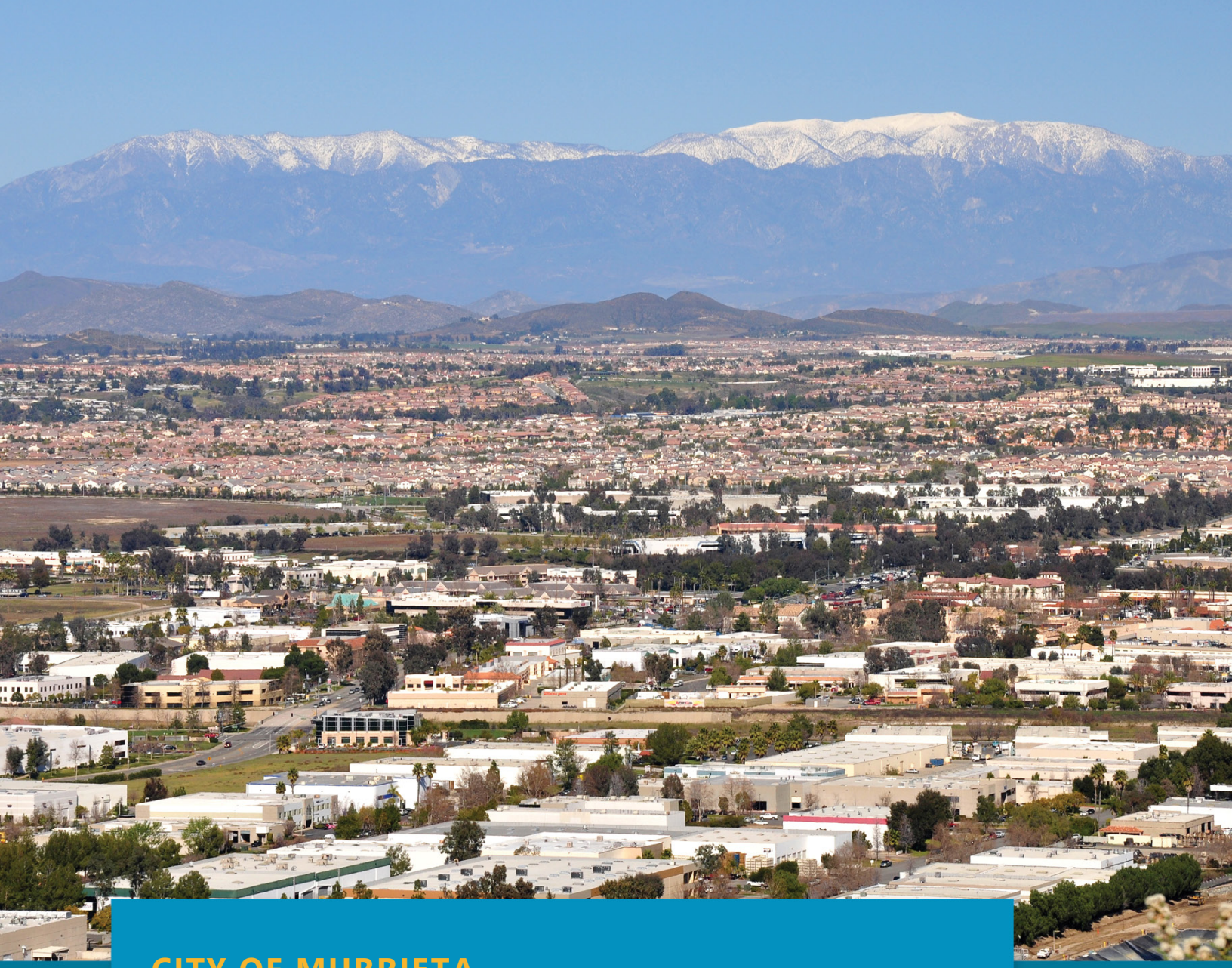
# APPENDIX J
# Draft Climate Action Plan



CITY OF MURRIETA

# Climate Action Plan Update

JANUARY 2020


**PREPARED BY:**

The City of Murrieta

**IN CONSULTATION WITH:**

Ascent Environmental, Inc.

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| 2011 CAP | 2011 Climate Action Plan |
| 2017 Scoping Plan | 2017 Climate Change Scoping Plan |
| AB | Assembly Bill |
| ABAU | Legislative-Adjusted BAU |
| BAU | business-as-usual |
| CAP | Climate Action Plan |
| CAP Update | Climate Action Plan Update |
| CARB | California Air Resources Board |
| CCA | Community Choice Aggregation |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| CFC | chlorofluorocarbon |
| $CH_4$ | methane |
| Checklist | CAP Consistency Review Checklist |
| City | City of Murrieta |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| EV | electric vehicle |
| GHG | greenhouse gas |
| GPU | General Plan Update |
| GWP | global warming potential |
| HFC | hydrofluorocarbon |
| $MMTCO_2e$ | million $MTCO_2e$ |
| MPO | metropolitan planning organization |
| $MTCO_2e$ | metric tons of carbon dioxide equivalent |
| $N_2O$ | nitrous oxide |
| $O_3$ | ozone |
| OPR | California Governor's Office of Planning and Research |
| PFC | perflurocarbon |
| RHNA | Regional Housing Needs Assessment |
| RTP | regional transportation plan |

| | |
|---|---|
| SB | Senate Bill |
| SCAG | Southern California Association of Governments |
| SCS | sustainable communities strategy |
| $SF_6$ | sulfur hexafluoride |
| SLCP | short-lived climate pollutant |
| Subregional CAP | Subregional Climate Action Plan |
| VMT | vehicle miles traveled |
| WCE | Western Community Energy Program |
| WRCOG | Western Riverside Council of Governments |
| ZNE | Zero Net Energy |

# EXECUTIVE SUMMARY

This Climate Action Plan Update (CAP Update) provides a comprehensive roadmap of actions that the City of Murrieta will take to achieve its fair share of greenhouse gas (GHG) reductions consistent with State laws, policy, and goals, and the latest climate change science. Moreover, the GHG reduction measures identified in the CAP Update would also provide important co-benefits to people living and working in the city, including but not limited to cost savings, economic benefits, improved city infrastructure, cleaner air, potential health benefits and reduced traffic congestion. The CAP Update will function as a "qualified plan for the reduction of greenhouse gases" under the State of California Environmental Quality Act (CEQA) Guidelines (Public Resource Code Section 15183.5), thereby affording streamlined environmental review benefits to future development projects.

Scientific evidence shows that the Earth's climate is experiencing a warming trend. The warming, as the result of GHGs in the atmosphere, is known as global climate change. The anticipated impacts of climate change are likely to adversely affect the City's residents and assets, including as a result of increased temperature, extreme heat events and heat waves, urban heat island effect, changes in precipitation patterns, increased wildfire risk, and increased flood risk.

The State government has also taken several steps to reduce GHG emissions and respond to the threat of 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 created a goal of lowering emissions to 1990 levels by 2020. In 2016, Senate Bill (SB) 32 was signed into law, which codified into statute the mid-term GHG reduction target of 40 percent below 1990 levels by 2030, established by Executive Order (EO) B-30-15. This 2030 target 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. EO B-55-18, signed in September 2018, furthers California's efforts to reduce GHG emissions by setting a goal to achieve carbon neutrality by 2045 and achieve net negative GHG emissions thereafter.

In 2011, the City of Murrieta (City) adopted its first CAP (2011 CAP), as part of the City's General Plan Update (GPU) (2011 General Plan). This CAP Update was prepared concurrently with a focused update of the City's General Plan to be consistent with State legislation and guidance released since the 2011 CAP was adopted. The 2011 CAP's GHG emissions baseline inventory was for the year 2009 and established emission forecasts for 2020 and 2035 with a GHG reduction target year of 2020, to align with State goals at that time. The CAP Update provides an updated baseline year of 2016, emissions forecasts for 2030, 2035, and 2050 with GHG emission targets for 2030 and 2035.

This CAP Update primarily focuses on reducing emissions by 2030 and 2035, and also establishes a 2050 goal, which is important to guide long-term planning. Achieving a 2050 goal in a local government CAP is considerably challenging due to the extended time horizon, uncertainty about the future and the City's limited jurisdiction over numerous sources of emissions. Furthermore, the California Air Resources Board's (CARB) 2017 Climate Change Scoping Plan (2017 Scoping Plan), which lays out the framework for achieving the 2030 target established by SB 32, does not demonstrate a feasible pathway for the State to achieve its 2050 goal at this time. It is technically possible to calculate the scale of emissions reductions at a local level to achieve a 2050 goal, but it is not feasible or meaningful to analyze how a local government can substantially achieve a 2050 target based on local actions alone and therefore, it is difficult to establish defensible reduction assumptions beyond a 15-year time frame. This is primarily because of uncertainty around future technological advances and future changes in State and federal law and a local government's relatively limited jurisdiction over numerous emissions sources and activities that affect emissions.

In the coming decades, new innovations and technologies could become available that will enable further GHG reductions beyond 2035 on the path to achieving the long-term 2050 goal. New or more reliable methods may also become available to quantify measures that are currently unquantifiable. Future laws or regulations may further reduce emissions in sectors currently outside of the jurisdiction of the City (e.g., new vehicle emissions standards that would apply to new or replacement vehicles decades into the future), or emissions in sectors currently addressed primarily by local measures. As climate change science and policy continues to change, the

City will be able to reevaluate how these and other factors are affecting progress toward meeting the long-term 2050 GHG emissions reduction goal in future CAP updates (as outlined in **Chapter 4**).

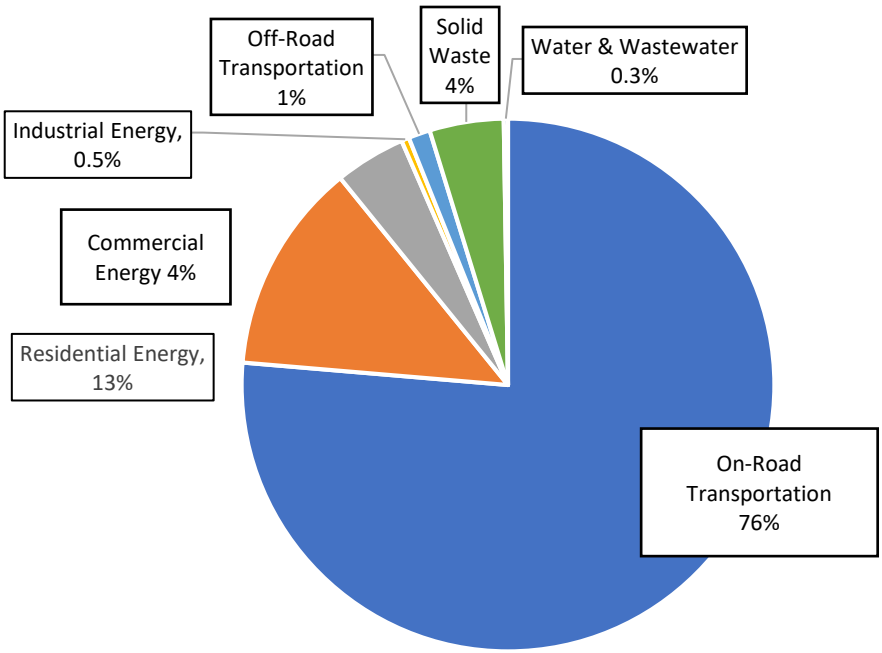
## Key Components of the Climate Action Planning Process

Climate action planning is broken up into five key components as identified in **Figure ES-1**. The climate action planning process was used in the development of the implementation of City's CAP Update and is described in detail in the following sections.

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

## Step 1. Conduct Baseline Assessment

The first step in the CAP Update process was to prepare a GHG emissions inventory assessment for the year 2016 to understand the sources of GHG emissions within the City's jurisdiction as well as provide a baseline for future emissions to be compared to. GHG emissions in this inventory include communitywide emissions resulting from activities occurring and permitted to occur within the existing city limits in 2016. The emissions sectors included in the inventory are on-road and off-road vehicles; residential, commercial, and industrial energy use; solid waste; and water and wastewater. In 2016, community activities in the City accounted for 890,575 metric tons of carbon dioxide equivalent ($MTCO_2e$). On-road vehicles (e.g., vehicular gasoline and diesel consumption) and building energy (e.g., electricity and natural gas consumption in buildings) accounted for about 94 percent (76 and 18 percent, respectively) of the citywide baseline emissions, as shown in **Figure ES-2**. The 2016 baseline was used to set targets for emissions reductions based on State goals. The baseline inventory is described in detail in **Chapter 2**.




*Source*: Ascent Environmental, Inc. 2019.

**Figure ES-2 Greenhouse Gas Emissions Inventory for the City of Murrieta in 2016 by Emissions Category**

## Step 2. Establish Goals

Emission forecasts were estimated based on the 2016 baseline inventory, current trends in City activity, City demographics, and legislative actions already adopted that could affect future emission sources. This first emissions forecasting scenario is considered as "business-as-usual" (BAU), assuming there would be no changes in citywide activities. Under the BAU scenario, the City would undergo a 75 percent increase in emissions from the 2016 baseline to 2050.

State and federal actions that are planned to continue or start in the future would reduce the City's BAU forecasted emissions. The second scenario that applies legislative actions to forecasted emissions is considered as the legislative-adjusted BAU (ABAU). Under the ABAU scenario, citywide emissions would be below 2016 baseline emissions by 8 percent by 2030 and 2 percent by 2050.

Consistent with CARB's recommendations for community-wide targets, reduction targets were derived for the CAP Update using a mass emissions approach. Because California's statewide emissions in 2016 were below its 1990 baseline levels, no further reduction from 2016 emissions levels are necessary to reach the State's 2020 target. To be consistent with the GPU 2035 buildout year, a target was established based on interpolation of the 2030 and 2050 targets. These targets, to be achieved through implementation of the CAP Update, are to reduce citywide GHG emissions by 40 percent below 2016 levels by 2030, 50 percent below 2016 levels by 2035, and by 80 percent below 2016 levels by 2050. **Table ES-1** provides the City GHG emission forecasts and targets, which are further discussed in **Chapter 2**.

**Table ES-1 GHG Emissions Projections and Targets**

| Forecast | 2016 Baseline Emissions ($MTCO_2e$) | 2030 | | 2035 | | 2050 | |
|---|---|---|---|---|---|---|---|
| | | Total Emissions ($MTCO_2e$) | Change from 2016 Baseline (%) | Total Emissions ($MTCO_2e$) | Change from 2016 Baseline (%) | Total Emissions ($MTCO_2e$) | Change from 2016 Baseline (%) |
| BAU | 890,575 | 1,122,275 | 26 | 1,213,537 | 36 | 1,560,442 | 75 |
| ABAU | -- | 815,174 | -8 | 820,787 | -8 | 875,589 | -2 |
| Reduction Targets | -- | 536,836 | -40 | 447,363 | -50 | 178,945 | -80 |

Notes: BAU = Business-as-usual; ABAU = Legislative-Adjusted BAU; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent

Source: Ascent Environmental, Inc. 2019.

## Step 3. Develop Plan

In addition to State and federal legislative action to meet the City's 2030 and 2035 reduction targets, and 2050 reduction goal, locally-based reduction measures are needed. To meet these targets, the CAP Update identifies measures to reduce GHG emissions citywide from a variety of emissions sources. In total, the City will implement a menu of 20 measures to achieve emission reductions. The measures were developed based on reductions included in the 2011 CAP, recommendations from the Western Riverside Council of Governments (WRCOG) Subregional CAP, larger reductions needed in high emitting sectors, existing local actions that can be expanded upon, technological innovation, the City's influence on impacting emissions, and the feasibility of implementation. In addition, measures were based on their potential for co-benefits such as cost savings, economic development, a healthy community and improved City infrastructure. Each measure provides direct and measurable emissions reductions through implementation of specific programs, policies, or projects. **Table ES-2** provides a list of all measures in the CAP Update. Detailed descriptions of each sector and corresponding measures, along with their associated potential GHG emissions reductions, are included in **Chapter 3**.

**Table ES-2 Summary of GHG Reduction Measures**

| Measure | Description |
|---|---|
| **Transportation** | |
| T- 1 | Electric Vehicle Incentives and Promotion |
| T- 2 | Electric Vehicle Charging Ordinance |
| T- 3 | TOD Affordable Housing Program |
| T- 4 | Murrieta Bike Network |
| T- 5 | Signal Synchronization |
| T- 6 | Traffic Calming Program |
| T- 7 | Transportation Demand Management Program |
| T- 8 | Transit Network |
| T- 9 | GHG Reduction Program |
| **Building Energy** | |
| BE-1 | Community Renewable Energy |
| BE-2 | Municipal Renewable Energy |
| BE-3 | Zero Net Energy Standard |
| BE-4 | Energy Efficiency and Electrification Program |

**Table ES-2 Summary of GHG Reduction Measures**

| Measure | Description |
|---|---|
| **Land Use** | |
| LU-1 | Jobs-Housing Balance Strategy |
| LU-2 | Tree Planting Program |
| LU-3 | Open Space Conservation |
| **Solid Waste** | |
| SW-1 | Waste Diversion Program |
| SW-2 | Construction Waste Diversion |
| **Water and Wastewater** | |
| WW-1 | Landscaping and Water Conservation Program |
| WW-2 | Rainwater Catchment and Greywater Systems Program |

Source: Ascent Environmental, Inc. 2019.

**Table ES-3** provides a list of key measures focused in the CAP Update which play an important role in the City meeting its GHG reduction targets. **Chapter 4** provides additional discussion of how the nine key GHG reduction measures could be implemented.

**Table ES-3 Key GHG Reduction Measures**

| Measure | Description |
|---|---|
| **Transportation** | |
| T- 1 | Electric Vehicle Incentives and Promotion |
| T- 2 | Electric Vehicle Charging Ordinance |
| T- 7 | Transportation Demand Management Program |
| T- 9 | GHG Reduction Program |
| **Building Energy** | |
| BE-1 | Community Renewable Energy |
| BE-2 | Municipal Renewable Energy |
| BE-3 | Zero Net Energy Standard |
| BE-4 | Energy Efficiency and Electrification Program |
| **Land Use** | |
| LU-1 | Jobs-Housing Balance Strategy |

Source: Ascent Environmental, Inc. 2019.

**Table ES-4** shows the GHG reductions attributable to the measures in this CAP Update and how anticipated reductions will help the City close the gap in emissions to meet its 2030 and 2035 targets. It also shows the City's progress in achieving its fair-share of emissions reductions toward the State's 2050 goal. Further details of the potential GHG reductions are provided in **Chapter 3**.

**Table ES-4 Effect of Plan Measures and Legislative Reductions on City of Murrieta Emissions and Targets ($MTCO_2e$)**

| Emissions | 2030 | 2035 | 2050 |
|---|---|---|---|
| **BAU Emissions Forecasts** | **1,122,275** | **1,213,537** | **1,560,442** |
| Federal and State Legislative Reductions | 307,102 | 392,750 | 684,853 |
| **ABAU Emissions Forecast (BAU Forecasts – Federal and State Legislative Reductions)** | **815,174** | **820,787** | **875,589** |
| **Target Emissions** | **536,836** | **447,363** | **178,945** |
| Reductions from CAP Transportation Measures | 154,396 | 204,673 | 285,324 |
| Reductions from CAP Energy Measures | 86,656 | 123,143 | 193,059 |
| Reductions from CAP Land Use Measures | 32,769 | 41,614 | 52,258 |
| Reductions from CAP Solid Waste Measures | 5,582 | 8,043 | 11,806 |
| Reductions from CAP Water and Wastewater Measures | 61 | 48 | 0 |
| **Total Reductions from CAP Measures** | **279,463** | **377,521** | **542,447** |
| **City of Murrieta Emissions with CAP (ABAU – CAP Reductions)** | **535,711** | **443,266** | **333,142** |
| Percentage of gap achieved through CAP Measures | 100% | 101% | 78% |

BAU = business-as-usual; ABAU = legislative-adjusted business-as-usual; CAP = Climate Action Plan; GHG = greenhouse gas emissions; $MTCO_2e$ = metric tons of carbon dioxide equivalent

Source: Ascent Environmental, Inc. 2019

## Steps 4 and 5. Implement Measures, and Monitor and Verify Progress

Implementation and monitoring mechanisms are identified in the CAP Update to ensure that all measures are adequately implemented, and reduction targets achieved. These steps complete the cyclical process of climate action planning, as demonstrated above in **Figure ES-1**, and provide the necessary information and feedback used to repeat and improve the process.

An important key to implementation will require new development projects to attain higher levels of energy efficiency and incorporate more sustainable design standards. If a project can show consistency with applicable GHG reduction measures in a CAP, the level of analysis for the project required under CEQA with respect to GHG emissions can be reduced considerably. A project's consistency with the CAP will be determined through the CAP Consistency Review Checklist (Checklist). The Checklist would contain 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 Update are achieved.

Implementation of the CAP Update will require ongoing management, oversight, and collaboration, ensuring that actions translate to on-the-ground results and reductions in GHG emissions. Successful implementation requires investment, long-term commitment, and participation of the community. Monitoring CAP actions and measures is an important part of ensuring the success of the CAP Update in meeting the City's targets. City staff will provide periodic updates to the City Council on CAP implementation and efforts. The City will again update the CAP, as needed, to ensure CAP measures remain implementable and feasible, adjusting measures based on changing conditions or demands, and incorporating new technology not considered in the previous CAPs.

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 community-wide level, individuals and businesses can play an important role in reducing GHG emissions by changing habits to consume less energy, produce less waste, and drive less. Details on the City's implementation and monitoring efforts and the importance of continued community engagement is outlined in **Chapter 4**.

# 1 INTRODUCTION

The City of Murrieta (City) Climate Action Plan Update (CAP Update) sets forth measures to reduce greenhouse gas (GHG) emissions from communitywide and municipal activities and is based on the proposed land use changes of the City's focused General Plan Update (GPU). The CAP Update is intended to meet State GHG targets and establishes locally-based measures that would reduce GHG emissions, while also improving livability and quality of life for people that live and work in the City.

The land use pattern of the GPU is a critical component of the City's strategy to reduce GHG emissions by locating residential units in close proximity to potential job opportunities at the employment areas in the proposed and existing Innovation , Business and Office Research Park designated areas. The land use pattern creates opportunities for trips to be made by walking, bicycling, or short vehicle trips, in addition to providing economic benefits.

The CAP Update has also been prepared to meet the requirements of CEQA Guidelines Section 15183.5(b) regarding plans for the reduction of GHG emissions. Doing so creates the opportunity for the City to streamline the analysis of GHG emissions during the environmental review process for future projects that implement the GPU.

## 1.1 Background and Overview

In 2009, the City initiated a comprehensive update of the General Plan (2011 General Plan), which was adopted on July 19, 2011, and included a Climate Action Plan (2011 CAP). The 2011 CAP established a baseline year for GHG emissions of 2009 and developed emissions forecasts for 2020 and 2035, and a GHG reduction target for 2020, consistent with Assembly Bill (AB) 32. The 2011 CAP included strategies and measures across seven categories (Community Involvement, Land Use and Community Vision, Transportation and Mobility, Energy Use and Conservation, Water Use and Efficiency, Waste Reduction and Recycling, and Open Space) to achieve the established 2020 GHG reduction target.

The City has decided to prepare the CAP Update because of several important changes that have occurred at the State and regional level since the City's 2011 CAP was prepared. Senate Bill (SB) 32, signed into law in 2016, established a statewide GHG reduction target of 40 percent below 1990 levels by 2030. In November 2017, the California Air Resources Board (CARB) published the 2017 Climate Change Scoping Plan (2017 Scoping Plan), which lays out the framework for achieving the 2030 target established by 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, the cities of Western Riverside County, through the Western Riverside Council of Governments (WRCOG) have established a common framework to allow for a commonality of regional climate action objectives known as the Subregional Climate Action Plan (Subregional CAP). This CAP Update would make the City's CAP consistent with State GHG reduction targets and relevant guidance contained in the WRCOG Subregional CAP completed in September 2014.

This CAP Update reflects the City's proposed GPU, including the creation of the new Innovation land use designation and a revised mix and location of land use designations in six areas of the City. The CAP Update reflects the proposed GPU's addition of 1,572 dwelling units and reduction of 2,405,601 square feet of non-residential land uses relative to the 2011 General Plan. Making the CAP Update consistent with the GPU and extending the City's GHG reduction target from 2020 to 2035 creates the opportunity for the City to streamline the analysis of GHG emissions during the environmental review process for projects that implement the GPU.

This CAP Update consists of four chapters, which in addition to this Introduction includes the following:

**Chapter 2 Greenhouse Gas Emissions Inventory, Forecasts, and Targets:** This chapter summarizes the sources of the City's existing and future GHG emissions. It presents an updated baseline inventory of community emissions for 2016, emissions forecasts for future years, and reduction targets for 2030 and 2035 based on State legislation and the GPU horizon year. It also identifies the significant role that State level strategies play in reducing GHG emissions within the City. The technical methods and other details supporting this analysis are provided in **Appendix A**.

**Chapter 3 Greenhouse Gas Reduction Measures:** To meet its reduction targets, the City will implement local measures to reduce communitywide GHG emissions. This chapter describes the measures the City has identified to reduce GHG emissions and achieve its 2030 and 2035 GHG targets. The analysis showing the numeric contribution of individual GHG reduction measures toward meeting the 2030 and 2035 targets, along with reduction calculation details for each GHG reduction measure, are provided in **Appendix B**.

**Chapter 4 Implementation and Monitoring:** This chapter provides an outline for how the City will implement the GHG reduction measures and includes guidelines for monitoring and updating the CAP. In addition, this chapter will describe the process for streamlining GHG emissions analysis during CEQA environmental review for future projects consistent with the GPU. The CAP Consistency Checklist contains measures that are required to be implemented on a project-by-project basis to achieve the City's 2030 and 2035 GHG reduction targets. By implementing the measures in the Checklist, a development project would demonstrate its consistency with the CAP Update. The Checklist is provided in **Appendix C**.

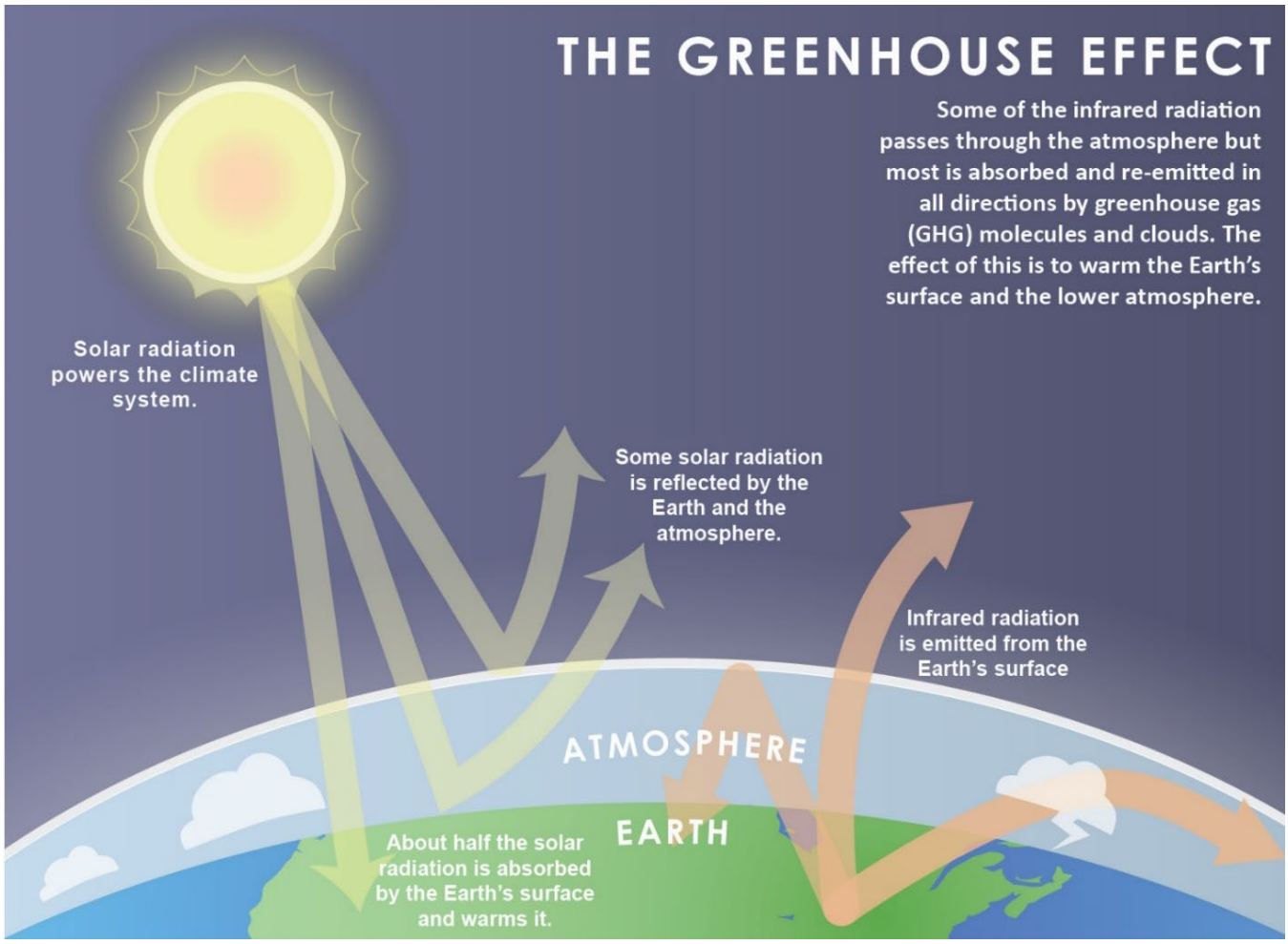
## 1.2 Introduction to Climate Change Science and Impacts

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, 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 stable. Without the greenhouse effect, Earth would not be able to support life as we know it.

> IPCC defines "extremely likely" as a 95 percent probability of occurrence/outcome. Additionally, multiple studies published in peer-reviewed scientific journals show that 97 percent or more of actively publishing climate scientists agree that climate change trends over the past century are "extremely likely" due to human activities.

