and 2019 Energy Code.

Commercial Building Type	Building Size (sq. ft.)	Electricity Added with HPWH (kWh per year)	Electricity Added with HPWH (kWh/year/ sq. ft.)	Natural Gas Savings with HPWH (Therms per year)	Natural Gas Savings with HPWH (Therms/year /sq. ft.)
(Climate Zone 7)					
Adjustment Factor of Climate Zone Difference (%)*	-	-	95%	-	95%
Adjustment Factor of Building Age Difference (%)**	-	-	110%	-	110%
Estimates used for Measure E-4.4			0.18	-	0.03

Measure E-4.4: Require Non-Residential Alterations and Additions to Install Alternatively-Fuel Water Heater
*Ratio of water heating energy use at buildings in Climate Zone 7 (where Carlsbad is located) to Climate Zone 10 (where Escondido is located) **Ratio of water heating energy use at existing buildings to newly constructed buildings
City of Carlsbad 2019, Energy Policy Initiatives Center 2019.

HPWH is used as an example here; however, other types of non-natural gas water heaters may be used to replace existing water heaters.[92] Similarly, office buildings were used as a commercial building type example; however, other types of buildings (e.g., retail, restaurant) have different water heating energy use on a per-square footage basis and are not included here.

Based on recent permitting data, an annual average of approximately 144,000 sq. ft. of commercial additions and alterations would have been subject to this requirement. Assuming this trend continues, they will be subject to the requirement beginning in 2023.[93] Certain buildings would be exempt from this requirement due to building age or other limitations. It is assumed 10 percent of the projects would be exempt.

Emissions reductions from natural gas savings were calculated using the natural gas savings per square footage, gross floor area, and the natural gas emission factor discussed in Section 4.3. The emissions reductions from natural gas savings due to E-4.4 are summarized in Table 51.

[92] Other options include, but are not limited to, instantaneous electric, electric tank solar water heater with HPWH back up, and solar water heater with electric tank back up.
[93] Projects with permits valued at $200,000 or greater were provided by the City (November 2019). Not all permits have information on the square footage of the project, for these projects, the square footages were estimated based on a $ per sq. ft. basis from the projects with both $ and sq. ft. available.

Table 51 Natural Gas and Emissions Savings from Measure E-4.4: Require Non-Residential Alterations and Additions to Install Alternatively-Fuel Water Heaters

Year	Annual Commercial Developments Subject to the Requirement after 2023* (sq. ft. per year)	Total Non-Residential Projects with Alternative-Fuel Water Heaters after 2023** (sq. ft.)	Natural Gas Savings from Using Alternative-Fuel Water Heater*** (Therms/sq. ft./year)	Total Natural Gas Savings (Therms/year)	Natural Gas Emission Factor (MT CO_2e/Therm)	Emissions Reductions from Natural Gas Savings (MT CO_2e)
2030	150,000	1,080,000	0.03	30,094	0.0054	165
2035	150,000	1,755,000	0.03	48,903	0.0054	268

*Estimated gross floor area of non-residential major additions and alterations with permit value $200,000 or more, based on recent year's data. **Assume 10% major renovations will be exempt from this requirement due to building age or other limitations. ***Assume the alternatively-powered water theaters are HPWH
The projections are based on current status, future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

Emissions from added electricity use are calculated by multiplying the electricity use per square foot and gross floor area by the GHG emission factor for electricity, discussed in Section 4.2.1 (GHG Emission Factor for Electricity) and Table 5 (2016 and Projected 2030 and 2035 GHG Emission Factor for Electricity in Escondido). As the renewable and zero-carbon content in electricity increases, the emissions decrease correspondingly. The emissions from electricity uses due to Measure E-4.4 are summarized in Table 52.

Table 52 Electricity and Emissions from Measure E-4.4: Require Non-Residential Alterations and Additions to Install Alternatively-Fuel Water Heaters

Year	Annual Non-Residential Projects Subject to the Requirement after 2023* (sq. ft. per year)	Total Non-Residential Projects with Alternatively-Powered Water Heaters after 2023** (sq. ft.)	Electricity Added from Alternatively-Powered Water Heater*** (kWh/sq. ft./year)	Total Electricity Use (kWh/year)	Electricity Emission Factor (lbs CO_2e/MWh)	Emissions from Additional Electricity Use (MT CO_2e)
2030	150,000	1,080,000	0.18	193,688	53	5
2035	150,000	1,755,000	0.18	314,743	36	5

*Estimated gross floor area of non-residential major additions and alterations with permit value $200,000 or more, based on recent years' data. **Assume 10% major renovations will be exempt from this requirement due to building age or other limitations. ***Assume the alternatively-powered water heaters are HPWH
The projections are based on current status, future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

The net emissions reductions from Measure E-4.4 are 160 MT CO_2e in 2030 and 263 MT CO_2e in 2035.

6.5 Strategy 5: Increase Renewable and Zero-Carbon Energy (E)

The goal of this strategy is to increase both grid-supply and behind-the-meter generation of renewable and zero-carbon electricity through the following four measures.

6.5.1 Measure E-5.1: Increase Renewable Energy Generated at Municipal Facilities

Currently, there are eight Escondido municipal sites with on-site renewable electricity systems; there are PV systems at seven municipal sites and a small hydroelectric system at the City dam. The total capacity of the seven PV systems is 832 kW (0.8 MW).[94]

Through Measure E-5.1, the City plans to install additional PV systems at municipal facilities and parking lots to increase the amount of on-site renewable electricity generation. The goal is to install two MW of PV by 2035, which is equivalent to approximately 3.5 MWh a year of renewable electricity generation.[95] The City's municipal operation electricity use in 2018 was approximately 8.8 MWh (not including the utilities department). The City is not anticipating new municipal buildings during the CAP horizon. Therefore, the renewable generation from the additional two MW PV system would cover approximately 40 percent of the total municipal electricity use.

The emissions reductions from all State and CAP actions that increase behind-the-meter renewable supply are given in Table 7 (Attribution of Emissions Reductions to Supplies that Increase Renewable and Zero-Carbon Supply in Escondido). The total reduction is attributed based on estimated capacity (MW) that would result from each measure. As shown in Table 53, GHG emissions reductions from Measure E-5.1 are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 53 Key Assumptions and Results for Measure E-5.1: Increase Renewable Energy Generated at Municipal Facilities

Year	State or City Action	Total	Measure E-5.1: Increase Renewable Energy Generated at Municipal Facilities	Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy*	Measure E-5.4: Increase Renewable Electricity Generated at School Sites	California Solar Polices, Programs, and Mandates**
2030	Projected Behind-the-meter PV Capacity (MW)	147	**0.8**	3.7	2.6	140.2
	Projected Emissions Reduction (MT CO_2e)	53,814	**292**	1,360	947	51,215
2035	Projected Behind-the-meter PV Capacity (MW)	151	**2.0**	6.0	2.6	140.8
	Projected Emissions Reduction (MT CO_2e)	56,373	**745**	2,252	965	52,411

*Does not represent all emissions reduction from E-5.2
**Solar policies, programs and mandates include the impact of the PV mandates from the 2019 Building Energy Efficiency Standard.
The projected capacity and emissions reductions based on current conditions, the future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

[94] Information provided by the City (April 2019).
[95] Information provided by the City (April 2019).

6.5.2 Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy

A zero net energy building produces renewable energy equal to or greater than its own annual consumption. This reduces or eliminates reliance on natural gas end-use. The City will develop and implement an ordinance requiring all new commercial developments to achieve zero net energy. The anticipated effective year of the ordinance is 2023.

As of November 2019, there is no statewide modeled reach code (a local energy ordinance that exceeds the minimum standards defined by Title 24) study on achieving zero net energy at newly-constructed non-residential buildings. However, the latest *2019 Nonresidential New Construction Reach Code Cost Effectiveness Study* (Study) covers several cost-effective reach code options, including a combination of all-electric design with energy efficiency measures and PV installation that would nearly offset annual electricity use.[96] This combination is cost-effective in Climate Zone 10 and used as a proxy for the zero net energy requirement of the potential ordinance. However, other options to achieve zero net energy may be studied during the design and implementation of the ordinance.

Based on recent permitting data, an annual average of approximately 43,000 sq. ft. of new office development and 91,750 sq. ft. of new retail development would have been subject to the ordinance. Assuming this trend continues, those averages will be subject to the annual requirement beginning in 2023.[97] It is assumed that 10 percent of the projects would be exempt due to other limitations. Because office and retail building types are modeled separately in the Study, the impacts are examined separately, as well. The energy savings and PV capacity needed on a square footage basis are provided in Table 54.[98]

Table 54 Assumptions of Energy Savings and PV Capacity Needed for Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy

Building Type	Medium Office	Medium Retail
Conditioned Floor Area (sq. ft.)	53,628	24,697
Electricity Savings from All-electric + Energy Efficiency Design (kWh)	12,344	11,737
Electricity Savings from All-electric + Energy Efficiency Design (kWh per sq. ft.)	0.23	0.48
Natural Gas Savings from All-electric + Energy Efficiency Design (Therms)	2,053	1,262
Natural Gas Savings from All-electric + Energy Efficiency Design (Therms per sq. ft.)	0.04	0.05
PV Installation (kW)	135	110
PV Installation (W per sq. ft.)	2.5	4.5

[96] TRC and EnergySoft: 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study, last modified July 15, 2019, accessed August 11, 2019.
[97] New office spaces (86,000 sq. ft. in last two years) and new retail spaces (183,500 in last two years) square footage were provided by the City (June 2019). The sq. ft. is new gross floor area.
[98] TRC and EnergySoft: 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study, last modified July 15, 2019, accessed August 11, 2019. The PV system measure is discussed in Section 3.2.1, and the energy savings are discussed in Figure 21 and Figure 28, Climate Zone 10, Utility SDG&E. The all-electric measure includes changing baseline gas-fueled equipment (HVAC and water heating system) to electric. The energy efficiency measures are listed in Figure 4, including building envelop, HVAC, and lighting.

Building Type	Medium Office	Medium Retail
Based on 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study results of prototype medium office and medium retail spaces in Climate Zone 10, where Escondido is located. The electricity and natural gas savings are based on the energy uses of mixed-fuel designs and all-electric + energy efficiency designs. TRC and EnergySoft 2019.		

The emissions reduction from natural gas savings, emissions added from additional electricity use, and emissions reduction from added PV systems are shown in Table 55 through Table 57.

Table 55 Emissions Reduction from Natural Gas Savings due to Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy

Year	Office Space		Retail Space		Total		
	New Floor Area Added after 2023* (sq. ft)	Natural Gas Savings due to All-Electric + EE Requirement (Therms/sq. ft./year)	New Floor Area Added after 2023* (sq. ft)	Natural Gas Savings due to All-Electric + EE Requirement (Therms/sq. ft./year)	Total Natural Gas Savings (Therms/year)	Natural Gas Emission Factor (MT CO_2e/Therm)	Emissions Reductions from Natural Gas Savings (MT CO_2e)
2030	309,600	0.04	660,600	0.05	45,608	0.0054	250
2035	503,100	0.04	1,073,475	0.05	74,114	0.0054	406

*Assumes 10 percent new development will be exempt from this requirement due to other limitations.
The projected natural gas savings and emissions reduction are the projections under the CAP, based on current status, future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

Table 56 Emissions Reduction from Electricity Savings due to Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy

Year	Office Space		Retail Space		Total		
	New Floor Area Added after 2023* (sq. ft)	Electricity Savings due to All-Electric + EE Requirement (kWh/sq. ft./year)	New Floor Area Added after 2023* (sq. ft)	Electricity Savings due to All-Electric + EE Requirement (kWh/sq. ft./year)	Total Electricity Savings (kWh /year)	Electricity Emission Factor (lbs CO_2e/MWh)	Emissions Reductions from Electricity Savings (MT CO_2e)
2030	309,600	0.23	660,600	0.48	385,207	53	9
2035	503,100	0.23	1,073,475	0.48	625,961	36	10

*Assumes 10 percent new development will be exempt from this requirement due to other limitations.
The projected electricity savings and emissions reduction are the projections under the CAP, based on current status, future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

Table 57 Emissions Reduction from PV Systems due to Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy

Year	Office Space		Retail Space		Total	
	New Floor Area Added after 2023* (sq. ft)	Additional PV Capacity due to PV Requirement (kW/sq. ft./year)	New Floor Area Added after 2023* (sq. ft)	Additional PV Capacity due to PV Requirement (kW/sq. ft./year)	Total PV Capacity Added (MW/year)	Emissions Reductions from Additional PV (MT CO_2e)
2030	309,600	2.5	660,600	4.5	3.7	1,360
2035	503,100	2.5	1,073,475	0.9	6.0	2,252

*Assumes 10 percent new development will be exempt from this requirement due to other limitations.
The projected PV capacity and emissions reduction are the projections under the CAP, based on current status, future impact of State policies and programs, and CAP assumptions.
Energy Policy Initiatives Center 2019.

The total emissions reductions from Measure E-5.2 are shown in Table 58. The reductions are the projected reduction amounts in the years 2030 and 2035 only and do not represent the cumulative reductions from the 2012 baseline year to 2030 or 2035.

Table 58 Results for Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy

Emissions Reduction	GHG Emissions Reduction in 2030 (MT CO_2e)	GHG Emissions Reduction in 2035 (MT CO_2e)
Emissions Reductions from Natural Gas Savings	250	406
Emissions Reductions from Electricity Savings	9	10
Emissions Reduction from Additional PV	1,360	2,252
Total Emissions Reductions	1,618	2,668

The emission reductions projections are based on CAP assumptions including future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

6.5.3 Measure E-5.3: Increase Grid-Supply Renewable and Zero-Carbon Electricity

As discussed in Section 5.1, SB 100 (100 Percent Clean Energy Act of 2018) adopts a 60 percent RPS for all of California's retail electric suppliers by 2030 and 100 percent zero-carbon electricity by 2045. Through Measure E-5.3, the City would present options to City Council to increase grid-supply to 100 percent renewable or zero-carbon electricity by 2030.

Based on the assumptions used in the most recent Community Choice Aggregation feasibility study in the San Diego region, it is assumed 95 percent of SDG&E's residential bundled customers' electric load and 85 percent of SDG&E's commercial bundled customers' electric load would be supplied by the local renewable and zero-carbon program. SDG&E DA customers, whose electric load is supplied by other retail electric suppliers, will stay with their current electric suppliers and not participate in the local renewable program.[99]

[99] The Cities of Chula Vista, La Mesa, and Santee: Community Choice Aggregation Technical Feasibility Study, Section: CCA Participation and Opt-Out Rates, Final Draft, July 16 2019, accessed August 3, 2019.

As previously explained in Section 5.1 and Table 7 Attribution of Emissions Reductions to Supplies that Increase Renewable and Zero-Carbon Supply in Escondido), because the local renewables and zero-carbon program is required to comply with the State's RPS mandates, a portion of the total emissions reduction from Measure E-5.4 is credited to the State's RPS compliance. The remaining emissions reduction beyond RPS compliance is allocated to local Measure E-5.3. The allocation of GHG emissions reduction in 2030 from this measure to the State and to the City is shown in Table 59.

Table 59 Key Assumptions and Results for Measure E-5.3: Increase Grid-Supply Renewable and Zero-Carbon Electricity

Year	State or City Action	Total for Local Renewables and Zero-Carbon Program	Local Renewables and Zero-Carbon program to Complying with RPS	Local Renewables and Zero-Carbon Program above RPS (E-5.3)
2030	Projected Renewables and Zero Carbon (%)	100%	60%	40%
	Emissions Reduction (MT CO_2e)	105,336	63,201	**42,134**
2035	Projected Renewables and Zero Carbon (%)	100%	73%	27%
	Emissions Reduction (MT CO_2e)	109,209	79,723	**29,486**

*Calculated in Table 7.
The emissions reduction is the projection under the CAP assumptions including future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

6.5.4 Measure E-5.4: Increase Renewable Electricity Generated at School Sites

In November 2019, the EUSD started phase 1 of PV system construction at school playgrounds and carports. The project includes four phases and is anticipated to be completed by summer 2020. Table 60 below includes the sites and their PV system capacities.[100]

Table 60 Escondido Union School District's Sites with PV Systems

Sites	Modeled System Size (kW)
Bernardo ES	165.6
Quantum Academy	129.6
Hidden Valley MS	266.4
Rocks Spring ES	187.2
Bear Valley MS	280.8
Reidy Creek ES	208.8
Farr Avenue ES	216.8
Rinco MS	237.6
Oak Hill ES	172.8
L.R. Green ES	194.4
District Office	187.2
Orange Glen ES	158.4
Del Dios ES	187.2

[100] School sites and PV capacities were provided by the City (October 2019).

Sites	Modeled System Size (kW)
Total	**2,593**
ES – elementary school, MS – middle school Escondido Union School District 2019	

The total PV capacity from all the sites is 2.6 MW.

The emissions reductions from all State actions and CAP measures that increase the behind-the-meter renewable supply are given in Table 7 (Attribution of Emissions Reductions to Supplies that Increase Renewable and Zero-Carbon Supply in Escondido). The total reduction is allocated based on estimated capacity (MW) that would result from each action. As shown in Table 61, GHG emissions reductions from Measure E-5.4 are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 61 Key Assumptions and Results for Measure E-5.4: Increase Renewable Electricity Generated at School Sites

Year	State or City Action	Total	Measure E-5.1: Increase Renewable Energy Generated at Municipal Facilities	Measure E-5.2: Require New Commercial Developments to Achieve Zero Net Energy*	Measure E-5.4: Increase Renewable Electricity Generated at School Sites	California Solar Polices, Programs, and Mandates**
2030	Projected Behind-the-meter PV Capacity (MW)	147	0.8	3.7	**2.6**	140.2
	Projected Emissions Reduction (MT CO_2e)	53,814	292	1,360	**947**	51,215
2035	Projected Behind-the-meter PV Capacity (MW)	151	2.0	6.0	**2.6**	140.8
	Projected Emissions Reduction (MT CO_2e)	56,373	745	2,252	**965**	52,411

*Does not represent all emissions reduction from E-5.2
**Solar policies, programs and mandates include the impact of the PV mandates from the 2019 Building Energy Efficiency Standard.
The projected capacity and emissions reductions are based on current conditions and CAP assumptions including the future impact of State policies and programs.
Energy Policy Initiatives Center 2019.

6.6 Strategy 6: Increase Water Efficiency (W)

The goal of this strategy is to increase indoor and outdoor water efficiency through the following two measures.

6.6.1 Measure W-6.1: Reduce Municipal Landscape Water Consumption

The City's Landscape Maintenance District (LMD) area had 43 smart irrigation controllers and 2,698 water efficient rotator nozzles installed in early 2017 using the SoCal Water$mart rebate program. All the controllers are connected to the internet through cell, radio, or both. Smart irrigation controllers have also been installed at several City parks; going forward, if existing irrigation controllers fail, they will be replaced with smart controllers. The estimated water savings of these smart irrigation controller replacements are 40 percent. In the 2018–2019 fiscal year, the City's water use in its parks was 84,397,000

gallons. Assuming the reduction in water use is 40 percent of the current level in 2035, the water savings would be 33,758,800 gallons.[101]

The water savings are converted to GHG reductions based on the imported water GHG intensities in 2030 and 2035. The imported water GHG intensities are calculated based on projected water use and the GHG emissions from water, as assumed in the BAU emissions projection.[102] Table 62 summarizes the key assumptions and results. The GHG emissions reductions projected are the reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 62 Key Assumptions and Results for Measure W-6.1: Reduce Municipal Landscape Water Consumption

Year	Reduction in Water Use at City Parks (%)	Reduction in Water Use at City Parks (Gallons)	Reduction in Water Use at Landscape Maintenance District (Gallons)	Total Reduction in Water Use (Gallons)	Total Reduction in Water Use (Acre-feet)	Water-GHG Intensity (MT CO_2e/Acre-foot)*	Emission Reduction (MT CO_2e)
2030	27%	22,505,867	4,770,589	27,276,456	84	0.54	45
2035	40%	33,758,800	4,770,589	38,529,389	118	0.54	64

*Water-GHG intensity of imported water.
City of Escondido 2019, Energy Policy Initiatives Center 2019.

6.6.2 Measure W-6.2: Reduce Landscape Water Consumption New Model Home Developments

To reduce residential water use, the City will require each single-family model home, including townhouse model homes, to be fully equipped with greywater systems and rain barrels, or other rainwater capture systems. The requirement is similar to that in Measure T-1.4*: Require Electric Vehicle Charging Stations at New Model Home Developments*. The developers would also be required to provide information about having greywater systems and rain barrels as an add-on option to potential homebuyers. The estimated effective year of this requirement is 2021.