Human activities (e.g., the burning of fossil fuels for transportation energy, increasing rates of deforestation and development) have contributed to elevated concentrations of GHGs in the atmosphere. These human-caused (i.e., anthropogenic) emissions of GHGs have resulted in above-normal ambient concentrations of GHGs, 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 a 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 GHG emissions (IPCC 2014).

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




Source: Ascent Environmental 2019.

**Figure 1-1 The Greenhouse Effect**

Global climate change is the driver behind shifting seasons, rising average temperatures, changes in precipitation patterns, shrinking mountain snowpack, higher sea levels, and other impacts to biological resources and humans. The impact of climate change in California varies across the state due to diversity in biophysical setting, climate, and jurisdictional characteristics. Annual temperatures in the City are projected to increase steadily over time as a result of climate change. While forecasts generally show little change in total annual precipitation in California, even modest changes could have a significant effect on California ecosystems that are conditioned to historical precipitation levels.

A vulnerability assessment was prepared to identify the anticipated impacts of climate change on the City's residents and assets, including as a result of increased temperature, extreme heat events and heat waves, urban heat island effect, changes in precipitation patterns, increased wildfire risk, and increased flood risk (**Appendix D**). In summary, by 2099 the annual average maximum temperature in the city is projected to increase by 5.1 to 10.4 °F (CEC 2018). The historically low and infrequent number of extreme heat events (no more than one per year) are expected to rise to two to 11 heat waves per year by 2099 (CEC 2018). With projected increased temperatures and extreme heat events the intensity of urban heat islands within the city compared to surrounding rural areas is expected to rise. The City's historical annual average (1950 to 2005) precipitation of 15.0 inches is expected to rise to 15.0 to 21.4 inches per year by 2099 (CEC 2018). In addition, as the City experiences increased intensity as well as unreliable participation patterns, increased flooding events and periods of drought are likely to occur. Increased temperatures and frequency of extreme heat events, along with changes in precipitation patterns, can lead to an increase in the frequency and intensity of wildfires (OPR 2018).

## 1.3 Regulatory Framework

With the adoption of the 2011 CAP, the City has already taken steps to reduce GHG emissions and adapt to climate change. The efforts adopted by the City in 2011 and the State's legislative background are summarized in the following sections, providing important guidance and policy drivers for the CAP Update.

### 1.3.1 State of California

In 2005, Governor 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 (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, the CARB developed a Scoping Plan in 2008. The Scoping Plan, along with its Update in 2014, describes the approach California will take to reduce GHGs to achieve reduction targets and goals. 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 (per EO S-3-05).

In 2015, Governor Brown 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 SB 32, which codified into statute the mid-term 2030 target of Executive Order B-30-15. The 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.

The approved 2017 Scoping Plan lays out the framework for achieving the 2030 reductions as established in Executive Order B-30-15 and SB 32. The 2017 Scoping Plan replaces the previous version and 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, which became law in 2008, is intended to reduce GHG emissions from passenger cars and light-duty trucks by more closely aligning regional transportation planning with regional housing allocations and local land use planning. SB 375 requires metropolitan planning organizations, including the Southern California Association of Governments (SCAG), to adopt a sustainable communities strategy (SCS) or Alternative Planning Strategy as part of its regional transportation plan (RTP) showing how it would, if implemented, achieve CARB-established targets for per capita reductions of GHG emissions from passenger cars and light duty trucks by 2020 and 2035, relative to a 2005 baseline. The current version of the SCAG RTP/SCS was adopted in April 2016 and, if implemented, demonstrates that the SCAG region would achieve its passenger vehicle GHG reduction targets by reducing emissions 8 percent below 2005 levels by 2020 and 13 percent below 2035 levels by 2035. SCAG published a draft version of its updated RTP/SCS in November 2019, which, if implemented shows how the SCAG region would achieve the 8 percent target by 2020 and an updated target of 19 percent by 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 2014, and most recently 2018, and is now known as *Safeguarding California*. In 2016, the State also developed the Safeguarding California Implementation Action Plans.

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

**Table 1-1 Relevant Federal and State Regulations**

| | | |
|---|---|---|
| Federal | Federal Clean Air Act (CAA) | In 2007, the U.S. Supreme Court ruled that $CO_2$ is an air pollutant as defined under the CAA, and the U.S. Environmental Protection Agency has the authority to regulate emissions of GHG. |
| Federal[1] | Corporate Average Fuel Economy (CAFE) Standards | The federal CAFE Standards determine the fuel efficiency of certain vehicle classes in the U.S. |
| 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. |
| State | AB 1493 | AB 1493 (Pavley) required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. |
| State | AB 197 | AB 197 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 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 Renewable Portfolio Standard to 50 percent by 2030 and doubling energy savings in electricity and natural gas end uses. |
| State | RPS | Requires California energy utilities to procure 33 percent of electricity from renewable sources by 2020. |
| State | SB 100 | Requires California energy utilities to procure 60 percent of electricity from renewable sources by 2030 and 100 percent from renewable and zero-carbon sources by 2045. |
| State | California Building Efficiency Standards (Title 24, Part 6) | Requires all new buildings in California to comply with energy efficiency standards established by CEC. |
| State | AB 341 | California target to achieve a 75 percent solid waste diversion target by 2020. |
| State | Pavley Clean Car Standards | Establishes GHG emission reduction standards for model years 2009 through 2016 that are more stringent than federal CAFE standards. |
| State[1] | Advanced Clean Car Standards | Establishes GHG emission reduction standards for model years 2017 through 2025 that are more stringent than federal CAFE standards. |
| State | SBX7-7 | Requires a 20 percent reduction in per capita water usage by 2020. |
| Federal | Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles | Establishes fuel efficiency standards for medium- and heavy-duty engines and vehicles. |

Notes: AB = Assembly Bill; CAFE = Corporate Average Fuel Economy; CEC = California Energy Commission; EPA = Environmental Protection Agency; GHG = greenhouse gas; RPS = Renewables Portfolio Standard; SB = Senate Bill; VMT = vehicle miles traveled.

Source: Ascent Environmental 2019.

1. On August 2, 2018, the National Highway Traffic Safety Administration (NHTSA) and U.S. Environmental Protection Agency (EPA) proposed the Safer Affordable Fuel-Efficient Vehicles Rule (SAFE Rule). This rule addresses emissions and fuel economy standards for motor vehicles and is separated in two parts as described below.

   Part One "One National Program" (84 FR 51310) revokes a waiver granted by EPA to the State of California under Section 209 of the Clean Air Act to enforce more stringent emission standards for motor vehicles than those required by EPA for the explicit purpose of greenhouse gas emission (GHG) reduction, and indirectly, criteria air pollutant and ozone precursor emission reduction. This revocation became effective on November 26, 2019, restricting the ability of CARB to enforce more stringent GHG emission standards for new vehicles and set zero emission vehicle mandates in California. CARB has estimated the vehicle tailpipe and evaporative emissions impacts to criteria air pollutants from SAFE Rule Part One and has provided off-model adjustment factors to adjust emissions output from CARB's Emission Factor (EMFAC) model.

   Part Two would address Corporate Average Fuel Economy (CAFE) standards for passenger cars and light trucks for model years 2021 to 2026. This rulemaking proposes new CAFE standards for model years 2022 through 2026 and would amend existing CAFE standards for model year 2021. The proposal would retain the model year 2020 standards (specifically, the footprint target curves for passenger cars and light trucks) through model year 2026, but comment is sought on a range of alternatives discussed throughout the proposed rule. This proposal addressing CAFE standards is being jointly developed with EPA, which is simultaneously proposing tailpipe carbon dioxide standards for the same vehicles covered by the same model years. As of January 31, 2020, Part Two is not final. The timing of a final SAFE Rule Part Two and the outcome of any pending or potential lawsuits (and how such lawsuits could delay or affect its implementation) are unknown at this time.

### 1.3.2 City of Murrieta

The City's 2011 CAP developed GHG emission reduction measures in accordance with the policies of the 2011 General Plan. From these policies the 2011 CAP identified seven emission reduction strategies and the corresponding policies to support them. Table 1-2 presents the seven strategies and the 2011 General Plan policies that were identified in the 2011 CAP as GHG reduction measures to achieve the 2020 GHG reduction target. These measures were used to inform development of measures for the CAP Update and in some cases have been expanded upon to meet the new targets for 2030 and 2035.

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| Community Involvement Strategy | **CIR-6.12** Increase public education about public transit options.<br>**CSV-15.1** Consider renewable energy generation systems on City-owned property for use in municipal operations.<br>**CSV-15.2** Reduce fuel consumption and emissions from municipal fleet vehicles.<br>**CSV-15.3** Continue to implement waste reduction programs at municipal facilities.<br>**CSV-15.4** Consider retrofitting and/or installing water- and energy-efficient fixtures and appliances in municipal facilities, where appropriate and feasible.<br>**CSV-15.5** Encourage the use of recycled water where appropriate and feasible in City parks and landscaped areas, and demonstrate preferred techniques for water efficient landscaping, including the use of native plants.<br>**CSV-15.6** Demonstrate cutting-edge green building techniques when constructing and retrofitting municipal buildings.<br>**CSV-15.7** Use energy-efficient lighting in parks, streets and other public places.<br>**HC-1.3** Encourage that the municipal vehicle fleet achieve the highest possible number of fuel-efficient and low emissions vehicles commercially available. |
| Land Use and Community Vision Strategy | **LU-1.6** Promote future patterns of development and land use that reduce infrastructure construction costs and make better use of existing and planned public facilities.<br>**LU-4.3** Locate multiple-family housing adjacent to jobs, retail, schools, open space, public transportation, and transportation corridors.<br>**LU-5.1** Support redevelopment and transition of obsolete industrial and manufacturing sites for commercial, flextech, and/or mixed-use development, reflective of current market demand.<br>**LU-5.2** Promote quality design and development practices that reduce environmental impacts.<br>**LU-6.1** Encourage flexibility in land use regulations to respond to requirements of new and emerging business and industry types.<br>**LU-7.4** Discourage the construction of marginal, disjointed strip center commercial development within the city.<br>**LU-7.8** Encourage consolidation of parking and reciprocal access agreements between adjacent business and commercial center property owners.<br>**LU-8.1** Encourage integrated development that incorporates a mix of uses (residential, commercial, office) in mixed use or transit-oriented development areas.<br>**LU-8.2** Encourage workplace development in close proximity to residences in mixed use or transit-oriented development areas.<br>**LU-8.4** Design mixed uses or transit-oriented development projects to:<br>▶ Create a pleasant walking environment to encourage pedestrian activity.<br>▶ Create lively streetscapes, interesting urban spaces, and attractive landscaping.<br>▶ Provide convenient shopping opportunities for residents close to their residence.<br>▶ Integrate with surrounding uses to become a part of the neighborhood rather than an isolated project.<br>▶ Use architectural elements or themes from the surrounding area, as appropriate.<br>▶ Provide appropriate transition between land use designations to minimize neighbor compatibility conflicts. |

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| | **LU-8.5** Encourage the creation of multi-modal transit opportunities with a healthy mix of businesses, childcare, senior services, and housing.<br>**LU-8.6** Encourage higher density residential, commercial, and employment development near a future Metrolink or High Speed Rail Station, along other major public transportation routes, and at other suitable locations.<br>**LU-8.7** Amend the Development Code to implement mixed use zoning districts that provide development standards for mixed use development, which should address minimum density and intensity requirements; allowable uses; horizontal and/or vertical mix of uses, building heights; and parking standards.<br>**LU-8.8** Evaluate mixed use projects to ensure that there is an adequate mix of uses on the site and in the area.<br>**LU-9.1** Encourage human-scale urban design on the neighborhood, block, and building scale.<br>**LU-9.2** Encourage active and inviting pedestrian-friendly street environments that include a variety of uses within commercial, mixed use or transit-oriented development areas.<br>**LU-9.3** Encourage new neighborhoods to be built on a pedestrian-scale, within walking distance of parks, neighborhood-serving commercial areas, and other neighborhood amenities.<br>**LU-9.4** Differentiate between areas zoned as neighborhood commercial and community commercial, encouraging unique, pedestrian-oriented, and neighborhood-serving uses in the neighborhood commercial zone.<br>**LU-9.5** Promote commercial uses near residential neighborhoods that serve local residents and create neighborhood-gathering places.<br>**LU-9.6** Provide pedestrian-oriented urban design through creative use of site development standards.<br>**LU-9.7** Encourage development patterns to become more conducive to short, local, and walkable trips, which could increase opportunities for physical activity and decrease time spent driving.<br>**LU-9.8** Consider infill locations for higher education facilities to capitalize upon existing or create synergies with surrounding uses.<br>**LU-10.1** Prepare and use design guidelines to encourage high-quality, pedestrian oriented design that enhances the public realm.<br>**LU-10.2** Consider preparation and adoption of a Street Master Plan that addresses walkability and streetscape.<br>**LU-10.3** Consider that the development of new residential block lengths are no more than 800 feet on any one side, and no longer than 600 feet on average per side, creating a street network that enables multiple routes for pedestrians, cyclists, and vehicles through a neighborhood.<br>**LU-10.4** Discourage physical barriers, such as arterial streets, transit or utility rights-of-way, or very long blocks without through-streets, between and within neighborhoods and neighborhood centers. If physical barriers are unavoidable, provide safe and comfortable crossings for pedestrians and cyclists.<br>**LU-10.5** Update the Development Code to create walkability, and interesting and varied pedestrian environments.<br>**LU-10.6** Encourage new businesses to have a pedestrian-accessible main entrance that faces the street, as appropriate.<br>**LU-10.7** Encourage well-designed covered or structured parking instead of surface parking lots.<br>**LU-10.8** Encourage new surface off-street parking to be located behind or to the side of buildings, as appropriate.<br>**LU-10.9** Encourage ground-floor structured parking to be buffered from the pedestrian environment through strategies such as wrapping the structure with active retail uses, placing entrances off the street, and screening with landscaping or art.<br>**ED-3.1** Support a diverse range of business activities including professional/technical, information, technology-focused manufacturing, research and development, including medical research and research institutions, educational services, medical/health services, and financial services.<br>**ED-3.2** Promote Murrieta as a center for medical/health services and technology through active |

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| | encouragement and recruitment of medical office, medical research, and health care facilities around the Loma Linda University Medical Center, South Murrieta Business Corridor, and confluence of the I-15/I-215 Freeways.<br>**ED-3.3** Create incentives to attract new businesses and industries that provide employment opportunities that match the education and occupational skill levels of Murrieta residents.<br>**ED-3.4** Develop an economic base that attracts jobs and exports products and services by capitalizing on the City's strategic location and relatively lower land prices between greater Los Angeles/Orange County metro and San Diego market regions.<br>**ED-4.2** Encourage retail development, expansion, and remodeling projects that can effectively reverse or minimize outflows of local resident expenditures to retail facilities beyond the City limit.<br>**ED-5.1** Encourage flex-tech buildings within business corridors and higher intensity office uses along freeway corridors with adequate visibility, convenient access, and future transit-oriented opportunities.<br>**ED-6.1** Encourage and support the development of institutions of higher education to serve educational pursuits of area residents and provide a highly skilled employment pool attractive to business investment and economic growth.<br>**ED-6.2** Support the development of technical colleges and training institutions that build job skills commensurate with the growth of the economic base, particularly in the emerging health care services industry and the need for doctors, nurses, and other trained personnel.<br>**ED-8.1** Encourage and market to employers that provide employment opportunities commensurate with the education and skills of Murrieta residents.<br>**ED-10.5** Consider opportunities for the development of higher-density and mixed-use residential uses to support commercial development within the Historic Downtown.<br>**AQ-6.3** Encourage non-polluting industry and clean green technology companies to locate to the City. |
| Transportation and Mobility Strategy | **LU-22.6** Encourage the development of an trail system within the Multiple Species Habitat Conservation Plan (MSHCP) and other open space areas that connects to a trails system within or adjacent to the existing and future street systems, including linkage through areas east of Warm Springs Creek (such as but not limited to a transitional buffer area) to the open space corridor along Adobe Creek. Trails adjacent to streets should allow for multiple users and provide buffers between vehicles and trail users.<br>**LU-24.2** Continue the expansion of a traditional town development pattern with a grid street design and urban land use intensities to support a pedestrian-oriented environment.<br>**LU-24.6** Encourage mixed-use development projects within the Historic Downtown that create a pedestrian style living environment and encourage use of mass transit.<br>**LU-25.2** Establish a strong role in the implementation of Proposition 1A with the California High Speed Rail Authority (CHSRA).<br>**CIR-1.1** Ensure the transportation system can adequately serve the concentrations of population and employment activities identified by the Land Use Element.<br>**CIR-1.9** Provide a coordinated traffic control system that moves traffic within and through the City in an efficient and orderly manner. Upgrade systems as technology evolves.<br>**CIR-1.11** Support the implementation of complete streets through a multi-modal transportation network that balances the needs of pedestrians, bicyclists, transit riders, mobility-challenged persons, older people, children, and vehicles while providing sufficient mobility and abundant access options for existing and future users of the street system.<br>**CIR-2.3** Provide a circulation network that accommodates the safe and efficient movement of all forms of non-motorized travel.<br>**CIR-2.5** Include paved shoulders on all roads in non-urban areas that can be used by cyclists and pedestrians.<br>**CIR-2.6** Explore the use of traffic calming measures on streets with high incidences of speeding and/or history of collisions.<br>**CIR-2.7** Publish and promote safe pedestrian and bike routes through creating an accurate citywide map |

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| | and posting pedestrian/cyclist-scale wayfinding signage. |
| | **CIR-2.12** Consider the development and implementation of Pedestrian Safety Guidelines that also include streetscape standards that emphasize pedestrian and cyclist safety (lighting, trees, greenery, traffic calming measures, etc.). |
| | **CIR-5.9** Coordinate with Western Riverside Council of Governments, Riverside County, and Riverside County Transportation Commission to identify, protect, and pursue opportunities for public transit along major transportation corridors, and future high speed rail service, which connect Murrieta to other population centers. |
| | **CIR-5.10** Support the siting and development of a Metrolink Station(s) within Murrieta along the I-15 and/or I-215 corridors. |
| | **CIR-5.11** Coordinate with California High Speed Rail Authority, Riverside Transit Authority, and City of Temecula on the siting and development of a California High Speed Rail Intermodal Transit Center. |
| | **CIR-5.14** Encourage new large residential, commercial, or employment developments to locate on existing and planned transit routes. |
| | **CIR-6.1** Encourage alternatives to single-occupancy vehicle transportation such as rail, public transit, paratransit, walking, cycling, and ridesharing. |
| | **CIR-6.2** Support a variety of transit vehicle types and technologies to serve different transportation needs. |
| | **CIR-6.3** Work with the Riverside Transit Agency, Murrieta Chamber of Commerce, and/or the City's Economic Development Department to conduct a travel/commute survey with the intent of creating vanpools, carpools, and employment center shuttles to reduce single occupant vehicles. |
| | **CIR-6.4** Seek opportunities for funding that goes to support alternative forms of transportation. |
| | **CIR-6.5** Support the dedication and/or construction of appropriate facilities in support of a public transportation system. |
| | **CIR-6.6** Identify opportunities to implement the Western Riverside County Non-Motorized Transportation Plan within key activity centers of the City through the development of non-motorized transportation corridors and facilities (i.e., neighborhood electric vehicle routes, bikeways, pedestrian paths, sidewalks/paths). |
| | **CIR-7.1** Encourage future developments to provide an internal system of sidewalks/pathways linking schools, shopping centers, and other public facilities with residences. |
| | **CIR-7.2** Require pedestrian access from the interior of new residential areas to public transit stops. |
| | **CIR-7.3** Encourage safe pedestrian walkways and ensure compliance with the Americans with Disabilities Act (ADA) requirements within all developments. |
| | **CIR-7.4** Consider the development and implementation of Pedestrian Friendly Street Standards. |
| | **CIR-7.5** Provide pedestrian amenities such as benches, trees, landscaping, and shade trees to encourage people to walk to destinations. |
| | **CIR-7.6** Promote improved demand responsive transit services for elderly and disabled persons. |
| | **CIR-7.7** Ensure visibility and access for pedestrians and encourage the removal of barriers (walls, fences) to allow for safe and convenient movement. |
| | **CIR-7.8** Work with Riverside County Transportation Commission, local retirement homes, the Senior Center, and other community groups to expand affordable and reliable transportation options for older adults and disabled persons. |
| | **CIR-8.1** Create, update, and implement a master plan for non-motorized travel throughout the City, including multi-use trails, off-street paved bikeways, on-street bikeways, and related amenities. |
| | **CIR-8.2** Promote bicycle and pedestrian trails along major home to work and other travel routes. |
| | **CIR-8.10** Work with adjacent property owners to create an interconnected trail that extends along the public right-of-way, which will benefit business by increasing exposure and access, and benefit the community through encouraging fitness, improved access, and a connected community. |
| | **CIR-8.11** Coordinate the location of multi-use trails to connect with regional trail systems, where feasible. |
| | **CIR-8.12** Pursue funding or grant opportunities to plan, construct, and maintain pedestrian, bicycle, and |

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| | multi-use trails.<br>**CIR-8.10** Work with adjacent property owners to create an interconnected trail that extends along the public right-of-way, which will benefit business by increasing exposure and access, and benefit the community through encouraging fitness, improved access, and a connected community.<br>**CIR-8.11** Coordinate the location of multi-use trails to connect with regional trail systems, where feasible.<br>**CIR-8.12** Pursue funding or grant opportunities to plan, construct, and maintain pedestrian, bicycle, and multi-use trails.<br>**CIR-8.13** Maintain a map or maps of current bikeways and multi-use trails, and make the map(s) available to the public.<br>**AQ-4.1** Cooperate with local, regional, State, and Federal agencies to reduce vehicle miles traveled (VMT) and consequent emissions through job creation.<br>**AQ-4.2** Improve jobs/housing balance by encouraging the development, expansion, and retention of business.<br>**AQ-4.3** Improve access of businesses to local institutions that provide education and job training to prepare local residents to fill the jobs local industries create.<br>**AQ-4.4** Encourage a mix of housing types that are affordable to all segments of the population and are near job opportunities to further reduce vehicle trips.<br>**AQ-5.1** Encourage employers to implement transportation demand management (TDM) measures, such as the following programs to reduce trips and vehicle miles traveled:<br>▶ Transit subsidies<br>▶ Bicycle facilities<br>▶ Alternative work schedules<br>▶ Ridesharing<br>▶ Telecommuting and work-at-home programs<br>▶ Employee education<br>▶ Preferential parking for carpools/vanpools<br>**AQ-5.3** Promote use of fuel-efficient and low-emissions vehicles, including Neighborhood Electric Vehicles.<br>**AQ-5.4** Encourage the use of lowest emission technology buses in public transit fleets.<br>**AQ-5.6** Manage the municipal vehicle fleet to achieve the highest possible number of fuel-efficient and low emissions vehicles commercially available.<br>**AQ-5.7** Reduce industrial truck idling by enforcing California's five (5) minute maximum law, requiring warehouse and distribution facilities to provide adequate on site truck parking, and requiring refrigerated warehouses to provide generators for refrigerated trucks. |
| Energy Use and Conservation Strategy | **CSV-12.1** Ensure that all developments comply with energy efficiency requirements as mandated by the applicable Building Code.<br>**CSV-12.2** Work with energy utilities to encourage and incentivize the retrofitting of building systems with energy-conserving fixtures and appliances.<br>**CSV-12.3** Support the on-site installation and use of renewable energy generation systems for residential, commercial, institutional, and industrial uses.<br>**CSV-12.4** Explore options for addressing aesthetic concerns about renewable energy systems that do not unreasonably restrict the use of these systems, remaining consistent with State law.<br>**CSV-12.5** Consider non-commercial solar power generation in residential areas.<br>**CSV-12.6** Encourage new development projects and significant rehabilitation or expansion projects to incorporate innovative energy conservation or generation amenities such as electric vehicle charging stations, solar canopies, and carports.<br>**CSV-12.7** Support bulk purchasing or financing packages of renewable energy purchasing for residential, business and government facilities.<br>**CSV-12.8** Promote community awareness of opportunities to conserve energy and use renewable energy. |

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| | **CSV-14.1** Ensure all applicable construction projects comply with the California State Green Building Standards Code.<br>**CSV-14.2** Encourage the integration of other principles of green building into development standards and guidelines, looking for opportunities to realize other benefits such as improved health and increased bicycle transportation.<br>**CSV-14.3** Identify and reduce regulatory barriers to green building.<br>**CSV-14.4** Raise community awareness regarding green building methods, incentives, and benefits at community events, the planning counter, and on the City's website. |
| Water Use and Efficiency Strategy | **INF-2.1** Support water district efforts to promote the use of recycled water where infrastructure is available, and to expand infrastructure where it does not currently exist.<br>**INF-2.2** Work with the water districts to explore options for expanding recycled water pipelines to serve City parks and facilities that are near existing infrastructure, such as California Oaks Sports Park and Town Square.<br>**INF-2.3** Continue to require installation of recycled water systems for landscaping, unless there is an exemption from the applicable water district.<br>**INF-2.4** Encourage other major users of irrigation, such as schools and private golf courses, to connect to nearby recycled water pipelines.<br>**INF-2.5** Coordinate with water districts to encourage innovative demonstrations of nonpotable uses for recycled water and/or groundwater recharge in City facilities and industrial applications.<br>**CSV-1.2** Promote the maximization of water supplies through conservation, water recycling, and groundwater recharge.<br>**CSV-1.4** Support water purveyors in promoting a City-wide recycled water system through project review and coordination with water districts.<br>**CSV-2.1** Ensure that all developments comply with water efficiency requirements, as mandated by the applicable Building Code.<br>**CSV-2.2** Work with water districts to encourage and incentivize the retrofitting of building systems, both indoor and outdoor, with water-conserving fixtures and appliances.<br>**CSV-2.4** Promote water efficient landscaping practices through outreach efforts, project review, and enforcement of City, regional, or State code requirements. |
| Waste Reduction and Recycling Strategy | **INF-1.15** Continue to implement the City's residential informational and outreach program by providing homeowners with Best Management Practices (BMP) for activities such as, but not limited to:<br>▸ Disposal of fats, oils, and grease<br>▸ Disposal of garden waste<br>▸ Disposal of household hazardous waste<br>▸ Disposal of pet waste<br>▸ Garden care and maintenance<br>▸ Vehicular repair and maintenance<br>▸ Vehicular washing<br>**CSV-13.1** Continue to comply with the landfill diversion requirements of the Integrated Waste Management Program.<br>**CSV-13.2** Ensure that non-residential and multi-family developments provide readily accessible areas for recycling (at a minimum) paper, corrugated cardboard, glass, plastics and metals, as required by California law.<br>**CSV-13.3** Maximize community reuse and recycling of products and materials through waste management contracts and public education.<br>**CSV-13.4** Incentivize businesses that provide solutions for recycling and re-use of specific waste streams such as food waste and cooking oils.<br>**CSV-13.5** Work with local landfills or green waste centers to develop the infrastructure for a composting |

**Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies**

| Reduction Strategies | Reduction Measures |
|---|---|
| | program.<br>**CSV-13.6** Provide public outreach and education workshops and information on the composting program.<br>**CSV-13.7** Work with local landfills or green waste centers, or other interested parties, as appropriate, to implement a community-wide food scrap collection and composting program. |
| Open Space Strategy | **CSV-9.1** Identify and protect native trees, trees of historic or cultural significance, and mature trees, consistent with the Tree Preservation Ordinance.<br>**CSV-9.2** Consider the establishment of street tree standards and a program for street tree planting, maintenance, and replacement.<br>**CSV-9.3** Promote the use of street trees as a buffer between pedestrians and motorized traffic.<br>**CSV-9.4** Encourage the planting of street trees in linear planting beds rather than tree wells to support long-living healthy trees.<br>**CSV-9.5** Encourage the planting of trees in private yards and properties.<br>**CSV-9.6** Maintain a guide to preferred trees, shrubs, and ground cover plants of noninvasive species, or refer private parties to an existing guide that meets City needs to assist private landscaping efforts.<br>**CSV-9.7** Allow edible landscaping such as fruit trees, plants that provide foraging opportunities for wildlife, and community gardens on public and private property.<br>**CSV-9.8** Encourage any new landscaped areas requiring permits to respect and incorporate the distinctive elements of the existing community landscape, including the retention of existing trees, to the maximum extent feasible.<br>**CSV-9.9** Promote the use of native plant species in public landscaping of parks, schools, medians and planter strips, as well as in private development throughout the City.<br>**CSV-10.1** Allow agricultural uses to continue in rural residential areas.<br>**CSV-10.2** Consider ways to allow small-scale urban agriculture in parks, schools, and neighborhoods.<br>**CSV-10.3** Ensure that residents are permitted to grow fruits and vegetables in their yards, so long as there are not significant negative impacts to adjacent property owners.<br>**CSV-10.4** Encourage and support the use of public lands for community gardens and other food production facilities, when feasible.<br>**CSV-10.5** Support opportunities for local food production and access, such as farmer's markets, community gardens, harvest sharing programs, and community supported agriculture programs.<br>**CSV-10.6** Encourage local farmers to sell fresh food locally.<br>**CSV-10.7** Allow public facilities such as schools, libraries, and community centers to be used as Community Supported Agriculture pick-up sites, where feasible.<br>**ROS-7.1** Preserve and enhance open space resources in Murrieta.<br>**ROS-7.2** Designate open space to preserve habitat and scenic views of natural areas.<br>**ROS-7.3** Seek opportunities to designate open space along waterways, while also providing for the development of trails.<br>**ROS-7.4** When possible, link open space and parks for the movement of wildlife and people.<br>**ROS-8.1** Encourage the provision of parks, recreation facilities, and/or open space in new development and redevelopment projects.<br>**ROS-8.2** Ensure that new residential developments provide for recreation needs of residents through development fees and park dedication.<br>**ROS-8.3** Encourage development that promotes outdoor activity.<br>**ROS-8.4** When reviewing new development or redevelopment projects, refer to the Trails Plan to determine whether right-of-way is needed for trails on the project site.<br>**ROS-9.1** Continue to require that adequate, usable, and permanent private open space is provided in residential developments.<br>**ROS-9.2** Encourage new and existing commercial, office, and industrial development to provide outdoor |

| Table 1-2 Greenhouse Gas Reduction Strategies and Measures from the 2011 CAP Strategies | |
|---|---|
| **Reduction Strategies** | **Reduction Measures** |
| | green spaces that may be used by employees.<br>**ROS-9.3** Encourage new development and redevelopment projects to incorporate gardens and green spaces with various cultural influences throughout the community to bridge cultures and provide education opportunities.<br>**ROS-9.4** Encourage green spaces planted with a diverse plant palette to promote natural variety, ecosystem services, and enhance the well-being of community residents.<br>**ROS-9.5** Review and modify as necessary, open space requirements for different types of development projects. |

### 1.3.3 California Environmental Quality Act

CEQA is a statute that requires local agencies to identify significant environmental impacts of their actions and, if feasible, avoid or mitigate those impacts. SB 97, passed in 2007, recognized that GHG emissions are within the scope of CEQA environmental review and therefore need to be analyzed as part of the CEQA process.