Having model homes equipped with such systems will encourage homebuyers to choose the add-on option. The City will allow for no-fee permitting for developers and waive fees for homebuyers of that subdivision at initial occupancy to further facilitate the implementation. On average, it is assumed that 13 new single-family homes will have such systems due to the requirement (12 through model home construction and one through a homebuyer add-on option).[103]

A California study indicates that, on average, households installing greywater systems reduce their water use by 26 percent over a year.[104] In Escondido, the water use at a single-family home is approximately 143,000 gallons a year; therefore, the water savings from a greywater system would be 37,000 gallons a

[101] The water savings since the installation are not available. However, the cost for water has been reduced by 15 percent; therefore, the water savings were estimated based on this change. Water use and estimated savings are provided by the City (July 2019). For LMD, water savings are estimated based on cost savings and water rate of $8.13 per 1,000 gallons, User Rates for Potable Water, Effective March 1, 2019, accessed July 29, 2019.
[102] Emissions from water and projected water use are provided in *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).
[103] Assumptions were provided by the City (October 2019).
[104] Greywater Action: Residential Greywater Irrigation Systems in California, September 2013, accessed November 18, 2019. Water savings vary by month, this is the annual saving.

year.[105] For rain barrels, based on SoCal Water$mart rebate program data, the average savings are 420 gallons a year.[106]

The water savings are converted to GHG reductions based on the imported water GHG intensities in 2030 and 2035. The imported water GHG intensities are calculated based on projected water use and the GHG emissions from water, as assumed in the BAU emissions projection.[107] Table 63 summarizes the key assumptions and results. The projected GHG emissions reductions are the reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 63 Key Assumptions and Results for Measure W-6.2: Reduce Landscape Water Consumption New Model Home Developments

Year	Annual Number of Homes with Greywater Systems and Rain Barrels due to W-6.2	Number of Greywater Systems and Rail Barrels due to W-6.2 after 2021	Water Saving per Home with Greywater System (Gallon per year)	Water Saving per Rain Barrel (Gallon per year)	Total Water Use Reduction (gallons)	Total Water Use Reduction (Acre-Feet)	Water-GHG Intensity (MT CO_2e/Acre-Foot)*	Emission Reduction (MT CO_2e)
2030	13	130	37,221	420	4,893,396	15	0.5	8
2035	13	195	37,221	420	7,340,094	23	0.5	12

*Water-GHG intensity of imported water.
Energy Policy Initiatives Center 2019.

6.7 Strategy 7: Diversify Local Water Supply (W)

The goal of this strategy is to reduce water-related energy use by diversifying local water supply through the following measure.

6.7.1 Measure W-7.1 Develop a Local Water Supply for Agriculture Water Use

Most of the water-related energy use is from upstream energy use (e.g., importing water from outside of San Diego region). The City plans to construct and operate a new Membrane Filtration/Reverse Osmosis Facility (MFRO) to produce a high-quality water supply for local agriculture water, which will increase local water supply and reduce the reliance on imported water. Once in operation, the MFRO will produce up to six million gallons of water per day (MGD, equivalent to 6,721 acre-feet per day) for agriculture irrigation use.[108]

Assuming the local water supply reduces imported water supply, the emissions avoided is calculated based on the imported water GHG intensities in 2030 and 2035. On the other hand, there will be additional

[105] The single-family potable water use was 9,679 acre-feet in 2015 based on the Escondido 2015 Urban Water Management Plan, May 2016. Table 2-3. The number of single-family homes in Escondido in 2015 was 22,031 based on SANDAG Demographic and Socioeconomic Estimates (May 25, 2019 version). SANDAG Data Surfer, accessed on November 18, 2019.
[106] Rebate data from Escondido are not available, data from Helix Water District were used as proxy.
[107] Emissions from water and projected water use are provided in *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018).
[108] Estimated water produced at MFRO was provided by the City (July 2019).

local electricity use to treat water at the MFRO.[109] Table 64 summarizes the key assumptions and results. The GHG emissions reductions projected are the amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 64 Key Assumptions and Results for Measure W-7.1 Develop a Local Water Supply for Agriculture Water Use

Year	New Local Water Provided to Agricultural Customers (Acre-Feet)	Water-GHG Intensity (MT CO2e/Acre-Foot)*	Emissions Avoided due to avoided Upstream Water (MT CO_2e)	Local Electricity Use Added from Water Treatment** (kWh)	Electricity Emission Factor (lbs CO_2e/MWh)	Emissions Generated from Electricity Consumed to Treat Water (MT CO_2e)	Net Emission Reduction (MT CO_2e)
2030	6,721	0.54	3,635	3,951,868	53	94	3,541
2035	6,721	0.54	3,635	3,951,868	36	64	3,571

*Water-GHG intensity of imported water. **Based on the energy intensity (599 kWh/acre-foot) of recycled water treatment (membrane filtration/reverse osmosis)
Energy Policy Initiatives Center 2019.

6.8 Strategy 8: Reduce and Recycle Solid Waste (S)

The goal of this strategy is to reduce emissions from landfill waste through the following measure.

6.8.1 Measure S-8.1: Increase Citywide Waste Diversion

Through Measure S-8.1, the City will work with its waste hauler to achieve an 80 percent waste diversion rate by 2030, and an 85 percent waste diversion rate by 2035. The 80 percent waste diversion rate would result in 2.4 pounds per person per day (PPD) waste disposed in landfills in 2030, and the 90 percent waste diversion rate would result in 1.2 PPD waste disposed in 2035.

The citywide waste disposal amount was 5.4 PPD in the 2012 baseline year and 5.9 PPD in 2016, corresponding to approximately 54 percent and 50 percent diversion rates, respectively. From 2012 to 2016, the diversion rates fluctuated between 50 percent and 54 percent.[110] The City has not conducted a waste characterization study recently; therefore, the baseline 2012 waste composition is used and held constant through the CAP horizon.[111] Landfills in the San Diego region are in the process of upgrading gas collection systems. It is assumed the landfill gas capture rate in 2030 will be 85 percent, an increase from the default 75 percent used in the BAU emissions projection. The emissions avoided from increasing the waste diversion rate is the difference between the waste category BAU emissions and the solid waste emissions using the target diversion rates and corresponding PPD waste amounts. Table 65 summarizes the key assumptions and results.

[109] The energy intensity of treating water to recycled water levels (membrane filtration/reverse osmosis process) is used as a proxy for the treatment energy use at MFRO. *Appendix A: City of Escondido Greenhouse Gas Emissions Inventories and Projections* (EPIC, 2018). The MFRO Environmental Impact Report included estimates on the operational energy use. There, it is assumed the energy use would be like a "refrigerated warehouse", which may not be as representative as the recycled water energy intensity.
[110] Method to convert PPD to estimated diversion rate is based on Calrecycle. Per Capita Disposal and Goal Measurement. Jurisdiction PPD from 2012–2016 were downloaded from CalReycle Jurisdiction Diversion Summary.
[111] Recent State actions include organic waste recycling, which may reduce the mixed waste emission factor in future years.

Table 65 Key Assumptions and Results for Measure S-8.1: Increase Citywide Waste Diversion

Year	Waste Disposed at Landfills from Escondido			Landfill Gas Capture Rate	Emissions with Targeted Diversion Rate (MT CO_2e)	Business as Usual Emissions (MT CO_2e)	GHG Emissions Reduction (MT CO_2e)
	lbs./person/day	short tons/year	MT/year				
2030	2.4	74,223	67,334	85%	7,457	31,045	23,588
2035	1.2	37,232	33,777	85%	3,741	31,145	27,405

Emissions from waste are calculated based on the mixed waste emission factor (0.74 MT CO_2e/short ton), oxidation rate (10%), and the waste capture rates. The projected emissions reductions are based on the CAP assumptions.
Energy Policy Initiatives Center 2019.

6.9 Strategy 9: Carbon Sequestration and Land Conservation (C)

The most recent urban tree canopy assessment in the San Diego region, conducted in 2014 using high-resolution Light Detection and Ranging (LiDAR), showed an urban tree canopy covering approximately 18 percent of Escondido.[112] The goal of this strategy is to increase the urban tree cover within Escondido through the following two measures (Measure C-9.1 and Measure C-9.2). In addition, Measure C-9.3 includes development of an Agricultural Land and Open Space Conservation Program.

6.9.1 Measure C-9.1: Enforce Landscape Tree Requirement at New Developments

The City's current water efficient landscape regulation includes the following requirements for tree planting: 1) a minimum of one tree for every four opposing parking spaces at new non-residential developments; and 2) a minimum of one tree per unit at new residential developments, including single-family and multi-family developments. A minimum of 15 gallons in size and proper irrigation and maintenance are required.[113]

Based on recent permitting data, an average of approximately 134,750 sq. ft. of new commercial office and retail development and 91,750 sq. ft. of new industrial developments were added per year.[114] The Escondido Municipal Code off-street parking regulations require on average of one parking space per 250 sq. ft. gross floor area; therefore, approximately 1,019 new parking spaces will be added every year at these new non-residential developments.[115] The new parking spaces will yield 255 new trees annually. The projected total number of new trees added by 2030 and 2035 are shown in Table 66.

[112] The assessment was done in 2014 for all urban areas in the San Diego County using methods developed by University of Vermont and USDA Forest Service.
[113] Escondido Municipal Code: Sec. 33-1339. Standards for Landscaping, accessed on August 1, 2019. These requirements are in addition to street tree requirements.
[114] The average annual new non-residential development sq. ft. is calculated based on new office spaces (86,000 sq. ft. in the last two years), new retail commercial spaces (183,500 in last two years), and new industrial (240,000 sq. ft.) square footage, as provided by the City (June 2019). The sq. ft. is new gross floor area.
[115] Escondido Municipal Code: Off-street Parking Requirement (Section 33-765), accessed on August 1, 2019. The minimum parking requirements for commercial, office, restaurant/food, retail, etc., are different. The average is used here.

Table 66 Number of New Trees Added at Non-Residential Parking Spaces due to Measure C-9.1: Enforce Landscape Tree Requirement at New Developments

Year	Annual New Non-Residential Developments Added (sq. ft. per year)	Parking Spaces at New Non-Residential Developments (Spaces per year)	Parking Space Tree Requirement (Spaces per tree)	Annual Number of New Trees Added	Number of New Trees Added by Target Year
2030	254,750	1,019	4	255	2,802
2035	254,750	1,019	4	255	4,076
*Average annual commercial and industrial development areas added Energy Policy Initiatives Center 2019.					

For new residential developments, SANDAG Series 13 projects that 150 new single-family units and 2,224 multi-family units will be added from 2020 to 2030, and an additional 104 single-family units and 207 multi-family units will be added from 2030 to 2035. [116] Based on the tree planting requirements, the number of trees that will be added at new residential developments will be 2,375 by 2030 and 2,686 by 2035.

The proposed strategy is to encourage thoughtful site design practices to optimize tree planting and open space. Should this unduly constrain development at high densities, the City will allow in-lieu plantings through the payment of a fee per tree unit. This ensures that new development projects achieve their planting requirements. The carbon sequestration potential from the new trees is based on the projected total number of trees planted and the CO_2 absorption rate per tree.[117] Table 67 summarizes the key assumptions and results. The GHG emissions reductions are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 67 Key Assumptions and Results for Measure C-9.1: Enforce Landscape Tree Requirement at New Developments

Year	Number of New Trees Added by Target Year	CO2 Sequestered* (MT CO_2/tree/year)	Carbon Sequestration (MT CO_2)
2030	5,177	0.0354	183
2035	6,762	0.0354	239
*Average number of trees. An improved estimate of the carbon sequestration rate can be evaluated once the implementation parameters are decided. The projected carbon sequestration rates are based on the CAP assumptions. Energy Policy Initiatives Center 2019.			

6.9.2 Measure C-9.2: Develop a Citywide Urban Forestry Program

Through Measure C-9.2, the City will develop and implement an Urban Forestry Program to track tree planting and maintenance at City facilities, public parks, and public rights-of-way. The number of trees

[116] SANDAG Series 13 Regional Growth Forecast (October 2013). SANDAG Data Surfer, accessed November 15, 2017.
[117] On average, the CO_2 sequestration rate is 0.035 MT CO_2 per tree per year. The carbon sequestration rate depends on the tree species, climate zone, planting location, and tree age. A more accurate carbon sequestration rate will be evaluated once the parameters are decided in implementation of the measure. California Emissions Estimator Model (CALEEMOD). Appendix D Default Data Tables (October 2017).

planted by the City varies by year. From 2016 to 2018, the City planted a total of 202 new trees. Assuming the trend continues, the goal is to plant an average of 67 new trees annually.[118]

Similar to Measure C-9.1, the carbon sequestration potential is based on the projected total number of trees planted and the CO_2 absorption rate per tree.[119] Table 68 summarizes the key assumptions and results. The GHG emissions reductions are the projected reduction amounts in the years 2030 and 2035 only, not the sum of the annual reductions from the 2012 baseline year to 2030 or 2035.

Table 68 Key Assumptions and Results for Measure C-9.2: Develop a Citywide Urban Forestry Program

Year	Annual Number of New Trees Added	Number of New Trees Added by Target Year*	CO2 Sequestered** (MT CO_2/tree/year)	Carbon Sequestration (MT CO_2)
2030	67	1,010	0.0354	36
2035	67	1,347	0.0354	48

*Includes 202 trees planted by the City from 2016 to 2018.
**Average of trees. An improved estimate of the carbon sequestration rate can be evaluated once the implementation parameters are decided.
The projected carbon sequestration rates are based on the CAP assumptions.
Energy Policy Initiatives Center 2019.

6.9.3 Measure C-9.3: Develop an Agricultural Land and Open Space Conservation Program

Through Measure C-9.3, the City plans to develop an Agricultural Land and Open Space Conservation Program that will both protect agricultural land and open space from conversion to residential developments and promote smart growth infill developments elsewhere. This will include proactive Williamson Act contracting, annexation preservation goals of 75 percent, community gardening ordinance and/or incentives, and actual land purchasing. The goal is to conserve 400 acres of agricultural land and/or open space from being developed into residential units. As a result of the land conservation, it is assumed at least 400 residential units would be built as infill multi-family developments elsewhere in the city.[120]

Preserving land from development into low-density single-family units would reduce the activity (e.g., energy use, VMT) and associated GHG emissions. Most GHG emissions from households are from transportation- and energy-related activities, and only those impacts are discussed here.[121]

First, building the expected housing units in smart growth infill areas would increase density and destination accessibility around the units. This leads to household VMT reduction. Assuming the units would be built in urban areas with densities ranging from 5.5 to 45 units per acre, the new density would be an increase of at least 450 percent compared to the one unit per acre density as previously zoned at

[118] The City planted 46 trees in 2016, 114 trees in 2017, and 42 new trees in 2018. Data provided by the City (June 2019).
[119] On average, the CO_2 sequestration rate is 0.035 MT CO_2 per tree per year. The carbon sequestration rate depends on the tree species, climate zone, planting location, and tree age. A more accurate carbon sequestration rate will be evaluated once the parameters are decided in implementation of the measure. California Emissions Estimator Model (CALEEMOD). Appendix D Default Data Tables (October 2017).
[120] Annexations are not considered under BAU projections. Therefore, the impacts of annexations are not estimated here.
[121] Based on the GHG inventory results, over 90 percent of the GHG emissions are from energy and transportation related activities.

the now preserved land.[122] Based on various studies, the ratio of VMT reduction to percent increase in density is 7 percent (i.e., the elasticity of VMT with respect to density is 7 percent). For example, a 20 percent increase in density would lead to 1.4 percent VMT reduction. However, these studies also cap the VMT reduction at 30 percent to eliminate the influence of any single factor, as community design relies on multiple land use strategies.[123] The more than 450 percent increase in density of these 400 units would yield a VMT reduction beyond the capped VMT increase indicated by the studies. Therefore, the VMT reduction from the units is set at 30 percent.

Assuming the average household VMT in Escondido is similar to that throughout the San Diego region, the VMT avoided in 2030 and 2035 due to the land conservation are shown in Table 69.[124]

Table 69 Household VMT Avoided due to Measure C-9.3: Develop an Agricultural Land and Open Space Conservation Program

Year	VMT Reduction from Increased Density*	Average Household VMT** (Miles/weekday)	VMT Reduction per Household (Miles/year)	% of VMT that are Escondido VMT	Escondido VMT Reduction per Household (Miles/year)
2030	30%	76	7,950	56%	4,420
2035	30%	75	7,828	56%	4,353

*CAPCOA Quantifying GHG Mitigation Measures LUT-1 Maximum VMT reduction.
**Assumes 3.2 persons per household in Escondido and 23.5-mile average weekday VMT per capita (SANDAG Series 13 projection for San Diego region).
347 average weekdays per year. 56% of all household VMT is allocated to Escondido based on Origin-Destination VMT allocation methods, assuming trips will have at least one trip-end within Escondido.
CAPCOA 2010, Energy Policy Initiatives Center 2019.

The VMT avoided per household is then converted to GHG emissions reductions using the total number of households and the average vehicle emission factors discussed in Section 4.4.1 (GHG Emission Factor for On-Road Transportation). The GHG emissions reductions in 2030 and 2035 are shown in Table 70.[125]

[122] The density assumption of the preserved land was provided by the City (October 2019). The densities at urban residential zones are based on Escondido General Plan Land Use/Community Form Element, accessed January 4, 2020.
[123] California Air Pollution Control Officers Association: Quantifying Greenhouse Gas Mitigation Measures (2010). LUT-1 Increase Density.
[124] SANDAG: San Diego Forward: The Regional Plan Program Environmental Impact Report 4.15 Transportation (2015), accessed on November 29, 2018. 2012, 2020, and 2035 San Diego region VMT per capita is from the Regional Plan, all other years are linearly interpolated. Number of persons per households based on SANDAG Series 13 Regional Growth Forecast (October 2013). SANDAG Data Surfer, accessed November 15, 2017.
[125] SANDAG: Escondido Centre City employment center, May 2019, accessed June 26, 2019.

Table 70 Emissions Reduction from VMT Avoided for Measure C-9.3: Develop an Agricultural Land and Open Space Conservation Program

Year	Number of Residential Units*	VMT Reduction per Household (Miles/year) **	VMT Reduction from all Units (Miles/year)	Average Vehicle Emission Rate (g CO_2e/mile)	GHG Emissions Reduction (MT CO_2e)
2030	257	4,420	1,136,682	297	337
2035	400	4,353	1,741,008	279	486

* Number of single-family units not being built at the preserved land. It is assumed that they are instead built at infill land as multi-family units** This is the VMT reduction for the units projected to be built in target years, which may differ from the VMT reduction from the homes built prior to target years.
The emissions reduction is the projection under the CAP assumptions, including future impact of State policies and programs used in the CARB EMFAC2014 model.
Energy Policy Initiatives Center 2019.

In addition, a typical multi-family home uses less energy (electricity and natural gas) than a typical single-family home. With the 2019 Building Standard PV mandates, all new single-family and low-rise multi-family homes would offset the homes' electricity use with electricity generation from PV. Therefore, only the natural gas savings from a multi-family home compared with a single-family home are accounted for here. The difference in natural gas use is shown in Table 71.

Table 71 Estimated Natural Gas Use of New Homes after 2020

Residential Type	Natural Gas Use per Home (Therms per year)
Single-Family 1	223
Single-Family 2	253
Single-Family (Average of 1&2)	238
Multi-Family	112
Natural Gas Saving*	126

*Average single-family minus multi-family unit natural gas use
Residential types are based on mixed-fuel prototype types developed by CEC for 2019 Building Energy Efficiency Standard. The two single-family prototypes have different floor areas (square footage) and number of stories, therefore different energy use.
Energy use are modeled with CEC CBECC-Res 22019.1.0 tool, May 2019 version, for Climate Zone 10 where Escondido is located.
Energy Policy Initiatives Center 2019.

Emissions reductions from natural gas savings were calculated using the natural gas savings per home, total number of households, and the natural gas emission factor discussed in Section 4.3. The emissions reductions from natural gas savings are summarized in Table 72.

Table 72 Emissions Reduction from Natural Gas Savings for Measure C-9.3: Develop an Agricultural Land and Open Space Conservation Program

Year	Number of Residential Units*	Natural Gas Savings Per Household (Therms per year)	Total Natural Gas Savings (Therms per year)	Natural Gas Emission Factor (MT CO_2e/Therm)	Emissions Reductions from Natural Gas Savings (MT CO_2e)
2030	257	126	32,464	0.0054	178
2035	400	126	50,500	0.0054	276

*Number of single-family homes not being built at preserved land, and instead being built at infill land as multi-family homes
The emissions reduction is the projection under the CAP, including future impact of State policies and programs used in the CARB EMFAC2014 model and CAP assumptions.
Energy Policy Initiatives Center 2019.

The total emissions reductions from Measure C-9.3 are 515 MT CO_2e in 2030 and 762 MT CO_2e in 2035, or the sum of the target year emissions reductions from Table 70 and Table 72.

Appendix C

CAP Measure Updates Summary and Related General Plan Policies

CAP Measure Updates and Related General Plan Policies			
CAP Measure		**2013 CAP Measure**	**Related General Plan Policies**
Strategy 1: Increase the Use of Zero-Emission or Alternative Fuel Vehicles			
T-1.1	Transition to a Clean and More Fuel-Efficient Fleet.	None	**RC** 7.8, 7.10
T-1.2	Install Electric Vehicle Charging Stations at Park and Ride Lots.	None	**RC** 7.5
T-1.3	Adopt an Ordinance to Require Electric Vehicle Charging Stations at New Developments.	None	**CC** 1.8
T-1.4	Require Electric Vehicle Charging Stations at New Model Home Developments.	None	**CC** 1.8
Strategy 2: Reduce Fossil Fuel Use			
T-2.1	Synchronize Traffic Signals.	None	**MI** 7.9 **RC** 7.2
T-2.2	Install Roundabouts.	None	**MI** 9.2
T-2.3	Increase Renewable or Alternative Fuel Construction Equipment.	R2-A1; R2-C1	**RC** 7.3, 7.8, 7.10
Strategy 3: Reduce Vehicle Miles Traveled			
T-3.1	Participate in the San Diego Association of Governments' iCommute Vanpool Program.	R2-T4	**MI** 6.2, 6.3 **RC** 7.9
T-3.2	Improve Pedestrian Infrastructure in Priority Areas.	R2-T1;	**CC** 1.9 **MI** 2.1, 3.1, 3.3, 3.5, 3.7, 5.7, 16.3 **H** 1.4 **RC** 7.2
T-3.3	Implement Safe Routes to School Program at Escondido Union School District.	None	**MI** 2.1, 3.9
T-3.4	Develop a Citywide Transportation Demand Management Plan.	R2-T4	**MI** 3.7, 4.7. 6.1, 6.2, 6.3 **RC** 7.2
T-3.5	Update Bicycle Master Plan.	R2-T2;	**MI** 2.1, 4.6, 4.3, 4.7, 5.7 **RC** 7.2

CAP Measure Updates and Related General Plan Policies			
CAP Measure		**2013 CAP Measure**	**Related General Plan Policies**
T-3.6	Increase Transit Commuters Among New Downtown Residents.	R2-T1; R2-T3	**CC** 1.9 **MI** 3.7, 5.8, 16.3 **H** 1.4, 1.6 **RC** 7.2
T-3.7	Develop an Intra-City Shuttle System.	None	**MI** 2.1, 5.8 **RC** 7.2
T-3.8	Increase Transit Ridership.	R2-T1; R2-T3	**MI** 4.6, 5.3, 5.4 **RC** 7.2, 7.9
T-3.9	Develop and Implement a Service Population-Based Vehicle Miles Traveled Threshold.	None	**MI** 2.1 **RC** 7.2
Strategy 4: Increase Building Efficiency			
E-4.1	Require New Residential Developments to Install Alternatively-Fueled Water Heaters.	R2-E1; R2-E5	**LU** 1.8
E-4.2	Require New Multi-Family Residential Developments to Install Electric Cooking Appliances.	R2-E1; R2-E5	**LU** 1.8
E-4.3	Reduce Electricity Use in Streetlights.	R2-W1;	**MI** 3.6, 7.4
E-4.4	Require Non-Residential Alterations and Additions to Install Alternative-Fuel Water Heaters.	R2-E2;	**LU** 1.8
Strategy 5: Increase Renewable and Zero Carbon Energy			
E-5.1	Increase Renewable Energy Generated at Municipal Facilities.	None	**MI** 16.6, 16.7
E-5.2	Require New Commercial Developments to Achieve Zero Net Energy.	R2-E2; R2-E4; R2-E6	**LU** 1.8 **MI** 16.6
E-5.3	Increase Grid-Supply Renewable and/or Zero-Carbon Electricity.	R2-E3; R2-E4; R3-E1	**MI** 16.6
E-5.4	Increase Renewable Electricity Generated at School Sites.	None	**MI** 16.6, 16.11
Strategy 6: Increase Water Efficiency			
W-6.1	Reduce Municipal Landscape Water Consumption.	R2-W3	**MI** 3.10, 12.9, 12.11

CAP Measure Updates and Related General Plan Policies			
CAP Measure		**2013 CAP Measure**	**Related General Plan Policies**
W-6.2	Reduce Landscape Water Consumption at New Model Home Developments.	R2-W2; R2-W3	**LU** 1.8 **MI** 12.11, 12.12
Strategy 7: Diversify Local Water Supply			
W-7.1	Develop a Local Water Supply for Agricultural Water Use.	R2-W3	**MI** 12.14
Strategy 8: Reduce and Recycle Solid Waste			
S-8.1	Increase Citywide Waste Diversion	R2-S1; R2-S2	**MI** 15.1, 15.4, 15.5, 15.6, 15.13
Strategy 9: Carbon Sequestration and Land Conservation			
C-9.1	Enforce Landscape Tree Requirements at New Developments.	R3-A1	**MI** 16.4
C-9.2	Develop a Citywide Urban Forestry Program.	R3-A2	**MI** 16.4 **CH** 1.8, 2.27
C-9.3	Develop an Agricultural Land and Open Space Conservation Program.	None	**LU** 12.3
Notes: CAP = Climate Action Plan; CH = Community Health and Services Policy; H = Housing Policy; LU = Land Use and Community Form Policy; MI = Mobility and Infrastructure Policy; RC = Resource Conservation Policy Source: Ascent Environmental 2020			

Appendix D

Final CAP Outreach Plan and Workshop Materials

Climate Action Plan Update

Phase 1 Outreach Activities

DATE	ACTIVITY	ELECTRONIC / PRINT REACH (RECIPIENTS)	IN-PERSON REACH (PEOPLE)
May 1	City Newsletter No. 1 – Outreach Plan (PPP)	9	---
May 8	Planning Commission presentation – PPP	---	10
June 20	City Council presentation – PPP	---	15
July 10	Planning Commission presentation – Workshop development	---	7
July 11	Print-ad display in Daily Transcript	*unknown*	
July 11	Workshop flyer released to Escondido Library group	*18,818*	---
July 11	Workshop flyer released to Escondido Chamber	*2,260*	---
July 11	Workshop flyer posted at City Hall on a display board	*unknown*	---
July 12	Presentation to Traffic Commission	---	5
July 12	City Newsletter No. 2 – Notice of Public Workshop	17	---
July 13	Cruising Grand	50	---
July 17	Workshop flyer distributed to CAFÉ	*unknown*	---
July 19	Social media – FB workshop announcement	*unknown*	---
July 19	Presentation to Historic Preservation Commission	---	7
July 26	Neighborhood Leadership Group Meeting	---	20
July 30	Public Workshop	---	50
August 17	City Newsletter No. 3 – Additional Outreach Opp.	46	
August 28	Planning Commission presentation – GHG inventory	---	8
Sep. 6	Building Industry Association outreach	---	22
Sep. 13	Escondido Chamber outreach	---	15
Sep. 14	CAFÉ outreach	---	29
Sep. 18	Leadership Academy (RLA) – Manzanita outreach	---	7
October 10	Neighborhood Group – Rustic Village outreach	---	11
October 11	Neighborhood Group – Old Escondido outreach	---	26
October 25	Neighborhood Leadership Group Meeting	---	19
Total reach (est.)		**21,000+**	**251**

Appendix F

Methods for Addressing Adaptation, Social Equity, and Environmental Justice in the Escondido Climate Action Plan

Methods for Addressing GHG Emissions Reductions and Adaptation, Social Equity, and Environmental Justice in the Escondido Climate Action Plan

March 3, 2021

Prepared for the City of Escondido

Table of Contents

1 OVERVIEW

Climate change is a global problem that can lead to significant fluctuations in regional climates. While there is consensus that global climate change is occurring and that it is exacerbated by human activity, there is less certainty as to the potential consequences of climate change, particularly at the local level. However, local efforts to build resilience in the face of adverse climate change effects can make a difference. Communities build resilience by determining what their social and economic vulnerabilities and disparities are and how they can make themselves less susceptible to, or able to cope, with the adverse effects of climate change. The City of Escondido ("City") initiated a Climate Action Plan ("CAP") update in 2018 to develop a detailed and strategic framework for measuring, planning, and reducing GHG emissions and related climate impacts. During the course of reviewing and considering ways to reduce the impacts of climate change, it became evident that much more work remains to scale these benefits. While many CAPs in the State of California have been successful in building momentum for climate action in their respective communities, they lack an analysis of who benefits, who is burdened, and if/where there are missed opportunities.

Old problems require new thinking. Rather than being indifferent to the reality that different groups are situated differently relative to their access to resources and opportunity, our vision for a climate-positive future in the City starts when we address existing disparities and advance more equitable outcomes. By seeking for social equity and environmental justice opportunities, the community will grow stronger. Not only will the City adapt and/or become more resilient to unavoidable impacts from climate change, the City will position itself for a more positive future.

This document helps summarize climate impacts and environmental changes that may take place over the near and distant future. It evaluates the ability of the City to respond to those changes and identifies strategies to adapt to changes while simultaneously building community capacity by mitigating the disproportionate harm faced by certain groups. It provides guidance to balance the needs of a growing city while enhancing quality of life for current and future residents, businesses, and other community members.

2 BACKGROUND

2.1 Framing Adaptation, Social Equity, and Environmental Justice

Many agencies and organizations have been working to reduce their GHG emissions associated with transportation, electricity, natural gas, solid waste, water, wastewater, etc. Within each major industrial sector there are specific mitigation options available. These sector specific measures that are developed to reduce GHG emissions are motivated by set goals known as a "roadmap" to create better communities with cleaner environments. However, certain groups of people have been systematically excluded from the benefits of these programs. In reference to the needs of different classes, ages, backgrounds, and identities, this can increase negative side effects on the City. Agencies and organizations should be more aware of their role to integrate, plan for, and implement a more universalism approach to climate action planning efforts within their respective business, industry, or jurisdiction. While openly discriminatory practices like redlining districts and other prejudicial housing practices are illegal in 2020, many sections of the community are still struggling to recover from generations of targeted exclusion and/or unequal investment. We must first recognize that previous practices have had a disparate impact on certain

communities, before we can actively work to create better communities for all. Especially when determining how best to prepare for future weather-related emergencies and/or climate hazard events.

This CAP addresses much more than climate change. While reducing emissions is one of the main contributions, this CAP establishes a series of cross-cutting priorities to build thriving and resilient neighborhoods for all. This document will identify short, medium, and long-term adaptation needs and develop strategies and programs to address those needs. The CAP advances a state-of-the-art way to expand choice and opportunity to give people what they need to enjoy full, healthy lives – this is among the reasons that equity and environmental justice serves as a thread to tie everything together.

- Adaptation efforts seek to reduce vulnerabilities within neighborhoods and minimize the expected effects of climate change. Adaptation planning aims to mitigate damage in the short-term, minimize negative impacts in the long-term, and, when possible, take advantage of changes that may lead to beneficial opportunities. Developing strategies to adapt to the changing conditions can only be achieved through efforts that continue to change the way individuals interact with the environment.
- Social equity means ensuring that all communities are treated fairly and given an equal opportunity to participate in the planning and decision-making process. Unlike equality, which connotes sameness, equity is responsive and accommodating to this difference and includes a broader decision-making process. Social equity reduces the social barriers as part of an overarching framework to make sure there is fair and just distribution of societal benefits and burdens, within a more inclusive decision-making process.
- Environmental justice means the same degree of protection from climate hazards regardless of age, race, color, national origin, income, or other potential discriminatory factor, with respect to the development, implementation, and enforcement of environmental laws.

Adaptation strategies may include social equity considerations by analyzing possible disproportionate impacts to lower income or vulnerable population groups. Attempting to isolate or uniformly apply solutions to future weather-related emergencies and/or climate hazards will only at best be able to address the symptoms, ignoring the multi-faceted social and economic causes of the issues. When the adaptation strategy implementation incorporates social equity and environmental justice, it attempts to accomplish at least one of the following:

1) Increase resiliency to climate change and build climate resilient infrastructure.
2) Promote a high quality of life for all. Reduce the equity gap for transformational change.
3) Create the foundation for new and higher quality job opportunities for shared economic prosperity and inclusion.
4) Establish trust and relationships within the community. Engage with lower income communities and under-represented populations to empower climate actions.

2.2 Co-Benefits of Adaptation

Climate change can seem like a distant threat for many residents and businesses, and the idea of making communities more climate resilient may seem a bit abstract compared to more tangible demands like housing, transportation, water, energy, etc. The good news is that communities are creating viable models and success stories that show the benefits of early preparation. These programs are not only reducing impacts on the environment and increasing resilience to climate impacts, but they are also providing for people's basic housing, transportation, food and work needs.

In order to successfully plan for climate change adaptation, we must examine our past, where we stand today, what is likely change in the future, and how we intend to react to those changes. Actions to reduce GHG emissions can greatly curtail the costs of climate change, especially over the longer term. However, themes related to GHG mitigation and climate change adaptation are often treated separately, if at all. Even if so, they are often discussed in isolation from each other and/or the broader sustainable development agenda. The City recognizes the potential to leverage the positive side benefits of GHG mitigation and climate change adaptation, as well as identifying potential trade-offs (co-costs) between the themes. Acting quickly and decisively to address climatic change will bring significant benefits – while also helping us avoid some of the worst consequences of unchecked climate impacts. This allows the City to take a more integrated and potentially balanced approach to mainstream climate considerations into broader economic, social, health, and development planning goals. Implementing the actions in this document would strengthen our economy, improve risk management, clean our environment, and improve health and wellness. Even if climate change is not a factor, taking the actions laid out in this section would still make sense.

This following list of indicators represent a range of potential benefits or positive outcomes of preventative adaptation actions.

- People
    1) Community engagement
    2) Education
    3) Social inclusion and capital
    4) Food security
    5) Water use, efficiency, and conservation
    6) Waste reduction and recycling
    7) Emergency preparedness
    8) Mental, physical, and physiological health
- Economic Prosperity
    1) Job creation
    2) Shared economic prosperity and inclusion
    3) Economic stability
    4) Lower household energy and water use costs
    5) Lower runaway health costs
    6) Supported local food production
- Environment
    1) Livable communities - land use/community design
    2) Transportation mobility and alternative transportation options
    3) Infrastructure improvements
    4) Air quality
    5) Energy use, efficiency, and conservation
    6) Water quality and availability
    7) Reduced waste generation, diversion wastes, and more recycling
    8) Biodiversity

The climate change adaptation strategies included in this document are generally geared to mitigating and/or preventing damage from climate impacts, but they also intersect with other City goals. This is a win-win paradigm in that the City can simultaneously build capacity for resiliency, while establishing and

strengthening the connections between people, the economy, and the environment. Co-benefits can play a useful role in prioritizing adaptation measure interventions. Given the prevailing uncertainties relating to the timing, severity, and consequences of climate change, it is sensible to seek out co-benefits between GHG mitigation, climate change adaptation, and social equity and environmental justice themes. This ensures that any measure implemented contributes to reducing global climate change impacts, while building resilience to current climatic variability.

2.3 Co-Benefits of Social Equity and Environmental Justice

Environmental issues are almost always rooted in economic and social issues. In fact, climate change is a direct product of extended environmental and social policies. An ironic, yet unfortunate, aspect of climate change is that the individual, businesses, agency, or organization most responsible for causing climate change are often the ones that are the least affected by it. The world's richest households, businesses, and industries generate more than half of the greenhouse gas emissions and the poorest half contribute just 10% of all emissions.[10] Even though all residents and businesses will all be effected by a changing climate, they will be effected in different ways and in time only in other ways less discussed (such as people moving, animals migrating, agriculture changes, diseases, etc.). The ones that have the most resources will be able to escape changing weather-related emergencies and climate hazard events (or otherwise change their circumstances to reduce their exposure). But most others will not. The real world is shaped by all of the past decisions that cities and counties have made through for recreation/parks programming, planning, engineering, and public works projects. Regrettably, the ones most affected by climate change, are often those with the least amount of representation in the political process. This dichotomy has led to disputes over how to share responsibility for curbing or mitigating greenhouse gas emissions or adapting to climate change. Climate change threatens to widen the social equity gap as the different groups are disproportionately affected.

Social equity, as a term, is more than just the fair, just, and equitable distribution of public services and implementation of public policy, it also means understanding and giving people what they need to enjoy full and healthy lives. If properly planned, an emphasis is placed on ensuring that traditionally disadvantaged and under-represented groups are not left behind. This involves being inclusive of both dominant and marginalized groups, and ensuring that neither of which is a precursor to how one fares. Planning for equity does not stifle growth or impede development. Instead, it expands opportunities to all members of a community and builds local capacity to respond. The benefit of social equity and environmental justice interventions is that they advocate the interests of human capital as a resource. By recognizing a special responsibility to plan for the needs of the disadvantaged or under-represented, and promoting racial and economic integration, it can serve as a catalyst to enrich social settings and provide meaningful variations in the physical environment. It can make life better and more interesting by combining the results of many diversities, perspectives, economic contributions, and different cultural experiences in spectacular ways.

Despite interest in the importance of social equity and environmental justice to sustainability, there is a concern that equity is often left behind in practice relative to social and economic imperatives. This City's vision of climate justice is where solutions begin with addressing the needs of those who are most vulnerable to climate change and/or experiencing disparate outcomes. If the City strives to provide equitable protection from environmental hazards and burdens, we must involve all social groups in the development and implementation of environmental policies, as well equitable benefits from projects funded and directed by the City. A snapshot assessment of Escondido's unique socio-economic profile will help provide the context for making policy decisions to better address existing disparities and advance

more equitable outcomes. Not only will the City adapt and/or become more resilient to unavoidable impacts from climate change, the City will also support a more targeted universalism approach to climate resiliency – one that addresses social equity and environmental justice to help mitigate the disproportionate harm faced by certain groups in the City.

2.4 Vulnerability Assessment Methodology

Recognizing that some degree of impact from climate change will occur regardless of future GHG emissions, local governments are implementing climate change adaptation approaches to adapt to climate impacts and/or become more resilient to weather-related emergencies and climate hazards. Responses to climate change can be either reactive or anticipatory. Reactive adaptation happens after a disaster has already taken place. In the context of weather-related emergencies and climate hazards, reactive adaptation will be especially costly because, decade by decade, the severity of climate impacts is likely to increase. Anticipatory adaptation looks ahead to projected changes and tries to implement responses *before* a weather-related emergency or climate hazard impact occurs. Careful and in-advance planning can ensure that incremental change incorporates adaptation, which allows costs to be minimized and spread out over time. In developing resilience and adapting to climate change, communities need to pay particular attention to engaging and assisting lower income and under-represented populations. These populations are more likely to be the vulnerable to weather-related emergencies and climate hazards. They include low-income communities, overburdened populations, children and youth, elderly individuals, certain communities of color, households and people with limited English proficiency, immigrants, individuals with chronic medical conditions, people who are homeless or at risk of homelessness, and individuals with disabilities. A diverse population like in the City will require many different targeted strategies, rather than just a singular set of universal policies.

This section establishes a benchmarking framework to help identify how the community will be affected by climate change in the coming years. Put simply, a "vulnerability assessment" is a process of identifying future risks associated with climate change. This is determined by three (3) factors: the magnitude and onset of potential environmental changes, the various characteristics of the City, and the ability to successfully respond to change. Ultimately, a vulnerability assessment and taking active steps to mitigate threat and prevention, helps shift from a reactive approach to an anticipatory one, with increase awareness of future climate impacts. Reusing the step-by-step assessment over time would also show where the City has progressed and then be able to re-evaluate things down the line as new information becomes available. Although the steps associated with preparing a vulnerability assessment are listed numerically, often the process will require moving from step-to-step in no established order.

1) Exposure: Identify climate change effects that may take place. This includes the magnitude or intensity of changes, and how quickly they will occur. As part of this effort, the City also needs to find a way to allow everyone to fairly share the same benefits and burdens from climate solutions and attain full and equal access to opportunities regardless of one's class, age, background, and identity.
2) Sensitivity: Identify populations, infrastructure, utilities, essential facilities, economic areas, and natural resources/habitat that are susceptible and vulnerable to each possible effect. To address social equity and environmental justice, the City must acknowledge where disparities exist and identify ways to redress those disparities.
3) Potential Impacts: Identify the range of impacts that may occur from climate change or changes in conditions in the environment.

4) Adaptive Capacity: Evaluate the ability to handle potential impacts. Identify to what capacity those natural and human systems have to adapt to offset negatives changes.
5) Risk and Onset: Adjust the impact assessment to account for uncertainty, timing, and adaptive capacity.
6) Prioritize Adaptive Needs: Prioritize initiatives based on vulnerability, while considering the effects such actions will have on people, habitat, infrastructure, and services. Despite interest in the importance of social equity and environmental justice to sustainability, there is a concern that equity is often left behind in practice relative to social and economic imperatives.
7) Identify Strategies: Identify strategies to address the highest priority needs along with co-benefits of potential solutions. These should be flexible, targeted, cost-effective, and integrative.
8) Evaluate and Prioritize: Prioritize strategies based on potential impact, cost, resources available, onset, and duration. Throughout the nation, lower income and under-represented populations are hit hardest by climate change. As the City addresses future climate impacts, it is imperative that decision-making tools are created and utilized to respond more effectively in communities that need it most.
9) Phase and Implement: Develop a plan that includes phasing of strategies and a monitoring system to assess effectiveness and resiliency goal setting. This step will include applying for grants to assist in funding, partnering with other local communities and agencies for cross-boundary solutions, and taking actions that coincide and align with other goals. This may also include an additional step, which is to evaluate the effectiveness of the implementing activities and to modify these actions based on the results of their effectiveness.

3 CLIMATE CHANGE IMPACTS

For the City to continue to thrive in the future (one that might include unavoidable impacts from climate change), it is important to understand how climate change can evolve gradually. This involves weather-related emergencies and climate hazards resulting from increased temperature, extreme weather events, and frequency and intensity of precipitation.