CAPs can include strategies that can change the physical environment and influence patterns that affect GHG emissions. Activities outlined in a CAP Update are typically subject to discretionary approval and may cause direct or indirect effects on the environment. They are therefore considered a “project” and subject to CEQA compliance. This CAP Update is evaluated as part of the Supplemental EIR for the GPU.

The State CEQA Guidelines (specifically Section 15183.5) establish standards for the contents and approval process of “plans for the reduction of greenhouse gas emissions.” This CAP Update was prepared in accordance with CEQA Guidelines Section 15183.5 and is therefore considered a “qualified” plan for the reduction of GHG emissions. As a qualified plan, 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 City’s CAP. The CAP Consistency Checklist contains measures that are required to be implemented on a project-by-project basis to achieve the City’s 2030 and 2035 GHG reduction targets. By implementing the measures in the Checklist, a development project would demonstrate its consistency with the CAP Update. The Checklist is provided in Appendix C.

## 1.4 Purpose and Objectives of a Climate Action Plan

The CAP Update organizes measures based on sectors evaluated in the 2016 inventory. These sectors include on-road transportation; off-road transportation; residential, commercial, and industrial energy use; solid waste; water; and wastewater. Measures were developed to target improving the GHG efficiency of communitywide and municipal activities. The CAP Update is the City’s approach to comply with the State’s overarching goals of reducing GHG emissions through local GHG reducing actions that can be taken by public agencies, businesses, and residents.

As discussed in greater detail in **Chapters 2** and **3**, the City estimates that communitywide activities emitted 890,575 metric tons of carbon dioxide equivalent ($MTCO_2e$) in 2016. Anticipated growth in GHG emissions for 2030 and 2035 was estimated based on growth forecasts for the City. The GHG reduction targets for the CAP Update have been established in accordance with CARB’s 2017 Scoping Plan recommendations for developing community-wide, plan-level reduction targets. Consistent with the Scoping Plan targets and the State’s 2016 GHG emissions inventory, the City must achieve the following reductions from 2016:

- 40 percent reduction by 2030 (i.e., 536,835 $MTCO_2e$),
- 50 percent reduction by 2035 (i.e., 447,363 $MTCO_2e$), and
- 80 percent reduction by 2050 (i.e., 178,945 $MTCO_2e$).

To achieve these objectives, the CAP Update identifies the gap between projected emissions and the reduction targets, and details reduction measures to comply with statewide and City GHG reduction targets and goals to close the gap.

As part of CAP implementation, each strategy and measure will be periodically assessed and monitored. Reporting on the status of implementation of these measures, periodic updates to the GHG emissions inventory, and other monitoring activities will be performed to track progress in reduction of communitywide GHG emissions. Implementation and monitoring is discussed in more detail in **Chapter 4**.

## 1.5 Co-Benefits

The measures provided in the CAP Update were primarily developed to reduce GHG emissions within the City, although many will result in other economic, social, or environmental "co-benefits." These benefits may include, but are not limited to, improvements in traffic congestion, air quality, water supply, cost savings, public health, and infrastructure. In addition to reductions in GHG emissions, co-benefits of reduction measures identified in the CAP Update include:

- Cost savings as the result of increasing energy and water use efficiency through technological improvements.
- Economic benefits through saving money with increased efficiency in energy and transportation and improving public health.
- Improved City infrastructure with the installation of safer streets, energy production, and efficient building design.

In addition to these co-benefits, the CAP Update allows the City to maintain control over GHG reduction measures that are most advantageous to the City, while also promoting economic competitiveness and positioning the City for grant funding. The CAP Update also demonstrates that the City is aligned with State targets for reducing GHG emissions. Discussion of reduction measures and their co-benefits are included in **Chapter 3**.

## 1.6 Summary of Public Involvement

The City held two public workshops and a pop-up event, as noted below, to solicit input on the General Plan and CAP Update and discuss the recent changes in State law related to GHGs and CAPs:

- November 2018 Community Workshop
- December 2018 Pop-up Event
- March 2019 Community Workshop

In addition, in early 2020 the City provided the CAP for public review and comment as part of the draft SEIR for the GPU. Throughout the process the public has provided input, including the desire for improved quality of life, improvements to City infrastructure, open space conservation, property development opportunities and economic development. The CAP provides another vehicle to implement the vision of the General Plan in these areas for a sustainable and healthy community.

# 2 GREENHOUSE GAS EMISSIONS INVENTORY, FORECASTS AND TARGETS

A greenhouse gas (GHG) emissions inventory is the first step in reducing a community's local emissions contributing to climate change. A GHG inventory is used to identify the major emission sources at the local level as well as specify the activities that result in the release of emissions within a calendar year. Inventories are also used to establish a baseline that is necessary to monitor emission trends over time, to develop reduction targets, and to identify effective GHG emission reduction measures consistent with State regulations.

State laws, executive orders, and plans that inform the City's Climate Action Plan (CAP) Update include Assembly Bill (AB) 32, Senate Bill (SB) 32, Executive Orders B-30-15 and S-3-05, and the California Air Resources Board (CARB) 2017 Climate Change Scoping Plan, which establish statewide targets and goals for GHG reduction relative to a 1990 baseline year. The City's 2011 Climate Action Plan (2011 CAP) used 2009 as its baseline year.

This CAP Update establishes a more recent baseline year of 2016 to reflect more recent available data and changes in data collection and emission quantification methods since 2009. Because the necessary data is not available to estimate the City's 1990 emission levels, proportional targets for the CAP Update were developed that express the level of GHG emissions reductions that would be needed locally between 2016 and future target years to demonstrate consistency with statewide targets. Updating baseline emissions and inventory of recent emissions is consistent with guidance from CARB's 2017 Scoping Plan and the Western Riverside Council of Governments (WRCOG) framework for subregional climate action planning.

What is the purpose of developing an emissions inventory?

- To assist in forecasting emissions into the future;
- To develop reduction targets the City will strive to meet; and
- To guide the development, evaluation, and implementation strategies to achieve these targets.

## 2.1 2016 Greenhouse Gas Emissions Inventory Overview

The purpose of the GHG emissions inventory is to gain an understanding of the sources and levels of GHG emissions within the City's jurisdiction, as well as to establish a baseline against which a future GHG emission forecast can be compared. The GHG emissions inventory for the City was prepared for calendar year 2016and therefore the inventory is considered the baseline year for the preparation of GHG emissions forecasts and GHG reduction targets that will be used in the City's CAP Update.

- ICLEI's 2019 U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions was used to quantify emissions.

Replacing the 2009 inventory with a 2016 inventory will provide a better understanding of the City's sources of GHG emissions and the activities contributing to those emissions. The baseline's community-wide emissions update was estimated following Local Governments for Sustainability (ICLEI's) *2019 U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions, Version 1.2*. The protocol provides a methodology for estimating GHG emissions including carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$), which are major contributors to climate change. This 2016 updated baseline inventory includes a set of communitywide sectors that are considered major sources of the three gases.

The baseline inventory includes emissions from the primary GHGs contributing to climate change. The gases emitted from the inventoried sectors have been converted to a base measure of $CO_2$ by applying a global warming potential (GWP) to non-$CO_2$ gases. The comparable unit of measurement between the primary gases for this inventory is expressed as carbon dioxide equivalent ($CO_2e$). Furthermore, emissions are reported in metric tons of carbon dioxide equivalent ($MTCO_2e$) as standard unit of measuring GHG emissions released into the atmosphere.

- GHG Emissions are measured in Metric Tons of Carbon Dioxide equivalent ($MTCO_2e$).

The 2016 inventory addresses communitywide GHG emissions as opposed to the 2009 baseline which included both communitywide and municipal emissions. However, the methodology and data chosen for this communitywide update inherently incorporate emissions from municipal operations (e.g. water use, wastewater generation, solid waste, and transportation) as municipal operations are a subset of communitywide emissions. The full technical report with further details on the GHG emission inventory and baseline, is incorporated as **Appendix A**.

GHG emissions in this inventory include communitywide emissions resulting from activities occurring and permitted to occur within the existing city limits in 2016. The emissions sectors included in the inventory are on-road transportation; off-road transportation; residential, commercial, and industrial energy use; solid waste; water; and wastewater. These sectors are considered in this inventory because they can be monitored by the City for meeting emission reduction targets. Each sector is briefly described below.

**On-Road Transportation:** Gasoline and diesel consumption in motor vehicles on local and regional roadways.

**Off-Road Transportation:** Diesel consumption in off-road vehicles.

**Residential Energy:** Electricity and natural gas use in residential buildings.

**Commercial Energy:** Electricity and natural gas use in non-residential buildings.

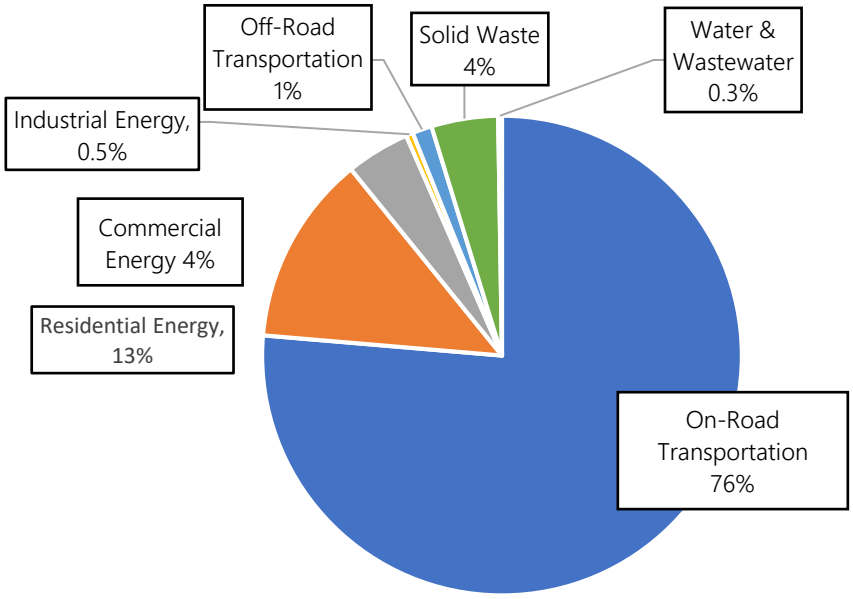
**Industrial Energy:** Electricity and natural gas use for industrial buildings.

**Solid Waste:** Total tonnage of waste sent to landfills.

**Water and Wastewater:** Energy used to transport water to residences and businesses. Fugitive emissions from wastewater treatment facilities and energy used to transport and treat wastewater.

## 2.1.1 2016 Greenhouse Gas Emissions Inventory Results

In 2016, the City of Murrieta emitted an estimated 890,575 $MTCO_2e$. **Figure 2-1** and **Table 2-1** provide a breakdown of the City's 2016 baseline GHG emissions by sector.




*Source*: Ascent Environmental, Inc. 2019.

**Figure 2-1 2016 City of Murrieta Communitywide Greenhouse Gas Inventory**

**Table 2-1 2016 City of Murrieta Communitywide Greenhouse Gas Inventory**

| Sector | Total Emissions ($MTCO_2e$) | Percent of Total |
|---|---|---|
| On-Road Transportation | 679,920 | 76% |
| Off-Road Transportation | 11,741 | 1% |
| Residential Energy | 114,112 | 13% |
| Commercial Energy | 38,310 | 4% |
| Industrial Energy | 4,124 | 1% |
| Solid Waste | 40,038 | 4% |
| Water and Wastewater | 2,275 | 0.3% |
| ***Total (All Sectors)*** | ***890,575*** | ***100%*** |

Notes: Columns may not add to totals due to rounding.

$MTCO_2e$ = metric tons of carbon dioxide equivalent

Source: Data compiled by Ascent Environmental, Inc. 2019.

The largest contributing source to the City's total GHG emissions is the On-Road Transportation sector which accounts for 76 percent of the total emissions in 2016. On-road transportation activities are primarily related to vehicular gasoline and diesel consumption. Emissions associated with this sector were calculated based on estimated vehicle miles traveled (VMT) for all vehicles traveling to/from and within the city. Emissions associated with electricity and natural gas use in residential, commercial, and industrial buildings is the second largest contributor of emissions at a combined 18 percent of the City's inventory in 2016. Emissions calculations for the electricity and natural gas sectors include electricity and natural gas used for water heating and cooling, and non-renewable building energy consumption.

## 2.2 Emission Forecasts

Estimates of future emissions levels are based on a continuation of current trends in activity and population growth. These forecasts also account for legislation in effect at the time of the CAP Update that could affect emissions in the future. Forecasts provide insights into the scale of local reductions needed ("local gap") to achieve GHG emissions reduction targets, as well as the local effects legislative actions will have on emissions.

The first forecast scenario used in the CAP Update, referred to as the "business-as-usual" (BAU) forecast, assumes that no additional State or federal legislative actions, beyond what have already been adopted, will be made to reduce GHG emissions in the future. They do not account for any GHG emissions reductions associated with the implementation of the CAP Update, or legislative actions, and assumes that population, housing, employment, and transportation activities will grow over time, consistent with growth forecast included in the General Plan Update (GPU). The second forecast scenario known as the Legislative-Adjusted BAU (ABAU) forecast, provides a reduction from the BAU forecast accounting for State and federal actions that are planned to take place in the future, assuming the same demographic trends as BAU forecasts.

A summary of BAU and ABAU forecasts is provided in Table 2-2. Details on how the forecasts were developed and the indicators used to estimate each sector can be found in Appendix A.

**Table 2-2 Annual Growth Factors (%)**

| Factor | 2016 to 2020 | 2020 to 2030 | 2030 to 2035 | 2035 to 2050 | 2016 to 2050 |
|---|---|---|---|---|---|
| Population | 1.07 | 1.00 | 0.93 | 0.94 | 0.97 |
| Jobs | 7.68 | 5.07 | 3.63 | 4.21 | 4.78 |
| Dwelling Units[1] | 1.25 | 1.15 | 1.06 | 1.00 | 1.00 |
| Vehicle Miles Traveled | 1.69 | 1.52 | 1.36 | 1.40 | 1.46 |

1. Growth projections included the City's GPU and Supplement EIR includes projections for total households. For purposes of the GHG emissions forecasts presented in this CAP Update, it is assumed that one household equals one dwelling unit.

Source: Iteris, VRPA Technologies, Inc., and Ascent Environmental 2019

### 2.2.1 Demographic Trends

Forecasted GHG emissions were based on demographic forecasts, including annual population, jobs, and household growth between 2016 and 2050 (for purposes of this CAP Update, it is assumed that one household equals one dwelling unit). Demographic forecasts were developed by Iteris and VRPA Technologies, Inc. for traffic and VMT modeling and were based on the demographics used in the GPU. The GPU's demographic forecasts were estimated up to year 2040 using land use configurations that would be considered under the GPU. Population, jobs, and household growth were extrapolated for year 2050 using the growth rates provided between 2016 and 2040. The City's population is forecasted to increase by 15 percent by 2030, 21 percent by 2035, and 39 percent by 2050 from 2016 levels. Employment in the city is forecasted to increase significantly by 121 percent by 2030, 164 percent by 2035, and 389 percent by 2050 from 2016 levels. Total households are also expected to increase by 18 percent by 2030, 24 percent by 2035, and 40 percent by 2050 from 2016 levels. Daily VMT is forecasted to increase by 24 percent by 2030, 33 percent by 2035, and 64 percent by 2050. Demographic estimates for years 2016 to 2050 are referenced in Appendix A. Table 2-2 shows the annual growth rates for 2020, 2030, 2035 and 2050. To estimate long-term growth trends and to account for variability in short-term growth trends (e.g., 2020-2030), Ascent has used the 2016-2050 annual growth rate in the forecasted BAU and ABAU scenarios.

Table 2-3 shows the population, jobs, household, and daily VMT forecast that was provided by Iteris and VRPA with 2050 projections extrapolated based on the 2016 through 2040 annual growth rate.

**Table 2-3 Demographic and Daily Vehicle Miles Traveled Forecast (2016-2050)**

| Factor | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Population | 110,897 | 115,718 | 127,772 | 133,798 | 154,003 |
| Jobs | 28,628 | 38,485 | 63,128 | 75,450 | 139,986 |
| Dwelling Units | 35,534 | 37,341 | 41,859 | 44,118 | 49,912 |
| Daily Vehicle Miles Traveled | 4,132,649 | 4,419,630 | 5,137,080 | 5,495,806 | 6,768,910 |

Source: Iteris, VRPA Technologies, Inc., and Ascent Environmental 2019

### 2.2.2 Business-As-Usual Forecasts

The BAU emissions forecasts are assumed to have no additional legislative action to reduce GHG emissions, beyond what has already been appropriated upon adoption of the CAP Update. BAU emissions forecasts were estimated based on the continuation of current trends in activities within the City, and population and employment growth. Annual GHG emissions would increase from 2016 levels under BAU conditions. Despite legislative action and local efforts that have already been adopted to reduce GHG emissions, population, jobs, housing, and VMT growth under the BAU scenario would cause emissions to increase until forecast year 2050. Table 2-4 shows the increase in GHG emissions for each forecast year

### 2.2.3 Legislative Adjustments

State and federal legislation play a significant role in reducing GHG emissions from activities in the City of Murrieta, as demonstrated by the ABAU scenario. This scenario accounts for a variety of approved legislative actions that will further reduce BAU GHG emissions from the City. The ABAU accounts for the implementation of legislative actions by estimating the impacts of the actions on the various GHG emissions-producing sectors in the CAP Update and adjusting emissions levels accordingly. The ABAU forecasts include State and federal actions only, they do not include local government actions such as the implementation of GHG emissions reduction measures provided in this CAP Update. The ABAU emissions inventory is utilized as the underlying basis to determine reduction targets and the level of reduction needed from the CAP measures. The legislative actions applied to estimate the ABAU are included in Table 1-1. With application of the adopted legislative actions, the City will experience an overall decrease in GHG emissions for the years 2030, 2035, and 2050, as shown in Table 2-4.

**Table 2-4 City of Murrieta Emissions Forecasts ($MTCO_2e$/year)**

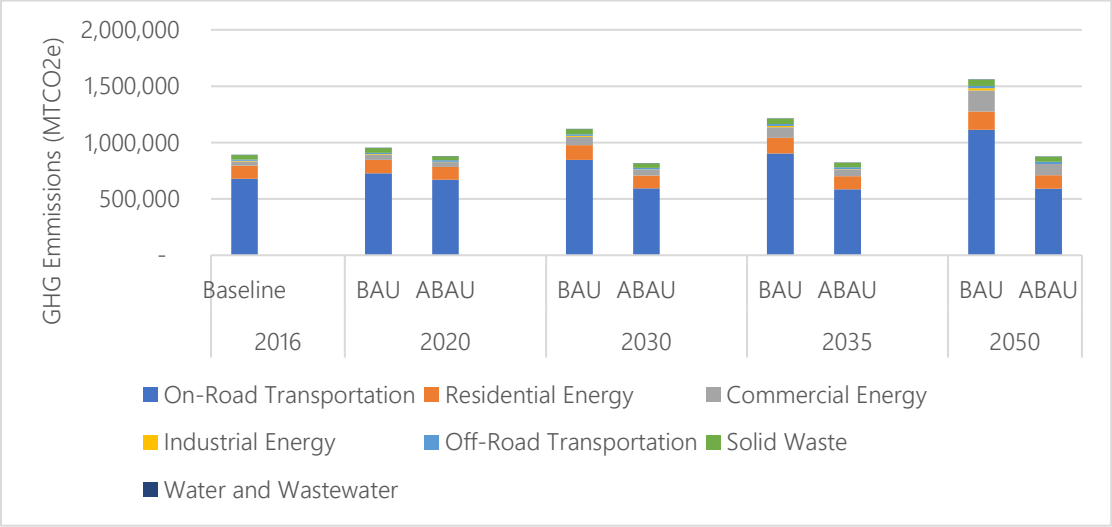
| Emissions Sector | 2016 | 2020 | | 2030 | | 2035 | | 2050 | |
|---|---|---|---|---|---|---|---|---|---|
| | | BAU | ABAU | BAU | ABAU | BAU | ABAU | BAU | ABAU |
| On-Road Transportation | 679,920 | 727,135 | 669,154 | 845,173 | 592,254 | 904,192 | 585,860 | 1,113,648 | 591,645 |
| Off-Road Transportation | 11,741 | 12,580 | 12,580 | 15,237 | 15,237 | 16,755 | 16,755 | 19,781 | 19,781 |
| Residential Energy | 114,112 | 118,854 | 114,180 | 132,290 | 113,865 | 139,230 | 114,775 | 161,409 | 116,927 |
| Commercial Energy | 38,310 | 46,175 | 42,071 | 73,645 | 51,518 | 93,006 | 59,829 | 187,331 | 101,023 |
| Industrial Energy | 4,179 | 5,037 | 4,274 | 8,033 | 3,389 | 10,145 | 3,004 | 20,434 | 266 |
| Solid Waste | 40,038 | 41,778 | 34,182 | 45,834 | 37,501 | 48,102 | 39,356 | 55,601 | 45,491 |
| Water and Wastewater | 2,275 | 2,008 | 1,916 | 2,063 | 1,410 | 2,108 | 1,208 | 2,239 | 456 |
| **Total** | **890,575** | **953,569** | **878,357** | **1,122,275** | **815,174** | **1,213,537** | **820,787** | **1,560,442** | **875,589** |
| *Percent change from 2016 (%)* | - | 7% | -1% | 26% | -8% | 36% | -8% | 75% | -2% |

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: Ascent Environmental 2019

A comparison of emission trends that would occur without anticipated legislative reductions (BAU) and with anticipated legislative reductions (ABAU) is presented in **Figure 2-1**. As shown in **Table 2-4** and **Figure 2-2**, from years 2016 to 2020 the City's ABAU emissions would decrease by one percent rather than increase by seven percent under a BAU scenario. This one percent reduction is the result of the application of legislative reductions provided in **Table 1-1** and a renewable energy mix in the electricity supply of 33 percent by 2020. Similarly, legislative reductions including a renewable energy mix of 60 percent applied to years 2030 to 2035 allows a seven percent reduction rather than a 27 percent increase. Although most legislative actions are not known at this time for years 2030 to 2050, SB 100 requires California to receive 100 percent of its electricity from renewable and zero-carbon sources. Furthermore, vehicle fuel economies are forecasted to improve along with increased electric vehicle (EV) adoption. Further details on the legislation details applied to the BAU emissions can be found in **Appendix A**.




Notes: BAU = Business-As-Usual; ABAU = Legislative-Adujsted Business-As-Usual; GHG = greenhouse gas; $MTCO_2e$= annual metric tons of carbon dioxide equivalent.

**Figure 2-2 Business-As-Usual and Legislative-Adjusted Business-As-Usual Emissions Forecasts Comparison**

## 2.3 Reductions Targets

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

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

Because the necessary data are not available to estimate the City's 1990 emission levels, proportional targets for the CAP Update were developed that express the level of GHG emissions reductions that would be needed locally between 2016 and future target years to demonstrate consistency with statewide targets. To determine an equivalent reduction target at the local level, CARB's 2017 Scoping Plan recommends community-wide GHG reduction goals for local CAPs that will help the State achieve its 2030 target and longer-term 2050 goal. CARB recommends that local governments evaluate and adopt robust and quantitative locally-appropriate goals that align with the statewide per capita targets and the State's sustainable development objectives to develop plans to achieve local goals (CARB 2017). These State goals consist of reducing emissions to six (6) $MTCO_2e$ per capita and two (2) $MTCO_2e$ per capita by 2030 and 2050, respectively.

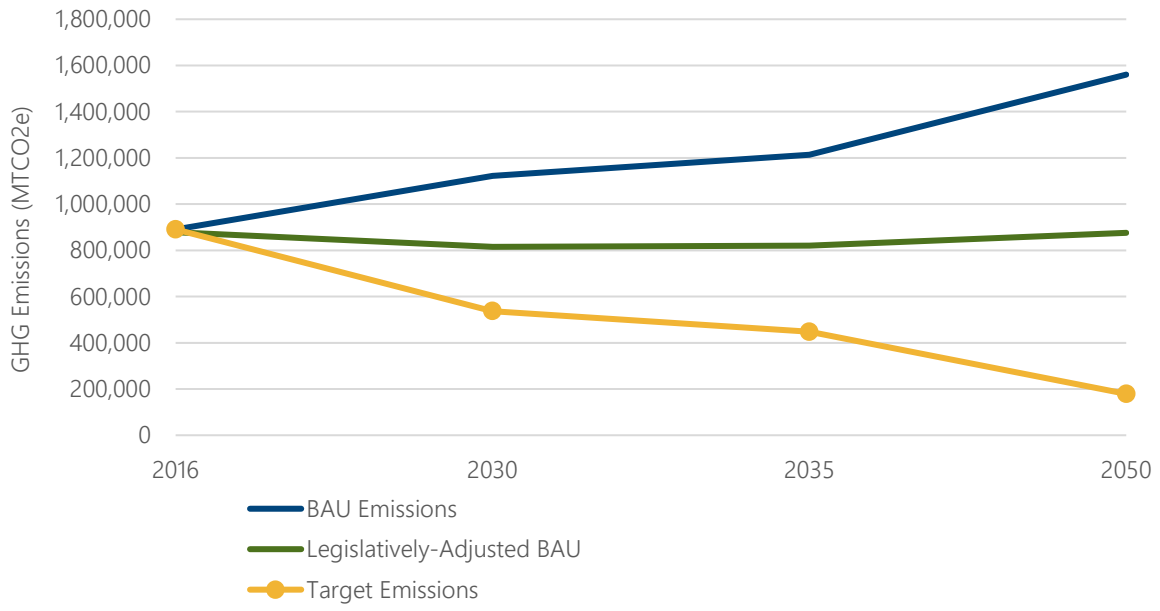
Because the statewide per capita targets are based on the statewide GHG emissions inventory that includes all emissions sectors in the state (and not all emissions sectors apply to all jurisdictions), CARB also states that it is appropriate for local jurisdictions to derive evidence-based local per capita goals on local emissions sectors and population forecasts that are consistent with the framework used to develop the statewide targets. The 2017 Scoping Plan clarifies that an evidence-based local per capita goal, or some other metric that the local jurisdiction deems appropriate (e.g., mass emission, per service population), may be used (CARB 2017). With the Scoping Plan recommendations in mind, reduction targets were derived using a mass emissions approach.

Statewide per capita targets are based on the statewide mass reduction targets (i.e., 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050). As indicated in the *CAP Update Tech Memo, GHG Inventory, Forecasts, and Targets* in Appendix A, CARB's statewide inventories show emissions from all sectors were approximately 431 million $MTCO_2e$ ($MMTCO_2e$) in 1990 and 429 $MMTCO_2e$ in 2016 (CARB 2018). Thus, 2016 statewide emissions were 2 $MMTCO_2e$ (0.37 percent) less than the 1990 level and the State's 2020 GHG target. Consequently, no further reductions from 2016 emissions levels are needed to achieve the 2020 target of returning emissions to 1990 levels. Because 2016 emissions are essentially equal to the 1990 emissions level based on CARB data, reduction percentages from 2016 levels needed to meet the State's 2030 and 2050 goals are equivalent to the reductions percentages when measured against 1990 levels: 40 percent by 2030 and 80 percent by 2050. A 2035 target was established based on interpolation of the 2030 and 2050 target and goal. Thus, consistent with CARB's recommendations for communitywide targets, the following adjusted reduction targets should be achieved in the City to meet statewide GHG reduction goals:

- 40 percent below 2016 levels by 2030,
- 50 percent below 2016 levels by 2035, and
- 80 percent below 2016 levels by 2050.

## 2.4 Local Emissions Gap

As discussed previously and shown in **Figure 2-3**, based on the current demographic trends and legislative actions, the City would meet its 2020 target without any additional local actions to reduce GHG emissions.




Notes: BAU = Business-As-Usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent
Source: Ascent Environmental 2019.

**Figure 2-3 Legislative-Adjusted Business-As-Usual Forecast Emissions and Recommended Emission Reduction Targets**

State and federal legislative actions, however, would not be adequate to achieve the City's 2030, 2035, and 2050 GHG reduction goals. While these legislative actions would assist in achieving this goal, the City would need to implement additional local actions to achieve further reductions. This additional reduction required at the local level to meet the reduction targets for each year is referred to as the "local gap." To close the local gap and meet the City's targets, GHG emissions would need to be reduced to 536,836 $MTCO_2e$ by 2030, 447,363 $MTCO_2e$ by 2035, and 178,945 $MTCO_2e$ by 2050.

This CAP Update primarily focuses on reducing emissions by 2030 and 2035 consistent with State targets, and also establishes a 2050 goal, which is important to guide long-term planning. However, achieving a 2050 goal in a local government CAP is considerably challenging due to the extended time horizon, uncertainty about the future and the City's limited jurisdiction over several sources of emissions. Furthermore, the State's 2017 Scoping Plan does not demonstrate a feasible pathway for the State to achieve its 2050 goal at this time. It is technically possible to calculate the scale of emissions reductions at a local level to achieve a 2050 goal, but it is not feasible or meaningful to analyze how a local government can substantially achieve a 2050 goal based on local actions alone, as it is difficult to establish defensible reduction assumptions beyond a 15-year time frame. This is primarily because of uncertainty around future technological advances and future changes in State and federal law and a local government's relatively limited jurisdiction over several emissions sources and activities that affect emissions.