3.1 Increased Temperatures

Temperature affects the smallest details of our daily life. It also has been found to affect the living organisms in various ways, including the physiology, behavior, growth, and distribution of plants and animals. Temperature increase can have an exponential number of impacts on the environment. For example, temperature plays an important part in the life cycle of insects. Many insects die during the colder winter months, but if temperature increase by just a couple of degrees, some of these insects won't die. This could lead to an increase in insect population or change in insect breeding habits. Both scenarios could be devastating to the agricultural crop industry. In addition to warm-weather insects/vectors, rising air temperatures causes stagnant air masses, which interacts with pollution from vehicles and industry and will increase the frequency and intensity of conditions conducive to smog formation. Children and the elderly are particularly vulnerable to respiratory, cardiovascular, and heat-related illnesses exacerbated by these conditions. Furthermore, numerous research studies have shown that indoor air temperature and circulation can impact one’s level of productivity, as well as one’s ability to learn, concentrate and remember important information. Warmer oceans put coastal communities at risk, increasing infrastructure costs, endangering plant and animal habitats, and threatening coral reefs. Warmer lakes, rivers, and streams threaten aquatic species, by disrupting reproductive cycles, displacing cold-water species and creating dead zones in deep lakes. Warmer climates may also lead to lake, river,

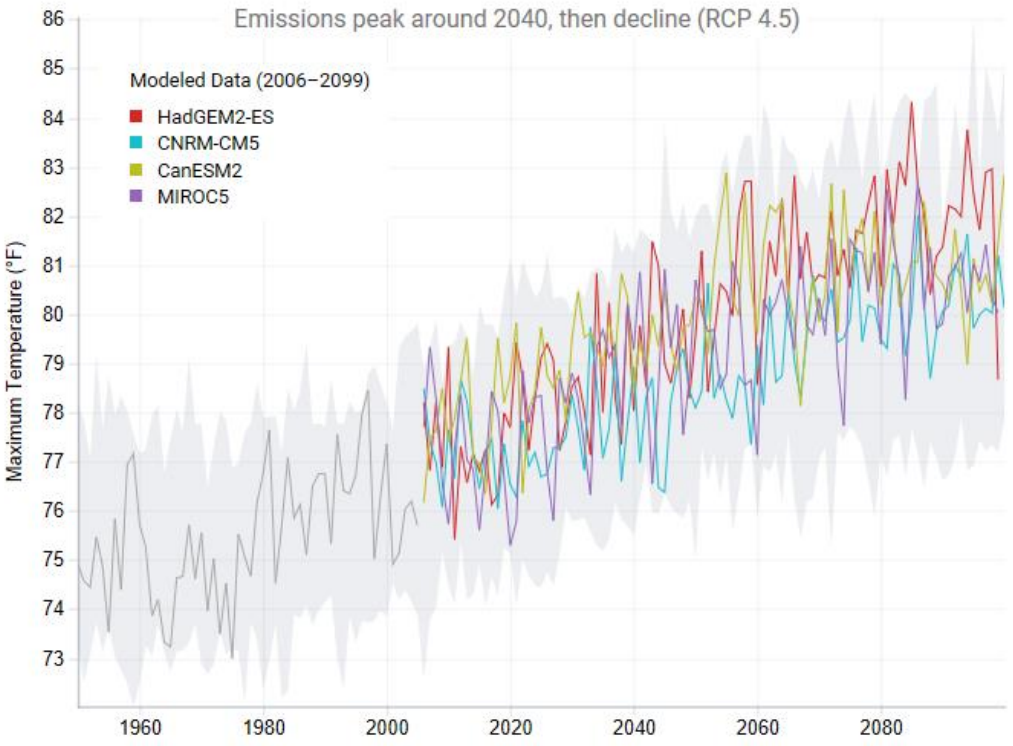
and ocean acidification. Warmer air temperatures also put inland communities at risk by expanding dry areas and their propensity to fuel wildfires.

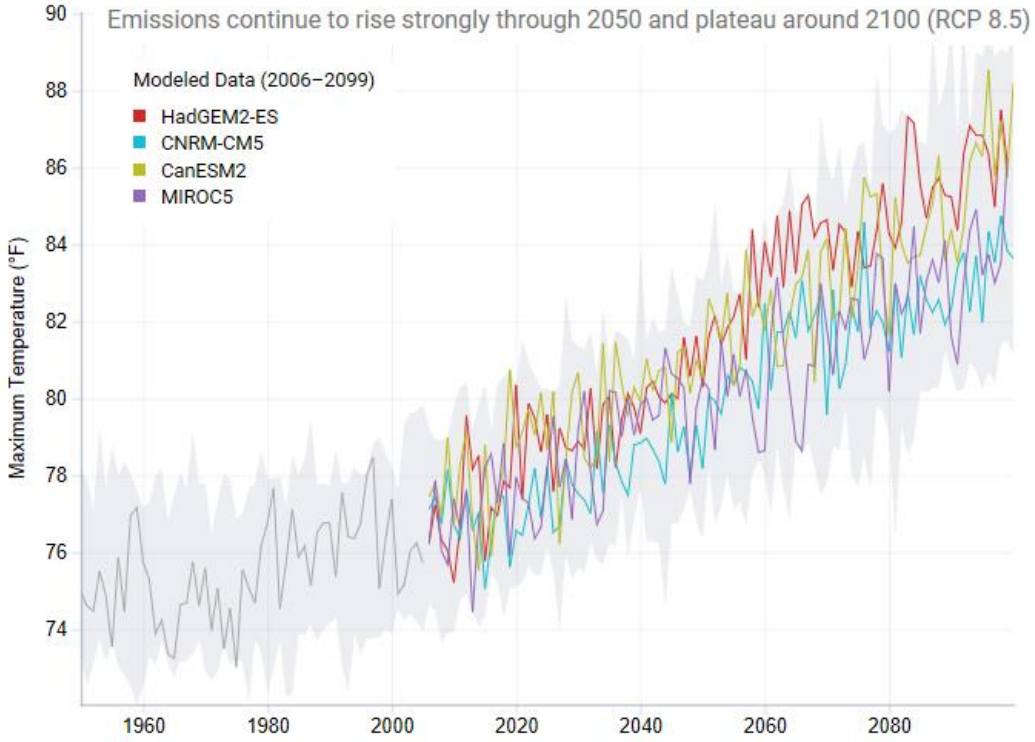
The greenhouse gas effect has already begun to heat the atmosphere and it will continue to do so over the next century, even if emission reduction targets are met. From 1900 to 2000, there was an average global daily maximum temperature increase of about 1 °F. The average global temperature rose by an additional 1 °F in just the last 20 years. Using the California Energy Commission's Cal Adapt tool, it was predicted that there would be an average temperature increase of 3-10°F by 2099, based on different future emission scenarios. [1a] The low emission scenario (RCP 4.5), projects emissions to peak by the year 2040 then start to decline. The high emissions scenario (RCP 8.5), projects emissions to rise throughout the next century, plateauing around the year 2100.[1a] These different scenarios provide a possible range of emission outcomes that can be used to analyze anywhere between ideal and worst-case future scenarios. It is important to note that the tipping point to many of the aforementioned climatic changes is an increase of 1-2°F. [11]

In Escondido, using baseline observed temperatures from 1960-2000, the collective projections from Cal-Adapt under the low emissions scenario (RCP 4.5) show an average maximum temperature increase of 3.9 °F by 2050 and 5.4 °F by 2099.[1a] The high emissions scenario (RCP 8.5) projects an average maximum temperature increase of 4.9 °F by 2050 and 9.6 °F by 2099.[1a]

Average daily maximum temperature projections for Escondido through 2099

	Low Emissions Scenario		High Emissions Scenario	
	Projection	Increase	Projection	Increase
1960-2000 (Observed Temperature)	75.6 °F	-	75.6 °F	-
2050	79.5 °F	3.9 °F	80.5 °F	4.9 °F
2099	81.0 °F	5.4 °F	85.2 °F	9.6 °F

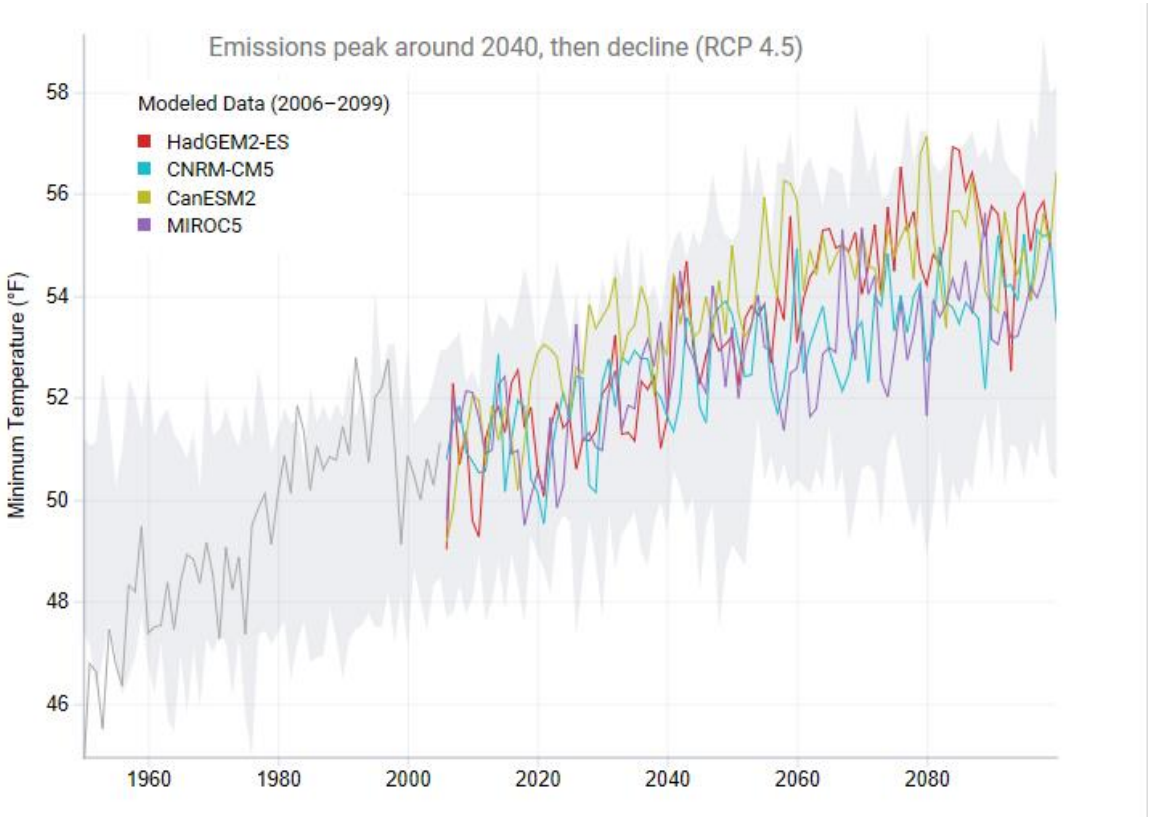

Emissions peak around 2040, then decline (RCP 4.5)
Modeled Data (2006–2099)
HadGEM2-ES
CNRM-CM5
CanESM2
MIROC5
Maximum Temperature (°F)
86
85
84
83
82
81
80
79
78
77
76
75
74
73
1960
1980
2000
2020
2040
2060
2080

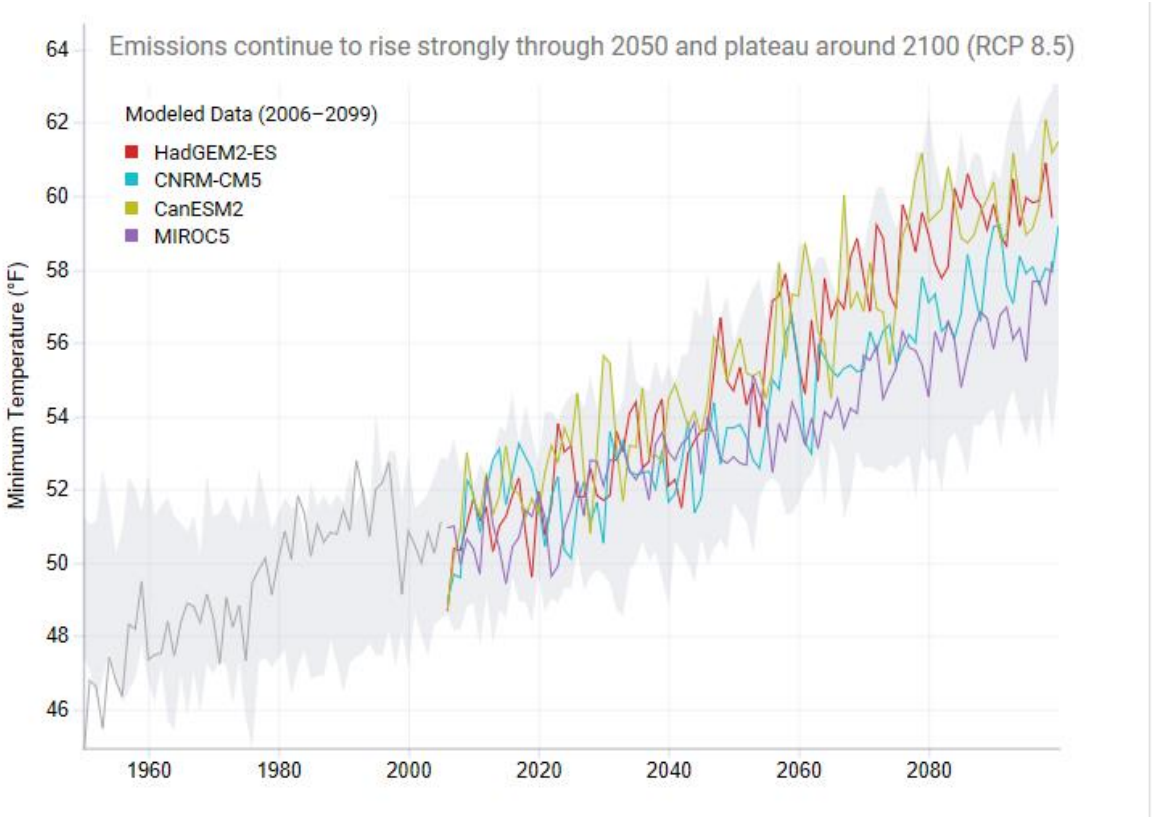

Emissions continue to rise strongly through 2050 and plateau around 2100 (RCP 8.5)
Modeled Data (2006–2099)
HadGEM2-ES
CNRM-CM5
CanESM2
MIROC5
Maximum Temperature (°F)
90
88
86
84
82
80
78
76
74
1960
1980
2000
2020
2040
2060
2080

Average daily minimum temperatures are also projected to increase. The Cal-Adapt tool using the low emissions scenario (RCP 4.5) projects an average minimum temperature increase of 3.5 °F by 2050 and 5.3 °F by 2099.[1b] The high emissions scenario projects an average minimum temperature increase of 4.6 °F by 2050 and 9.2 °F by 2099.[1b]

Average daily minimum temperature projections for Escondido through 2099

	Low Emissions Scenario		High Emissions Scenario	
	Projection	Increase	Projection	Increase
1960-2000 (Observed Temperature)	49.8 °F	-	49.8 °F	-
2050	53.3 °F	3.5 °F	54.4 °F	4.6 °F
2099	55.1 °F	5.3 °F	59.0 °F	9.2 °F





When one hears the words "global warming," most people tend to think that the expectation is that there will be consistent and constant temperature increases. But when it comes to climate, the rate of warming varies. As a result, some years are warmer than others. Factors**,** like air and ocean circulation patterns, affect both the rate and the intensity of what is experienced as increased temperatures. However, ever since the observations have been made, the average surface temperature has risen more quickly since the late 1970s (0.29 to 0.46°F per decade since 1979). Eight (8) of the top ten (10) warmest years on record in the United States have occurred since 1998, with 2012 and 2015 being the two (2) warmest years on record.

3.2 Extreme Weather Events

If high temperatures, especially when combined with high relative humidity, persist for several days (heat waves), and if nighttime temperatures do not drop, extreme heat can result. The frequency of heat wave days and nights with extreme nighttime temperatures are a threat because they induce injury, illness, and death from the resulting heat waves and wildfires. Heat stroke and dehydration can occur during extreme heat and hazardous weather can cause injuries and, in some cases, death. Warmer climates have increased levels of harmful air pollutants such as ground-level ozone, which can damage lung tissue, inflame airways, impair respiratory health, and aggravate lung diseases, which are amplified during extreme weather events. Extreme weather events also impact the transmission of food, water and animal-borne diseases. Prolonged drought in dry areas can lead to damage to property and infrastructure. Disruptions in daily life related to property and infrastructure damage can mean lost work and school days and harm commercial trade. Extreme weather-related health risks also reduce productivity, such as when extreme heat curtails construction, or when more potent allergies and more air pollution lead to lost work and school days.

Cal-Adapt loosely defines extreme heat days at or above the 98th percentile daily maximum temperature for a given area based on observed historical climate data. For Escondido, that threshold is 97.1 °F, and historical observations show an average of 5 extreme heat days per year from 1961-2000.[1d] The frequency of extreme heat days are projected to increase as average temperature increases, rising to 15-20 extreme heat days per year by 2050, and 21-40 extreme heat days per year by 2100.[1d] Warm nights, defined by the 98th percentile daily minimum temperature as 66.4 °F, are projected to increase, too. Historical observations show an average of 5 extreme warm nights per year from 1961-2000, and projections show an average of 25-37 extreme heat nights by 2050, and 36-91 extreme heat nights by 2100.[1d]

Average number of extreme heat days for Escondido through 2099

	Low Emissions Scenario		High Emissions Scenario	
	Extreme Heat Days	Increase	Extreme Heat Days	Increase
1960-2000	5	-	5	-
2050	15	10	20	15
2099	21	16	40	35

Average number of extreme warm nights for Escondido through 2099

	Low Emissions Scenario		High Emissions Scenario	
	Extreme Warm Nights	Increase	Extreme Warm Nights	Increase
1960-2000	5	-	5	-
2050	25	20	37	32
2099	36	31	91	86

While the world is certainly experiencing an overall warming trend, much more goes into winter than temperature alone — snowfall and large storms depend on moisture in the atmosphere, and under climate change, that is increasing. Snowy weather patterns depend on the large-scale flow of the atmosphere, which is changing, too. A phenomenon, called winter temperature dipole, is shifting winter weather patterns. This makes for an east-west contrast, where cold east periods in the winter have been increasing in their frequency and the arctic air is being pushed into areas where it has historically been uncommon. Many extreme temperature conditions that redistribute heat and produce some combination of clouds, precipitation, and wind are becoming more common. These atmospheric conditions will affect snowstorms, derechos, hailstorms, rainstorms, blizzards, low-pressure systems, lightning storms, hurricanes, typhoons, and twisters. Scientific studies indicate that extreme weather events, like large storms are likely to become more frequent and/or more intense with climate change. Tropical storm activity in the Atlantic Ocean, the Caribbean, and the Gulf of Mexico has increased during the past 20 years. Storm intensity is closely related to variations in sea surface temperature in the tropical Atlantic.

3.3 Frequency and Intensity of Precipitation

Both the amount and distribution of precipitation are likely to change over the coming years. Southern California already experiences highly variable precipitation patterns, and climate change will further increase this volatility. The range of precipitation extremes will likely expand, resulting in fewer wet days and more dry days. More intense rainstorms could occur, distributing precipitation over a smaller window of time, followed by longer periods of drought.

The Cal-Adapt projections do not show a significant increase or decrease in the average annual precipitation for Escondido, which is observed to be 15.3 inches per year using the 1961-2000 baseline.[1c] However, in an extremely variable climate, annual averages are not likely to provide the most useful measurement of precipitation. For example, the average annual precipitation in Escondido from 1996-1999 was 15.3", aligning exactly with the observed baseline average. But the actual recording of those years tells a different story. The recorded precipitation for those years were 13.1", 14.0", 27.4", and 6.8".[1c] While the average precipitation for those years suggests normalcy, the reality is that each year had to face substantially different challenges. The Cal-Adapt projections show yearly precipitation highs of 40" and lows of 2-3", highlighting the variability and uncertainty of the projections on a year to year basis.[1c]

Severe rainfall events can delay planting and harvesting, cause power outages, snarl traffic, delay air travel, induce soil erosion and mudslides, and otherwise make it difficult for people to go about their daily business. The expansion of flood-prone areas, flood plains, and inundations zones could put more people and property at risk. Higher year-to-year variability can change overall water availability even if the yearly average does not change significantly over time. Wetter years will see a higher proportion of water lost to runoff along with higher risk of flooding. Drier years will increase water demand while also losing more to evaporation. Overall, these factors will lead to less water capture by constructed and natural environments, depleting the local water supply. It could also lead to more water entering the lakes from the surrounding watershed, bringing with it nutrients, pesticides and invasive species.

4 CITY SETTING AND CONTEXT

4.1 Population and Economic Portfolio

In 2017, the City had a population of 150,783, consisting of many diverse population groups. But different classes, ages, backgrounds, and identities are not all starting from the same place. Projected climate change will affect certain groups of people more than others, depending on where they live and their ability to cope with different climate hazards. In some cases, the impacts of climate change are expected to worsen existing vulnerabilities and disparities. Therefore, extra attention should be given to supporting those disadvantaged and under-represented groups. They might be more susceptible to health issues, financial burdens, or information barriers that limit their ability to adapt to changes in the social and economic environment. Some of the vulnerable groups are detailed here, along with several additional descriptive characters to further identify the makeup of the groups and how they might be impacted by climate change.

The City is also expected to grow relatively significantly over the next several decades, at a time when we may realize some of the climate impacts. SANDAG provides a tool for projecting changes in various population characteristics in the near future.[6] These projections are important for visualizing the potential changes in community makeup in order to better serve the diverse community groups.

Population Forecast to 2035

	2035	**% Increase**
Total Population	172,892	+14.7%
Seniors (60+)	19.1%	+21%
Children	27.4%	+8.3%
Hispanic or Latino	66.4%	+29.4%
Number of Jobs	---	+11.1%

Employment Breakdown by Industry [9b 9c]

Industry	**2013**	**2017**
Retail Trade	11.9%	12.5%
Health Care and Social Assistance	11.8%	10.7%
Manufacturing	11.2%	9.86%
Construction	8.45%	8.99%
Administrative, Support, & Waste Management Services	8.07%	8.37%
Accommodation & Food Services	8.69%	8.23%
Other Services	5.60%	7.15%
Educational Services	6.66%	6.70%
Professional. Scientific, & Technical Services	5.97%	5.93%
Arts, Entertainment, & Recreation	3.39%	3.39%
Transportation & Warehousing	2.36%	3.11%
Wholesale Trade	2.67%	3.08%
Finance & Insurance	2.78%	2.82%
Agriculture, Forestry, Fishing, & Hunting	3.17%	2.42%
Public Administration	2.71%	2.29%
Real Estate, Rental, & Leasing	2.47%	1.92%
Information	1.29%	1.79%
Utilities	0.81%	0.71%

From 2013 to 2017 employment rose by 15.1% overall, going from 62,200 jobs in 2013 to 71,600 jobs in 2017, a much higher rate than the population increase of 3.4% during those years (ACS). Escondido saw a notable rise in the percentage of jobs in retail, wholesale, construction, transportation, information, and other various services. These expanding industries are candidates for targeted job information outreach and training programs.

Escondido saw a relative decline in manufacturing, health care / social assistance, agriculture / forestry / fishing / hunting, accommodation / food services, and real estate jobs. Workers in these industries might be at risk of losing their job, so attention should be given to assisting with the transition from these shrinking industries to emerging ones. Future action plans and policies should review the most current data and adjusts their target groups to properly reflect which groups are vulnerable to job loss.

4.2 Lower Income Households

Usually there are high levels of residential segregation by income, which inhibits economic mobility. Lower income households are markedly different from other households. The vast majority of low-income households are working but still struggle to make ends meet. They seek to balance work and family life**,** yet face much greater risk and vulnerability than their higher-income counterparts. Lower income households also pay higher interest rates on loans when starting businesses and generally have less in reserve during emergencies, which frustrates economic opportunity. For that reason, lower income households tend to focus on immediate costs out of necessity. As a result, there are fewer lower-income households living in stable housing conditions, which means there is a great dependency on economic, policy, and cultural foundations. Changes in the social and economic environment can put disproportionate financial and health stresses on low-income households, which typically live on fixed incomes.

Population below 100% and 150% of the Federal Poverty Level [9a 9c]

	Below 100% poverty level	Below 150% poverty level
2010	15.6%	28.4%
2017	16.3%	29.0%

Lower income populations are more likely to live in areas with less greenspace, and in more compact areas that are built-up. As covered elsewhere in this document, heat islands form as vegetation is replaced by asphalt and concrete for roads, buildings, and other structures necessary to accommodate growing populations. These hardscape surfaces absorb, rather than reflect, the sun's heat causing surface temperatures and overall ambient temperatures to rise. Therefore, this group will be more likely to be impacted by temperature increases, extreme weather events, and increased frequency and intensity of precipitation that occur as a result of climate change. Because of residency location, this group is more likely to be exposed to a wide range of pollutants, which will be exacerbated by climate impacts. This group also has reduced access to key information and available programs and services as a result of language, cultural, or geographical barriers. Lower income household are also more likely to be “time poor,” in that they have less time and capacity to seek out information sharing civic activities. For example, lower income households may be unaware of the existence of resources, such as cooling centers or cool zones. For those in the extremely low-income category, their poverty exacerbates their vulnerability. Basic needs may not be fulfilled as easily, such as food and clean drinking water. Threats do not only take form in depletion, but also in the changing environment with malnutrition and food security, which can leave to hunger and/or diet-related diseases such as diabetes, high cholesterol, and high blood pressure.

4.3 Homeless Populations

For the most part, individuals that are homeless are unable to turn to the comforts of home during extreme weather events Some homeless are able to receive temporary housing accommodations through supportive housing provisions, where on-site or off-site services are provided to assist homeless individuals retain housing or improve their health conditions. Regardless of their living situation, basic needs, such as food and clean drinking water are not always readily accessible. They have a greater need for transportation services and public health and emergency services, especially if the individual or family lacks access to a personal vehicle (i.e. transit dependent) or basic health care. There is a general inability

of the individual (or family) to meet the demands placed upon the, and often find it difficult to cope with change. Their precarious standing as a group or class exacerbates their vulnerability to social and economic changes.

Homeless count from 2018-2019 [8a 8b]

	Total	Sheltered	Unsheltered
2018	411	148	263
2019	350	109	241

The homeless population can be considered one of the groups or classes that is a frontline environmental justice community. Not only are rising temperatures a danger to individuals already experiencing homelessness, extreme weather events and increased frequency and intensity of precipitation driven by our changing climate are leaving more and more people with nowhere to turn. Basic needs may not be fulfilled as easily, such as accessing food and clean drinking water. Rising temperatures decrease air quality, in part, by increasing the formation of ground-level ozone and fine particles. Exposure to high levels of ozone can lead to shortness of breath, wheezing and coughing, chest pain, and temporary decreases in lung function. The homeless are less able than most of us to find respite from this polluted air. Waste heat from vehicles, factories, and air conditioners may add warmth to their surroundings, further exacerbating the heat island effect. Hotter temperatures are also more hospitable to warm-weather insects/vectors, and longer-lasting warm weather seasons extend the life and breeding cycles of many of these same insects. Forced to move around, the homeless population interacts with more people and are more susceptible to infectious diseases. This is alarming since infectious diseases may be an undesirable outcome to climate change. In the alternative, during the cold winter months, especially with an increase in frequency and intensity of precipitation, it will be increasingly difficult to stay warm. Finding an appropriate place to sleep can also be the difference between staying warm and freezing. This dynamic situation, and the circumstances that put them and their families in their current situation, increases their exposure to a variety of environmental risks and vulnerabilities, such as limited access to health care coverage, unknown exposures due to social and economic barriers and lack of training, prejudice of social class, transit dependence, and limited access to healthy, safe and affordable housing.

4.4 Seniors, Retired, Elderly

Senescence, or the state and period of aging, is inevitable. Because many seniors are of retirement age, and are no longer working, they are more likely to be disconnected from the community. For this reason, many seniors seek out the company of other seniors or settings where other seniors live or recreate. At the later stages of the life cycle, many individuals seek dependent relationships, or have some sort of semi- or full-dependency, with family or professional care givers. Many seniors voluntarily seek out housing arrangements in senior housing or residential care facilities where varying levels and intensities of care and supervision, protective supervision, personal care, or health-related services are provided. As one ages, a person's ability to perform everyday tasks diminishes. Alterations in physiological functions can occur, including increased task-difficulty in the dark, increased vulnerability to falls and accidents, reduction of mobility, and ability limitations. For this reason, the elderly also pays a larger share of their fixed incomes on health care services and medications, and this indirect cost of living expense is increasing at greater rates than real wages or the return on investments for many people. Based upon their varying needs, some seniors may reside in community treatment facilities or receive specialized services and support or special adaptations directed toward social or economic habilitation. Given that they are often on a fixed income; they are financially vulnerable to health issues associated with climate change.

Generally, as one ages there is an increasing inability to adapt to new situations, making alterations in the social and economic environment poorly withstood.

Elderly Population (60+) and additional characteristics [9a 9c]

	Total	Hispanic or Latino	Below 100% Poverty	Below 150% Poverty	Non-English Speaking	Renter
2010	15.0%	16.8%	8.0%	25.6%	16.4%	29.7%
2017	15.8%	20.2%	9.1%	18.6%	19.1%	27.0%

The challenges seniors will face adapting to climate change could have significant implications for the individual's health and the population as a whole. Individual physiological and social factors associated with aging may render the effects of climate change on older adults more severe as compared to other age groups and classes. Historically, extreme heat is unusual and unexpected. In these situations, older people are the most likely to suffer health issues (encompassing infectious diseases, decreasing nutrition, injuries, etc.) because individual health factors interact with environmental exposure. Pre-existing chronic medical conditions (i.e., cardiovascular disease, obesity) make susceptibility to heat worse. Ambient air pollution, especially ozone and fine particulates, affects older people more frequently, particularly those with chronic illnesses such as heart disease, lung disease, or diabetes. Those with a pre-existing health conditions that limits mobility, and those on medications that increase susceptibility to climate-related parameters, are thus the most likely to be impacted. Displacement caused by wildfires can put disproportionate financial and health stresses on the elderly, who are typically on fixed incomes and/or may be semi- or fully-dependent on hospice care or specialized services.

4.5 Renters

Renting lets people stay mobile and move without being tied down to a place or to regular house payments. Renting gives people flexibility in how they manage their household budgets, so it tends to be convenient (or necessary) for households who may not want to (or cannot) make the long-term financial commitment that comes with buying a home. In some cases, tenure by age of population can be at a younger stage in the lifecycle, often referred to an entry-level household, where personal wealth and purchasing power is low but grows with age. In other cases, local housing markets are not providing sufficient affordable and accessible units to the renters who require them, so this group or class may contain a variety of household ages. The cost of living may be so great that households are forced to live paycheck to paycheck. The diversity of rental housing is as reflective of the housing supply as it is of the condition. Because the household does not own the property, so they are in less control over how it is maintained or improved over time. Substandard housing exposes people to additional physical risk and mental stress, stemming from numerous structural deficiencies prevalent in poorly maintained rental properties. Substandard housing and environmental conditions contribute cumulatively to poor health outcomes such as asthma, gastrointestinal disease, and other conditions. Housing instability and lack of privacy due to overcrowding can create additional stress that leads to anxiety and depression.

Renters and average size of renting household [9a 9c]

	Total	Average size of renting household
2010	45.1%	3.03
2017	51.9%	3.40

As the effects of climate change intensify over time, many families may be displaced from their current housing accommodations. Human health impacts can encompass infectious diseases, decreasing nutrition, injuries, and job loss. Even those who are not directly impacted by extreme climate change may be paying tens of thousands of dollars in their lifetime due to its effects. This is money that not all families can afford, and money that could otherwise be put to other necessities like housing, transportation, food, healthcare, and so on.

4.6 Children, Youth, and Students

The social, economic, and culture status of children and minors are tied to the group classification or lifestyle of their family or guardian unit. Generally, as a dependent, there is an increased inability to meet and deal with new situations without the family unit or guardian group. Alterations in the environment are badly withstood independently. This group is more vulnerable to higher temperatures, extreme weather events, and increased frequency and intensity of precipitation, because they rely on caregivers to provide support services. Members of this group do not have a car and are unable to drive without assistance. The health impacts flagged by this group and class starts at the prenatal level with a heightened risk of low birth weight and neonatal death, and continues through childhood and adolescence with potential infectious diseases, decreasing nutrition, injuries, and job loss. Because of their status in the lifecycle, i.e. formative years, changes in the social and economic environment has a greater propensity to translate to irrecoverable physical, emotional, and mental changes. For example, with climate impacts and increased temperatures, winters will be shorter, making outdoor allergy seasons longer and warmer. This worsens allergic episodic symptoms in the development stage, which increases the chances of lung problems and asthma symptoms. Also, a changing environment might directly change potential exercise behaviors, which is well documented to support fighting obesity and other chronic illnesses.

Children Population (<18 years) and additional characteristics [9a 9c]

	Total	Hispanic or Latino	Below 100% Poverty	Below 125% Poverty	Renter
2010	27.1%	61.0%	20.9%	28.7%	51.0%
2017	25.3%	68.6%	22.6%	30.7%	62.7%

4.7 Minority Groups and Non-English Speakers

There are so many racial minority groups that some people question whether "minority" is the appropriate term to describe people of different groups or classes. For example, the Hispanic-American population is among the fastest-growing in the United States, in particular San Diego County. Notwithstanding, the size of a minority group or class is an important component that plays a role in shaping the experiences of those that belong to it. Racial and ethnic minority groups are often segregated geographically from other groups or classes. The size of the group or class is an important component that plays a role in shaping the experiences of its members. In particular, members of smaller groups theoretically have a lower chance of seeing other group or class members across various social and economic contexts.

Some of the critical barriers faced by ethnic minority communities include: logistical barriers to transportation, childcare, access to programs and services, and obtaining time off from work, etc. Services that offer languages other than English are lacking in many areas and/or programs, even in communities

where minority group populations are high. In addition to language barriers, other challenges may arise, such as spiritual, religious, or cultural differences, each of which may affect perceptions about government programs and services. Some individuals may also be distrusting of government and City or County Officials. In addition, a lack of accurate information can inhibit those in need from seeking or receiving services.

Hispanic or Latino Population and additional characteristics [9a 9c]

	Total	Elderly (60+)	Children	Below 100% Poverty	Below 125% Poverty	Renter
2010	46.2%	5.4%	35.8%	22.0%	31.6%	61.3%
2017	51.3%	6.2%	33.7%	20.5%	29.4%	70.6%

Non-English Speaking population [9a 9c]

	Total
2010	25.4%
2017	22.7%

Although climate change is expected to affect the city as a whole, there are a few communities who will feel the effects the most, including those households living in marginalized communities. Minority groups and non-English speakers are often already overburdened with poor environmental conditions and are disproportionately affected by, and less resilient to, the health impacts of climate change. Among minority groups and non-English speakers, there is usually a disproportionately low attendance at meetings and a lack of civic participation. Therefore, ethnic minority groups might be more disconnected from the community, affecting awareness about social programs and services. For example, households consisting of minority groups and classes may be unaware of the existence of resources, such as cooling centers or cool zones. They may be more vulnerable to financial and health stresses due to a lack of social networks to help provide guidance in times of need. This dynamic situation, and the circumstances that put them and their families in their current situation, increases their exposure to a variety of environmental risks and vulnerabilities, such as limited access to health care coverage, unknown exposures due to language barriers and lack of training, racism and an increasingly hostile sentiment towards immigrants, and transit dependence.

4.8 Agricultural Industry Workers and Farmworkers

It is crucial to have a reliable and healthy workforce. Migrant farmworkers and their families live in a range of housing types, if at all. In addition to traditional housing such as single-family homes and apartments, seasonal and year-round farmworkers take shelter in labor camps, mobile homes, motels, cars, in fields, under tarps, or in barns and tool sheds. Seasonal and year-round farmworkers and their families often reside in dilapidated rental housing and mobile homes. Not only do many workers live in crowded, unsanitary conditions, but they often lack basic utilities. Also, they are increasing likely to reside in isolated areas far away from important services like health clinics, grocery stores, and public transportation. Hazardous conditions are routine, including pesticide exposure, extreme heat and lack of shade, and adequate clean drinking water. Farmworkers comprise one of the most vulnerable populations, experiencing multiple social and economic disadvantages that negatively impact their health. Farmworkers tend to live in isolated neighborhoods or areas that are “informal” and often poorly served

by municipal governments. Due to the difficult nature of surveying migrant workers, projections tend to underestimate the true number of this group.

Agricultural industry workers and farmworkers are another group that can be considered as a frontline environmental justice community. Because many farmworkers and day laborers are temporary and seasonal workers, they are forced to live a transient life and are constantly looking for work and housing. This group will be more likely to be impacted by temperature increases, extreme weather events, and increased frequency and intensity of precipitation because of the irregular and hazardous work available to them. Basic needs may not be fulfilled as easily, such as food and clean drinking water. They are among the most economically vulnerable workers. For some, their precarious immigration status exacerbates their vulnerability to labor issues and economic security. Service boundaries and language restrictions can provide additional barriers in accessing programs and services. This dynamic situation, and the circumstances that put them and their families in their current situation, increases their exposure to a variety of environmental risks and vulnerabilities, such as limited access to health care coverage, increased costs associated with exposure to various pesticides and herbicides, unknown exposures due to language barriers and lack of training, racism and an increasingly hostile sentiment towards immigrants, transit dependence, on the job injuries due to heavy or repetitive labor, and limited access to healthy, safe and affordable housing.

5 IMPACT AND NEEDS ASSESSMENT

Projected climate impacts related to increased climate change, such as temperature, extreme weather events, and increased frequency and intensity of precipitation, etc., will impact our daily lives in many different ways. The impact may be more significant depending on individual or household status in a group or class, as well as various variables within the social and economic environment. Things that we depend upon and value — housing, transportation, water, energy, agriculture, ecosystems, business activity, and human health — will all experience the effects of a changing climate. This section attempts to document the scope and extent of these changes.

5.1 Housing

Climate and land use patterns are expected to change social and economic environments dramatically in the coming century, raising concerns about their effects on how cities and county's can accommodate social equity and environmental justice in its land development policies. Today, many people are having difficulty paying for safe, decent, and attainable housing – this forces households to make difficult decisions about where their housing is located, its relative size, and/or its condition. As the population grows, shortfalls in the housing stock become increasingly difficult to contend with. This housing shortage generates a housing affordability problem, exacerbated by growing income disparities. Meanwhile climate change is a threat multiplier that exacerbates social equity and environmental justice issues already faced by people of disadvantaged or under-represented groups. As a new set of climate-adaptation policies are being developed to build more housing, there is an opportunity to create new policies that strengthen our housing options to promote climate resiliency. This could mean that the City should strive to build more compactly and use energy-efficient, green building techniques, constructed with resilience in mind. It could also mean that the City should put homes, schools, commercial areas, and park and other destinations close to each other so that people can easily walk, bike, use public transit, or drive shorter distances. Increasing the resiliency of our housing is particularly critical in lower-income

neighborhoods and underserved communities who have historically lacked adequate housing – because of long-term social disinvestment – and are at greater risk from climate-change impacts. Because adding to our housing stock in ways that are climate-resilient can help reduce energy- and transportation-related pollution, slowing the effects of climate change and increasing resiliency to climate impacts, including extreme heat, while reducing economic burdens for residents. Smarter choices about accommodating future housing demand can help promote development in previously developed areas, which helps reduce pressure to build on undeveloped land or discourages building in areas that are currently or are projected to be more vulnerable to climate change-related impacts. The relative influence of fire patterns and severity, remains unclear, particularly given the substantial geographical variability in fire-prone places. New housing must mitigate this growing threat through sound building and site design practices.

5.2 Transportation

As climate changes, agencies may have to deal with new weather stressors that require different planning and engineering approaches or responses. Potential operational impacts and anticipated changes to system maintenance include more inspections, a higher frequency of repairs, more frequent diversions to alternate routes, increased emphasis on alternate modes of transport such as transit, biking, or walking, and potential dynamic or seasonal restrictions for trucks or rail during times of high heat. While most planning and engineering approaches are often reactive, the increasingly unpredictable nature of extreme weather events could place increasing strain on an already stressed system. Changes in relatively short duration extreme events often result in the most significant consequences, and while an ad hoc response to these events on an individual basis make sense now, the cumulative impact of more severe and more frequent events may warrant a change in business practices to address any of the following concerns:

- More frequent/severe flooding of underground tunnels and low-lying infrastructure.
- Increased thermal expansion of paved surfaces, potentially causing degradation and reduced service life, due to higher temperatures and increased duration of heat waves.
- Higher maintenance/construction costs for roads and bridges, due to increased temperatures.
- Asphalt degradation and shorter replacement cycles; leading to limited access, congestion, and higher costs, due to higher temperatures.
- Culvert and drainage infrastructure damage, due to changes in frequency and intensity of precipitation.
- Decreased driver/operator performance and decision-making skills, due to inclement weather.
- Increased risk of vehicle crashes in severe weather.
- Restricted access to local economies and public transportation.

Operational and system maintenance programs must take a proactive approach to regularly re-evaluate existing programs and practices in light of new, unforeseen demands to ensure they are climate resilient. For example, being able to create alternative transportation methods has a multitude of benefits, including taking cars off the road, reducing emissions/pollutants in the air, and giving more accessibility to a wider range of people and more choices for mobility. It can make travel accessible for those that cannot drive, such as children, elderly, and disabled, as well as for those that cannot afford a personal vehicle. Safe streets for pedestrians and bicyclists can improve the quality of life and health for residents, and can attract new businesses and development. The City should take actions to ensure that investment decisions address potential climate impacts as appropriate in order to protect infrastructure investments. Through such actions, transportation systems will gradually become better prepared for future climate shifts.

Commute to work for Escondido residents is almost exclusively by automobile. According to the 2010 census, 3% take public transit to work, 2% walk, and only 1% bicycle to work. This may not seem like a big deal, but it becomes more evident when being socially or economically disadvantaged intersects with what is referred to as "transport disadvantage." A lack of access to walking and biking opportunities and/or reliable and frequent transit service, automatically excludes people from using that service. Some people may have transport disadvantages, but if they have the means to, they can overcome these barriers and without limiting their ability to get to work, to grocery shop or go about their daily lives. The development of complete streets, strategically places transit stops, reduced off-street parking requirements, transportation demand strategies, and the proper incentives can be used to increase the use of alternative transportation and provide more equity into transportation planning.

5.3 Water

Fresh water supply will be greatly impacted by climate change effects. Local water supplies are limited due to the generally arid climate, seasonal availability of surface supply, the relatively shallow aquifers, and lack of permeable soils.[7] As Southern California already faces recurring water supply shortages, further response to climate change effects will be vital. Prolonged droughts will cause stress on supply sources, while increasing overall water demand. The San Diego County Water Authority projects overall water demand for the San Diego region could increase by 25% by 2040, even when accounting for expanded water conservation practices.[7] Changes in precipitation patterns could decrease snowpack by up to 65%.[3] Climate change impacts on groundwater sources are also a cause for concern, although the effects are not fully understood. These potential water shortages and demand increases can increase supply costs and put a financial burden on customers.

5.4 Energy

Changes in temperature, extreme weather events, and the frequency and intensity of precipitation will affect how much energy is produced, delivered, and consumed. Energy plays an important role in many aspects of our lives. For example, we use electricity for lighting and cooling. We use fuel for transportation, heating, and cooking. Our energy production and use is interconnected with many other aspects of modern life, such as land use, population growth, economic demand, and use of goods and services. In a warmer climate, it is anticipated that we will use more electricity for air conditioning and less natural gas, oil, and wood for heating. If the climate warms by 3.5°F, the demand for energy used for cooling is expected to increase by about 5% - 40%, while the demand for energy used for heating is expected to decrease by about 3% - 30%. Such high peak energy demand, especially in summer months, runs the risk of grid shutdown and higher energy costs. Additionally, the impacts of higher temperatures will be different depending on location as there can be local-scale temperature differences between urban and rural areas. Urban areas tend to have higher temperatures than surrounding rural areas in what is known as the urban heat island effect. Heat sinks into manmade landscapes such as asphalt or concrete due to their increased heat capacity. Meteorological services have found an average annual difference between urban and surrounding rural areas on the order of 4°F - 5°F. Expanding urban tree canopies, utilizing heat-reflective surfaces, and lowering emissions are long-term solutions to addressing the urban heat island effect. Tree canopies can serve as an inhibitor to the magnitude of the urban heat island effect. Shade provided by trees can cover paved surfaces, shade buildings, cool the air through evapotranspiration, and sequester carbon from the atmosphere. Studies have also shown that habitat conservation and restoration can be a strong tool to combat the urban heat island effect from growing.