In the coming decades, new innovations and technologies could become available that will enable further GHG reductions beyond 2035 on the path to achieving the long-term 2050 goal. New or more reliable methods may also become available to quantify measures that are currently unquantifiable. Finally, future laws or regulations may further reduce emissions in sectors currently outside of the jurisdiction of the City (e.g., new vehicle emissions standards that would apply to new or replacement vehicles decades into the future), or emissions in sectors currently addressed primarily by local measures. As climate change science and policy continues to change, the City will be able to reevaluate how these and other factors are affecting progress toward meeting the long-term 2050 GHG emissions reduction goal in future CAP updates (as outlined in **Chapter 4**)

A detailed description of the calculations and estimates for these emissions and targets is provided in Appendix A.

# 3 GREENHOUSE GAS REDUCTION MEASURES

This chapter outlines the greenhouse gas (GHG) reduction measures that the City will implement to achieve its reduction targets. Accounting for legislative actions taken by the federal and State governments, this Climate Action Plan Update (CAP Update) focuses on locally-based measures the City can implement to reduce GHG emissions across various emissions categories.

The local measures to reduce emissions fall under five emissions categories: transportation, building energy, land use, solid waste, and water and wastewater. These actions and measures mainly focus on community-scale reductions, but also include municipal operations. Through partnerships with and among the community, businesses, and other organizations, these measures could provide co-benefits, such as an improved environment, cost savings, conserved resources, public health benefits and greater quality of life.

As described in **Section 1.3** of the CAP Update, the existing strategies and measures of the 2011 CAP were used to inform development of measures for the CAP Update and in some cases have been expanded upon in order to meet the targets for 2030 and 2035.

## 3.1 Summary of Greenhouse Gas Reduction Measures

Chapter 2 of the CAP Update describes the City's GHG reduction targets for years 2030 and 2035, and a reduction goal for 2050 to be consistent with State goals. The 2030 target would require a 40 percent reduction from 2016 levels (reduction to 536,836 metric tons of carbon dioxide equivalent [$MTCO_2e$]), 2035 would require a 50 percent reduction from 2016 levels (reduction to 447,363 $MTCO_2e$), and 2050 would require an 80 percent reduction from 2016 levels (reduction to 178,945 $MTCO_2e$).

Under business-as-usual (BAU) GHG emissions forecast, the City is estimated to generate 1,122,275 $MTCO_2e$ in 2030, which would be 585,439 $MTCO_2e$ more than the 2030 reduction target. Thus, continuing under a BAU scenario, the City would not meet its 2030, 2035, and 2050 targets. Under the legislative-adjusted BAU scenario (ABAU), the 2030 target is exceeded by 278,338 $MTCO_2e$ and the 2035 target is exceeded by 373,423 $MTCO_2e$, requiring addition local action by the City to meet its reduction target. This CAP Update provides local measures to close the gap and meet the City's reduction targets for 2030 and 2035.

**Table 3-1** shows the GHG reductions attributable to the measures in this CAP Update and how anticipated reductions will help the City close the gap in emissions to meet its 2030 and 2035 targets. It also shows the City's progress in achieving its fair-share of emissions reductions toward the State's 2050 goal. Detailed calculations for each measure are provided in **Appendix B**.

**Table 3-1 Effect of Plan Measures and Legislative Reductions on City of Murrieta Emissions and Targets ($MTCO_2e$)**

| Emissions | 2030 | 2035 | 2050 |
|---|---|---|---|
| **BAU Emissions Forecasts** | **1,122,275** | **1,213,537** | **1,560,442** |
| Federal and State Legislative Reductions | 307,102 | 392,750 | 684,853 |
| **ABAU Emissions Forecast (BAU Forecasts – Federal and State Legislative Reductions)** | **815,174** | **820,787** | **875,589** |
| **Target Emissions** | **536,836** | **447,363** | **178,945** |
| Reductions from CAP Transportation Measures | 154,396 | 204,673 | 285,324 |
| Reductions from CAP Energy Measures | 86,656 | 123,143 | 193,059 |
| Reductions from CAP Land Use Measures | 32,769 | 41,614 | 52,258 |
| Reductions from CAP Solid Waste Measures | 5,582 | 8,043 | 11,806 |

**Table 3-1 Effect of Plan Measures and Legislative Reductions on City of Murrieta Emissions and Targets ($MTCO_2e$)**

| Emissions | 2030 | 2035 | 2050 |
|---|---|---|---|
| Reductions from CAP Water and Wastewater Measures | 61 | 48 | 0 |
| **Total Reductions from CAP Measures** | **279,463** | **377,521** | **542,447** |
| **City of Murrieta Emissions with CAP (ABAU – CAP Reductions)** | **535,711** | **443,266** | **333,142** |
| Percentage of gap achieved through CAP Measures | 100% | 101% | 78% |

BAU = business-as-usual; ABAU = legislative-adjusted business-as-usual; CAP = Climate Action Plan; GHG = greenhouse gas emissions; $MTCO_2e$ = metric tons of carbon dioxide equivalent

Source: Ascent Environmental, Inc. 2019

The table shows that in 2030 the largest amount of reductions would come from transportation measures, followed by measures addressing building energy, land use, solid waste, and water and wastewater. For years 2035 and 2050, the largest amount of reductions would come from transportation measures, with building energy and the remaining measures to follow.

## 3.2 Detailed Greenhouse Reduction Measures

To close the gap between the City's anticipated ABAU emissions and its reduction targets for 2030 and 2035, this CAP Update proposes 20 GHG reduction measures organized under five GHG emissions categories. These measures were developed based on a combination of factors, including:

- The reduction measures included in the City's 2011 CAP;
- Recommended measures identified by the Western Riverside Council of Governments (WRCOG) in its subregional CAP;
- The need for greater reductions in the sectors with the most emissions, especially in building energy and transportation;
- Other existing programs, policies, activities, or projects that can be expanded upon, or proposed policies yet to be adopted;
- Technological innovations;
- The City's jurisdiction and influence over activities that directly or indirectly generate GHG emissions; and
- The potential feasibility of the measure.

Each measure is described in detail in this chapter, including the full description of each measure, assumptions for what implementation of each measure will achieve (in 2030, 2035, and 2050), and estimated GHG emissions reduction potential associated with implementation of each measure (in 2030, 2035, and 2050). Measures, implementation assumptions, and GHG reduction potential are defined in **Table 3-2**. Additional GHG reduction calculation details are included in **Appendix B**.

**Chapter 4** further describes how the City will implement each of the 20 GHG reduction measures and monitor their effectiveness over time. In addition, **Section 4.2.3**, "Implementation Descriptions for Key Measures," provides additional discussion of how the following nine key GHG reduction measures could be implemented:

- T-1 and T-2 Electric Vehicle (EV) Programs,
- T-7 Transportation Demand Management Program,
- T-9 GHG Mitigation Fee Program for New Development,
- BE-1 Community Renewable Energy,
- BE-2 Municipal Renewable Energy,
- BE-3 Zero Net Energy Standard,

- BE-4 Energy Efficiency and Electrification Program, and
- LU-1 Jobs-Housing Balance Strategy.

**Table 3-2 Greenhouse Gas Reduction Measure Details**

| Category | Description |
|---|---|
| Measure | Programs, policies, or projects the City will implement that will cause a direct and measurable reduction in GHG emissions. |
| Implementation Assumption | Metric by which achievement of the specified measure will be determined in 2030, 2035, and 2050. |
| GHG Reduction Potential in 2030, 2035, and 2050 | Estimated reduction in local GHG emissions if the performance metric is met. The years 2030, 2035, and 2050, correspond to the emissions target set by the City (and in line with State mandates). |

Notes: CAP = Climate Action Plan; City = City of Murrieta; GHG = greenhouse gas

Source: Ascent Environmental, Inc. 2019.

## 3.2.1 Transportation

Transportation Measures Co-Benefits:
- Cost savings
- Air quality improvements
- Economic benefits
- Improved City infrastructure
- Mobility and roadway safety
- Public health benefits

Emissions from on- and off-road transportation are the largest contributor to the City's total GHG emissions at 77 percent. On-road vehicles contribute approximately 76 percent of emissions, while off-road vehicles contribute approximately one percent of emissions. On- and off-road emissions are dependent upon vehicle types. On-road emissions typically occur from the operation of passenger vehicles, while off-road emissions account for the use of construction equipment, recreational vehicles, and residential and commercial equipment. Legislative reductions, mainly from improvements in State and federal vehicle fuel efficiency and GHG standards, will contribute to reductions in transportation emissions. At the local level, the State relies on local and regional agencies to implement measures that affect the frequency or distance of vehicle travel or reduce the use of internal combustion vehicles by shifting to alternative modes of transportation. These measures 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 including bicycling, walking, and transit. Table 3-3 provides GHG reduction measures for the transportation sector, including implementation assumptions and GHG reduction potential in 2030, 2035, and 2050.

**Table 3-3 Transportation**

**T-1: Electric Vehicle Incentives and Promotion**

**Measure:**
Increase EV and alternative fuel vehicles to 21.5% of the City's vehicle mix by 2030 and 23% by 2035 by incentivizing EV purchases and promoting EV ownership for residents and businesses.[1]

**Implementation Assumption:**
This measure assumes that through the City's efforts to incentivize EV adoption among residents, the percentage of EV and Zero Emissions Vehicles (ZEVs) increases in the City to above levels that are already forecasted to occur due to State and federal vehicle standards under an ABAU scenario.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 86,188 | 87,335 | 120,574 |

**Table 3-3 Transportation**

**T-2: Electric Vehicle Charging Ordinance**

**Measure:**
Adopt an (EV) charging station ordinance that requires the following for new development[1]:

- Installation of one EV charger per single-family housing unit; and
- EV charger infrastructure installation at six percent of total parking spaces for new multi-family projects
- EV charger installation at three percent of total parking spaces for new nonresidential projects

**Implementation Assumption:**
This measure assumes that the City will adopt an ordinance that requires new development to have a certain level of EV infrastructure in place as part of the project. The reductions achieved from this measure are combined with T-1.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| See T-1 | See T-1 | See T-1 |

**T-3: TOD Affordable Housing Program**

**Measure:**
Prioritize mixed-use and transit-oriented affordable housing projects to achieve the City's affordable housing targets in the SCAG Regional Housing Needs Assessment.

**Implementation Assumption:**
This measure assumes that the City would focus on developing mixed-use, transit-oriented affordable housing projects in the future. The measure further assumes that these projects would be located in areas that encourage trips made by walking, biking, and transit, and keeps pace with City's RHNA and Housing Element goals for affordable housing units in the City.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 5,036 | 5,572 | 7,670 |

**T-4: Murrieta Bike Network**

**Measure:**
Increase the City's bike and pedestrian infrastructure, including implementing the Downtown Murrieta Bike Network, developing comprehensive bike parking standards, and increasing the total percentage of City streets that include bike lanes throughout the City.

**Implementation Assumption:**
This measure assumes that the City continues to develop the City's bike network, and the percentage of streets in Murrieta with bike lanes continues to increase over time.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 367 | 120 | 0 |

**T-5: Traffic Signal Synchronization**

**Measure:**
Improve traffic flow and reduce traffic congestion by implementing a comprehensive traffic signal synchronization and update.

**Implementation Assumption:**
This measure assumes that the City would conduct a comprehensive upgrade of the traffic signal system to improve traffic flow and relieve traffic congestion, particularly during commute congestion periods. This measure assumes that fuel consumption associated with commute-related VMT in the City will decrease by 9% as a result of improving traffic signal synchronization.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 1,213 | 1,265 | 1,500 |

**Table 3-3 Transportation**

**T-6: Traffic Calming Program**

**Measure:**
Implement a traffic calming measure program to increase the percentage of City streets and intersections with traffic calming measures.

**Implementation Assumption:**
This measure assumes that the City would continue to implement traffic calming measures on City streets and intersections to reduce traffic speeds and reduce cut-through traffic. The measure further assumes that a certain percentage of streets and intersections will include traffic calming measures by each milestone year.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 890 | 929 | 3,306 |

**T-7: Transportation Demand Management Program**

**Measure:**
Implement a Citywide TDM Program to reduce communitywide VMT[1]

1. Update Development Code to require employers with 50 or more employees to implement commute trip reduction programs.

   Commute Trip Reduction Programs voluntary for employees include:
   - Alternative modes of commuting incentive program (e.g., walking, biking, etc.);
   - Ride-sharing and preferential parking;
   - Discounted transit fee program; or
   - Telecommuting or alternative work schedules
2. Implement a comprehensive ridesharing program targeted at residents working in neighboring cities and long-distance commuters (e.g., San Diego, Los Angeles).
3. Monitor progress annually on TDM program to measure progress towards achieving a nine percent reduction in VMT by 2030 and an 11 percent reduction by 2035.

**Implementation Assumption:**
This measure assumes that the City would implement a comprehensive TDM program that requires new large employers to offer TDM options and incentives to employees as well as providing commute services and support (e.g., rideshare, telework) for residents who work outside the City. The measure assumes a certain percentage of commute-related VMT reduction by each target year.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 8,954 | 11,416 | 18,373 |

**T-8: Transit Network**

**Measure:**
Work with RTA and WRCOG to expand the transit network in the City and increase service frequency with a priority on expanding services to neighboring cities where Murrieta residents work.

**Implementation Assumption:**
This measure assumes that the City would work with RTA and other regional partners to expand the transit network in the City and increase the frequency of service of existing transit services.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 10,391 | 21,555 | 25,145 |

**Table 3-3 Transportation**

**T-9: GHG Reduction Program**

**Measure:**

Develop and implement a no-net-increase in GHG emissions threshold for new development projects in the City and develop a GHG Fee Program to offset remaining GHG emissions from new development that cannot be achieved through project design features or other GHG reduction measures included in the CAP Update. As part of implementation of this measure, the City shall[1]:

- Adopt a set of strategies to reduce GHG emissions from new development through project-specific mitigation measures.
- Develop a process in which the remainder of emissions that cannot be reduced through project-specific measures shall be quantified and offset through a combination of a local emissions offset program to be set up by the City and other offset registry programs.

**Implementation Assumption:**

This measure assumes the City develops a program to reduce and offset GHG emissions associated with new development projects. The measure assumes emissions reductions and offsets can be tracked and quantified to ensure compliance with the measure.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 41,357 | 76,481 | 108,756 |

Notes: City = City of Murrieta; GHG = greenhouse gas; MTCO2e = metric tons of carbon dioxide equivalent; EV = electric vehicle; SCAG = Southern California Association of Governments; RTA = Riverside Transit Agency; WRCOG = Western Riverside Council of Governments

[1] Refer to Section 4.2.3 Implementation Descriptions for Key Measures, for additional discussion of how this measure could be implemented

Source: Ascent Environmental, Inc. 2019.

## 3.2.2 Building Energy

Energy consumption in the City includes electricity and natural gas use, which accounted for 18 percent of the City's total emissions in 2016. The City's building energy sector accounts for consumption from residential, commercial, and industrial energy users. The success of building energy emission reduction measures depends on coordination with local utilities and organizations; participation from community members, and implementation of new or revised local policies and programs. Table 3-4 provides GHG reduction measures for the building energy sector, including implementation assumptions and GHG reduction potential in 2030, 2035, and 2050.

Building Energy Measures Co-Benefits:
- Cost savings
- Air quality improvements
- Economic benefits
- Improved City infrastructure

**Table 3-4 Building Energy**

**BE-1: Community Renewable Energy**

**Measure:**
The City shall create or join a Community Choice Aggregation (CCA) program such as Western Community Energy or create a partnership with SoCal Edison's off-site renewable energy programs (i.e., Green Rate Program), which allows building renters and owners to opt into cleaner electricity sources.[1]

**Implementation Assumption:**
This measure assumes that the City of Murrieta joins Western Community Energy or forms a partnership with SCE such as the Green Rate Program. Based on estimates from the CCA feasibility study conducted for Western Community Energy, the measure assumes that 95% of existing and new residential customers opt-in to the CCA and 90% of existing and new nonresidential users opt-in to the CCA. The measure assumes that customers that do opt-in choose the 100% renewable energy option. Based on other CCAs in California, this is a conservative opt-in rate.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 28,306 | 22,210 | 0 |

**BE-2: Municipal Renewable Energy**

**Measure:**
Develop renewable energy generation systems on City-owned property for use in municipal operations.

**Implementation Assumption:**
The measure assumes that the City develops photovoltaic systems on City buildings and property over the next ten years and beyond. The measure assumes that the City offsets 100% of its GHG emissions associated with electricity by 2035 through a combination of on-site solar systems and participation in the CCA.[1]

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 26 | 39 | 0 |

**BE-3: Zero Net Energy Standards**

**Measure:**
Adopt a Zero Net Energy standards for development by 2025 and implement it through the following phased approach:
- Begin phase-in of standards in 2025 by applying, where feasible, to residential, commercial, and industrial projects
- Full phase-in of standards for residential and commercial uses by 2030, requiring all new residential and commercial projects to comply
- Full phase-in of standards for industrial uses by 2035, requiring all new industrial uses to comply

**Implementation Assumption:**
This measure assumes that the City adopts a Zero Net Energy standard for development by 2025. The measure assumes that it would be feasible for 75% of residential units and 65% of commercial square footage developed between 2020 and 2030 to comply with the ZNE standard. The measure assumes that it would be feasible for 100% of residential units and 100% of commercial projects to comply with the ZNE standard by 2030, feasible for 50% of industrial projects developed between 2025 and 2035 to comply, and feasible for 100% of industrial projects to comply by 2035.[1]

**Table 3-4 Building Energy**

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 24,659 | 50,094 | 113,303 |

**BE-4: Energy Efficiency and Electrification Program**

**Measure:**

Work with WRCOG's Western Riverside Energy Partnership to develop and implement a comprehensive electrification and energy efficiency retrofit program focused on reduction of natural gas use in existing residential and commercial land uses. The program would include the goal of reducing natural gas in existing residential and nonresidential land uses by 20% by 2030. [1]

- The program would include, but not be limited to, strategies focused on:
  - Pool-related energy use (e.g., pool cover rebate program)
  - Electrification retrofits for natural gas appliances in existing residential and commercial land uses (i.e., hot water heaters, cooktops, heating systems)

**Implementation Assumption:**

This measure assumes that the City will develop and implement a comprehensive energy efficiency retrofit and appliance electrification program, focused on reducing natural gas use in existing land uses through appliance upgrades, weatherization upgrades, and other energy efficiency measures.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 33,664 | 50,800 | 79,757 |

Notes: City = City of Murrieta; GHG = greenhouse gas; WRCOG = Western Riverside Council of Governments; $MTCO_2e$ = metric tons of carbon dioxide equivalent

[1] Refer to Section 4.2.3 Implementation Descriptions for Key Measures, for additional discussion of how this measure could be implemented

Source: Ascent Environmental, Inc. 2019.

### 3.2.3 Land Use

Land use types and patterns inherently affect GHG emissions in the City by influencing people's travel behaviors and the sequestration of carbon. Land use patterns provide an overarching influence on all inventoried sectors. Through the implementation of land use measures with keeping the goal of reducing GHG emissions in mind, they can play a fundamental role in how cities operate, while at the same time support the reduction of carbon stored in the atmosphere. **Table 3-5** provides GHG reduction measures for the land use sector, including implementation assumptions and GHG reduction potential in 2030, 2035, and 2050.

Land Use Measures Co-Benefits:
- Cost savings
- Air quality improvement
- Economic benefits
- Improved City infrastructure
- Improved quality of life

**Table 3-5 Land Use**

**LU-1: Jobs-Housing Balance Strategy**

**Measure:**
Encourage flexibility in land use regulations to respond to requirements of new and emerging business and industry types and help create a sustainable jobs-housing balance.[1]

**Implementation Assumption:**
This measure assumes the number of jobs within the City and within a 30-mile radius of the City would increase in the future and would result in commute-related VMT reductions for residents.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 10,373 | 10,418 | 12,261 |

**LU -2: Tree Planting Program**

**Measure:**
Develop a tree planting program to plant trees throughout the City to increase carbon sequestration.

**Implementation Assumption:**
This measure assumes the City would develop a program to plant trees for carbon sequestration and other co-benefits, planting an average number of trees per year.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 6,301 | 12,956 | 19,612 |

**LU -3: Open Space Conservation**

**Measure:**
Work with the Western Riverside Regional Conservation Authority (RCA) and the Center for Natural Lands Management to implement land use conservation programs for the City. The program would include a minimum acreage of land preserved through conservation easements and, therefore, would not be permitted for future development.

**Implementation Assumption:**
This measure assumes that a certain number of acres in the City limits would be preserved as open space resulting in carbon sequestration. The measure assumes that this land would otherwise be cleared for development and, if nor preserved, would result in a net decrease in sequestration potential.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 16,095 | 18,240 | 20,385 |

Notes: City = City of Murrieta; GHG = greenhouse gas; MTCO2e = metric tons of carbon dioxide equivalent

[1] Refer to Section 4.2.3 Implementation Descriptions for Key Measures, for additional discussion of measure implementation.

Source: Ascent Environmental, Inc. 2019.

### 3.2.4 Solid Waste

Solid waste emissions generated in the City are produced from the transport of solid waste and the off-gassing of waste disposed into landfills. Solid waste accounts for an estimated four percent of communitywide emissions in the city in 2016. Reducing waste in the City is important to preserve resources while also creating renewable sources that may help contribute to emission reductions in other sectors. **Table 3-6** provides GHG reduction measures for the solid waste sector, including implementation assumptions and GHG reduction potential in 2030, 2035, and 2050.

Solid Waste Measures Co-Benefits:
- Improved City infrastructure
- Air quality improvement
- Cost savings

**Table 3-6 Solid Waste**

**SW-1: Waste Diversion Program**

**Measure:**
Encourage recycling or reuse of materials to reduce the amount of solid waste generated within the City with the goal of achieving an 85% waste diversion rate by 2030 and 90% waste diversion rate by 2035.

**Implementation Assumption:**
This measure assumes that the City would work to exceed the State's 75% waste diversion target by achieving an 85% waste diversion rate by 2030 and 90% waste diversion rate by 2035.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 4,583 | 7,215 | 11,120 |

**SW-2: Construction Waste Diversion**

**Measure:**
Require all construction projects to exceed CALGreen construction waste diversion requirements by 15 percent.

**Implementation Assumption:**
This measure assumes that the City would implement a policy, as part of the City's CAP Consistency checklist or other development review process, to require all construction projects to exceed CALGreen's 65 percent construction waste diversion requirements by 15 percent.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 998 | 827 | 686 |

Notes: City = City of Murrieta; GHG = greenhouse gas; MTCO2e = metric tons of carbon dioxide equivalent

Source: Ascent Environmental, Inc. 2019.

### 3.2.5 Water and Wastewater

GHG emissions are produced through the energy used to pump, transport, and treat water and wastewater. The handling of water and wastewater accounted for less than one percent of the City's total emissions in 2016. Though reductions achieved through wastewater and water measures are minimal compared to other measures, they are needed to address serious impacts of climate change by reducing water consumption, recycling wastewater, and changing behavioral patterns of water consumption. Beyond providing emissions reductions, these measures provide the City with sustainable practices that will allow it to better adapt to the changing climate. **Table 3-7** provides GHG reduction measures for the water and wastewater sector, including implementation assumptions and GHG reduction potential in 2030, 2035, and 2050.

Water and Wastewater Measures Co-Benefits:

- Cost savings
- Economic benefits
- Improved City infrastructure

**Table 3-7 Water and Wastewater**

**WW-1: Landscaping and Water Conservation Program**

**Measure:**
Reduce outdoor water use by 10% at residential, commercial, and public properties by installing efficient irrigation systems and plants with lower watering needs.

**Implementation Assumption:**
This measure assumes that City would implement a policy to reduce outdoor water use from various land uses by installing efficient irrigation systems, using plants with lower watering needs, and promoting water conservation. The measure assumes that Citywide water use is reduced by a certain percent by the target years.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 55 | 44 | 0 |

**WW-2: Rainwater Catchment and Greywater Systems Program**

**Measure:**
Encourage property owners to recycle water with rainwater catchment and greywater systems in existing and new developments.

**Implementation Assumption:**
This measure assumes that the City would develop and implement a program to increase recycled water use by residents through the use of rainwater catchment and greywater systems in existing and new developments.

| GHG Reduction Potential in 2030 ($MTCO_2e$) | GHG Reduction Potential in 2035 ($MTCO_2e$) | GHG Reduction Potential in 2050 ($MTCO_2e$) |
|---|---|---|
| 5 | 4 | 0 |

Notes: City = City of Murrieta; GHG = greenhouse gas; MTCO2e = metric tons of carbon dioxide equivalent

Source: Ascent Environmental, Inc. 2019.

# 4 IMPLEMENTATION AND MONITORING

This chapter outlines how the City will implement and monitor the Climate Action Plan Update (CAP Update) measures over time to reduce greenhouse gases (GHGs). To achieve the GHG emissions reductions described in Chapter 3, measures should be continuously assessed and monitored to ensure that: (1) the measures are effective; (2) the City is on track to achieve the GHG reduction targets; and (3) desired community outcomes are attained.

## 4.1 Implementation Strategy

Implementation of the reduction measures identified in **Chapter 3** will require ongoing management, oversight, and staffing. Ensuring that the measures translate to on-the-ground results and reductions in GHG emissions is critical to the success of the CAP Update. Most importantly, the City's CAP Update and GHG emissions reduction measures will depend on the participation of the City's residents, businesses, and stakeholders.

> The City will continue to monitor and update measures to ensure they can be successfully implemented.

**Figure 4-1** provides an overview of the considerations involved in the process of implementing GHG reduction measures including identification of administration and staffing needs, securing adequate financing and budget, determining actual method(s) of implementation, monitoring the effectiveness of implementation and reporting its results, and involving the public in the process. To continue successful implementation of the CAP Update measures, the City will further expand on this initial examination once implementation has begun.

**Figure 4-1 Implementation Process**

### 4.1.1 The Role of New Development

Implementation of the CAP Update will require that new development projects attain higher levels of energy efficiency and incorporate more sustainable design standards. New developments that are consistent with applicable GHG reduction measures in a CAP Update are eligible for CEQA streamlining, per the provisions of State CEQA Guidelines Section 15183.5. Under these provisions, if a project can show consistency with applicable GHG reduction measures in a CAP, the level of analysis for the project required under CEQA with respect to GHG emissions can be reduced considerably. Furthermore, a project's incremental contribution to cumulative GHG emissions may be determined not to be cumulatively considerable. This CAP Update meets the criteria identified in Section 15183.5 and is therefore considered a "qualified" CAP and may be used for the specific purpose of streamlining the analysis of GHG emissions for subsequent projects. The CAP Update provides environmental review streamlining benefits for development projects proposed in the city provided they demonstrate consistency with this CAP Update.

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. The Checklist is provided in **Appendix C** of the CAP Update.

The Checklist may also be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or federal law or regulation. 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 thus will contribute its "fair share" in achieving the identified GHG reduction targets.

The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of

## 4.1.2 Implementation Activities

The City will implement the measures of the CAP Update through several types of programs and activities that can be grouped into the following categories. The categories identified for implementation efforts include: Municipal Operations; New Ordinances and Code Updates; Planning; Financing and Incentives; Partnerships; and Education and Outreach. While each measure identified in the CAP Update would fall into these categories, some measures overlap and belong to more than one category. For example, adding rainwater catchment systems (**Measure WW-2**) first requires the City to conduct outreach and provide education to residents and business owners about the systems, but would also require the City to provide sources of funding and incentives for installation. Detailed descriptions of each type of implementation category are provided below.

- **Municipal Operations:** City specific actions to update and make municipal operations more efficient. These measures would be implemented by the City and would reduce emissions specifically related to municipal operations.
- **New Ordinances and Code Updates:** Implementation of several measures in the CAP Update would occur through new ordinances adopted by the City or through amended regulations as part of municipal code updates.
- **Planning:** The CAP Update identifies measures that are more programmatic in nature and require visioning and long-term planning efforts to allow for GHG reductions.
- **Financing and Incentives:** Successful implementation of CAP Update measures requires identifying mechanisms for funding and allocating resources. Further, several measures identified in the CAP Update would be implemented by community residents, business owners, other local agencies, and developers.
- **Partnerships:** Interagency coordination and collaboration with other organizations are critical to ensuring implementation of certain measures.
- **Education and Outreach:** Education and outreach efforts about the goals of the CAP Update will help create support for the CAP Update and involve the community in its implementation. These efforts would be intended to increase participation and awareness and could include informing residents about potential GHG reductions and co-benefits of various measures.

## 4.1.3 Implementation Effort and Timeframe

Once the CAP Update has been adopted, City staff will need to develop a detailed implementation plan that will outline the actions the City will take to reduce its GHG emissions. The implementation plan will be based on a number of factors such as staff capacity, potential feasible work flows and the availability of funding opportunities. It will be the responsibility of department staff to facilitate and monitor the implementation of the measures. In the development of the implementation plan, staff will prioritize GHG reduction measure implementation based on a variety of factors including but not limited to cost-effectiveness, GHG reduction potential, available funding, the feasibility of implementation, timeline required to implement, and community input.

In advance of a detailed implementation plan, each action was qualitatively analyzed based on separate factors that could be used in prioritizing CAP measure implementation. These factors include GHG reduction potential, implementation effort, and implementation timeframe.

Levels of effort required to implement measures are based on staff implementation costs and ease of implementation, which were both evaluated for all CAP measures 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 implementation. 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 the comparison between existing and proposed measures.

The timeframe over which measures are implemented varies between short-term (i.e. within a year) and long-term (i.e. at least five years to implement). Prioritization of the measures is based on timeframe in which measures can be implemented. Certain measures should be prioritized early because they would require more effort and would take longer to implement. Assigning such measures a higher priority would allow the City to allocate resources appropriately.

Factors that could be used to prioritize GHG reduction measure implementation include, but are not limited to, cost-effectiveness, GHG reduction potential, available funding, the feasibility of implementation, timeline required to implement, co-benefits, and community input.

Sample criteria used to define the implementation efforts for each measure are shown in Table 4-1. 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).