5.5 Agricultural Production

Agriculture is vital to the economy and to the foundation of community health. However, crop yields will decline when temperatures exceed a crop's optimal temperature range. Furthermore, changes in climatic levels can have unpredictable results on crop yields when combined with other varying factors like temperature, ozone, nutrient availability, and water resource availability. The currently utilized crop species may not be suitable for cultivation as climate-related atmospheric changes occur. For example, avocados are susceptible to damage from high maximum daily temperature, and projections estimate overall avocado yield could decline by 15% - 45% by 2050 due to rising temperatures.[5] Higher temperatures can introduce new and higher concentrations of pests and weeds which can damage crops and/or require more expensive and potentially damaging control techniques. Constraints on water supply could increase production costs, which can decrease margins and might lead to higher crop prices for the consumer. Potentially suitable agricultural land will be very important as climate change impacts take effect. Farmers' markets will become important community pillars to support local farmers and reduce food waste. Supporting locally sourced foods also reduces the vehicle miles traveled from "farm to fork," which with all other things being equal, means less greenhouse gas emissions.

5.6 Ecosystem

The natural environment is susceptible to degradation caused by climate change. More intense storms can increase the risk of damage from landslides and flooding, causing habitat loss and natural ecosystem disturbances. Similarly, wildlife is vulnerable to the negative health issues caused by climate change and may put some species at risk of endangerment or extinction. Invasive species might proliferate as a changing climate creates an environment that better suits their ability to compete in the surrounding area. Furthermore, some species are vulnerable to changes in temperature, humidity, or drought conditions. Governments and their associated partners should develop action plans to increase the survivability of species, and prioritize efforts based on the susceptibility of extinction for each species. Policy should reflect future changes in the climate through the establishment of guidelines for constructing and managing open spaces. Possible additions could include a shade-to-space ratio, drinkable water, and site supervision.

Higher temperatures, prolonged droughts, and precipitation changes can all exacerbate California's already very high wildfire risk. By 2100, the average area burned in California could increase by up to 77% based on current emission projections.[3] Drier vegetation becomes more flammable, both increasing the risk of catching fire and the intensity of burning. The length of the fire season will likely grow as temperatures rise over time, increasing the probability of fire events occurring. Increased wildfires can create stress for communities including limited water supplies to combat fires, health problems from smoke inhalation, and increased property damage. As risk increases, fire insurance is estimated to go up by 18% by 2055, which may put some individuals under financial stress or risk major devastation to go without.[3] Adaptation to rising wildfire risk will require community awareness, evacuation plans, damage mitigation plans, and long-term prevention plans. The City has a high to very-high fire risk along the outskirts of almost the entire city. The Escondido Fire Department makes regular trips to high risk areas to communicate with residents about wildfire preparation. The Department conducts interviews with residents, helps them identify evacuation routes, and educates them on the steps to take during a wildfire event.

5.7 Business Activity

The climate change crisis is a non-market crisis, in that the market doesn't monetize these impacts. Traditional economists are even increasingly acknowledging this and are calling for ways to monetize the impacts of carbon, which is where everything from the cap and trade program to carbon tax credits. Whatever the means employed, the price of greenhouse gas emissions will increase in coming decades. Climate change will cause a shift in many industries as consumer demand behavior changes. As energy supply moves towards renewables instead of fossil fuels, we will continue to see changes in the transportation industry, construction, home appliances, and energy production. These industry shifts will have associated job gains and losses, which create new opportunities for some, while eliminating employment opportunities for others. Potential increased costs of food, water, and energy can put burdens on consumers, especially those of lower income, which can have far-reaching effects on the community and the economy. A strong workforce with quality jobs can be one of the most important factors in building resiliency. As climate change impacts occur, and as actions in the CAP are implemented, economic changes are expected to occur in various industries, specifically in the creation of green jobs. For example, potential increased public transportation ridership might create a demand for transportation-related jobs. Incentives and programs that promote solar panels could create demand for solar panel installation and maintenance jobs. Green jobs are predominately middle-class jobs that pay well, so they can provide a pathway up the social and economic ladder. It is important for Escondido to understand these possible industry shifts so that job seekers can be prepared for and aware of new job opportunities. Priority should be given to communicating job announcements and providing training to vulnerable populations. It is also very important to understand the past industry changes as well as industry trends that are taking place today.

5.8 Human Health

Despite future efforts to implement these concepts, climate change will still have numerous negative effects on existing homes and the livability of certain housing types and/or locations. Prolonged higher temperatures can lead to air quality issues from things like ground-level ozone which can cause breathing difficulty and lung problems. Exposure to higher temperatures increases the risk of heat-related illness and death, especially for vulnerable populations like children, elderly, and outdoor workers. Elevated nighttime temperatures can increase perspiration, lead to dehydration, and cause people to lose sleep. Heat-related deaths in California are projected to increase by 100-200% by 2050.[3] A warmer climate can also create an atmosphere that introduces pests carrying vector-borne diseases. These health problems can cause peripheral impacts in the community, such as straining hospital supplies and increasing medical expenses. To help assist residents during high heat events, Escondido has established community cooling centers or cool zones where people can take refuge from the heat. However, public education and awareness of the changing environment will be instrumental in the successful implementation of these adaptation strategies as well as to build community capacity.

Cool Zone Locations in Escondido

Organization	Address	Zip	Phone
East Valley Community Center	2245 East Valley Parkway	92027	760-839-4382
Escondido Public Library	239 Kalmia Street	92025	760-839-4684

Interfaith Community Services	550 W. Washington, Suite B	92025	760-489-6380
San Diego Humane Society	3500 Burnet Drive	92027	619-299-7012
Park Avenue Community Center	210 Park Avenue	92025	760-839-4688

6 PRIORITIZATION OF NEEDS

The lower income and vulnerable groups discussed earlier in the document should not be considered an exhaustive collection of local socio-economic demographics, but should be referenced as a baseline for understanding the City's populations (groups and classes) in order to inform decision-making and implementation. Additionally, each potential vulnerability listed earlier should not be viewed in isolation. Instead we should be acutely aware of any overlapping population groups and risk factors, as containing multiple vulnerable characteristics can compound the potential problems that climate change presents. By analyzing the intersectionality of risk factors, we will become aware of specific groups that consist of multiple risks making them more vulnerable than the sum of the parts. Careful analysis of the spatial relationships of different inequalities can help identify these possible overlapping characteristics. For example, the maps depicting median income, non-English speaking areas, and housing tenure all show similarly distributed characteristics. The South Centre City area and the East Valley area contain the highest proportions of non-English speaking, renters, and low median income. Those areas should be highly prioritized when implementing programs intended to assist with any or all of the mentioned population groups. The exercise also highlights social and economic inequities within the City as a disproportionate number of lower income households and people of color are concentrated in census tracts with very low to moderate access to open space areas. Other connections can also be found by identifying what is lacking in a particular area. The map depicting the senior population shows the highest concentrations residing along the outer areas of the city. When contrasting that map with the transit routes map, we can see that those areas have few transit stops. Seniors may need transportation assistance if they cannot afford a vehicle or cannot physically operate one, so areas with a high proportion of seniors could be priority areas to target new transit stops.

When implementing a climate change adaption strategy, it is of vital importance to analyze the geographic distribution of intended recipients of the strategy. Analyzing the relationship between geographic locations and vulnerabilities provides information on potential causes of risk factors and helps to prioritize areas of most need. Careful attention must be given during the analytical stage so that the City can be prepared to provide the right level of information to City Officials to help their decision on where to distribute services that will help the most disadvantaged groups. Maps have been provided as attachments to this document to help capture and illustrate various socio-economic and geographic indicators at the neighborhood level, which can be used to explore broader sustainability through location efficiencies. Using the map and analysis discussed below, the City will prioritize neighborhoods with a 50 percent ranking in the State Office of Environmental Health Hazard Assessment ("OEHHA") CalEnviroScreen for priority investments and early implementation of focused measures to support social equity and environmental justice. By focusing efforts on vulnerable neighborhoods and populations, the City will provide equitable protection from environmental hazards and burdens.

6.1 Social Equity and Health Index Map

The City created a Social Equity and Health Index Map to better understand how local decisions can impact lower income and vulnerable populations, and to establish benchmarks and metrics to serve as a citywide assessment of social equity and environmental justice disparities. This map is directly reporting the OEHHA statewide database, CalEnviroScreen. The OEHHA database model, which is periodically updated, identifies communities that are most affected by many sources of pollution, and where people are often especially vulnerable to pollution's effects. CalEnviroScreen uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. This mapping tool creates an opportunity to assess different geographical areas of the city and developed standardized indicators for comparison purposes. U.S. Census and health survey data was utilized to determine the social vulnerability of every census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. Each census tract was ranked on socio-economic and chronic health factors, including poverty, income, unemployment, education, elderly, non-English speaking, and housing tenure; as well as asthma and cardiovascular incidence rates; and pollution burden indicators such as diesel, ozone, particulate matter. Whereas, the separate rankings help create a heat map of related risk factors, the aggregated database helps public health and city officials identify and map sections of the community that need support before, during, and after a hazardous event. The overlap of these risk factors highlights areas of greater cumulative risk that should be prioritized when implementing corresponding adaptation strategies. The Social Equity and Health Index Map is provided as an attachment. This mapping tool can help inform decision-makers about how best to incorporate climate equity into City operations and ensure every department is able to identify which communities will need support before, during, and after a hazardous event. The City can also assess other mechanisms to help dismantle barriers our communities face to become more civically engaged and a part of the decision-making process, internally and, where applicable, with other agencies within the City. The goal is to prioritize neighborhoods with a 50 percent ranking in the OEHHA CalEnviroScreen for priority investments and early implementation of focused measures to support social equity and environmental justice.

6.2 Heat Vulnerability Index Map

As discussed Section 5.4 *Energy,* there are many urban areas that experience a heat absorption phenomenon, called "heat islands" whereby certain areas experience warmer temperatures than their rural surroundings. Research has found that temperature difference is usually due to human activities and from the modification of land surfaces which remove green and shaded areas from urban settings. A few factors that contribute to localized heat islands include: reduced vegetation in urban areas; and an increase in roads, roofs, buildings, and other materials that have low solar reflectance and high heat absorption rate. The best way to assess the community's exposer to the formation of an urban heat island is to identify and assess tree canopy areas and impervious land cover, like buildings and roads. Many urban areas have a lower percentage of green space compared to rural regions. Since trees and vegetation provide shading effects, which help lower surface temperatures, a low percentage of green space of the total urban land area can directly translate into higher surface temperatures. In contrast to vegetated areas, impervious surfaces are very effective at trapping heat. Hardscape areas do not effectively dissipate ambient heat. To determine the amount and location of vegetation and impervious land cover throughout Escondido, data from SANGIS helped extrapolate and distinguish tree canopy coverage and impervious surfaces throughout the city. By combining data from the above maps, specific areas of the community that are particularly sensitive to heat are identified. The Heat Vulnerability Index Map is provided as an attachment. The densest clusters of tree canopy exist in areas of the city committed to parks or open space. Buildings, roads, and other surfaces that absorb heat are located predominantly

in commercial and industrial areas of the city. This mapping tool can help inform decision-makers about green space planning, landscaping installation requirements, and/or other programs to reduce heat absorption.

7 ADAPTATION STRATEGIES

This section includes adaptation strategies that have been identified to improve the ability of the City and its residents and businesses to adapt to the climate impacts. These actions may be further refined so that there is a clear roadmap on how to prepare for climate impacts and how to ensure the City is addressing adaptation, while moving in the right direction to address social equity and environmental justice when implementing the CAP. Implementing the actions in this section would strengthen the City's economy, improve risk management, clean our environment, and improve health and wellness.

Strategy A-1: Become a "Climate Smart" Leader

Measure A-1.1: Fully anticipate, plan for, and mitigate the risks of climate change and seize the opportunities associated with the social and environmental change.

Recognize climate impact variables as a risk in how the City manages programs, projects, and infrastructure.

Target Year	Adaptation Action
2020	Annually monitor climate change research and best practices to improve the understanding of local climate change, weather-related emergencies and climate hazards, and to support climate change preparation efforts in local, state, and federal partners.
2023	Adopt established methods for projecting the lifecycle carbon emissions of land use and transportation investments and begin to prioritize projects that have the greatest potential to sustain future changes and changing weather-related emergencies and climate hazards.
2023	Assess climate impacts in the 2023 MJHMP update, incorporate social equity and environmental justice concepts to the extent practicable, and develop system wide approach to prepare for and respond to changing weather-related emergencies and climate hazard events.
2024	Complete planning and establish priorities for plantings, materials, and infrastructure specifications that will be resilient to climate change hazards and be cost-effective over the lifetime of the asset in infrastructure design.
2025	Update the "2020 Escondido Climate Adaptation Study".

Measure A-1.2: Make sure that everyone is given the opportunity to be prepared for the current and future risks that are exacerbated by climate impacts.

Develop and build capacity for a transparent and inclusive education and outreach processes and design a decision-making framework to achieve equitable access and other climate health-related goals.

Target Year	Adaptation Action
2020	Designate point of contact(s) to establish and maintain staff ability and capacity to ensure effective implementation and equitable outcomes of climate action efforts. Initiate interdepartmental education and

Strategy A-1: Become a "Climate Smart" Leader	
	planning with City staff to motivate and seek opportunities for creative partnerships to jumpstart priority actions.
2022	Identify and create collaborative partnerships with community-based organizations including vulnerable populations to broaden and diversify community engagement, and to support community-based initiatives that align with climate action planning priorities.
2023	Partner with interested organizations to develop a climate change adaptation public outreach and education program. Engage typically underrepresented vulnerable populations by creating neighborhood climate ambassador liaisons ("Climate Ambassadors"). Climate Ambassadors can conduct outreach and secure commitment in priority investment neighborhoods ("PINs") to support climate actions, initiate major initiatives, and coordinate investments, etc.
2025	Provide quality information and/or "how-to" resources for local climate adaptation using interactive approaches that may include competition, feedback, and recognition. Activities may include: ▪ Provide free technical assistance to businesses. ▪ Develop working groups with workforce development and training organizations to integrate green jobs into existing work. ▪ Develop and implement a local green business program to provide recognition for business achievements. ▪ Partner with business groups to conduct Fix-It Fairs or participate in street-fairs by engaging under-served businesses in learning about sector opportunities ▪ Hold regular workshops with building contractors on green building best practices.
2026	Minimize health issues and disparities caused by weather-related emergencies and climate hazard events (such as extreme heat days), especially for populations most vulnerable to these impacts, by improving the preparation for and response from health, community service, public safety, and emergency staff, resources, and/or services. Actions may include: ▪ Leverage partnerships and support organizations to provide assistance to vulnerable populations in high fire hazard areas. ▪ Advertise outdoor worker protection measures, including heat safety and employment security. ▪ Develop a cool zone plan in consultation with resident, business, and community groups and provide updates in conspicuous locations online and on social media when cool zones are activated. ▪ Educate homeowners and tenants of multi-family housing about weatherization projects and the cost savings gained from energy efficient homes through training programs. ▪ Develop evacuation assistance plans and advertise their availability to vulnerable populations in hazard areas and be prepared to implement these plans as part of climate hazard-related emergency operations. ▪ Utilize citywide publication and social media to reach a broad audience to advertise preparedness, risks of potential climate hazard events, and/or implementation status of these measures.

Measure A-1.3: Hardwire social equity and environmental justice into new programs and projects.	
Focus planning and intervention programs in priority investment neighborhoods ("PINs") that currently experience social or environmental injustice and/or bear a disproportionate burden of potential public health impacts.	
Target Year	**Adaptation Action**
2020	Develop a specific strategy or plan to redress social equity disparities by prioritizing and targeting CAP implementation projects into the most vulnerable areas as defined by the "2020 Social Equity and Health Index Map".
2020	Maximize mitigation benefits locally by prioritizing Escondido community specific (i.e. local) mitigation for GHG emissions and biological impacts/habitat loss. If no local mitigation credits or mitigation opportunities are available, allow project applicants to seek out regional solutions first. If no regional solutions are available then State solutions, with a preference to proximity.
2023	Consider establishing equity considerations for recreation/parks programming, planning, engineering, and public works projects, such as: ▪ Does the proposed action generate burdens either directly or indirectly to vulnerable populations? If yes, are there opportunities to avoid, minimize, or reduce those impacts? ▪ Can the benefits of the proposed action be targeted in ways to reduce vulnerable population disparities? ▪ Are the benefits of the proposed action broadly accessible to residents or businesses of vulnerable populations?
Measure A-1.4: Develop working relationships with other agencies and continue to analyze climate impacts.	
Establish working groups and collaborate with regional and State agencies and groups to promote becoming "Climate Smart" and promote complementary adaptation strategy development.	
Target Year	**Adaptation Action**
2020	Work with SANDAG and NCTD to make the regional transportation network more resilient, incorporate consideration of climate impacts as part of infrastructure planning and development, and prioritize transportation investments that have the capacity to adapt to climate change, while promoting social equity and environmental justice.
2022	Work with law enforcement, CAL FIRE, City of San Marcos, County of San Diego, City of Vista, and City of Poway to ensure updates for wildfire hazard maps and reduce risk from high fire hazard areas. ▪ Model future climate conditions to identify at-risk areas. ▪ Develop effective response mechanisms and evacuation scenarios. ▪ Identify areas within General Plan planning area where future development should be avoided, reconsidered, or mitigated, due to fire hazards.

Notes: CAL FIRE = California Department of Forestry and Fire Protection; City = City of Escondido; GHG = greenhouse gas; MJHMP = Multi-Jurisdictional Hazard Mitigation Plan; NCTD = North County Transit District; SANDAG = San Diego Association of Governments

Source: City of Escondido 2020.

Strategy A-2: Build Thriving and Resilient Neighborhoods	
Measure A-2.1: Make sure that everyone has equitable access to healthy environments in which to live, work, and play.	
Recognize the importance of the ecosystem in improving personal, environmental, and economic health	
Target Year	**Adaptation Action**
2022	Identify and create collaborative partnerships with community-based organizations (e.g. San Diego Food System Alliance, California Food Link, San Diego New Farmers Guild, etc.) to develop equitable programmatic resources to increase the production and consumption of home grown and locally sourced food by supporting farmers' markets; expanding community gardens on public and private lands; and other forms of urban agriculture to: ▪ Support more resilient local agriculture on school campuses and at other public institutions or assembly spaces (e.g. church grounds, etc.) to help mitigate climate change and adapt to its impacts. ▪ Facilitate "Farm-to-School" programs for small farm-based businesses. ▪ Create local food maps and food distribution plans to preserve the affordability of local and sustainable food systems to ensure food security, nutrition, and public health. ▪ Support existing programs and/or create new programs to reduce investment risk and facilitate sustainable farming practices to connect more people to more local, farm-fresh foods.
2022	Establish partnerships with local businesses and groups to provide educational opportunities for residents to gain skills in organic gardening, fruit production, composting, food preservation, and cooking healthy foods.
2023	Review and update heat response plans to: ▪ Coordinate operations of readily accessible cooling centers. ▪ Recommend potential ways for property managers and homeowners' associations to implement Cool Zones. ▪ Develop an "early warning system" and response plans that alert residents, businesses, and community members, especially those most vulnerable to heat, when projected heat conditions exceed 100 degrees.
2024	Develop incentives to increase the planting of fruit trees in appropriate areas on private property.
2024	Use regulatory and voluntary tools to increase access to neighborhood parks, passive parklands, parklets, and/or pop-up recreation programs to increase parkland coverage and/or expand equitable access to recreational opportunities.
2025	Consider ways to improve equitable access to clean and sustainable energy. This could include the creation of a Clean Energy Equity Plan to support low-income residents and small organizations to purchase or obtain renewable energy. Also develop a program to engage with the Solar on Multi-Family Housing Program ("SOMAH") to support local green job training.
Measure A-2.2: Create "climate safe and decent" housing options.	
Support more comfortable and resilient homes and buildings to proactively adapt to changing weather-related emergencies and climate hazard events.	
Target Year	**Adaptation Action**

Strategy A-2: Build Thriving and Resilient Neighborhoods	
2020	Increase the use of public and private roofs for rooftop gardens. Provide education on how private property owners can use rooftop gardens as an eco-friendly alternative to: bring greenery into a sterile space, provide a place to relax or grow food, delay stormwater runoff, and cool the building to reduce energy consumption. Expand green roof installations through outreach and incentives, such as the Stormwater Credit Fee.
2023	Update the building code to require new private buildings to have operable windows, providing choice levels of light, and wall-to-wall ventilation.
2023	Update the building code to mandate the installation of cool roofs on all new and retrofitted roofs on multi-family projects.
2025	Pursue a green jobs plan component to the Clean Energy Equity Plan.
2027	Develop and implement a mitigation plan for power outages, which may include the following: ▪ Adopt an ordinance that requires new senior housing or large care facilities to install air conditioning in all units and on-site home energy batteries and energy storage. The ordinance shall also require conversion projects to provide adequate on-site temperature-controlled spaces in indoor common areas, if any. ▪ Adopt an ordinance that requires new affordable housing projects to install air conditioning in all units. Require affordable rehabilitation projects or other conversions to provide adequate on-site temperature-controlled spaces in indoor common areas, if any.
2028	Consider ways to reduce reliance on centralized sources for energy including: ▪ Facilitate access to local, decentralized renewable energy by incorporating renewable energy projects into CCA or other community-wide renewable programs. ▪ Complete a micro-grid feasibility study and begin implementation.

Measure A-2.3: Build capacity for adaptive neighborhoods.

Reduce risks and impacts from increased temperatures, exacerbated air pollution risks, drought conditions, and precipitation variability in the areas around homes and businesses.

Target Year	Adaptation Action
2022	Utilize the "2020 High Fire Hazard Map" to better manage the risk of wildfires as a result of drier summers, especially in areas where homes are next to natural open space areas: ▪ Enforce statutory standards for provision of defensible space inhibiting wildfire spread on private properties, and implement brush clearing and fuel breaks to manage the potential spread of wildfire. Evaluate other ways to reduce risks in and around wildland-urban interface areas that are rated as high fire hazard areas, such as improving the quality and plant palette around wildfire prone areas, and/or other ways to reduce risks in and around high fire hazard areas. ▪ Manage the increased risk of wildfires of new residential subdivisions in very high fire hazard areas by expanding the required fuel modification zones from 100 to 150 or 200 feet, depending on geographic conditions such as land slope, unburnable areas, and surrounding vegetation fuel points. ▪ Avoid the siting of new land use densities (i.e. density increases) in very high fire hazard areas and identify areas within General Plan planning area where future development should be avoided, reconsidered, or mitigated, due to fire hazards.

Strategy A-2: Build Thriving and Resilient Neighborhoods	
	▪ Partner with SANDAG, other agencies, and North San Diego County cities for funding or acquisition and management of lands conserved for habitat protection and/or agricultural use. ▪ Develop opportunities to transfer development rights from very high fire hazard areas to less at-risk areas (e.g. urban infill areas, etc.) and/or seek other regulatory ways to incentivize land conservation or open space preservation. ▪ When analyzing new residential projects in very high fire hazard areas, incorporate evacuation route planning into the analysis. Evaluate brush fire spread and wildland fire behavior characteristics that utilize a 60 mph prevailing wind factor at a minimum, or higher wind speeds, if documented, as necessary.
2024	Adopt plant palettes in the Landscape Ordinance to withstand drought conditions and promote plant-type resilience (in street and park trees, green roofs, etc.). Adopt a new tree code in the Landscape Ordinance that considers tree selections so that tree plantings are known to perform well in the general climate conditions, are climate resilient trees, and will increase canopy or vegetative cover. As part of the next CAP update, monitor tree canopy changes due to development and determine if policy and rule changes are needed.
2024	Utilize the "2020 Heat Vulnerability Map" to identify at-risk areas and help inform decisions and priorities about implementing ways to cool the urban environment. When evaluating programs, projects, and infrastructure in at risk areas and priority investment neighborhoods ("PINs"), prioritize efforts that decrease the urban heat island effect, especially in areas with populations most vulnerable to heat, through strategies like revegetation, tree preservation, new plantings, depaving and porous pavement, green infrastructure, and site specific development design.
2025	Coordinate a more integrated approach to flood or water-surge event planning and consider new innovative ways to adapt to climate impacts, including the following: ▪ Update the Jurisdictional Runoff Management Plan to develop stream and riparian restoration program strategies and work to naturalize and/or protect creek watershed areas. ▪ Implement a program that systematically identify areas with underserved storm drains and secure funding for their upsizing. ▪ Increase resilience of natural systems by keeping natural resources areas and establish a fund to acquire or protect land in particularly vulnerable areas.
2027	Develop, adopt, and implement integrated plans for mitigating climate impacts in wildland-urban interface areas that include, but are not limited to the following: ▪ Collaborate with agencies managing public lands to identify, develop, or maintain corridors and linkages between undeveloped areas. ▪ Use purchase of development rights or conservation easements to protect climate-vulnerable habitats. ▪ Develop, adopt, and implement integrated plans for mitigating wildfire impacts in the existing wildland-urban interface. ▪ Assess the financing capabilities and implementation feasibility of the Multiple Habitat Conservation Plan ("MHCP") or open space management.
Measure A-2.4: Build a sustainable and resilient transportation network.	
Align the transportation system improvements with quality of life and enable a variety environmentally friendly choices that feature green infrastructure and have the capacity to adapt to climate impacts.	

Strategy A-2: Build Thriving and Resilient Neighborhoods	
Target Year	**Adaptation Action**
2023	Work with NCTD to build more bus shelter amenities to help prevent health effects from long sun exposure and incentivize usage of public transportation.
2024	Evaluate and pursue stable funding sources and financing strategies to accelerate and sustain natural and green infrastructure within the public right-of-way.
2025	Conduct walk audits around prioritized schools, transit boarding areas, and parks to encourage Safe Routes to Schools, Transit, and Parks.
2026	Give greater weight to investing in improvements to transportation infrastructure that are projected to be affected by multiple climate changes and/or build in flexible options that can adapt to changing conditions.

Notes: CCA = community choice aggregation; City = City of Escondido; NCTD = North County Transit District; mph = miles per hour

Source: City of Escondido 2020.

A range of factors were considered in the design and selection of the various actions, including the projected timeframe and estimated likelihood of the vulnerability, the importance and effectiveness of each action in increasing resilience, and technical feasibility and City implementation capacity. The City must continue to place a high priority on public engagement and input to identify and select the final actions that will be included in the CAP.

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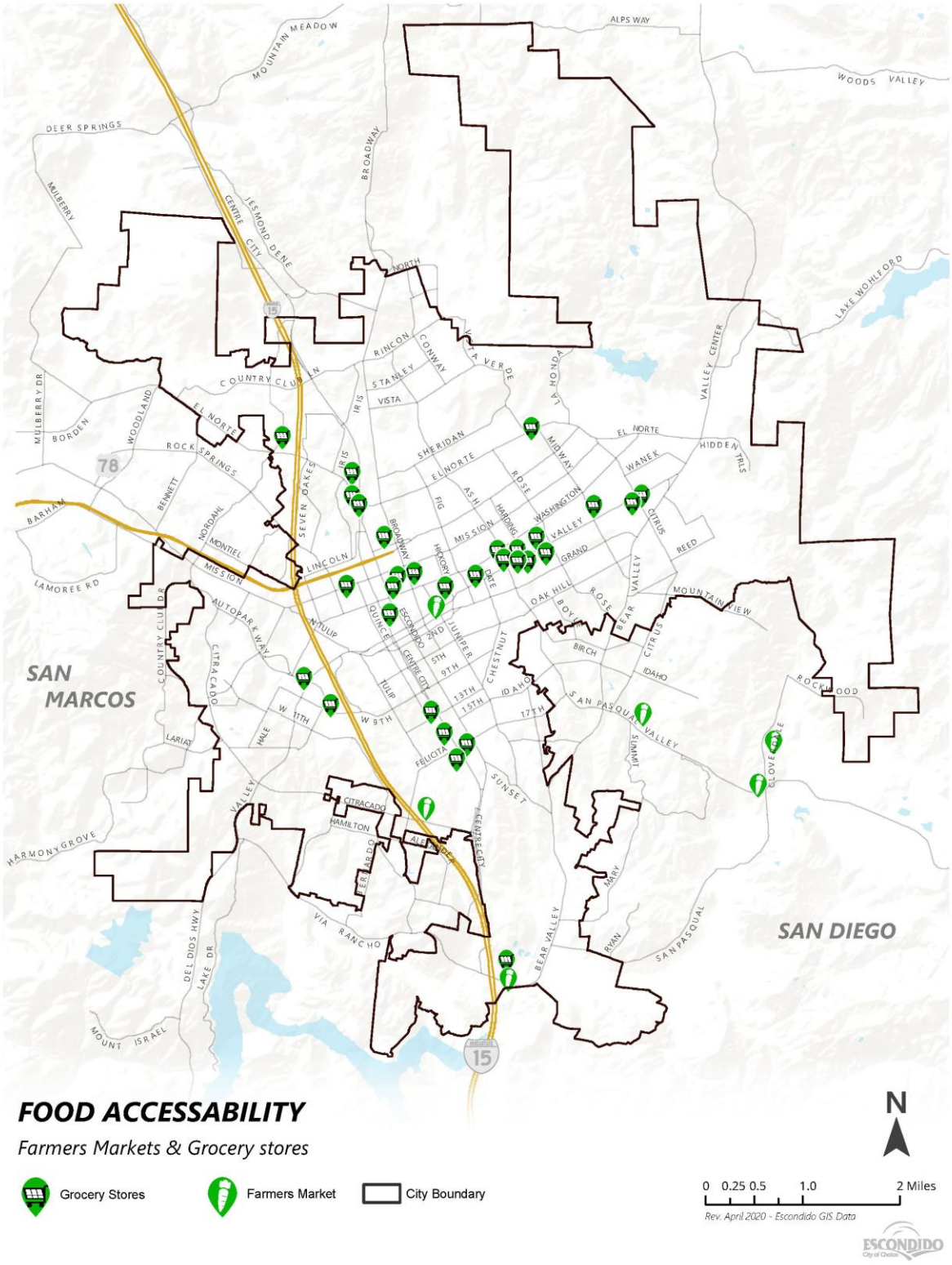
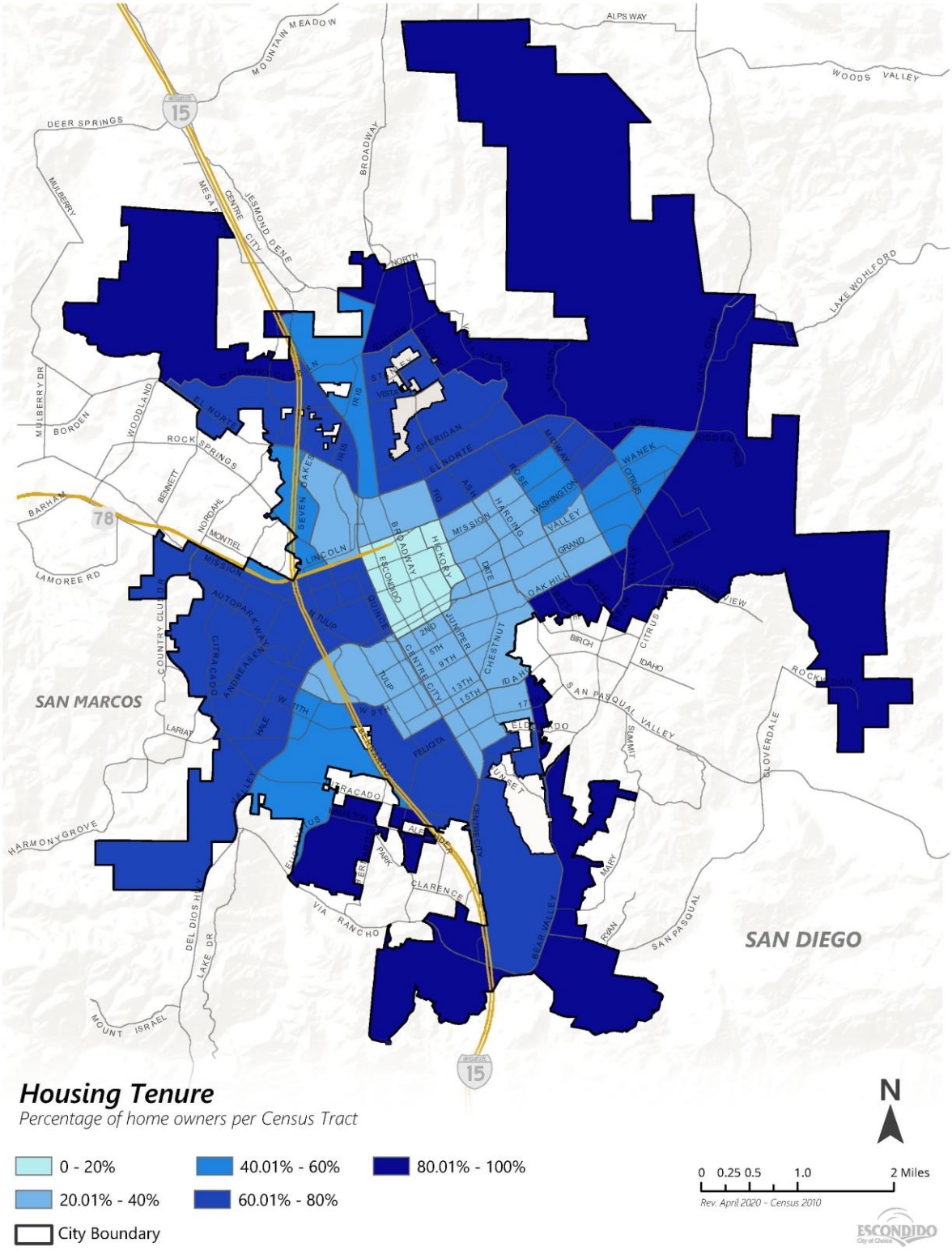
[8b] San Diego Regional Task Force on the Homeless. 2019. We All Count. Accessed online at https://www.rtfhsd.org/reports-data/ on March 28, 2020.
[9a] U.S. Census Bureau. American Community Survey, 2006-2010 American Community Survey 5-Year Estimates.
[9b] U.S. Census Bureau. American Community Survey, 2009-2013 American Community Survey 5-Year Estimates.
[9c] U.S. Census Bureau. American Community Survey, 2013-2017 American Community Survey 5-Year Estimates.
[10] The Guardian. 2015. World's Richest 10 Percent Produce Half of Global Carbon Emissions Says OxFam. Accessed online at https://www.theguardian.com/environment/2015/dec/02/worlds-richest-10-produce-half-of-global-carbon-emissions-says-oxfam on March 28, 2020.
[11] The Nature. November 27, 2019. Climate Tipping Points. Accessed online at https://www.nature.com/articles/d41586-019-03595-0 on March 28, 2019.

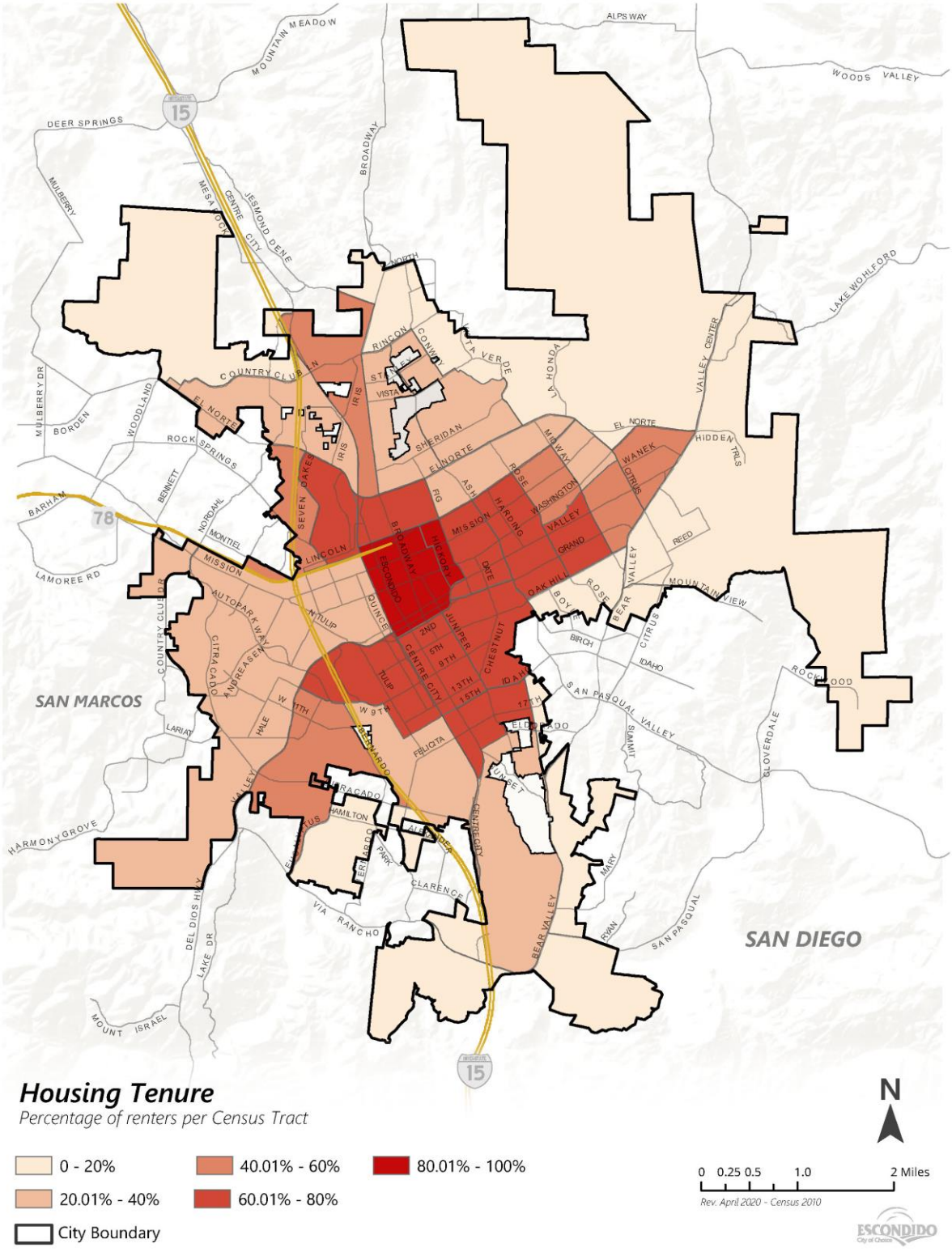
9 MAP EXHIBITS



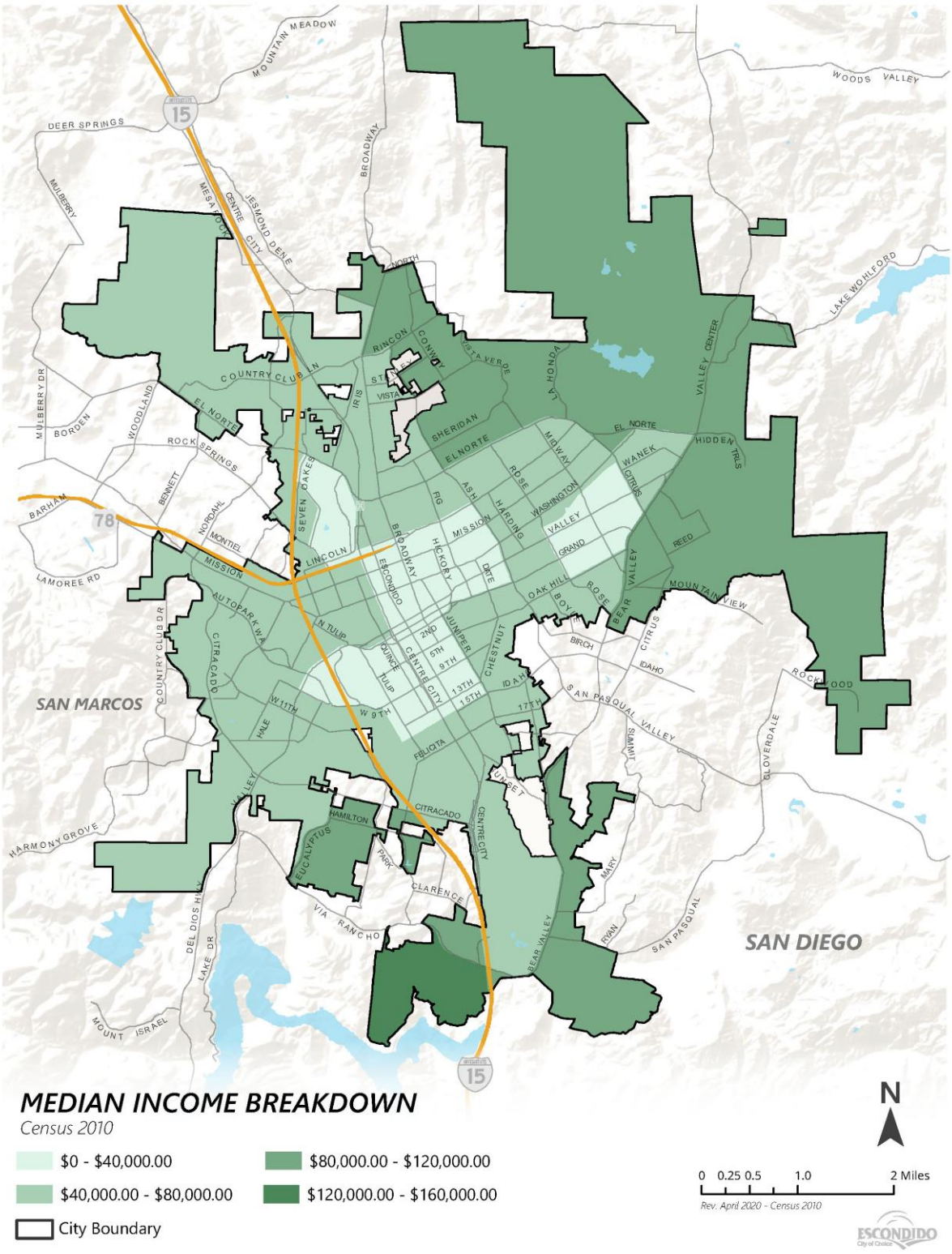
Map 1: Food Access Map (i.e. Groceries and Farmers' Markets)