**Table 4-1 Sample Evaluation Criteria for GHG Reduction Measure Implementation**

| Implementation Effort Level | Sample Criteria | | |
|---|---|---|---|
| | Staff Costs | Ease of Implementation | Implementation Timeframe |
| Low/Short-Term | ▶ Uses existing staff<br>▶ Existing staff can implement but will require reprioritization of workload | ▶ Existing programs in place to support implementation.<br>▶ External and internal coordination is limited.<br>▶ Revisions to policy or code are limited. | ▶ Less than a year to fully implement |
| Medium/Mid-Term | ▶ Requires new staff or contracts to implement | ▶ External and internal coordination is required.<br>▶ Policy or code revisions necessary. | ▶ Implementation would take between 2-4 years |
| High/Long-Term | ▶ Requires a significant amount of new staff or contracts to implement | ▶ Development of new policies, programs, or codes, or revisions to the General Plan.<br>▶ Robust outreach program required to engage residents and businesses.<br>▶ Requires regional cooperation and securing long-term funding. | ▶ At least five years required to implement |

## 4.1.4 Implementation Strategy Matrix

The implementation strategy matrix, outlined below in Table 4-2, provides a summary of the initial prioritization and categorization of the CAP Update's GHG reduction measures. The matrix includes each GHG reduction measure, implementation activity type, responsible department or agency, implementation timeframe, and level of staff implementation cost and ease of implementation for each measure. Following adoption of the CAP Update, 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, and allocate staff resources and secure funding as needed.

As the City begins implementing each action, measure-specific implementation plans will be developed where appropriate to further refine implementation details such as implementation timeframe, staff implementation costs and the timeframe required for implementation.

**[Note to City:** please carefully review contents of Table 4-2, including Responsible Department/Agency, Implementation Timeframe, Staff Implementation Costs, and Ease of Implementation]

**Table 4-2 Preliminary Implementation Strategy Matrix**

| Measure | Title | Category | Responsible Department/ Agency | Implementation Timeframe | Staff Implementation Costs | Ease of Implementation |
|---|---|---|---|---|---|---|
| **Transportation** | | | | | | |
| T-1 | EV Incentives and Promotion | New Ordinances and Code Updates | PD | Mid-Term | Low | Medium |
| T-2 | EV Charging Ordinance | New Ordinances and Code Updates | PD; BS | Mid-Term | Low | Medium |
| T-3 | TOD Affordable Housing Program | Planning | PD | Ongoing | Medium | Medium |
| T-4 | Murrieta Bike Network | Planning | PD; PW | Ongoing | Low | Medium |
| T-5 | Signal Synchronization | Municipal Operations | PW | Mid-Term | Low | Medium |
| T-6 | Traffic Calming Program | Planning | PW | Mid-Term | Low | Medium |
| T-7 | Transportation Demand Management Program | Planning | PD; PW | Short-Term | Medium | Medium |
| T-8 | Transit Network | Planning; Partnerships | PD; RTA | Mid-Term | Medium | Medium |
| T-9 | GHG Reduction Program | Planning | PD | Long-Term | Medium | High |
| **Building Energy** | | | | | | |
| BE-1 | Community Renewable Energy | Financing and Incentives; Partnerships; Education and Outreach | PD; CM | Long-Term | High | High |
| BE-2 | Municipal Renewable Energy | Municipal Operations | CSD; PW | Ongoing | Medium | High |
| BE-3 | Zero Net Energy Standard | New Ordinances and Code Updates | PD; CM | Ongoing + Mid-Term | Medium | High |
| BE-4 | Energy Efficiency and Electrification Program | Financing and Incentives; Partnerships; Education and Outreach | PD; BS | Ongoing | Low | Medium |
| **Land Use** | | | | | | |
| LU-1 | Jobs-Housing Balance Strategy | New Ordinances and Code Updates; Planning | PD | Ongoing | Medium | Medium |
| LU-2 | Tree Planting Program | Partnerships | PD; CSD | Short-Term | Low | Low |
| LU-3 | Open Space Conservation | Partnerships | PD; RCA | Ongoing | Low | Low |
| **Solid Waste** | | | | | | |
| SW-1 | Waste Diversion Program | New Ordinances and Code Updates; Partnerships | PD; PW | Mid-Term | Medium | High |
| SW-2 | Construction Waste Diversion | New Ordinances and Code Updates; | PD; PW; BS | Mid-Term | Medium | High |

**Table 4-2 Preliminary Implementation Strategy Matrix**

| Measure | Title | Category | Responsible Department/ Agency | Implementation Timeframe | Staff Implementation Costs | Ease of Implementation |
|---|---|---|---|---|---|---|
| | | Partnerships | | | | |
| **Water and Wastewater** | | | | | | |
| WW-1 | Landscaping and Water Conservation Program | Financing and Incentives; Education and Outreach | PD; BS; CSD | Ongoing | Low | Medium |
| WW-2 | Rainwater Catchment and Greywater Systems Program | Financing and Incentives; Education and Outreach | PD; BS | Ongoing | Low | Low |

Notes: EV = Electric Vehicle; CM = City Manager's Office; CSD = Community Services; PD = Planning Division; PW = Public Works Department; BS = Building & Safety; RTA = Riverside Transit Agency; RCA = Regional Conservation Agency

## 4.1.5 Implementation Descriptions for Key Measures

The following section includes a description of how key CAP Update measures would be implemented and considerations for specific steps that could be taken to successfully implement the measures.

### T-1 and T-2 – Electric Vehicle Programs

These measures are focused on increasing the number of EVs and ZEVs to achieve a higher percentage of vehicles in the City being EVs and ZEVs than what is currently projected for Riverside County. The City can provide a policy environment conducive to EV adoption and help remove barriers to help increase EV adoption rates. T-1 focuses on promoting and increasing EV ownership in the City and would include several components that would together create a comprehensive program. The program would include:

- An educational component to conduct outreach and educate residents about the benefits of EV ownership
- A marketing component to educate residents on current incentives and rebates available for purchasing an EV and installing residential EV charging equipment
- Updates to the City's development code to incentivize the installation of EV chargers in new and existing land uses
- An incentive program for the purchase of EVs and ZEVs for City residents potentially funded through the GHG Mitigation Fee Program (T-9)

T-2 focuses on developing and adopting an EV Infrastructure ordinance to ensure that new development in the City includes adequate EV charging infrastructure to keep pace with the City's increased EV adoption rates.

#### Implementation Items

- T-1
  - Research other cities and agencies (e.g., Pasadena) that have implemented similar programs in California and adopt components of programs that are appropriate for the development of the City program.
  - Work with Transportation Network Companies (e.g., Uber and Lyft) to promote EV adoption amongst drivers, promoting the benefits of EV's unique to drivers (e.g., lower maintenance costs, lower fuel costs).
  - Work with the South Coast Air Quality Management District, Southern California Association of Governments (SCAG), and Western Riverside Council of Governments (WRCOG) to discuss potential opportunities for collaboration in implementing the program. Develop an implementation plan and timeline for implementing the program by 2023.
- T-2

- Research other jurisdictions that have adopted EV ordinances to increase EV charging infrastructure (e.g., Menlo Park).
- Develop and adopt an EV ordinance to require appropriate levels of EV charging in new residential and nonresidential uses in the City.
- Promote available incentives for EV charging infrastructure to residents and developers in the City.

## T-7 – Transportation Demand Management Program

This measure is focused on reducing commute-related VMT generated by new large employers in the city and the region. The measure would build on the City's existing Transportation Demand Management process in place to increase resources and support available to employers to help implement employer-based TDM programs, and increase the City's resources to manage and monitor progress of programs. Given that the City is focused on attracting new employers to develop a sustainable jobs-housing balance, the TDM measures included in the program would be designed to be conducive to development and attractive to employees to reduce commute costs and time. The TDM measures established as part of the program can be included in the City's CAP Consistency Checklist to effectively streamline this measure into the City's development process for new projects. The TDM Program measures could include, but are not limited to:

- A comprehensive marketing program targeted at employees to promote the benefits (health, cost savings) of low-GHG commute modes (e.g., walking, biking, transit, telecommuting, etc.);
- Requirements for short and long-term bicycle parking facilities including on site-amenities (e.g., showers, locker rooms);
- Incentives for using alternative modes (e.g., transit pass subsidies, carpool, parking cash-out program);
- A vanpool program for residents with longer commutes outside the City;
- A ride-matching and ride-sharing program for both employees working in the City and for residents who commute to regions outside the City (e.g., San Diego, Los Angeles);
- A telecommuting program to promote telecommuting for large employers in the City as well as advocating for telecommuting practices in the larger region with support from WRCOG; and
- A monitoring program to track progress on the VMT reductions achieved through the TDM program.

### Implementation Items

- Research other cities and agencies in the region conducting comprehensive TDM Programs and adopt components of programs that are appropriate for development in the City's expanded program.
- Work with WRCOG and other regional partners to discuss potential collaboration on implementation components of the TDM Program.
- Develop TDM Program Implementation Plan and hire a Transportation Demand Management Coordinator to implement the TDM Program.
- Adopt a TDM Program ordinance that would apply to specific types of new development in the City and help reduce VMT generated from new projects. This ordinance can be implemented, in part, through the City's CAP Consistency Checklist.

## T-9 – GHG Mitigation Fee Program for New Development

This measure is intended to reduce GHGs from new development in the City, particularly, but not exclusive to, GHG emissions associated with VMT generated by new residential and nonresidential development in the City. As part of the measure, the City would develop a program to mitigate a certain percentage of GHG emissions from new development through a fee-based program that would offset emissions through development of local mitigation projects. The total fee for different new development projects would be calculated based on key characteristics of the project (e.g., land use type, size) to estimate the anticipated GHG emissions of the project, similar to other impact fee programs (e.g., transportation impact fees). Applicants would then pay into a fee program for the project's GHG emissions that cannot be mitigated through other CAP measures. Mitigation

projects funded through the program would give priority to implementing local projects to reduce emissions in the city and then, once local options are exhausted, through a mitigation bank to contribute to larger mitigation projects (e.g., large transit projects). A key next step for the City in implementation of this measure would be to conduct a more in-depth analysis for how the fee program would be structured for successful implementation. Types of mitigation projects to be funded through the program could include but are not limited to:

- Funding of TDM measures which would result in GHG emissions reductions (e.g., transit pass subsidies, car-sharing program)
- Funding of larger transit projects which demonstrate VMT reductions and GHG emissions
- Appliance replacement programs to replace natural gas appliances with electric appliances
- Vehicle replacement programs to incentivize the purchase of EVs and ZEVs for residents and businesses

### Implementation Items

- Research VMT Mitigation and Banking Programs including information in UC Berkeley's Technical Report "Implementing SB 743: An Analysis of Vehicle Miles Traveled Banking and Exchange Frameworks."
- Develop a comprehensive list of strategies, projects, and other opportunities to reduce GHG emissions which can be funded and implemented through the program.
- Choose or design the most appropriate framework for developing a GHG Mitigation Fee Program and incorporate the program into the City's development and environmental review processes.

## BE-1 - Community Renewable Energy

The Western Community Energy Program (WCE) is a program established in 2018 to implement a Community Choice Aggregation (CCA) program for jurisdictions in western Riverside County. WCE's primary objectives are to provide local control in rate-setting for customers, provide overall rates that are lower and/or competitive with those offered by SCE, expanded options for economic development, and supply an energy portfolio that will use local and/or regional renewable resources. During Phase 1, beginning in 2020, WCE anticipates serving approximately 114,000 out of 120,500 residential and nonresidential accounts. Alongside serving as an energy provider, WCE also intends to develop an energy program to provide support for WCE customers conducting energy efficiency and renewable energy-related projects. It is anticipated that these programs could help in the implementation of other CAP measures (BE-4). Details regarding the development, governance, and operations of WCE can be found here in the Western Community Energy Implementation Plan.

### Implementation Items

- Research existing CCA programs in California to understand how the programs operate and what success they have achieved.
- Work in collaboration with WRCOG and WCE to discuss the details and requirements for joining WCE, including the potential need for a feasibility study, costs and timeline for, and anticipated rates.
- Explore developing an alternative program with SCE to increase the purchase of renewable energy by residents and businesses that can achieve the GHG reductions quantified for the measure (BE-1).

## BE-2 - Municipal Renewable Energy

Through this measure, the City has the opportunity to demonstrate leadership and sustainability by developing renewable energy systems for municipal operations. By increasing the City's renewable energy generation, the City can achieve long-term cost savings and increase the resilience of the City's municipal energy supply during power outages. WRCOG's Energy Department offers support, services, and access to financing for local jurisdictions that are conducting energy efficiency and renewable energy projects at municipal facilities.

### Implementation Items

- Conduct audits at municipal facilities to quantify energy use and to identify and quantify energy efficiency and conservation opportunities.

- Based on energy audits, develop a list of energy efficiency and renewable energy projects that could be implemented as well as an implementation plan and timeline for the development of the projects.
- Identify grants, rebate and incentive programs (WRCOG program), and financing opportunities for municipal energy efficiency and renewable energy.

## BE-3 - Zero Net Energy Standard

This measure focuses on developing a Zero Net Energy (ZNE) Standard for new residential and nonresidential projects in the City, with requirements phased in over time between 2020 and 2030. Beginning in approximately 2013, the California Energy Commission and California Public Utilities Commission began discussions of phasing in a ZNE standard for new construction in California. Since then, the State has been taking significant steps to phase in a standard, including the development of California's Zero Net Energy Action Plan and, most recently, the 2019 Energy Efficiency Standard Update, which requires solar installations for all single-family and low-rise multi-family homes. This measure is intended to help the City keep pace as the State moves closer to a ZNE standard for all new development and get ahead of the curve of anticipated changes to come.

### Implementation Items

- Research California's Zero Net Energy Action Plan and other ZNE resources, including other ZNE standards that have been adopted by California cities (e.g., San Jose).
- Identify potential funding opportunities, technical support, and resources in helping to develop a ZNE standard for both residential and nonresidential uses.
- Develop ZNE standard and detailed timeline for implementation of the standard for different land uses.
- Identify forthcoming residential development projects that could potentially serve as a case study for early adoption of the City’s ZNE standard.

## BE-4 - Energy Efficiency and Electrification Program

This measure focuses on developing a comprehensive electrification and energy efficiency retrofit program focused on the reduction of natural gas use in existing residential and commercial land uses. The program would include multiple components, in collaboration with regional partners, focusing on various aspects of energy conservation, energy efficiency, and building electrification. These programs would likely include:

- An energy conservation marketing campaign to achieve energy cost savings through conservation practices and tools to help monitor and lower energy use.
- An energy efficiency assessment and retrofit program to help residents and businesses assess energy efficiency opportunities and incentives for energy efficiency upgrades.
- An appliance retrofit program focused on upgrading to all-electric appliances in some existing buildings (i.e., water heaters, cooktops, heating systems, pool heating systems) but would also include energy efficient electric appliances (e.g., refrigerators, televisions).

### Implementation Items

- Work with WRCOG and WCE to discuss opportunities for collaboration and support in implementing the City’s Energy Efficiency and Electrification Program including opportunities to share data and resources.
- Conduct research regarding the implementation of similar programs in other California cities and agencies. Develop an implementation timeline and plan for the development of the program with assistance from WRCOG and WCE when appropriate.
- Develop Energy Efficiency and Electrification Program and set internal targets for energy reductions that are consistent with the estimate used to quantify this measure.

### LU-1 - Jobs-Housing Balance Strategy

This measure is intended to support the City in achieving a sustainable jobs-housing balance by implementing strategies to attract new employers to the City and the surrounding region and, as a result, reducing commute-related VMT for residents and improving quality of life. This measure requires that the City exercise flexibility in land use regulations to respond to requirements of new and emerging business and industry types as well as ensuring the regulatory environment in the City remains attractive to large employers looking to locate in the City.

#### Implementation Items

- Research strategies to update the City's development code to ensure flexibility in building standards when working with large employers who are considering locating in the City.
- Work with WRCOG, SCAG, and the Murrieta Chamber of Commerce to understand the growth population and employment characteristics in the region and opportunities to create a sustainable jobs-housing balance for residents.
- Adjust the development code and long-term nonresidential land use development strategy in the City to ensure the City is taking advantage of regional growth opportunities in key employment sectors and industries.

## 4.2 Monitoring and Updates

In order for the CAP Update to remain effective and consistent with State and regional protocols, it will need to be maintained and updated periodically. Although the CAP Update provides a long-term strategy to reduce GHG emissions and improve the sustainability and resilience of the City, new legislation and updates to climate science will need to be considered as it implements reduction measures. Thus, City staff will need to evaluate and monitor specific action performance over time. At the time when the plan and specific action are reviewed, the City will revise as necessary to ensure goals identified in the CAP Update remain achievable within the context of the identified actions. This will include conducting periodic GHG emissions inventory updates and analyzing measure performance.

Upon adoption, the City will begin to implement CAP measures and actions. The City will begin data tracking and initial monitoring beginning two years after the CAP Update's adoption. Every two years, City Staff will prepare a monitoring report, describing the estimated GHG reductions achieved to date through the implementation of CAP actions. On an annual basis, City Staff will provide the City Council a summary of the progress made over the year implementing CAP actions. These annual summaries and biennial monitoring reports will provide transparency in CAP implementation and allow the City opportunities to adjust measures as necessary to achieve emissions reduction targets.

The City will:

- Prepare an annual progress summary after the first year of implementation.
- Prepare a monitoring report to City Council every 2 years; and
- Prepare a CAP update every 5 years.

In addition to updating the City's emissions inventory, City staff will also evaluate the cost, effectiveness, and benefits of each individual measure to determine prioritization and feasibility. Evaluating CAP measure performance entails monitoring the level of community participation, costs, and barriers to implementation, as well as actual reductions in activities evaluated in the CAP Update or other activities that result in GHG emissions reductions. By evaluating whether the implementation of a measure is on track to achieve its reduction potential, the City can identify successful measures and reevaluate or replace those that do not provide sufficient GHG emission reductions.

The report provided to City Council every 2 years will include:

- estimated annual GHG reductions,
- participation rates (where applicable),
- implementation costs and funding needs,
- community benefits realized,

- remaining barriers to implementation, and
- potential recommendations for changes to specific actions.

In addition to the monitoring reports, the City will update its CAP every five years, one year after the second biennial CAP monitoring report.

## 4.2 Ongoing Engagement

Ongoing engagement and education are critical for successful implementation of all measures. This includes involvement with residents and businesses, community organizations, developers, property owners, and other local and regional government agencies and organizations. While this CAP Update focuses on measures in which the City has a role, many of the measures require partnership and collaboration as suggested in the preliminary implementation matrix, **Table 4-2**.

Individual residents of Murrieta play a large role in the success of the CAP. Thus, 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. Through public education efforts, the City is also committed to educating its community members about the important role individuals play in combating climate change by reducing emissions. Many actions identified in **Chapter 3** require public involvement to achieve GHG emission reduction targets. It will be the City's responsibility to promote increased community awareness and participation in existing programs, or connecting the community with new information, tools, funding or resources.

## 4.3 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 residences in the long term. The City will undergo initial start-up, ongoing administration, staffing, and enforcement costs with implementation which will require 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 4-3**; 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.

**Table 4-3 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.<br>▸ Incorporated cities and counties in California are eligible for funds.<br>▸ Program funds are intended to:<br>• Reduce, reuse, and recycle all waste.<br>• Encourage development of recycled-content products and markets.<br>• 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.<br>▸ The following programs can be utilized to fund local measures:<br>• Air Quality Improvement Program (Assembly Bill (AB) 118)<br>• Loan Incentives Program |

**Table 4-3 Potential Funding Sources to Support Greenhouse Gas Reduction Measures**

| Funding Source | Description |
|---|---|
| | • 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:<br>• Sustainability Planning Grant Program<br>• Fixed Guide Way Capital Investment Grants<br>• Job Access and Reverse Commute and New Freedom Programs<br>• 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** | |
| Southern California Edison (SCE) | ▶ SCE is one of the utilities participating in the Go Solar initiative.<br>▶ A variety of rebates are available for existing and new homes.<br>▶ Photovoltaics, thermal technologies, and solar hot water projects are eligible.<br>▶ 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.<br>▶ 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.<br>▶ Financing is repaid through property tax bills.<br>▶ Western Riverside Council Governments (WRCOG) has implemented the Home Energy Renovation Opportunity (HERO; a PACE program) in the County to assist residents in financing residential energy efficiency and solar retrofits. |
| Clean Vehicle Rebate Program | ▶ 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.<br>▶ Funded by the American Recovery and Reinvestment Act, California utility ratepayers, and private contributions.<br>▶ Utilities administer the program, offering homeowners the choice of one of two upgrade packages—basic or advanced.<br>▶ Homeowners are connected to home energy professionals.<br>▶ Rebates, incentives, and financing are available.<br>▶ Homeowners can receive up to $4,000 back on an upgrade through the local utility. |
| 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.<br>▶ Residents can finance energy saving measures as part of a single mortgage.<br>▶ 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.<br>▶ 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. |

**Table 4-3 Potential Funding Sources to Support Greenhouse Gas Reduction Measures**

| Funding Source | Description |
|---|---|
| | ▶ Rent increases can fund retrofits in commercial buildings.<br>▶ Net energy cost savings can fund retrofits in households.<br>▶ 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.<br>▶ 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.<br>▶ 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.<br>▶ HUD also administers the HOME program, providing grants to improve affordable housing opportunities and conditions. |
| 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<br>▶ 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.<br>▶ Funds can support a variety of projects including affordable housing, renewable energy, public transportation, zero-emission vehicles, environmental restoration, sustainable agriculture, recycling, and more.<br>▶ 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 2019

# APPENDIX A
# Final Technical Memorandum: Greenhouse Gas Emissions Inventory, Forecasts, and Reduction Targets

# Memo

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**Date:** July 12, 2019

**To:** Danny Serrano, RICK Engineering

**From:** Andrew Martin and Kai Lord-Farmer, Ascent Environmental

**Subject:** City of Murrieta Climate Action Plan Update
Draft Technical Memorandum: Greenhouse Gas Emissions Inventory, Forecasts, and Reduction Targets

## INTRODUCTION

The City of Murrieta (City) adopted a Climate Action Plan (CAP) on July 19, 2011, as part of the City's 2011 General Plan. The City's 2011 CAP included a goal to reduce emissions to 1990 levels by 2020 to remain consistent with the statewide greenhouse gas (GHG) emission reduction goal set forth in Assembly Bill 32. The City is currently updating its Climate Action Plan concurrent with efforts to prepare a focused update of the City's General Plan (GPU). The updated CAP will be consistent with new State legislation and guidance issued since the 2011 CAP was adopted. Ascent has completed several technical analyses required for the preparation of the CAP update, including: (1) a new 2016 GHG emissions inventory to serve as the baseline year for the CAP; (2) new GHG emission forecasts for 2020, 2030, 2035 (GPU horizon year) and 2050; (3) revised GHG emission reduction targets for the forecast years. This technical memorandum summarizes the results of the analyses, including methods, assumptions, emission factors, and data sources.

## ORGANIZATION OF THIS MEMORANDUM

This memorandum consists of four main sections:

- **Section 1: GHG Emissions Inventory** summarizes the 2016 GHG emissions inventory developed. The emissions inventory includes the following emissions sectors: building energy, on-road transportation, off-road transportation, solid waste, water use, and wastewater.

- **Section 2: GHG Emissions Forecasts** summarizes the forecasted GHG emissions under "business-as-usual" (BAU) and legislative-adjusted BAU scenarios. A BAU scenario is one in which no action is taken by local, State or federal agencies to reduce GHG emissions. A legislative-adjusted scenario is one in which BAU conditions are adjusted to reflect policy or regulatory actions enacted by State or federal agencies, but without considering any local actions to reduce GHG emissions.

- **Section 3: GHG Reduction Targets** identifies recommended GHG emission reduction targets for 2020, 2030, 2035, and the longer-term goal for 2050, and shows the calculated gap between estimated GHG reductions under the forecast scenarios and the recommended emission reduction targets. The recommended GHG emission reduction targets for each year are provided to demonstrate consistency between the City's GHG emissions and State GHG reduction targets established through legislation and executive order.

- **Section 4: Next Steps** briefly discusses the next steps in the climate action planning process and what is needed to achieve the GHG reduction targets discussed in Section 3.

# 1 EMISSION INVENTORY

## 1.1 2016 GREENHOUSE GAS EMISSIONS INVENTORY

The purpose of the GHG emissions inventory is to gain an understanding of the sources and levels of GHG emissions within the City's jurisdiction, as well as to establish a baseline against which future GHG emissions forecasts can be compared. The GHG emissions inventory for the City was prepared for the calendar year 2016. The 2016 GHG emissions inventory is considered the baseline year for the preparation of GHG emissions forecasts and GHG reduction targets that will be used in the City's CAP update.

The 2016 GHG emissions inventory is summarized below in Table 1. GHG emissions in this inventory include communitywide emissions resulting from activities occurring and permitted to occur within the existing city limits in 2016, which were approximately 890,520 metric tons of carbon dioxide equivalent ($MTCO_2e$). The emissions sectors included in the inventory are residential and commercial energy use, industrial energy use, on-road vehicles, off-road vehicles, solid waste, water use, and wastewater. The largest emissions sector is on-road vehicles, representing approximately 76 percent of all communitywide GHG emissions in 2016.

**Table 1 2016 City of Murrieta Communitywide Greenhouse Gas Inventory**

| Sector | 2016 ($MTCO_2e$/year) | Percent of Total |
|---|---|---|
| On-Road Vehicles | 679,920 | 76% |
| Off-Road Vehicles | 11,741 | 1% |
| *Transportation Sector Total* | 691,661 | 77% |
| Residential Energy | 104,352 | 12% |
| Commercial Energy | 27,410 | 3% |
| Industrial Energy | 24,784 | 3% |
| *Building Sector Total* | 156,546 | 18% |
| Solid Waste | 40,038 | 4% |
| Wastewater and Water-Related | 2,275 | 0.3% |
| *Total (All Sectors)* | 890,520 | 100% |

Notes: Totals may not add due to rounding. $MTCO_2e$ = metric tons of carbon dioxide equivalent; GWP = Global Warming Potential

Source: Data compiled by Ascent Environmental in 2019.

# 2 EMISSIONS FORECASTS

## 2.1 GREENHOUSE GAS EMISSIONS FORECASTS TO 2020, 2030, 2035, 2050

Emission forecasts were calculated for two emissions scenarios, including (1) BAU conditions and (2) legislative-adjusted BAU conditions. The BAU forecast scenario accounts for future growth in emissions associated with future growth and activity levels in the City but assumes no future action to reduce GHG emissions by State or federal agencies. In contrast, the legislative-adjusted BAU (ABAU) forecast scenario accounts for future growth in emissions associated with future growth and activity levels in the City, along with legislative actions to reduce emissions due to State and federal regulations, programs, or other mandated actions. A summary of legislative reductions applied is provided below in Table 5. These forecast scenarios provide the City with the information needed to focus its GHG reduction efforts on the emission sectors and sources that have the most GHG reduction opportunities, considering what State and federal legislative reductions are already achieving or are expected to achieve in the future.

BAU forecasts described in this section for 2020, 2030, 2035 and 2050 are generally based on the State's GHG reduction target years established in key State legislation and policies, including Assembly Bill (AB) 32, Senate Bill (SB) 32, Executive Order (EO) B-30-15, and EO S-3-05; as well as the buildout year for the GPU (2035). The Statewide GHG reduction targets are as follows:

- 1990 levels by 2020 (AB 32);
- 40 percent below 1990 levels by 2030 (SB 32 and EO B-30-15); and,
- 80 percent below 1990 levels by 2050 (EO B-30-15 and S-3-05).

Estimated BAU emission forecasts were based on demographic forecasts, including annual population, jobs, and household growth between 2016 and 2050 for the City, as developed by Iteris and VRPA for the traffic and vehicle miles traveled (VMT) modeling of the GPU. To remain consistent with the demographic forecasts used for the GPU traffic and VMT modeling, Ascent has used forecast data provided by Iteris and VRPA regarding population, jobs, and household growth in the City through the year 2040. These forecasts are based on the land use configuration to be included in the GPU. Ascent has extrapolated a population, jobs, and household growth estimate for 2050 using the growth rates provided between 2016 and 2040. Table 2 below shows the annual growth rates for 2020, 2030, 2035 and 2050. To estimate long-term growth trends and account for variability in short-term growth trends (e.g., 2020-2030), Ascent has used the 2016-2050 annual growth rate in the forecasted BAU and ABAU scenarios.

**Table 2 Annual Growth Factors (%)**

| Factor | 2016 to 2020 | 2020 to 2030 | 2030 to 2035 | 2035 to 2050 | 2016 to 2050 |
|---|---|---|---|---|---|
| Population | 1.07 | 1.00 | 0.93 | 0.94 | 0.97 |
| Jobs | 7.68 | 5.07 | 3.63 | 4.21 | 4.78 |
| Dwelling Units | 1.25 | 1.15 | 1.06 | 1.00 | 1.00 |
| Vehicle Miles Traveled | 1.69 | 1.52 | 1.36 | 1.40 | 1.46 |

Source: Data compiled by Ascent Environmental in 2019.

Table 3 shows the population, jobs, household, and daily VMT forecast that was provided by Iteris and VRPA with 2050 projections extrapolated based on the 2016 through 2040 annual growth rate.

**Table 3 Demographic and Daily Vehicle Miles Traveled Forecast (2016-2050)**

| Factor | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Population | 110,897 | 115,718 | 127,772 | 133,798 | 154,003 |
| Jobs | 28,628 | 38,485 | 63,128 | 75,450 | 139,986 |
| Dwelling Units | 35,534 | 37,341 | 41,859 | 44,118 | 49,912 |
| Daily Vehicle Miles Traveled | 4,132,649 | 4,419,630 | 5,137,080 | 5,495,806 | 6,768,910 |

Source: Data compiled by Ascent Environmental in 2019.

Table 4 includes the BAU emissions forecast for each emissions sector from 2016 through 2050. Table 4 also includes the growth factor which was applied to each emissions sector and the annual activity data which was used to estimate emissions in each sector.