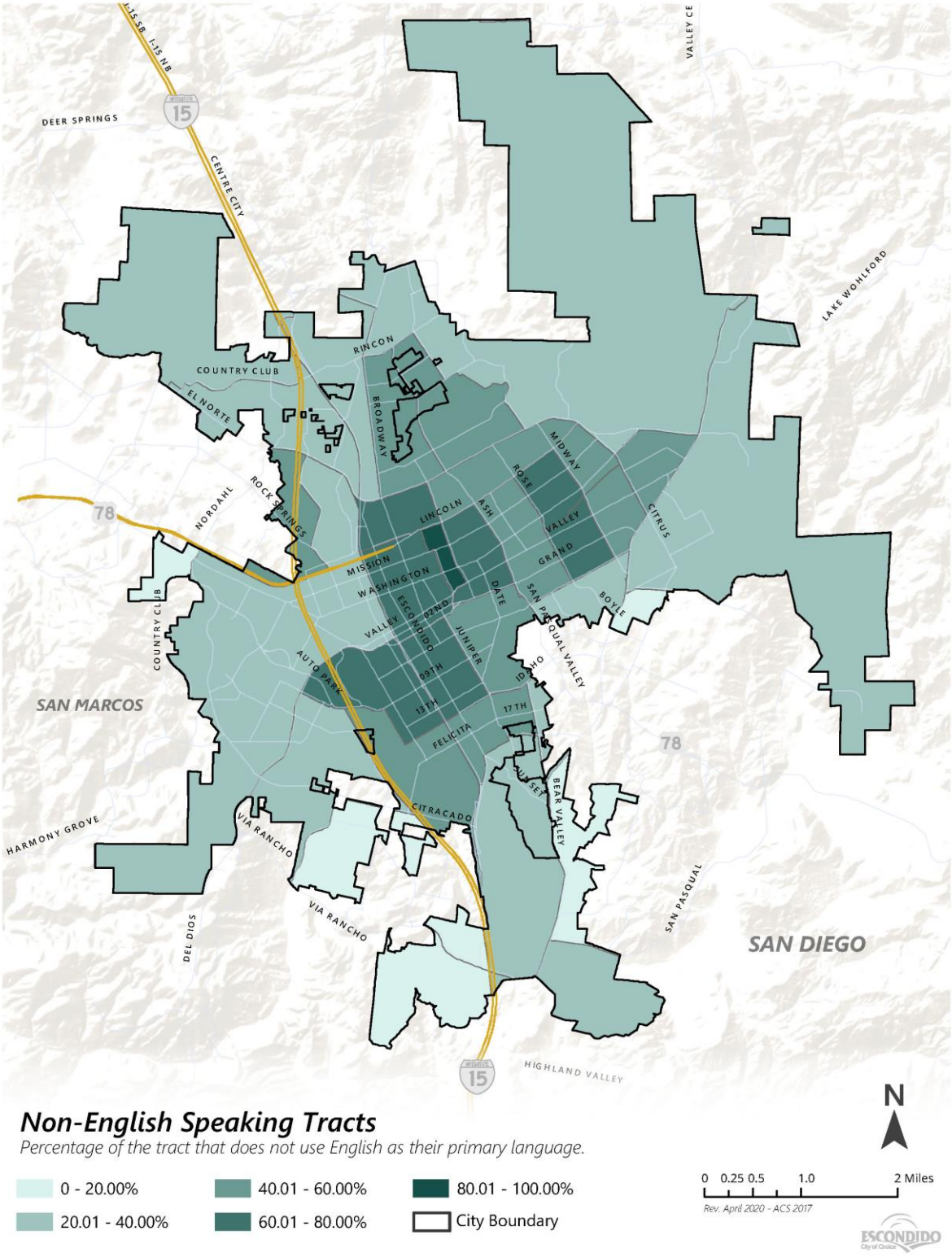
Map 2: Home Ownership Map



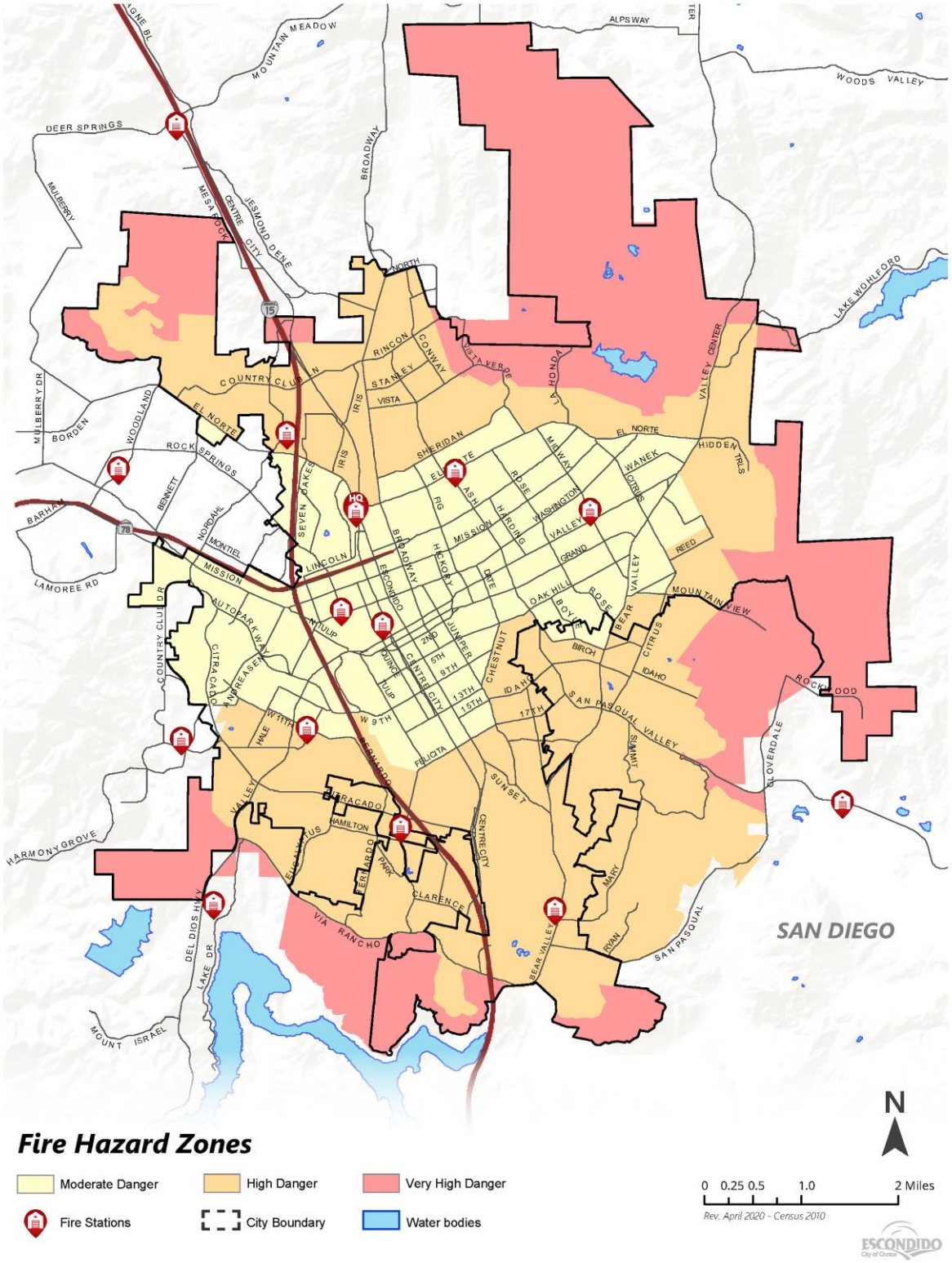
Map 3: Renter Map



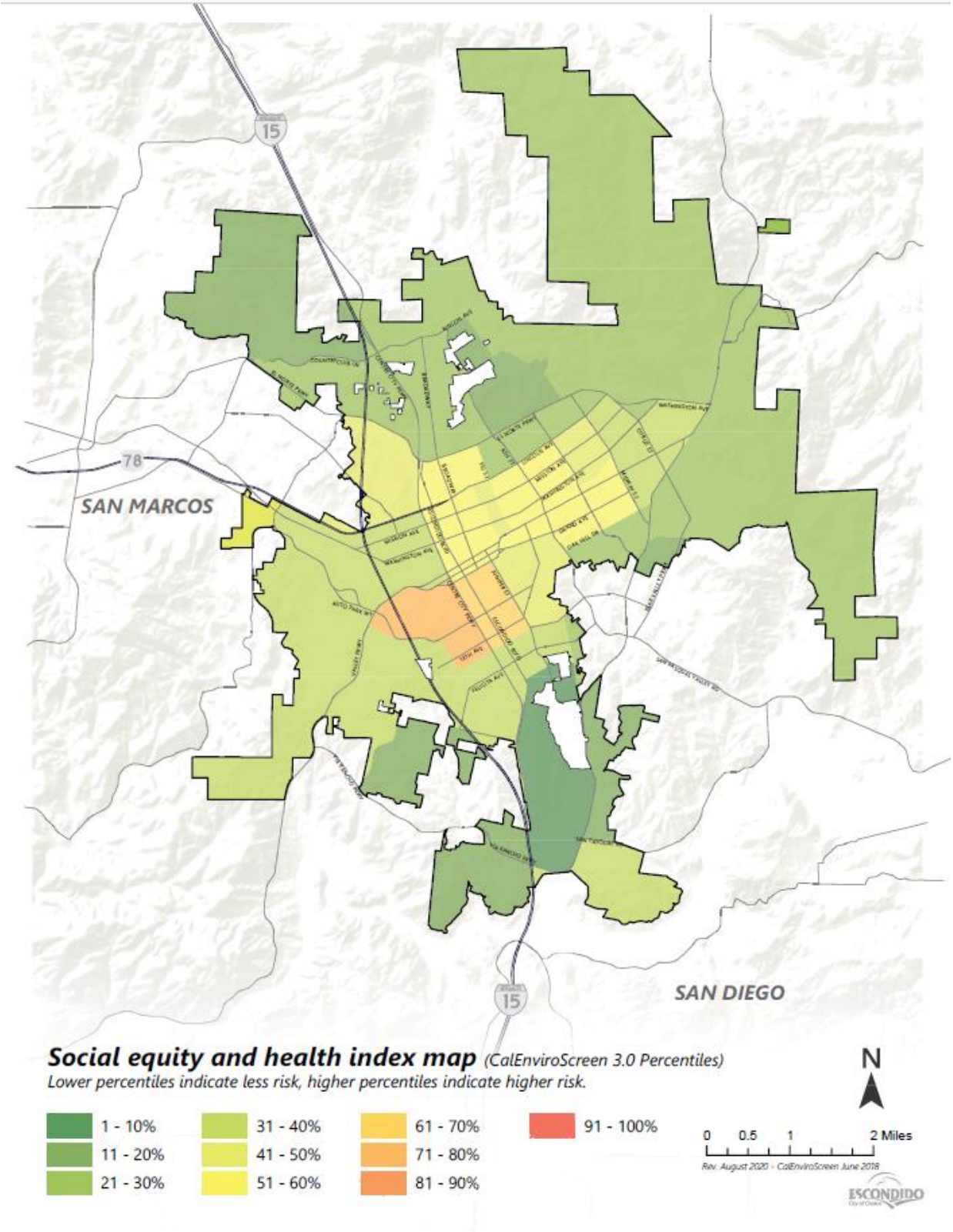
Map 4: Median Income Map



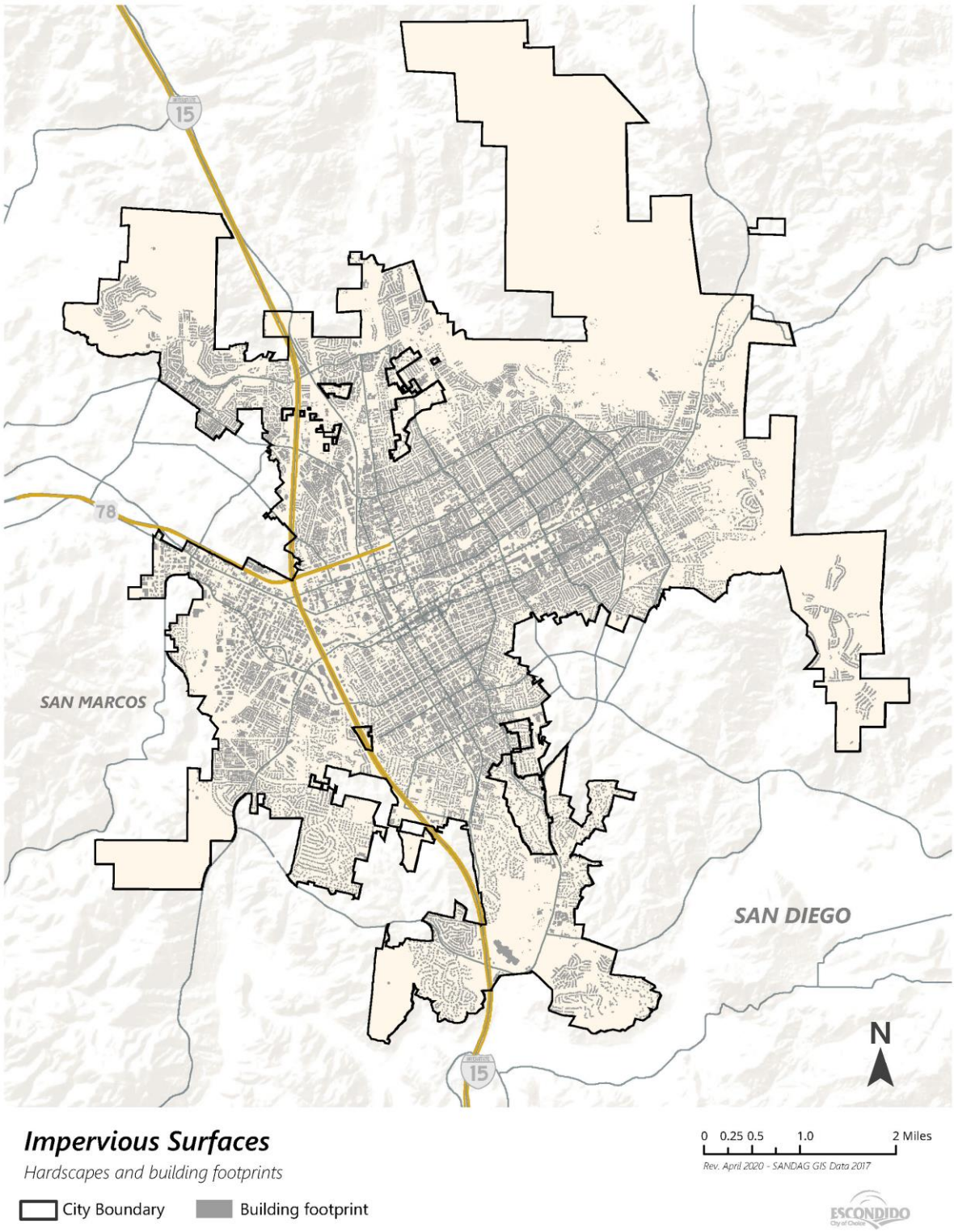
Map 5: Non-English Speaking Map



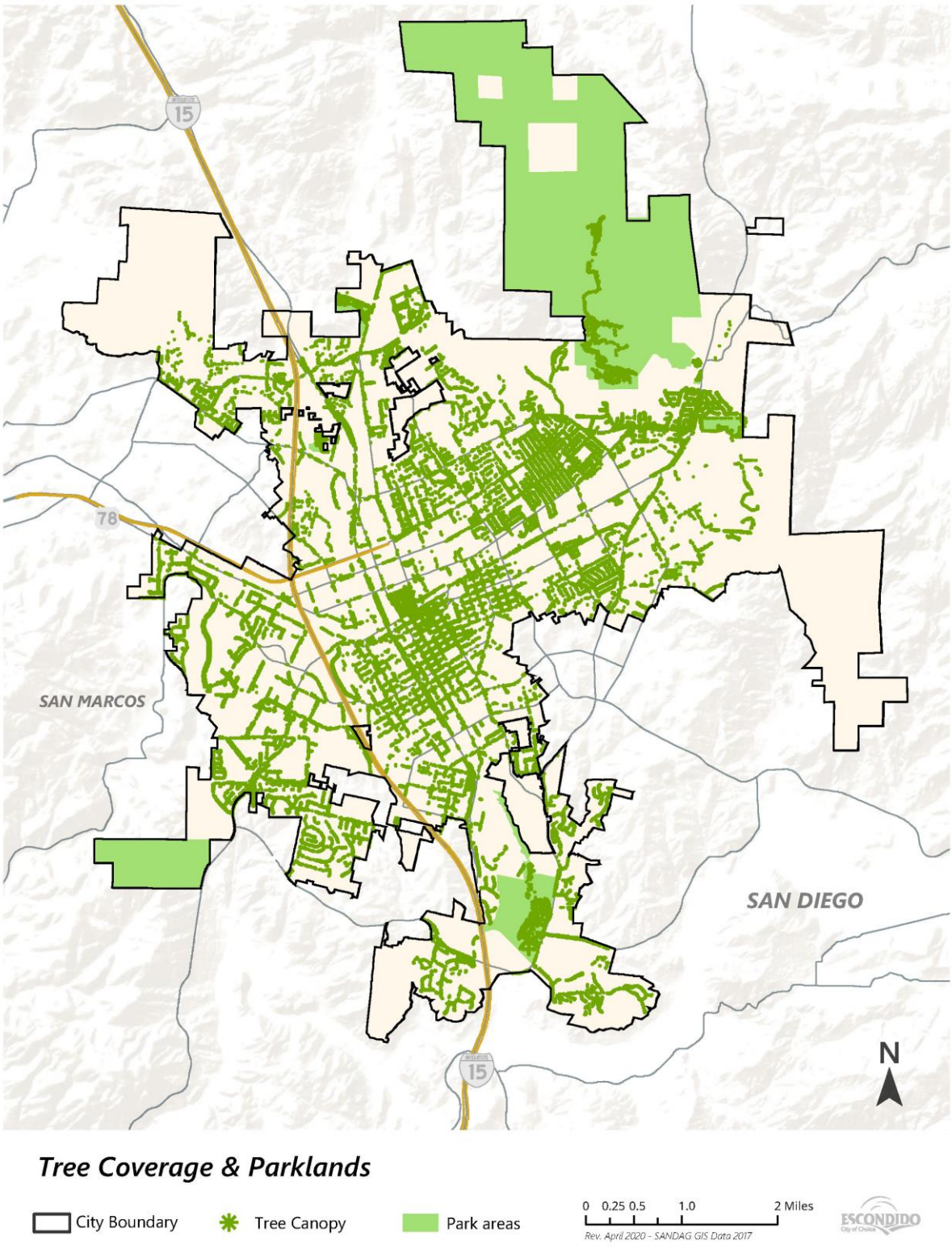
Map 6: 2020 High Fire Hazard Map



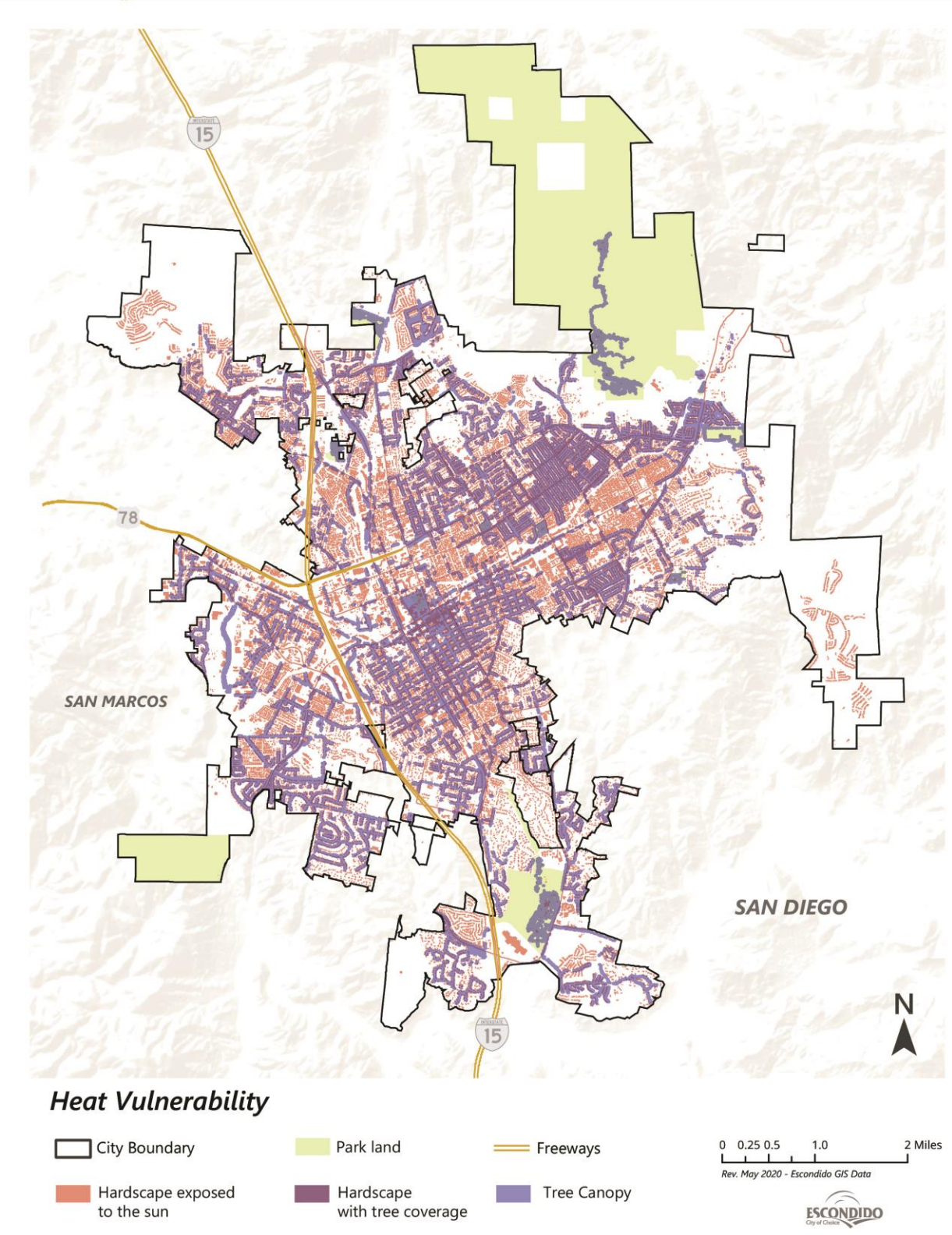
Map 7: 2020 Social Equity and Health Index Map



Map 8: Hardscape and Impervious Areas Map



Map 9: Tree Coverage Map



Map 10: 2020 Heat Vulnerability Index Map