**Table 4 Business-As-Usual Forecasts ($MTCO_2e$/year)**

| Sector | Activity Data | Growth Factor | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|---|---|
| Residential Energy | Kilowatts (kW) and Therms | Population | 114,112 | 131,204 | 190,170 | 139,230 | 161,409 |
| Commercial Energy | | Jobs | 27,410 | 31,418 | 45,102 | 54,575 | 99,861 |
| Industrial Energy | | Jobs | 24,784 | 29,872 | 47,643 | 60,169 | 121,191 |
| On-Road Vehicles | VMT | VMT | 679,920 | 727,135 | 845,173 | 904,192 | 1,113,648 |
| Off-Road Vehicles | Diesel Fuel Use | OFFROAD Model[1] | 11,741 | 12,580 | 15,237 | 16,755 | 19,781 |
| Solid Waste | Landfill Disposal Rate (Tons) | Population | 40,038 | 41,778 | 45,834 | 48,102 | 55,601 |
| Wastewater and Water-Related | Million Gallons (MG) wastewater processer; kW | Population | 2,275 | 2,008 | 2,063 | 2,165 | 2,239 |
| **Total** | | | **900,280** | **963,647** | **1,133,343** | **1,225,187** | **1,573,729** |

Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.

1. Off-Road Vehicle emissions were estimated using the California Air Resources Board 2017 OFFROAD Model which included annual forecast of off-road vehicle use in Riverside County through 2050.

Source: Data compiled by Ascent Environmental in 2019.

By comparison with the BAU analysis, the City's GHG emissions, accounting for applicable legislative reductions, would decrease by 9 percent between 2016 and 2035 rather than increase by 36 percent without legislative reductions, as shown in Tables 3 and 4 and in Figure 1. Figure 1 also shows the emissions trend that would occur without anticipated legislative reductions and accounting for emission growth in the City without anticipated legislative reductions. Table 5 includes the ABAU emissions forecast for each emissions sector from 2016 through 2050. The legislative reductions applied to each GHG emissions sector are summarized below in Table 6.

**Table 5 Legislative-Adjusted Business-As-Usual Forecasts ($MTCO_2e$/year)**

| Sector | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Residential Energy | 114,112 | 114,180 | 113,865 | 114,775 | 116,927 |
| Commercial Energy | 27,410 | 42,071 | 51,518 | 59,829 | 101,023 |
| Industrial Energy | 24,784 | 4,274 | 3,389 | 3,004 | 266 |
| On-Road Vehicles | 679,920 | 669,154 | 592,254 | 585,860 | 591,645 |
| Off-Road Vehicles | 11,741 | 12,580 | 15,237 | 16,755 | 19,781 |
| Solid Waste | 40,038 | 34,182 | 37,501 | 39,356 | 45,491 |
| Wastewater and Water-Related | 2,275 | 1,916 | 1,410 | 1,208 | 456 |
| **Total** | **900,280** | **878,357** | **815,174** | **820,787** | **875,589** |

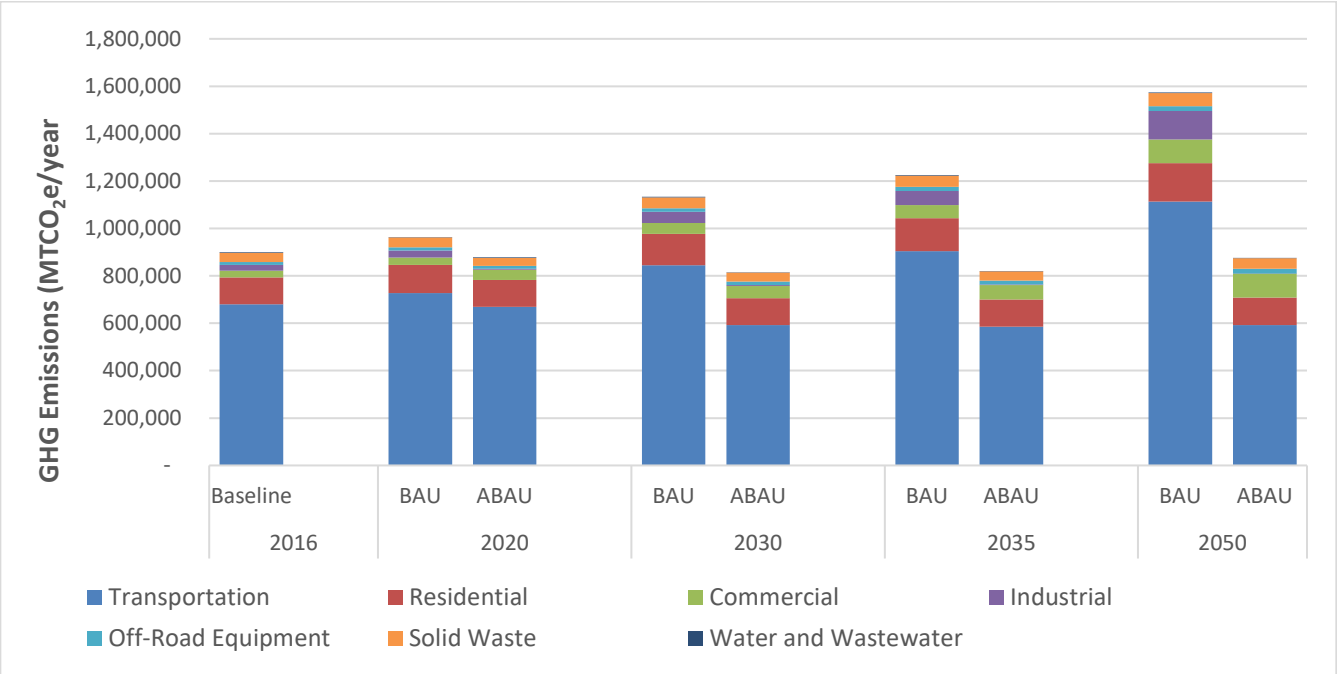
Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.

Source: Data compiled by Ascent Environmental in 2019.

**Table 6 Legislative Reductions Summary**

| Source | Legislative Reduction | Description | Sectors Applied |
|---|---|---|---|
| State | RPS | Requires California energy utilities to procure 33 percent of electricity from renewable sources by 2020. | Building Energy, Water |
| State | SB 100 | Requires California energy utilities to procure 60 percent of electricity from renewable sources by 2030 and 100 percent from renewable and zero-carbon sources by 2045. | Building Energy, Water |
| State | California Building Efficiency Standards (Title 24, Part 6) | Requires all new buildings in California to comply with energy efficiency standards established by CEC. | Building Energy |
| State | AB 341 | California target to achieve a 75 percent solid waste diversion target by 2020. | Solid Waste |
| State | Pavley Clean Car Standards | Establishes GHG emission reduction standards for model years 2009 through 2016 that are more stringent than federal CAFE standards. | On-Road Vehicles |
| State | Advanced Clean Car Standards | Establishes GHG emission reduction standards for model years 2017 through 2025 that are more stringent than federal CAFE standards. | On-Road Vehicles |
| State | SBX7-7 | Requires a 20 percent reduction in per capita water usage by 2020. | Water |
| Federal | Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles | Establishes fuel efficiency standards for medium- and heavy-duty engines and vehicles. | On-Road Vehicles |

Notes: AB = Assembly Bill; CAFE = Corporate Average Fuel Economy; CEC = California Energy Commission; EPA = Environmental Protection Agency; GHG = greenhouse gas; RPS = Renewable Portfolio Standard; SB = Senate Bill; VMT = vehicle miles traveled. Source: Ascent Environmental 2019.




*Notes: BAU = Business-As-Usual; ABAU = Legislative-Adujsted Business-As-Usual; GHG = greenhouse gas; $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.*

**Figure 1 Business-As-Usual and Legislative-Adjusted Business-As-Usual Emissions Forecasts**

Emission forecasts under the legislative-adjusted BAU forecast scenario are detailed for each sector and discussed below.

### 2.1.2 Building Energy

Emissions from future electricity and natural gas use were estimated by multiplying anticipated energy use with forecasted emission factors. Future energy use was forecasted in three parts. First, energy use was scaled by growth factors detailed in Table 2. Second, energy emission factors were adjusted to reflect California's Renewables Portfolio Standard (RPS) targets. Electricity emission factors are anticipated to decline based on current regulations, while natural gas emission factors stay constant. Third, energy intensity factors were adjusted to reflect increased stringency expected under California's Title 24 building energy efficiency standards (i.e., 2019 standards which will go into effect on January 1, 2020) and are expected to achieve decreases in electricity and natural gas consumption in new construction. The residential building sector also accounts for emissions associated with residential electric vehicle (EV) charging which takes into account the percentage of VMT in future years based on projections in EMFAC 2017. The assumptions to energy efficiency and future electricity emission factors are described below. Table 7 summarizes the legislative factors used to scale building use by energy type.

**Table 7 Building Energy Emissions Forecast Methods and Legislative Reductions by Source**

| Energy Type | Forecast Methods | |
|---|---|---|
| | Scale Factor | Applied Legislative Reductions |
| Electricity | Population growth for residential building energy; job growth for commercial/industrial building energy. | RPS achieved and scheduled targets (i.e., 33 percent renewable by 2020, 60 percent renewable by 2030, 100 percent renewable or zero-carbon by 2045) applied to SCE's emission factors. Accounts for 2016 to 2019 Title 24 energy efficiency gains in new construction. |
| Natural Gas | Population growth for residential building energy; job growth for commercial/industrial building energy. | Accounts for 2016 to 2019 Title 24 energy efficiency gains in new construction. |

Notes: RPS = Renewable Portfolio Standard; SCE= Southern California Edison
Source: Ascent Environmental 2019.

## RESIDENTIAL BUILDING ENERGY

Between 2016 and 2035, electricity and natural gas emissions from residential buildings would increase by 5 percent from 114,112 to 116,927 $MTCO_2e$ per year with legislative adjustments. Table 8 shows the baseline and legislative-adjusted BAU forecasted emissions from the residential building energy sector by energy type for 2016, 2020, 2030, 2035, and 2050.

**Table 8 Residential Building Energy Legislative-Adjusted Business-As-Usual Emissions Forecasts (2016-2050) ($MTCO_2e$/year)**

| Energy Type | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Electricity (Associated with Residential EV Charging) | 64 | 293 | 962 | 1,228 | 0 |
| Electricity | 29,849 | 26,372 | 16,514 | 16,928 | 0 |
| Natural Gas | 84,199 | 87,515 | 96,389 | 101,158 | 116,927 |
| **Total Residential Building Energy Emissions** | **114,112** | **114,180** | **113,865** | **119,314** | **116,927** |

Notes: Totals may not add due to rounding. $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

## COMMERCIAL AND INDUSTRIAL BUILDING ENERGY

Between 2016 and 2035, electricity and natural gas emissions from commercial and industrial buildings would increase by 58 percent from 42,489 to 65,391 $MTCO_2e$ per year with legislative adjustments. Table 9 shows the baseline and legislative-adjusted BAU forecasted emissions for the commercial and industrial building energy sector by energy type for 2016, 2020, 2030, 2035, and 2050.

**Table 9 Commercial and Industrial Building Energy Legislative-Adjusted Business-As-Usual Emissions Forecasts (2016-2050) ($MTCO_2e$/year)**

| Energy Type | | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|---|
| Commercial Energy | Electricity | 17,651 | 17,170 | 11,804 | 12,898 | 0 |
| | Natural Gas | 20,660 | 24,901 | 39,715 | 50,156 | 101,023 |
| Industrial Energy | Electricity | 4,124 | 4,208 | 3,285 | 3,829 | 0 |
| | Natural Gas | 54 | 66 | 105 | 132 | 266 |
| Total Commercial and Industrial Building Energy Emissions | | **42,489** | **46,345** | **54,908** | **67,015** | **101,289** |

Notes: Totals may not add due to rounding.
$MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

### ELECTRICITY EMISSION FACTORS

Electricity emissions from the building energy sector would see declines through 2045 without additional City action, despite growth, due to State measures already in place. Electricity emission factors for carbon dioxide equivalent ($CO_2e$) are based on Southern California Edison's (SCE) emission factor reported for 2016 (SCE 2016). California utility providers, including SCE, are scheduled to reach a 33 percent renewable electricity generation mix by 2020 and 60 percent by 2030, and 100 percent by 2045 pursuant to statewide implementation of the RPS and 100 percent electricity from renewable or zero-carbon sources pursuant to SB 100. SCE's 2016 emission factor was 0.24 metric tons of $CO_2$ per megawatt hour of electricity generated ($MTCO_2e$/MWh). By 2030, the emission factor will be 0.060 $MTCO_2e$/MWh. Consistent with SB 100, it was assumed that SCE would generate 100 percent of its electricity from renewable sources by 2045. For the purposes of this forecast, it is assumed that SCE would continue to make progress towards achieving the 2045 zero-carbon goal after 2030 so their 2035 emissions factor would decrease to 0.045 $MTCO_2e$/MWh.

### ENERGY EFFICIENCY

The State's Title 24 Building Energy Efficiency Standards apply to both new construction and existing buildings. The 2019 Title 24 standards will go into effect in January 2020. The California Energy Commission (CEC) estimates that new residential buildings built to the 2019 standards would be 53 percent more efficient than residential buildings built to the previous standards (CEC 2015). CEC estimates that new non-residential built to the 2019 standards would be 30 percent more efficient than non-residential buildings built to the previous standards (CEC 2018).

## 2.1.3 Water and Wastewater

Between 2016 and 2035, water- and wastewater-related emissions from the City would decrease by 34 percent from 2,275 to 1,479 $MTCO_2e$ per year. This change reflects an increase in water consumption and wastewater generation with lower electricity factors related to the 2020, 2030, and 2045 RPS targets, consistent with SB 100 legislative actions described above, as well as a 20 percent water efficiency reduction, consistent with SBX7-7. Table 10 summarizes the legislative reductions used to forecast water and wastewater emissions.

**Table 10 Water and Wastewater Forecast Methods and Legislative Reductions by Source**

| Source | Forecast Methods | |
|---|---|---|
| | Scale Factor | Applied Legislative Reductions |
| Water Consumption | Population growth. | Assumes electricity use for pumping, conveyance, and treatment follow the 2020, 2030, and 2045 RPS and zero-carbon schedule. Assumes a 20 percent reduction in water-related energy due to 20 percent reduction in water usage per requirements of SBX7-7. |
| Wastewater Treatment | Population growth. | Assumes electricity use for pumping, conveyance, and treatment follow the 2020, 2030, and 2045 RPS and zero-carbon schedule. Assumes a 20 percent reduction in wastewater-related energy due to 20 percent reduction in water usage per requirements of SBX7-7. |

Notes: RPS = Renewable Portfolio Standard.
Source: Ascent Environmental 2019.

Table 11 shows the baseline and legislative-adjusted BAU forecasted emissions from water- and wastewater-related sources for 2016, 2020, 2030, 2035, and 2050. Population growth rates and electricity emission factors are detailed in Table 3 and Section 1.2.1.

**Table 11 Water and Wastewater Legislative-Adjusted Business-As-Usual Emissions Forecasts (2016-2050) ($MTCO_2e$/year)**

| Activity | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Water-Related | 1,605 | 1,242 | 817 | 643 | 0 |
| Wastewater Treatment | 670 | 674 | 593 | 565 | 456 |
| **Total Water and Wastewater Emissions** | **2,275** | **1,916** | **1,410** | **1,208** | **456** |

Notes: Totals may not add due to rounding.
$MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

## 2.1.4 Solid Waste

Between 2016 and 2030, solid waste emissions generated from the City would increase by two percent from 40,038 to 39,356 $MTCO_2e$ per year with legislative adjustments applied. Table 12 summarizes the legislative reductions used to forecast emissions from the solid waste sector.

**Table 12 Solid Waste Forecast Methods and Legislative Reductions by Source**

| Source | Forecast Methods | |
|---|---|---|
| | Scale Factor | Applied Legislative Reductions |
| Landfill Disposal | Population growth. | Assumes California's 75 percent waste diversion goal would be achieved by 2020. |

Source: Ascent Environmental 2019.

The forecasts shown in Table 13 below account for the $CH_4$ and $CO_2$ emissions from waste decay generated annually. With respect to solid waste generation, the California Department of Resources Recycling and Recovery (CalRecycle) established a target pursuant to AB 341 (Chapter 476, Statutes of 2011) to achieve a statewide waste diversion of 75 percent by 2020, which is equivalent to a disposal rate of 2.7 pounds of waste per resident per day. The City's waste disposal tonnage, disposal rates, and disposal targets are reported to CalRecycle by year. Emission forecasts for this sector assume the City will achieve a disposal rate of 2.7 pounds of waste per resident per day and would remain constant after 2020 through 2050.

Table 13 shows the baseline and legislative-adjusted BAU forecasted emissions from the solid waste sector for 2016, 2020, 2030, 2035, and 2050.

**Table 13 Solid Waste Legislative-Adjusted Business-As-Usual Emissions Forecasts (2016-2050) ($MTCO_2e$/year)**

| Activity | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Total Solid Waste Emissions | 40,038 | 34,182 | 37,501 | 39,356 | 45,491 |

Notes: Totals may not add due to rounding.
$MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

## 2.1.5 Transportation

### ON-ROAD VEHICLES

Between 2016 and 2035, GHG emissions from on-road vehicles would increase by approximately 14 percent from 679,920 to 585,860 $MTCO_2e$ per year, accounting for an increase in total VMT of 33 percent, and future vehicle emission factors modeled in the California Air Resources Board's (CARB's) Emission Factor (EMFAC) 2017 model. With respect to the legislative adjustments included in this forecast, State and federal policies and associated regulations incorporated in the on-road vehicle sector include the Pavley Clean Car Standards, Advanced Clean Car Standards, and fuel efficiency standards for medium- and heavy-duty vehicles. These standards are included in EMFAC's emission factor estimates and forecasts. The Low Carbon Fuel Standard was excluded in EMFAC 2017 forecasts because most of the emission benefits originate from upstream fuel production and do not directly reduce emissions in the City's GHG inventory or forecasts. Table 14 summarizes the legislative reductions used to forecast on-road vehicle emissions.

**Table 14 On-Road Vehicles Forecast Methods and Legislative Reductions by Source**

| Source | Forecast Methods | |
|---|---|---|
| | Scale Factor | Applied Legislative Reductions |
| On-Road Vehicles | VMT estimates provided by VRPA. | EMFAC emission factor considerations include ACC, Pavley, and fuel efficiency standards for medium- and heavy-duty vehicles. |

Notes: VMT = vehicle miles traveled; EMFAC = California Air Resources Board's EMisson FACtor model; ACC = Advanced Clean Cars; Pavley = Pavley Clean Car Standards.

Source: Ascent Environmental 2019.

Table 15 shows the baseline and legislative-adjusted BAU forecasted emissions from on-road vehicles for 2016, 2020, 2030, 2035, and 2050.

**Table 15 On-Road Vehicles Legislative-Adjusted Business-As-Usual Emissions Forecasts (2016-2050) ($MTCO_2e$/year)**

| Source | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| On-Road Vehicles | 679,920 | 669,154 | 592,254 | 585,860 | 591,645 |

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

### OFF-ROAD VEHICLES

Between 2016 and 2035, emissions associated with off-road vehicles used in the city would increase by 43 percent from 11,741 to 16,755 $MTCO_2e$ per year. Table 16 shows the baseline and legislative-adjusted BAU forecasted emissions from the off-road vehicle sector for 2016, 2020, 2030, 2035, and 2050.

**Table 16 Off-Road Vehicles Legislative-Adjusted Business-As-Usual Emissions Forecasts (2016-2050) ($MTCO_2e$/year)**

| Source | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| Off-Road Vehicles | 11,741 | 12,580 | 15,237 | 16,755 | 19,781 |

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

### 2.1.6 Discussion

As discussed above and shown in Figure 1 and Table 5, the City's legislative-adjusted BAU emissions would decrease by two percent between 2016 and 2020. This is a result of anticipated growth, despite reductions that would result from the following:

- A greater renewable mix in California's electricity supply (33 percent by 2020);
- Building energy efficiency through compliance with 2019 Title 24 standards (53 percent energy reduction for residential, 30 percent for non-residential);
- Water consumption reduction of 20 percent by 2020 through compliance with SBX7-7;
- Reductions in on-road vehicle emission factors forecasted in EMFAC 2017; and
- Achieving the waste diversion goal of 75 percent, pursuant to AB 341.

From 2020 to 2035, the City's legislative-adjusted BAU emissions would decrease by 3 percent. This is a result of anticipated growth, despite reductions that would result from the following:

- A greater renewable mix in California's electricity supply (60 percent by 2030);
- Building energy efficiency through compliance with 2019 Title 24 standards (53 percent energy reduction for residential, 30 percent for non-residential);
- Water consumption reduction of 20 percent by 2020 through compliance with SBX7-7;
- Reductions in on-road vehicle emission factors forecasted in EMFAC 2017; and
- Maintaining waste diversion goal of 75 percent, pursuant to AB 341.

From 2030 to 2050, new or updated legislative actions that might be put into place by the State or federal government are not known at this time. Thus, the City's projected growth would outpace reductions from existing legislative actions. The main legislative reductions beyond 2030 known at this time would come from SB 100's target of 100 percent of electricity from renewable or zero-carbon sources by 2045 for all electricity providers. Other minor additional reductions would be in forecasted improvements in vehicle fuel economy and increased VMT share of EVs (3.3 percent of vehicles in Riverside County by 2050), as estimated in the EMFAC 2017 model. Existing legislative actions that reduce emissions are assumed to continue to apply from 2030 to 2050 but would not outpace projected growth in population and jobs in that timeframe.

# 3 GREENHOUSE GAS EMISSION REDUCTION TARGETS

## 3.1 REDUCTION TARGETS

As directed in AB 32, SB 32, EO B-30-15, EO S-3-05, and CARB's 2017 Climate Change Scoping Plan (Scoping Plan), the State aims to reduce statewide annual GHG emissions to:

- 1990 levels by 2020 (per AB 32);
- 40 percent below 1990 levels by 2030 (per SB 32 and EO B-30-15); and
- 80 percent below 1990 levels by 2050 (per EO S-3-05).

Because the necessary data are not available to estimate the City's 1990 emission levels, proportional targets for the CAP Update were developed that express the level of GHG emissions reductions that would be needed locally between 2016 and future target years to demonstrate consistency with statewide targets. As stated above, CARB aims to reduce statewide emissions to 1990 levels by 2020, 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050, per AB 32, SB 32, and EO B-30-15. However, without a 1990 baseline for the City, the State's targets are translated to be in relation to the State's 2016 emission inventory. This inventory update for 2016 was undertaken due to the availability of higher quality data and the evolution of data collection and emissions quantification methods.

CARB's *2017 Climate Change Scoping Plan* recommends that to be consistent with this statewide goal, local jurisdictions should emit no more than 6 MT $CO_2e$ per capita by 2030 and 2 MT $CO_2e$ per capita by 2050. According to CARB, these per-capita targets are consistent with the State's GHG reduction goals because, when applied to DOF's population forecasts for the state, the per-capita targets reflect a 40 percent reduction in statewide emissions from 1990 levels by 2030 and an 80 percent reduction in statewide emissions from 1990 levels by 2050. These targets are equivalent to the state emitting no more than 265 million MT $CO_2e$ by 2030 and 100 million MT $CO_2e$ by 2050.

According to the inventories available from CARB, Statewide emissions from all sectors were approximately 431 million MTCO2e (MMTCO2e) in 1990 and 429 MMTCO2e in 2016 (CARB 2018). Thus, 2016 Statewide emissions were 2 MMTCO2e (0.37 percent) less than the 1990 level and the State's 2020 GHG target. Consequently, no further reductions from 2016 emissions levels are needed to reach the 2020 target of returning emissions to 1990 levels. Because 2016 emissions are essentially equal to the 1990 emissions level, reduction percentages from 2016 levels needed to meet the State's 2030 and 2050 goals are equivalent to the reductions percentages when measured against 1990 levels: 40 percent by 2030 and 80 percent by 2050. Thus, the post-2020 target for the City that is consistent with the State's goals would be to reduce the City's emissions by 40 percent below 2016 levels by 2030 and 80 percent below 2016 levels by 2050. A 2035 target would be established based on interpolation of the 2030 and 2050 targets.

In order to stay consistent with the State's targets and to account for the City's 2016 inventory, the City's percent-based GHG reduction targets are matched with the state-level reduction targets relative to a 2016 baseline. The GHG emissions reduction targets for the City have been developed using the methodology explained above and shown in Table 17.

The following recommended GHG reduction targets would reduce the City's annual GHG emissions consistent with the State's GHG reduction targets:

- 2020 target: no reductions required;
- 2030 target: 40 percent below 2016 levels (542,686 MTCO2e);
- 2035 target: 50 percent below 2016 levels (452,238 MTCO2e); and
- 2050 target: 80 percent below 2016 levels (180,895 MTCO2e).

**Table 17 City of Murrieta Emissions Forecasts and Targets (MT $CO_2e$/yr)**

| | 2016 | 2020 | 2030 | 2035 | 2050 |
|---|---|---|---|---|---|
| BAU Forecast | 900,280 | 900,280 | 963,647 | 1,133,343 | 1,573,729 |
| Percent Change from 2016 | | 7% | 26% | 36% | 75% |
| ABAU Forecast | 900,280 | 900,280 | 878,357 | 815,174 | 875,589 |
| Percent Change from 2016 | | N/A | -9% | -9% | -3% |
| State Reduction Target (percent change from 2016) | | -2%[1] | 40% | 50% | 80% |
| Target Emissions | | N/A | 542,686 | 452,238[2] | 180,895 |
| Reductions Needed from ABAU Forecast | | 3,917 | 272,488 | 368,549 | 694,694 |

Notes: ABAU = legislative-adjusted business-as-usual, BAU = business-as-usual, $CO_2e$ = carbon dioxide equivalents, N/A = Not Available, MT = metric tons

[1] Based on the State's GHG inventory in 1990 and 2016. (CARB 2018).

[2] Interpolated between 2030 and 2050.

Source: Ascent Environmental 2019.

Figure 2 depicts the baseline and legislative-adjusted BAU GHG emission forecasts by sector, as distinguished by colored wedges. The sum of the wedges represents anticipated annual GHG emissions each year. Each wedge shows how an emissions sector is expected to contribute to the City's annual inventory over time. The black line indicates the recommended GHG reduction targets for 2030, 2035 and the longer-term goal for 2050. The additional reductions needed to meet these target to close the expected "gap" between the expected ABAU emission levels and the recommended targets are also apparent in Figure 2. While advances in new technologies and new State policy strategies may allow for additional reductions in the future, legislative reductions that may occur past 2030 are currently unknown. Additionally, many of the State's strategies outlined in the 2017 Scoping Plan either have not yet been implemented or sufficient detail regarding the timing and estimated effectiveness of implementation is not yet available.

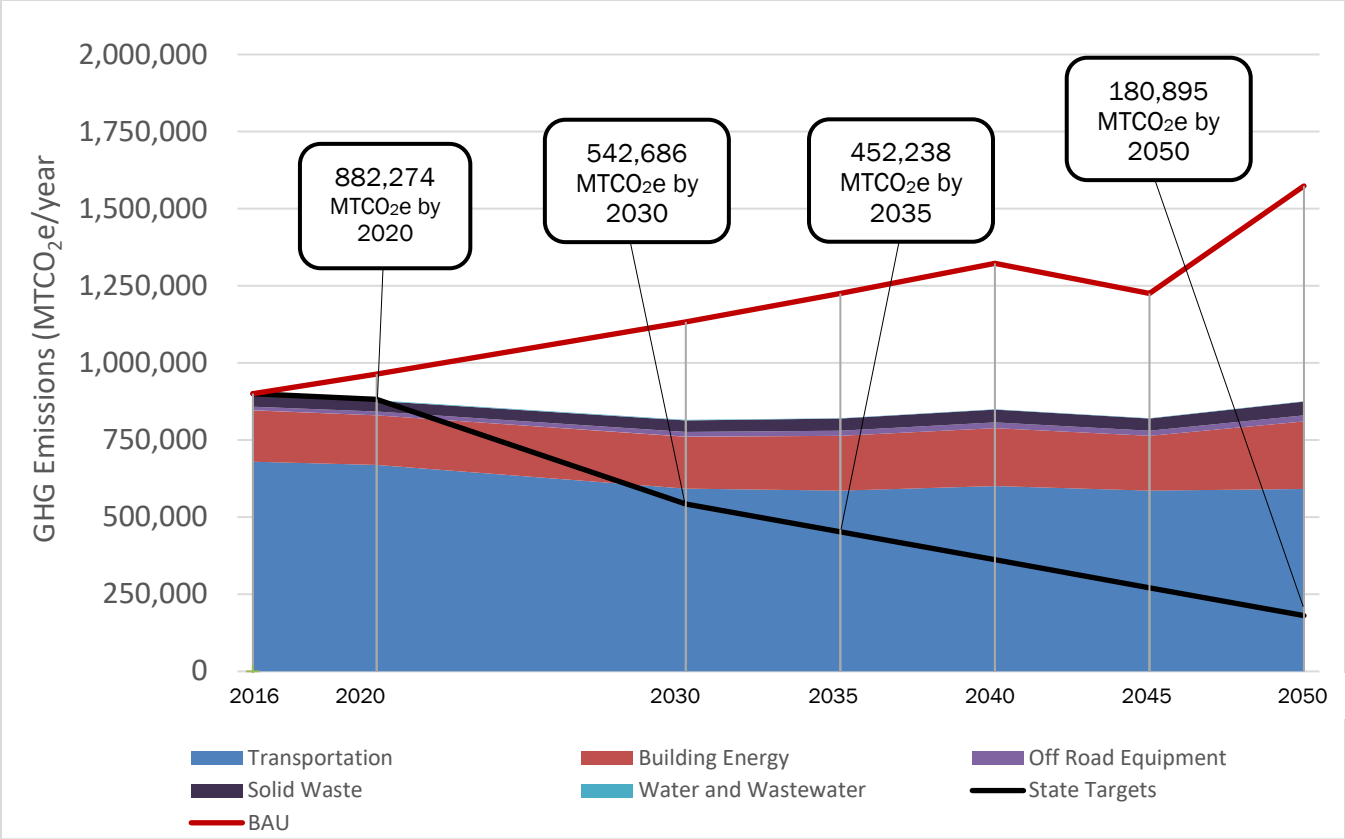



**Figure 2 Legislative-Adjusted Business-As-Usual Forecast Emissions by Sector and Recommended Emission Reduction Targets: 2030, 2035, and 2050**

A recent California Appellate Court decision, Cleveland National Forest Foundation v. San Diego Association of Governments (November 24, 2014) 231 Cal.App.4th 1056, examined whether EO S-3-05 should be viewed as having the equivalent force of a legislative mandate for specific emissions reductions. The case was reviewed by the California Supreme Court in January 2017 and a decision was released on July 13, 2017. The California Supreme Court ruled that SANDAG did not abuse its discretion by declining to adopt EO S-3-05 as a measure of significance for the specific GHG reduction target years, especially in analyzing the significance of impacts in 2050. Despite this, the California Supreme Court cautioned that future analyses may have a greater capacity to analyze impacts through 2050 and would be required to perform those analyses if that capacity is achievable. Thus, in addition to the other emission reduction targets set in the CAP, the CAP may include analysis of longer-term trends in view of the State's longer-term 2050 goal, as 2050 goals were established in EOs B-30-15 and S-3-05 and referenced in the 2017 Scoping Plan (CARB 2017:99).

# 4 NEXT STEPS: GHG REDUCTION MEASURES AND GAP ANALYSIS

## GREENHOUSE GAS EMISSIONS REDUCTIONS

As discussed in Section 3, while legislative reductions would reduce future emissions and achieve the 2020 GHG reduction target, additional GHG reductions are needed to achieve the recommended GHG reduction targets and goals for 2030, 2035, and 2050.

The 2017 Scoping Plan relies on local action to help achieve statewide GHG reduction targets. As stated in the Scoping Plan, "local efforts can deliver substantial additional GHG and criteria emissions reductions beyond what State policy alone can do, and these efforts will sometimes be more cost-effective and provide more co-benefits than relying exclusively on top-down statewide regulations to achieve the State's climate stabilization goals" (CARB 2017:97). As shown in Table 17 and Figure 2, while the City will not need to reduce emissions to achieve the 2020 target, the GHG reductions required to meet the later targets will require a set of reduction measures with a particular focus on the larger emissions sectors of on-road transportation and building energy.

Next steps in the climate action planning process include (1) working with the City to decide which targets to include in the CAP and (2) developing a set of GHG reduction measures to be included in the CAP that can effectively reduce GHG emissions from the various sectors to achieve the targets established for the CAP.

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# APPENDIX B
# Final Technical Memorandum: Gap Analysis and Greenhouse Gas Reduction Measure Calculations

# Memo

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**Date:** November 1, 2019

**To:** Jarrett Ramaiya and Carl Stiehl, City of Murrieta

**From:** Kai Lord-Farmer and Poonam Boparai

**Subject:** City of Murrieta Climate Action Plan Update – Updated Gap Analysis

## INTRODUCTION

This memo provides an analysis of annual GHG reductions that would be achieved through the list of Climate Action Plan (CAP) measures that have been discussed with City of Murrieta staff. Table 1 includes a summary of the total GHG reductions achieved through the measures, the proportion of the GHG reduction gap being met by these measures, and additional GHG reductions needed to achieve citywide targets consistent with the State's GHG reduction goals for 2030 and 2050. Table 2 includes the list of GHG reduction measures as well as the GHG reduction potential of each measure for the years 2030, 2035 (General Plan buildout year), and 2050. Table 3 describes the assumptions used to quantify each measure and includes target performance metrics that must be achieved to reduce GHG emissions in line with the City's 2030 and 2035 targets. Many of the performance metrics increase between 2030 and 2035 to achieve the City's 2035 target.

The memo serves as the final analysis of the GHG reduction potential of the list of CAP measures to achieve the City's 2030 and 2035 targets. As shown in Table 1, the City's GHG emissions targets would be achieved for 2030 and 2035 through the set of measures developed for the CAP. The CAP measures work to achieve the reductions necessary to meet the 2030 and 2035 targets while making progress towards the 2050 target. Over the coming decades, new innovations and technologies are anticipated to become available that will enable further GHG reductions and make additional progress towards the 2050 GHG reduction goal. New methods may also become available to quantify measures that are currently unquantifiable. In addition, future federal and State regulations could further reduce emissions in sectors currently addressed primarily by local City measures.

**Table 1 City of Murrieta CAP GHG Reduction Gap Analysis (MT $CO_2e$)**

| Metric | 2030 | 2035 | 2050 |
|---|---|---|---|
| BAU Forecast | 1,133,343 | 1,225,130 | 1,573,729 |
| Total ABAU Forecast | 815,174 | 820,787 | 875,589 |
| City Emissions Targets to achieve consistency with State Targets | 542,686 | 452,238 | 180,895 |
| Mass Emissions Reduction Target | 272,488 | 368,549 | 694,694 |
| Total Reductions from Measures | 273,748 | 377,521 | 542,447 |
| Remaining GHG Reduction Gap | (1,260) | (8,972) | 152,246 |
| Percentage of gap achieved through Measures | 100% | 102% | 78% |

Notes: Totals may not add due to rounding.
BAU = Business-as-Usual
ABAU = Adjusted-Business-as-Usual
$MTCO_2e$ = metric tons of carbon dioxide equivalent.
Source: Data compiled by Ascent Environmental in 2019.

**Table 2 City of Murrieta CAP GHG Reduction Measures**

| Measure # | Sector | Measure Title | Description | GHG Reductions (MT $CO_2e$/yr) | | |
|---|---|---|---|---|---|---|
| | | | | 2030 | 2035 | 2050 |
| BE-1 | Building Energy | Community Renewable Energy | The City shall create or join a Community Choice Aggregation (CCA) program or create a partnership with SoCal Edison's off-site renewable energy programs (i.e., Green Rate Program), which allows building renters and owners to opt into cleaner electricity sources. | 28,306 | 22,210 | 0 |
| BE-2 | Building Energy | Municipal Renewable Energy | Develop renewable energy generation systems on City-owned property for use in municipal operations. | 26 | 39 | 0 |
| BE-3 | Building Energy | Zero Net Energy Standard | Phase in Zero Net Energy Standard for residential developments by 2030 and nonresidential development by 2035<br>- Develop and adopt a Zero Net Energy Standard for residential and nonresidential development by 2025<br>- Begin phase-in of standard beginning in 2025 with standard applying to residential land uses and large nonresidential projects<br>- Fully phase in Zero Net Energy Standard by 2030, requiring all new residential and commercial projects to comply with Zero Net Energy Standard<br>- Fully phase in Zero Net Energy Standard by 2035, requiring all new industrial projects to comply with Zero Net Energy Standard | 24,659 | 50,094 | 113,303 |
| BE-4 | Building Energy | Energy Efficiency and Electrification Program | Work with WRCOG's Western Riverside Energy Partnership to develop and implement a comprehensive electrification and energy efficiency retrofit program focused on the reduction of natural gas use in existing residential and commercial land uses. The program would include the goal of reducing natural gas in existing residential and nonresidential land uses 20% by 2030.<br>- The program would include but not limited to strategies focused on reductions from:<br>o Pool-related energy use (e.g., pool cover rebate program)<br>o Electrification retrofits for natural gas appliances in existing residential and commercial land uses (i.e., hot water heaters, cooktops, heating systems) | 33,664 | 50,800 | 79,757 |
| LU-1 | Land Use | Jobs-Housing Balance Strategy | Encourage flexibility in land use regulations to respond to requirements of new and emerging business and industry types to help create sustainable jobs-housing balance. | 10,373 | 10,418 | 12,261 |
| LU-2 | Land Use | Tree Planting Program | Develop a tree planting program to plant trees throughout the City to increase carbon sequestration. | 6,301 | 12,956 | 19,612 |
| LU-3 | Land Use | Open Space Conservation | Work with the Western Riverside Regional Conservation Authority (RCA) and the Center for Natural Lands Management to implement land use conservation programs for the City. The program would include a minimum acreage of land preserved through conservation easements and, therefore, would not be permitted for future development. | 16,095 | 18,240 | 20,385 |

| | | | | | | |
|---|---|---|---|---|---|---|
| T-1 | Transportation | EV Programs | Increase electric vehicles and alternative fuel vehicles to 21% of the City's vehicle mix by 2030 and 23% by 2035 by incentivizing EV purchases and promoting EV ownership for residents and businesses. | 82,205 | 87,335 | 120,574 |
| T-2 | Transportation | EV Programs | Adopt an electric vehicle (EV) charging station ordinance that requires the following for new development:<br>- Installation of one EV charger per single-family housing unit; and<br>- Six percent of total parking spaces require EV charger infrastructure installation for new multi-family projects<br>- Three percent of total parking spaces require EV charger installation for new nonresidential projects | See T-1 | See T-1 | See T-1 |
| T-3 | Transportation | TOD Affordable Housing Program | Prioritize mixed-use and transit-oriented affordable housing projects to achieve the City's affordable housing targets in the SCAG Regional Housing Needs Assessment. | 5,036 | 5,572 | 7,670 |
| T-4 | Transportation | Murrieta Bike Network | Increase the City's bike and pedestrian infrastructure, including implementing the Downtown Murrieta Bike Network, developing comprehensive bike parking standards, and increasing the total percentage of City streets that include bike lanes throughout the City. | 367 | 120 | 0 |
| T-5 | Transportation | Traffic Signalization | Improve traffic flow and reduce traffic congestion by implementing a comprehensive traffic signalization synchronization and update. | 1,213 | 1,265 | 1,500 |
| T-6 | Transportation | Traffic Calming Program | Implement a traffic calming measure program to increase the percentage of City streets and intersections with calming traffic measures. | 890 | 929 | 3,306 |
| T-7 | Transportation | Transportation Demand Management Program | Implement a Citywide TDM Program to reduce communitywide VMT<br>1. Update Development Code to require employers with 50 or more employees to implement commute trip reduction programs.<br>Commute Trip Reduction Programs voluntary for employees include:<br>- Alternative modes of commuting incentive program (e.g., walking, biking, etc.);<br>- Ride-sharing and preferential parking;<br>- Discounted transit fee program; or<br>- Telecommuting or alternative work schedules<br>2. Implement a comprehensive ridesharing program targeted at residents working in neighboring cities and long-distance commuters (i.e., San Diego, Los Angeles).<br>3. Monitor progress annually on TDM program to measure progress towards achieving a nine percent reduction in VMT by 2030 and an 11 percent reduction by 2035. | 8,954 | 11,416 | 18,373 |
| T-8 | Transportation | Transit Network | Work with RTA and WRCOG to expand the transit network in the City and increase service frequency with a priority on expanding services to neighboring cities where Murrieta residents work. | 8,659 | 21,555 | 25,145 |
| T-9 | Transportation | GHG Fee Program | Develop and implement a no-net-increase in GHG emissions threshold for new development projects in the City and develop a GHG Fee Program to offset remaining GHG emissions from new development that cannot | 41,357 | 76,481 | 108,756 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | be achieved through project design features or other CAP measures. As part of implementation of this measure, the City shall:<br>- Adopt a set of strategies to reduce GHG emissions from new development through project-specific mitigation measures (See Implementation Descriptions below for suggestion of potential strategies.)<br>- Develop a process in which the remainder of emissions that cannot be reduced through project-specific measures shall be quantified and offset through a combination of a local emissions offset program to be set up by the City and other offset registry programs(See Implementation Descriptions below for a description of the local emissions offset program.) | | | |
| SW-1 | Solid Waste | Waste Reduction Program | Encourage recycling or the re-use of materials to reduce the amount of solid waste generated within the City with the goal of achieving a 90% waste diversion rate by 2035. | 4,583 | 7,215 | 11,120 |
| SW-2 | Solid Waste | Construction Waste Diversion | Require all construction projects to exceed CalGreen construction waste diversion requirements by 15 percent. | 998 | 827 | 686 |
| WW-1 | Water | Landscaping and Water Conservation Program | Reduce outdoor water use by 10% at residential, commercial, and public properties by installing efficient irrigation systems and plants with lower watering needs. | 55 | 44 | 0 |
| WW-2 | Water | Rainwater Catchment Program | Encourage property owners to recycle water with rainwater catchment and greywater systems in existing and new developments. | 5 | 4 | 0 |

**Notes:** $MTCO_2e$ = metric tons of carbon dioxide equivalent.
**Source:** Ascent Environmental 2019.

**Table 3 City of Murrieta CAP GHG Reduction Measure Assumptions and Target Metrics**

| Measure # | Sector | Measure Title | Metric Assumptions | Metric Unit | Measure Target Metrics | | |
|---|---|---|---|---|---|---|---|
| | | | | | 2030 | 2035 | 2050 |
| BE-1 | Building Energy | Community Renewable Energy | This measure assumes that the City of Murrieta joins the Western Community Energy. Based on estimates from the CCA feasibility study conducted for Western Community Energy, the measure assumes that 95% of existing and new residential customers opt-in to the CCA and 90% of existing and new nonresidential uses opt-in to the CCA. The measure assumes that customers that do opt-in choose the 100% renewable energy option. Based on other CCAs in California, this is a conservative opt-in rate. | kWh purchased under CCA | 468,029,462 | 478,212,825 | 555,867,016 |
| | | | | Residential Opt-In Rate | 95% | 95% | 95% |
| | | | | Nonresidential Opt-In Rate | 90% | 90% | 90% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Assumed renewable energy mix for CCA customers | 100% | 100% | 100% |
| BE-2 | Building Energy | Municipal Renewable Energy | The measure assumes that the City begins to develop photovoltaic systems on City buildings and property over the next ten years and beyond. The measure assumes that the City offsets 100% of its GHG emissions associated with electricity by 2035 through a combination of on-site solar systems and participation in the CCA. | kWh generated from City Solar Systems | 410,289 | 820,577 | 820,577 |
| BE-3 | Building Energy | Zero Net Energy Standard | This measure assumes that the City begins to develop a Zero Net Energy standard, which is finalized and adopted by 2025. The measure assumes that 75% of residential units and 65% of commercial square footage developed between 2020 and 2030 would comply with the ZNE standard. The measure assumes that 100% of residential units, 100% of commercial projects, and 50% of industrial projects developed between 2030 and 2035 would comply with the ZNE standard beyond 2030, and 100% of industrial projects would comply with the ZNE standard by 2035. | Consumption avoided through ZNE Standard (kWh) | 51,356,672 | 92,086,377 | 191,901,119 |
| | | | | Consumption avoided through ZNE Standard (Therms) | 3,179,444 | 6,858,463 | 16,713,800 |
| | | | | New residential units using ZNE Standard | 75% | 100% | 100% |
| | | | | New commercial sq. ft. developed using ZNE Standard | 65% | 100% | 100% |
| | | | | New industrial Sq. Ft. developed using ZNE Standard | 50% | 50% | 100% |
| BE-4 | Building Energy | Energy Efficiency and Electrification Program | This measure assumes that the City will develop and implement a comprehensive energy efficiency retrofit and appliance electrification program, focused on reducing natural gas use in existing land uses through appliance upgrades, weatherization upgrades, and other energy efficiency measures. | Percent reduction in natural gas use in existing residential, commercial, and industrial land uses | 20% | 25% | 25% |
| LU-1 | Land Use | Jobs-Housing Balance Strategy | This measure assumes the number of jobs within the City and within a 30-mile radius of the City increases in the future and therefore results in commute-related VMT reductions for residents. | Percent increase in jobs available within a 30-mile radius | 30% | 35% | 35% |
| LU-2 | Land Use | Tree Planting Program | This measure assumes the City develops a program to plant trees for carbon sequestration and other co-benefits, planting an assumed average number of trees per year. | Average number of trees planted per year | 750 | 800 | 800 |
| LU-2 | Land Use | Open Space Conservation | This measure assumes that a certain number of acres in the City limits is preserved as open space resulting in carbon sequestration. The measure assumes that this land would otherwise be cleared for development and, if done, would result in a net decrease in sequestration potential. | Number of acres preserved | 200 | 150 | 150 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| T-1 | Transportation | EV Programs | This measure assumes that through the City's efforts to incentivize EV adoption among residents, the percentage of EV and Zero Emissions Vehicles (ZEVs) increase in the City to above levels that are already projected to occur under a ABAU scenario. | Percentage of citywide vehicle mix that are EVs or ZEVs | 21% | 23% | 31% |
| T-2 | Transportation | EV Programs | This measure assumes that the City will adopt an ordinance that requires new development to have a certain level of EV infrastructure in place as part of the project. The reductions achieved from this measure is combined with T-1. | Percent of new SFU with charging stations | 100% | 100% | 100% |
| | | | | Percent of new MFU parking spaces with charging stations | 6% | 6% | 6% |
| | | | | Percent of parking spaces in nonresidential land uses with charging stations | 3% | 3% | 3% |
| T-3 | Transportation | TOD Affordable Housing Program Murrieta Bike Network Traffic Signalization | This measure assumes that the City focuses on developing mixed-use, transit-oriented affordable housing projects in the future. The measure assumes that the City locates these projects in areas that encourage trips made by walking, biking, and transit and keeps pace with City's Regional Housing Needs Assessment goals for affordable housing units in the City. | Number of transit-oriented affordable housing units built | 1,573 | 787 | 2,360 |
| T-4 | Transportation | Murrieta Bike Network | This measure assumes that the City continues to develop the City's bike network, and the percentage of streets in Murrieta with bike lanes continues to increase over time. | Percent of citywide street length with bike lanes | 19% | 38% | 51% |
| T-5 | Transportation | Traffic Signalization | This measure assumes the City conducts a comprehensive upgrade of the traffic signal system to improve traffic flow and relieve traffic congestion, particularly during periods of commute congestion periods. This measure assumes that fuel consumption associated with commute-related VMT in the City will decrease by 9% as a result of improving traffic signalization. | Transportation fuel reduced by improving traffic signalization (Gallons of Gasoline) | 138,146 | 144,091 | 170,831 |
| T-6 | Transportation | Traffic Calming Program | This measure assumes that the City continues to implement traffic calming measures on City streets and intersections to reduce traffic speeds and reduce cut-through traffic and assumes a certain percentage of streets and intersections will include traffic calming measures by a certain year. | Percent of intersections with traffic calming improvements | 25% | 25% | 50% |
| | | | | Percent of streets with traffic calming improvements | 25% | 50% | 50% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| T-7 | Transportation | Transportation Demand Management Program | This measure assumes that the City implements a comprehensive TDM program that requires new large employers to offer TDM options and incentives to employees as well as providing commute services and support (e.g., rideshare, telework) for residents who work outside the City. The measure assumes a certain percentage of commute-related VMT reduction by target years. | Percent of commute-related VMT reduced | 9% | 11% | 15% |
| T-8 | Transportation | Transit Network | This measure assumes that the City works with RTA and other regional partners to expand the transit network in the City and increase the frequency of service of existing transit services. | Percent reduction in citywide VMT | 2.5% | 6% | 6% |
| T-9 | Transportation | GHG Fee Program | This measure assumes the City develops, as part of the City's forthcoming CAP Consistency checklist or other development review process, a program to reduce and offset GHG emissions associated with new development projects. The measure assumes emissions reductions and offsets can be tracked and quantified to ensure compliance with the measure. | Percent of project emissions reduce through program | 50% | 50% | 50% |
| SW-1 | Solid Waste | Waste Diversion | This measure assumes that the City works to meet the waste diversion targets set by CalRecycle for specific target years. The reductions associated with this measure have been included in the ABAU forecast as part of the legislative reductions. | Percent of waste diverted from landfills | 85% | 90% | 95% |
| SW-2 | Solid Waste | Construction Waste Diversion | This measure assumes that the City implements a policy, as part of the City's forthcoming CAP Consistency checklist or other development review process, to require all construction projects to exceed CalGreen construction waste diversion requirements by 15 percent. | Percent of construction waste | 65% | 65% | 65% |
| WW-1 | Water | Landscaping and Water Conservation Program | This measure assumes that City implements a policy to reduce outdoor water use from various land uses by installing efficient irrigation systems, using plants with lower watering needs, and promoting water conservation. The measure assumes that Citywide water use is reduced by a certain percent by target years. | Percent reduction in citywide water use | 10% | 10% | 10% |
| WW-2 | Water | Rainwater Catchment Program | This measure assumes that the City develops and implements a program to increase recycled water use by residents through the use of with rainwater catchment and greywater systems in existing and new developments | Percent reduction in citywide water use | 1% | 1% | 1% |

**Notes:** $MTCO_2e$ = metric tons of carbon dioxide equivalent.
kWh = kilowatt-hour; VMT= vehicle miles traveled
SFU= single-family unit; MFU= multi-family unit
**Source:** Ascent Environmental 2019.

# IMPLEMENTATION DESCRIPTIONS FOR KEY MEASURES

The following section includes a description of how key CAP measures would be implemented and specific steps that should be taken to successfully implement the measure.

## BE-1 - COMMUNITY RENEWABLE ENERGY

The Western Community Energy Program (WCE) is a program established in 2018 to implement a Community Choice Aggregation (CCA) program for jurisdictions in western Riverside County. WCE's primary objectives are to provide local control in rate-setting for customers, provide overall rates that are lower and/or competitive with those offered by SCE, expanded options for economic development, and supply an energy portfolio that will use local and/or regional renewable resources. During Phase 1, beginning in 2020, WCE anticipates serving approximately 114,000 out of 120,500 residential and nonresidential accounts. Alongside serving as an energy provider, WCE also intends to develop an energy program to provide support for WCE customers conducting energy efficiency and renewable energy-related projects. It is anticipated that these programs could help in the implementation of other CAP measures (BE-4). Details regarding the development, governance, and operations of WCE can be found here in the Western Community Energy Implementation Plan.

### Implementation Items

- Research existing CCA programs in California to understand how the programs operate and what success they have achieved.
- Work in collaboration with WRCOG and WCE to discuss the details and requirements in joining WCE, including the potential need for a feasibility study, costs and timeline for, and anticipated rates.
- Explore developing an alternative program with SCE to increase the purchase of renewable energy by residents and businesses that can achieve the GHG reductions quantified for the measure (BE-1).

## BE-2 - MUNICIPAL RENEWABLE ENERGY

Through this measure, the City has the opportunity to demonstrate leadership by developing renewable energy systems for municipal operations. By increasing the City's renewable energy generation, the City can achieve long-term cost savings and increase the resilience of the City's municipal energy supply during power outages. WRCOG's Energy Department offers support, services, and access to financing for local jurisdictions who are conducting energy efficiency and renewable energy projects at municipal facilities.

### Implementation Items

- Conduct audits at municipal facilities to quantify energy use and to identify and quantify energy efficiency and conservation opportunities.
- Based on energy audits, develop a list of energy efficiency and renewable energy projects the could be implemented as well as an implementation plan and timeline for the development of the projects.
- Identify grants, rebate and incentive programs (WRCOG program), and financing opportunities for municipal energy efficiency and renewable energy.

## BE-3 - ZERO NET ENERGY STANDARD

This measure focuses on developing a Zero Net Energy (ZNE) Standard for new residential and nonresidential projects in the City, with requirements phased in over time between 2020 and 2030. Beginning in approximately 2013, the California Energy Commission and California Public Utilities

Commission begun discussions of phasing in a ZNE standard for new construction in California. Since then, the State has been taking significant steps to phase in a standard, including the development of California's Zero Net Energy Action Plan and, most recently, the 2019 Energy Efficiency Standard Update, which requires solar installations for all single-family and low-rise multi-family homes. This measure is intended to help the City keep pace as the State moves closer to a ZNE standard for all new development and get ahead of the curve of anticipated changes to come.

### Implementation Items

- Research California's Zero Net Energy Action Plan and other ZNE resources, including other ZNE standards that have been adopted by California cities (e.g., San Jose).
- Identify potential funding opportunities, technical support, resources in helping to develop a ZNE standard for both residential and nonresidential uses.
- Develop ZNE standard and detailed timeline for implementation of the standard for different land uses.
- Identify forthcoming residential development projects that could potentially serve as a case study for early adoption of the City's ZNE standard

## BE-4 - ENERGY EFFICIENCY AND ELECTRIFICATION PROGRAM

This measure focuses on developing a comprehensive electrification and energy efficiency retrofit program focused on the reduction of natural gas use in existing residential and commercial land uses. The program would include multiple components, in collaboration with regional partners, focusing on various aspects of energy conservation, energy efficiency, and building electrification. These programs would likely include:

- An energy conservation marketing campaign to achieve energy cost savings through conservation practices and tools to help monitor and lower energy use.
- An energy efficiency assessment and retrofit program to help residents and businesses assess energy efficiency opportunities and incentives for energy efficiency upgrades.
- An appliance retrofit program focused on upgrading to all-electric appliances in existing buildings (i.e., water heaters, cooktops, heating systems, pool heating systems) but would also include energy efficient electric appliances (e.g., refrigerators, televisions).

### Implementation Items

- Work with WRCOG and WCE to discuss opportunities for collaboration and support in implementing the City's Energy Efficiency and Electrification Program including opportunities to share data and resources.
- Conduct research regarding the implementation of similar programs in other California cities and agencies. Develop an implementation timeline and plan for the development of the program with assistance from WRCOG and WCE when appropriate.
- Develop Energy Efficiency and Electrification Program and set internal targets for energy reductions that are consistent with the estimate used to quantify this measure.

## LU-1 - JOBS-HOUSING BALANCE STRATEGY

This measure is intended to support the City in achieving a sustainable jobs-housing balance by implementing strategies to attract new employers to the City and the surrounding region and, as a result, reducing commute related VMT for residents and improving quality of life. This measure requires that the City exercise flexibility in land use regulations to respond to requirements of new and emerging business and

industry types as well as ensuring the regulatory environment in the City remains attractive to large employers looking to locate in the City.

### Implementation Items

- Research strategies to update the City's development code to ensure flexibility in building standards when working with large employers who are considering locating in the City.
- Work with WRCOG, SCAG, and the Murrieta Chamber of Commerce to understand the growth population and employment characteristics in the region and opportunities to create a sustainable jobs-housing balance for residents.
- Adjust the development code and long-term nonresidential land use development strategy in the City to ensure the City is taking advantage of regional growth opportunities in key employment sectors and industries.

## T-1 AND T-2 – ELECTRIC VEHICLE PROGRAMS

This measure is focused on increasing the number of EVs and ZEVs to achieve a higher percentage of vehicles in the City being EVs and ZEVs than what is currently projected for Riverside County. The City can provide an environment conducive to EV adoption and help remove barriers to help increase EV adoption rates. T-1 focuses on promoting and increasing EV ownership in the City and would include several components that would together create a comprehensive program. The program would include:

- An educational component to conduct outreach and educate residents about the benefits of EV ownership
- A marketing component to educate residents on current incentives and rebates available for purchasing an EV and installing residential EV Charging equipment
- Updates to the City's development code to incentivize the installation of EV chargers in new and existing land uses
- An incentive program for the purchase of EVs and ZEVs for City residents potentially funded through the GHG Mitigation Fee Program (T-9)

T-2 focuses on developing and adapting an EV Infrastructure ordinance to ensure that new development in the City includes adequate equipment EV charging infrastructure to keep pace with the City's increased EV adoption rates.

### Implementation Items

- T-1
  - Research other cities and agencies (e.g., Pasadena) that have implemented similar programs in California and adopt components of programs that are appropriate for the development of the City program.
  - Work with Transportation Network Companies (e.g., Uber and Lyft) to promote EV adoption amongst drivers, promoting the benefits of EV's unique to drivers (e.g., lower maintenance costs, lower fuel costs).
  - Work with the South Coast Air Quality Management District, SCAG, and WRCOG to discuss potential opportunities for collaboration in implementing the program. Develop an implementation plan and timeline for implementing the program by 2023.
- T-2
  - Research other jurisdictions which have adopted EV ordinances to increase EV charging infrastructure (e.g., Menlo Park).
  - Develop and adopt an EV ordinance to require appropriate levels of EV charging in new residential and nonresidential uses in the City.

- Promote available incentives for EV charging infrastructure to residents and developers in the City.

## T-7 – TRANSPORTATION DEMAND MANAGEMENT PROGRAM

This measure is focused on reducing commute-related VMT generated by new large employers in the City and the region. The measure would build on the City's existing Transportation Demand Management process in place to increase resources and support available to employers to help implement employer base TDM programs and increase resources to City to manage and monitor progress of the TDM Program. Given that the City is focused on attracting new employers to develop a sustainable jobs-housing balance, the TDM measures included in the program would be designed to be conducive to development and attractive to employees to reduce commute costs and time. The TDM measures established as part of the program can be included in the City's CAP Consistency Checklist to effectively streamline this measure into the City's development process for new projects. The TDM Program measures could include, but are not limited to:

- A comprehensive marketing program targeted at employees to promote the benefits (health, cost savings) of low-GHG commute modes (e.g., walking, biking, transit, telecommuting, etc.);
- Requirements for short and long-term bicycle parking facilities including on site-amenities (e.g., showers, locker rooms);
- Incentives for using alternative modes (e.g., transit pass subsidies, carpool, parking cash-out program);
- a vanpool program for residents with longer commutes outside the City;
- A ride-matching and ride-sharing program for both employees working in the City and for residents who commute to regions outside the City (e.g., San Diego, Los Angeles);
- A telecommuting program to promote telecommuting for large employers in the City as well as advocating for telecommuting practices in the larger region with support from WRCOG; and
- A monitoring program to track progress on the VMT reductions achieved through the TDM program.

### Implementation Items

- Research other cities and agencies in the region conducting comprehensive TDM Programs and adopt components of programs that are appropriate for development in the City's expanded program.
- Work with WRCOG and other regional partners to discuss potential collaboration in implementation components of the TDM Program.
- Develop TDM Program Implementation Plan and hire a Transportation Demand Management coordinator to implement the TDM Program.
- Adopt a TDM Program ordinance that would apply to specific types of new development in the City and help reduce VMT generate from new projects. This ordinance can be implemented, in part, through the City's CAP Consistency Checklist.

## T-9 – GHG MITIGATION FEE PROGRAM FOR NEW DEVELOPMENT

This measure is intended to reduce GHGs from new development in the City, particularly, but not exclusive to, GHG emissions associated with VMT generated by new residential and nonresidential development in the City. As part of the measure, the City would develop a program to mitigate a certain percentage of GHG emissions from new development through a fee-based program that would offset emissions through development of local mitigation projects. The total fee for different new development projects would be calculated based on key characteristics of the project (e.g., land use type, size) to estimate the anticipated GHG emissions of the project, similar to other impact fee programs (e.g., transportation impact fees).

Applicants would then pay into a fee program for the project's GHG emissions that cannot be mitigated through other CAP measures. Mitigation projects funded through the program would give priority to implementing local projects to reduce emissions in the City and then, once local options are exhausted, through a mitigation bank to contribute to larger mitigation projects (e.g., large transit projects). A key next step for the City in implementation of this measure would be to conduct a more in-depth analysis to price the fee appropriately and how the fee program would be structured for successful implementation. Types of mitigation projects to be funded through the program could include:

- Funding of TDM measures which would result in GHG emissions reductions (e.g., transit pass subsidies, car-sharing program)
- Funding of larger transit projects which demonstrate VMT reductions and GHG emissions
- Appliance replacement programs to replace natural gas appliances with electric appliances
- Vehicle replacement programs to incentivize the purchase of EVs and ZEVs for residents and businesses

## Implementation Items

- Research VMT Mitigation and Banking Programs including information in UC Berkeley's Technical Report "Implementing SB 743: An Analysis of Vehicle Miles Traveled Banking and Exchange Frameworks" .
- Develop a comprehensive list of strategies, projects, and other opportunities to reduce GHG emissions which can be funded and implemented through the program.
- Choose or design the most appropriate framework for developing a GHG Mitigation Fee Program and incorporate the program into the City's development and environmental review processes.

# APPENDIX C
# Climate Action Plan Consistency Checklist

*Development Services*
Planning Division
1 Town Square
Murrieta, CA 92562
951-461-6061
www.murrietaca.gov

# CLIMATE ACTION PLAN CONSISTENCY CHECKLIST INTRODUCTION

The City of Murrieta has prepared a Climate Action Plan (CAP) that outlines actions that the City will undertake to achieve its proportional share of State greenhouse gas (GHG) emissions reductions. The purpose of the CAP Consistency Checklist (Checklist) is to, in conjunction with the CAP, provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

This Checklist contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this Checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this Checklist to the extent feasible.

The Checklist may be periodically updated to incorporate new GHG reduction techniques, to comply with later amendments to the CAP, or to reflect changes in local, State, or federal laws, regulations, ordinances, and programs.

## APPLICATION SUBMITTAL REQUIREMENTS

- The Checklist is required only for projects subject to CEQA review. The diagram below shows the context for the CAP Consistency Checklist within the planning review process framework.
- If required, the Checklist must be included in the project submittal package. Application materials and submittal procedures can be found on the City of Murrieta website here. This checklist is designed to assist the applicant in identifying the minimum CAP-related requirements specific to their project. However, it may be necessary to supplement the completed checklist with supporting materials, calculations or certifications, to demonstrate compliance with CAP requirements.
- The requirements in the Checklist will be included in the project's conditions of approval.
- The applicant must provide an explanation of how the proposed project will implement the requirements described herein to the satisfaction of the Planning Division.
- If a question in the Checklist is deemed not applicable to a project, an explanation must be provided to the satisfaction of the Planning Division.

DRAFT

## Application Information

### Contact Information

Project No./Name: _____

Property Address/APN: _____

Applicant Name/Co.: _____

Contact Phone: _____ Contact Email: _____

Was a consultant retained to complete this checklist? ☐ Yes ☐ No If Yes, complete the following

Consultant Name: _____ Contact Phone: _____

Company Name: _____ Contact Email: _____

### Project Information

1. What is the size of the project (acres)? _____
2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of one- and two-family units): _____
   - ☐ Residential (indicate # of multi-family units): _____
   - ☐ Commercial (indicate total square footage):
   - ☐ Hotel (indicate # of rooms): _____
   - ☐ Industrial (indicate total square footage): _____
   - ☐ Other (describe): _____
4. Provide a brief description of the project proposed: _____

_____

_____

_____

# CAP CONSISTENCY CHECKLIST QUESTIONS

## STEP 1: LAND USE CONSISTENCY

The first step in determining CAP consistency for discretionary development is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the City to determine a project's consistency with the land use assumptions used in the CAP. Projects found not to be consistent with the CAP's land use assumptions will be subject to a project-specific analysis of GHG emissions' impact on the environment in accordance with the requirements of the CEQA. This may result in GHG-reducing mitigation measures applied as a condition of project approval, including where feasible the measures listed in Step 2 of this checklist.

| Step 1: Land Use Consistency | | |
|---|---|---|
| **Checklist Item**<br>**(Check the appropriate box and provide explanation and supporting documentation for your answer)** | **Yes** | **No** |
| 1. Are the proposed land uses in the project consistent with the existing General Plan land use and zoning designations?<br><br>If "Yes", questions 2 below is not applicable and the project shall proceed to Step 2 of the checklist.<br><br>If "No", proceed to Question 2 below. | ☐ | ☐ |
| 2. If the proposed project is not consistent with the General Plan land use or zoning designations, does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?<br><br>If "Yes", attach to this checklist the estimated project emissions under both existing and proposed designation(s) for comparison. Compare the maximum buildout of the existing designation and the maximum buildout of the proposed designation. If the proposed project is determined to result in an equivalent or less GHG-intensive project when compared to the existing designations, proceed to Step 2 of the checklist.<br><br>If "No", the applicant must conduct a full GHG impact analysis for the project as part of the CEQA process. The project shall incorporate each of the applicable measures identified in Section C to mitigate cumulative GHG emissions impacts. | ☐ | ☐ |

## STEP 2: CAP MEASURES CONSISTENCY

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable strategies and actions of the CAP. Step 2 only applies to development projects that involve permits that may require a certificate of occupancy from the Building Official.[1] All applicable Checklist questions must be answered "Yes", and documentation provided, where necessary, that substantiates how compliance would be achieved. For measures for which a "Yes" is indicated, the features must be demonstrated as part of the project's design and described. All applicable requirements in the Checklist will be included in the conditions of approval.

If any questions are marked with a "No", the project cannot be determined to be consistent with the CAP, and project specific GHG analysis would be required as part of the CEQA process. If any questions are marked "N/A" (meaning "not applicable"), a statement describing why the question is not applicable shall be provided to the satisfaction of the Planning Division or building official.

| Step 2: CAP Strategies Consistency | | | |
|---|---|---|---|
| Checklist Item<br>(Check the appropriate box and provide explanation for your answer) | Yes | No | N/A |
| **1. Zero Net Energy Standards (Measure BE-3)** | | | |
| a) For residential projects, would the project or a portion of the project be subject to building permitting (i.e., building permits issued) on or after January 1, 2023?<br><br>b) For commercial projects or commercial portions of mixed-use projects, would the project or a portion of the project be subject to building permitting (i.e., building permits issued) on or after January 1, 2025?<br><br>c) For industrial projects, would the project or a portion of the project be subject to building permitting (i.e., building permits issued) on or after January 1, 2025?<br><br>If "Yes" to either a, b, or c, proceed to question d of this checklist requirement. | ☐ | ☐ | ☐ |
| d) Would the project or portions of the project permitted after January 1, 2023 for residential projects and after January 1, 2025 for nonresidential projects be designed and constructed to comply with the Zero Net Energy standard[2]? | ☐ | ☐ | ☐ |
| **2. Construction Waste Diversion (Measure SW-2)** | | | |
| a) For residential projects, recycle and/or salvage for reuse a minimum of 80 percent of the nonhazardous construction and demolition waste in accordance with either Section 4.408.2, 4.408.3 or 4.408.4 of the California Code of Regulations, Title 24?<br><br>b) For nonresidential projects, recycle and/or salvage for reuse a minimum of 80 percent of the nonhazardous construction and demolition waste in accordance with either Section 5.408.1.1, 5.408.1.2 or 5.408.1.3 of the California Code of Regulations, Title 24? | ☐ | ☐ | ☐ |

[1] Actions that are not subject to Step 2 would include, for example: 1) discretionary map actions that do not propose specific development; 2) permits allowing wireless communication facilities; 3) special events permits; 4) conditional use permits that do not result in the use intensification or expansion of an existing building; and 5) non-building infrastructure projects such as roads and pipelines. Because such actions would not result in new occupancy buildings from which GHG emissions reductions could be achieved, the items contained in Step 2 would not be applicable.

[2] Although the City has not yet developed a Zero Net Energy standard, the City will develop such a standard prior to January 1, 2023, pursuant to Measure BE-3 in the CAP. For purposes of CAP compliance, all new residential projects that include phases for which building permitting would begin after January 1, 2023, compliance with zero net energy standard as stated herein must be included as a condition of approval and included as a mitigation measure in the project's environmental document (as applicable). For all new commercial projects, commercial portions of mixed-used projects, and industrial projects that include phases for which building permitting would begin after January 1, 2025, projects must demonstrate compliance with zero net energy standard. Such projects or phases thereof, to meet the zero net energy standard, must achieve a Total Energy Design Rating (Total EDR) and Energy Efficiency Design Rating (Efficiency EDR) of zero, consistent with the standards in Title 24, Part 6 of the California Code of Regulations, by the date established above for each land use type.

| Step 2: CAP Strategies Consistency | | | |
|---|---|---|---|
| **Checklist Item**<br>**(Check the appropriate box and provide explanation for your answer)** | **Yes** | **No** | **N/A** |
| **3. Transportation Demand Management Program (Measure T-7)** | | | |
| a) For the construction of nonresidential projects that would include 50 or more employees, would the project include a transportation demand management plan that meets requirements of Section 16.40 "Transportation Demand Management" of the City's Municipal Code has been reviewed and approved by the City of Murrieta Public Works Department?<br><br>Check "N/A" if the project is a residential project or if it would include 49 or fewer employees. | ☐ | ☐ | ☐ |
| **4. Electric Vehicle Service Equipment (EVSE) (Measure T-2)[3]** | | | |
| Checklist Requirement by Project Type:<br><br>a) <u>One- and two-family dwellings and townhouses with attached private garages:</u> Would the required parking serving each new dwelling include Electric Vehicle Service Equipment (EVSE) to allow for electric vehicle charging by the resident(s)?<br><br>b) <u>Multi-Family Residential Projects:</u> Would 6% of the total parking spaces required, or a minimum of two spaces, whichever is greater, include Electric Vehicle Service Equipment (EVSE) to allow for electric vehicle charging by the resident(s)?<br><br>c) <u>Non-residential projects</u>: Would 3% of the total parking spaces required, or a minimum of two spaces, whichever is greater, include Electric Vehicle Service Equipment (EVSE) to allow for electric vehicle charging by the resident(s)? | ☐ | ☐ | ☐ |

[3] For the purpose of this Checklist, EVSE is defined by Article 625 of the California Electrical Code.

# APPENDIX D
# Final Technical Memorandum: Climate Change Vulnerability Assessment

# Memo

455 Capitol Mall, Suite 300
Sacramento, CA 95814
916.444-7301

**Date:** September 7, 2018

**To:** Paul Swancott (City of Murrieta)

**From:** Ricky Williams, Poonam Boparai, and Honey Walters

**Subject:** City of Murrieta Climate Action Plan Technical Memorandum: Climate Change Vulnerability Assessment

## INTRODUCTION

Climate change is a global phenomenon that has the long-term potential to cause a variety of consequences, including detrimental impacts on human health and safety, economic continuity, water security, provisions of basic services, and economic function (California Natural Resources Agency [CNRA] 2012). The effects of climate change will continue to impact the physical environment throughout California, Riverside County, and the City of Murrieta (City). The magnitude and timing of climate change effects will vary by location; therefore, it is important to identify the projected severity of these impacts specific to the City. The first step in adapting to climate change is to analyze these impacts and the vulnerabilities they create.

In accordance with Senate Bill (SB) 379, this Vulnerability Assessment follows the recommended format and methods described in the most recent Cal-Adapt tool and California Adaption Planning Guide. SB 379 requires that jurisdictions update their safety elements and local hazard mitigation plans, as necessary, to address climate adaption and resiliency strategies. The update is required to include a set of goals, policies, and objectives based on a vulnerability assessment.

## CLIMATE CHANGE ADAPTATION PLANNING PROCESS

The California Adaption Planning Guide (APG), developed by California Governor's Office of Emergency Services (Cal OES) and CNRA, helps communities throughout California plan for and adapt to the impacts of climate change. The APG includes a nine-step process, illustrated in Figure 1, which allows communities to assess their specific climate vulnerabilities and provides strategies for communities to reduce climate-related risks and prepare for current and future impacts of climate change.

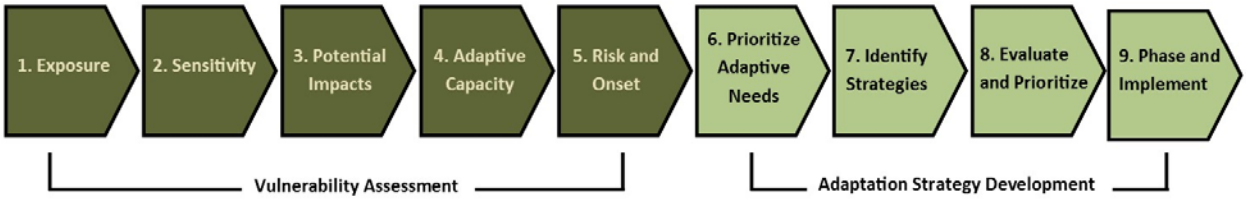


*Figure 1: The Nine Steps in the Adaptation Planning Process*

The first phase of the nine-step process focuses on preparing a Vulnerability Assessment, which is a method for determining the anticipated impacts of climate change on community assets and populations. This phase evaluates a community's level of exposure to climate-related impacts and analyzes how these impacts will affect a community's populations, functions, and structures. The second phase of the process uses the information gathered in the Vulnerability Assessment to develop adaption strategies and measures to help the community prepare for, respond to, and adapt to local climate change impacts. The strategies support a collaborative planning process that involves a variety of City departments and State agencies, including, but not limited to Cal OES, CNRA, and the California Department of Public Health (CDPH). This memorandum follows APG's nine-step process and includes a Vulnerability Assessment, identifying key climate-related risks faced by the City.

# 1 VULNERABILITY ASSESSMENT

This Vulnerability Assessment for the City involves the first five steps in the adaption planning process. Based on the work of International Panel on Climate Change (IPCC) and research conducted by the State and partner agencies and organizations, climate change is already affecting the City (as described in the following sections) and will continue to further in the future.

## 1.1 STEP 1: EXPOSURE

The effects of climate change can be described in terms of primary exposure to various physical changes in the climate and environment caused by global climate change, such as temperature, precipitation, and sea level rise. Secondary consequences, such as reduced water supply, impacts on structures from erosion and sea-level rise, increased frequency and duration of heat waves, and increased fire risk, occur as a result of one or a combination of these primary effects (California Governor's Office of Planning and Research (OPR) 2018).

The impact of climate change in California varies across the state due to diversity in biophysical setting, climate, and jurisdictional characteristics. The Desert Region, as designated by CNRA includes San Bernardino, Riverside, and Imperial Counties. The Cal-Adapt tool, developed by the California Energy Commission (CEC) and University of California (UC) Berkeley is used to project the impacts of climate change at a local and regional level. This tool provides climate change-related projections for a variety of impacts including maximum and minimum temperature and precipitation, extreme heat days and warm nights, snowpack, sea level rise, wildfire risk, and streamflow. These impacts are projected for two scenarios: High-Emissions Scenario, which assumes that emissions will continue to rise through 2050 and plateau in 2100, then decline, and Low-Emissions Scenario, which assumes emissions will peak around 2040, then decline. Because the degree of effectiveness of programs implemented to reduce GHG emissions is not yet known, results from both emissions-scenarios are considered in the Vulnerability Assessment and distinguished, where possible (CEC 2018).

### 1.1.1 Increased Temperature

Increases in average temperatures can result in multiple negative effects on the built and natural environment. These secondary impacts of increased temperature include increased frequency of extreme heat events and heat waves, and exacerbation of the urban heat island effect. In Riverside County, projected increases in temperatures will be higher further inland and closer to desert regions.

Annual temperatures in the City are projected to increase steadily under both Low- and High-Emissions scenarios. The City's historical average annual maximum and minimum temperatures, based on data from 1950 to 2005, are 79.8 degrees Fahrenheit (°F) and 47.1 °F, respectively. By 2099 the annual average maximum temperature is projected to increase by 5.1 to 10.4 °F, and the annual average minimum temperature is project to increase by 5.9 to 10.3 °F (CEC 2018). A summary of the historical average and 2050 and 2099 minimum and maximum temperature projections is shown in Table 1.1-1.

**Table 1.1-1 Maximum and Minimum Temperatures for the City of Murrieta**

| | Historical Average (Max/Min) | 2050 Projected (Max/Min) | 2099 Projected (Max/Min) |
|---|---|---|---|
| Low-Emissions Scenario | 79.8°F/47.1°F | 84.6°F /51.8°F | 84.9°F /53.0°F |
| High-Emissions Scenario | | 84.7°F/52.2°F | 90.2°F/57.4°F |

°F = Degrees Fahrenheit

Source: CEC 2018 data for City of Murrieta Grid Cell (33.59375,-117.21875)

## EXTREME HEAT EVENTS AND HEAT WAVES

Increased temperature is expected to lead to secondary climate change impacts, including increases in the frequency, intensity, and duration of extreme heat days and heat waves. Cal-Adapt defines the extreme heat day threshold for the City as 105.1 °F or higher, between April 1st and October 31st. The City historically has averaged five extreme heat days per year between 1950 and 2005. The City is projected to experience an average of 26 to 36 extreme heat days per year by 2050, and 27 to 62 extreme heat days per year by 2099, depending upon the emissions scenario used for projections (CEC 2018).

Heat waves, which can be defined as five or more consecutive extreme heat days, have been historically infrequent in the City, with no more than one heat wave occurring in a year. However, a rise in the frequency of heat waves from two to five heat waves per year by 2050 and two to 11 heat waves per year by 2099 is projected, depending upon the emissions scenario used for projections (CEC 2018).

## URBAN HEAT ISLAND EFFECT

Urbanized areas can experience higher temperatures, greater pollution, and more negative health impacts during hot summer months when compared to more rural communities. This phenomenon is known as an urban heat island. Heat islands are created by a combination of heat-absorptive surfaces (such as dark pavement and roofing), heat-generating activities (such as engines and generators), and the absence of vegetation (which provides evaporative cooling). According to the U.S. Environmental Protection Agency (EPA), daytime temperatures in urban areas are on average 1 to 6 °F higher than in rural areas, while nighttime temperatures can be as much as 22 °F higher as the heat is gradually released from buildings and pavement (California Environmental Protection Agency [CalEPA] 2018a).

The CalEPA's Urban Heat Island Index shows urban heat islands in California. The Urban Heat Island Index is calculated as a temperature differential over time between an urban census tract and nearby upwind rural reference points. Local wind patterns dissipate the adverse impacts of urban heat island effects. The index is reported in degree-hours per day on a Celsius scale, as a measure of heat intensity over time. An increase of one degree over an eight-hour period would equal eight degree-hours, as would an increase of two degrees over a four-hour period (CalEPA 2018b). The City generally experiences mild winds from the southwest which provide little relief from the urban heat island effect (National Oceanic and Atmospheric Administration [NOAA] 2018). The heat index for the City is 131.6 degree-hours per day, which is

approximately equal to a 9.9 °F average temperature difference between the City and nearby rural areas (CalEPA 2018b).

### 1.1.2 Changes in Precipitation Patterns

The City's water supply comes from local sources of groundwater and surface water, imported water from the Metropolitan Water District's Colorado River Aqueduct and the State Water Project, recycled water reclamation facilities, and water transfers and exchanges (City 2011). Increased temperatures, particularly in the Sierra Nevada region, which supports the State Water Project, as well as the Rocky Mountains, which heads the Colorado River, will lead to earlier and faster snowmelt and could leave the City vulnerable to water resource fluctuation during historically dry months (July-September). Additionally, as temperatures rise and snowpack decreases, the dry season may manifest earlier in the year and extend later, leading to a longer season of water insecurity.

While projections generally show little change in total annual precipitation in California, even modest changes could have a significant effect on California ecosystems that are conditioned to historical precipitation levels. Reduced precipitation could lead to higher risks of drought, while increased precipitation could cause flooding and soil erosion (CNRA 2014). The City has an historical annual average (1950 to 2005) precipitation of 15.0 inches. The annual precipitation in the City is projected to be 15.7 to 17.8 inches by 2050, and 15.0 to 21.4 inches by 2099, depending upon the emissions scenario used for projections (CEC 2018).

#### DROUGHT AND GROUNDWATER

As of early 2018, the National Drought Mitigation Center classified a majority of Riverside County as being in a "severe drought," the third-most intense drought condition classification (National Integrated Drought Information System [NIDIS] 2018). Although precipitation projections tend to be less certain than other types of climate change projections, a slight decrease in average precipitation is expected in the region through midcentury (CEC 2013).

The City relies on numerous wells within the local groundwater basin as an important source of water supply to each of the retail water purveyors that serve the City and its sphere of influence. Major groundwater basins underlying the City include the Murrieta-Temecula Basin and the French Basin, which rely on surface streams for groundwater recharge (City 2011b). Increased average temperatures and changes in the timing, amounts, and snow/rain form of precipitation could affect local groundwater recharge. Groundwater use typically increases during droughts, which due to the uncertainty in the amount and timing of water availability could result in challenges in providing adequate groundwater supply to meet future demand (Western Riverside Council of Governments [WRCOG] 2014).

#### EXTREME STORMS

Changes in precipitation patterns may result in less frequent, but more extreme storm events (EPA 2017). The City is projected to experience a slight increase in overall precipitation which may fall with more intense characteristics (i.e., high volume over a short period of time with stronger wind patterns). These storms may produce higher volumes of runoff and contribute to increased flood risks and associated impacts.

### 1.1.3 Increased Wildfire Risk

Increased temperatures and frequency of extreme heat events, along with changes in precipitation patterns, can lead an increase in the frequency and intensity of wildfires (Governor's Office of Planning and Research

[OPR] 2018). The City is surrounded by relatively rural and undeveloped hillsides and ranches with a high potential for wildfires which can exacerbated by occasional Santa Ana winds and high temperatures (City 2011). 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 a more intense and difficult to control wildfire.

The California Department of Forestry and Fire Protection (CAL FIRE) has developed the City's Fire Hazard Severity Zone Map, identifying Very High Fire Hazard Severity Zones in the City that are included in the Local Responsibility Area. The map shows that a substantial portion of the City, including areas along the western edge of the City at the base of the Santa Rosa Plateau and the northeastern rural City neighborhoods, are identified as Very High Fire Hazard Severity Zones (CAL FIRE 2009). The historic annual (1950 to 2005) mean hectares burned in Riverside County is 4,861.1 hectares or approximately 12,012 acres. The annual mean area burned is projected to increase by 15 percent by 2050 and by 11 percent by 2099 under the high-emissions scenario (CEC 2018).

In addition to increased threats to human safety, the 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 in vulnerable populations such as the elderly, children, agricultural and outdoor workers, and those suffering from pre-existing cardiovascular or respiratory conditions (OPR 2018).

### 1.1.4 Increased Flood Risk

Climate change is predicted to modify the frequency, intensity, and duration of extreme storm events, such as sustained periods of heavy precipitation and increased rainfall intensity during precipitation events. These projected changes could lead to increased flood magnitude and frequency. (IPCC 2014). The City lies within the inland portion of the Santa Margarita River Basin. Murrieta Creek and Temecula Creek are primary tributaries to this basin and flow through the City. Stream flows in Murrieta Creek, which flows southeasterly through the portion of the City that lies between Interstate 15 (I-15) and the base of the Santa Rosa Plateau, have been highly variable, and flooding frequently occurs in Historic Murrieta. Most areas along this creek and its associated tributaries lack formal flood control systems, as a result, drainage in some areas is dependent on natural features and can result in flooding in less developed areas, even with moderate rain (City 2011).

Increased precipitation and extreme storm events because of climate change, as described previously, would result in increased flood scenarios and major flooding events. The City's flooding potential will be exacerbated when experiencing atmospheric rivers, or narrow streams of warm, concentrated precipitation often resulting in the deposition of considerable rainfall over a short period of time. Expected increases in average temperature would increase the intensity and magnitude of atmospheric rivers, resulting in increased regional and localized flooding (Dettinger 2011).

## 1.2 STEPS 2 AND 3: SENSITIVITY AND POTENTIAL IMPACTS

For the purposes of this Vulnerability Assessment, Steps 2 and 3 are discussed together as they are closely related. Step 2 includes the use of systematic evaluation to identify populations, functions, and structures that may be affected by projected exposures to climate change impacts and their degree of sensitivity. These determinations are made with a simple "yes" or "no" answer. This evaluation uses the APG's recommended

sensitivity checklist, and focuses specifically on resources in the City potentially affected by climate change impacts identified in Section 1.1, "Step 1: Exposure."

APG's sensitivity checklist is organized into three main categories: Population, Functions, and Structures. These categories are described in detail below.

- **Population:** Includes both the general human population and segments of the population that are most likely to be sensitive or vulnerable to climate change impacts. This applies, particularly to non-English speaking or elderly populations who may require special response assistance or special medical care after a climate-influenced disaster, and disadvantaged communities.

- **Functions:** Includes facilities that are essential to the health and welfare of the whole population and are especially important following climate-influenced hazard events. These facilities include hospitals, medical facilities, police and fire stations, emergency operations centers, evacuation shelters, and schools. Transportation systems, such as airways (e.g., airports and highways), bridges, tunnels, roadways, railways (e.g., tracks, tunnels, bridges, and rail yards), and waterways (e.g., canals, seaports, harbors, and piers) are also important to consider. Lifeline utility systems such as potable water, wastewater, fuel, natural gas, electric power, and communications are also critical for public health and safety. Functions also include other economic systems such as agriculture, recreation, and tourism, as well as natural resources within a community, including various plant and animal species and their habitat.

- **Structures:** Includes the structures of essential facilities noted above such as residential and commercial infrastructure, institutions (i.e., schools, churches, hospitals, prisons, etc.), recreational facilities, transportation infrastructure, parks, dikes and levees, and water and wastewater treatment infrastructure. It also includes high potential loss facilities, where damage would have large environmental, economic, or public safety considerations (e.g., nuclear power plants, dams, and military installations). This category also includes hazardous material facilities that house industrial/hazardous materials.

An evaluation of the severity of climate change impacts on the sensitive populations, functions, and structures is included in Step 3. Given that climate change exposures at the local scale are inherently uncertain, the APG recommends that communities conduct a qualitative assessment that describes the potential impacts based on the exposure (CNRA 2012). This assessment is not meant to be exhaustive and prescriptive, rather, it is intended to provide a high-level view of potential impacts that occur as a result of identified climate change exposures. Further evaluation and research would be needed to more precisely identify points of sensitivity and potential impacts, including specific facilities, structures, and areas of concern.

### 1.2.1 Increased Temperature

The average maximum and minimum temperatures in the City are project to rise between approximately 5 to 10 °F by 2099. Increased temperatures can lead to secondary climate change impacts including increases in the frequency, intensity, and duration of extreme heat events and heat waves.

#### POPULATIONS

Higher frequency of extreme heat conditions can cause serious public health impacts, increasing the risk of conditions directly related to heat such as heat stroke and dehydration (OPR 2018). Exposure to excessive heat may lead to heat-related illnesses such as heat cramps, heat exhaustion, and heat stroke. The most serious reaction to extreme heat and heat stroke results in severe mental status changes, seizure, loss of consciousness, kidney failure, abnormal cardiac rhythm, and death (CalEPA 2013).

Higher temperatures also result in worsened air quality through increased air pollution. Ozone formation and particulate matter generation (e.g., from wildfire smoke), pose health hazards to vulnerable populations including children, the elderly, pregnant women, and persons with pre-existing chronic diseases. Based on the 2010 U.S. census, the City's population is 103,606 residents, approximately seven percent of which are children (under five years) and approximately 12 percent are elderly (65 years and over) (U.S. Census Bureau 2017).

Extreme heat events pose greater challenges to disadvantaged communities due to sub-standard living environments and limited access to resources. Low income populations living in aging buildings with poor insulation experience higher costs associated with air conditioning; some populations in these buildings may refrain from turning on air conditions to reduce these costs, making them more susceptible to health condition risks (Singer et al. 2016). Approximately nine percent of the City's population is currently considered to be living in poverty, and approximately 11 percent of the population under 65 years is without health insurance (U.S. Census Bureau 2017).

The climate change—related impacts to populations in the City would have the greatest impact on vulnerable populations. Approximately 20 percent of the City's population is considered vulnerable population (i.e. children and elderly), and at least 11 percent of the population is considered to live in poverty or does not have access to health insurance. Climate change will result in increased temperatures in the City, including increased heat waves and extreme heat events. Further, the City experiences large temperature increases compared to the adjacent rural areas due to the urban heat island effect. This urban heat island effect, on average, increases the temperature in the City an average of nearly 10 °F higher than the adjacent rural areas.

*Severity of Impacts on Populations:* ***High***

## FUNCTIONS AND STRUCTURES

High temperatures decrease the efficiency of power transmission lines, while demand for electricity simultaneously goes up as operation of air conditioners and cooling equipment increases. This may result in increased risk of power outages and blackouts, affecting the operation of infrastructure. Prolonged exposure to heat can exacerbate roadway degradation, as asphalt and concrete can deform at a faster rate under high temperatures and can impact bridge expansion joints as they experience expansion and contraction as temperatures fluctuate.

Energy use in buildings increases as temperature increases as a result of increased demand for cooling systems. Temperature-related power failure can adversely affect the quality of working and living environments in residential, commercial, and industrial buildings. In periods of extreme heat, loss of electricity inhibits cooling of inside areas resulting in a lack of refuge from dangerous heat. Further, economic losses may be incurred from loss of productive work time due to downed communication systems or dangerous work conditions, or in residential buildings from an inability to properly store foods susceptible to spoiling in heat.

The production of agricultural products is a major activity in Riverside County. Agricultural activities can be highly vulnerable to the impacts of climate change, including drought conditions and extreme heat. In 2014, drought conditions cost agriculture in California approximately $2.2 billion, and costs may be substantially higher in the future if continued drought further depletes groundwater supplies (WRCOG 2014). Though agriculture represents a large portion of the regional economy, it is a relatively small sector of employment for individuals working or living in the City (U.S. Census Bureau 2015).

*Severity of Impacts on Structures and Functions:* ***Medium***

### 1.2.2 Changes in Precipitation Patterns

Increased average temperatures and a hastening of snowmelt in the Sierra Nevada, Rocky Mountains, and distant portions of watersheds could affect the flows of the State Water Project and the Colorado River upon which the City relies. Reduce flow of fresh water, more persistent drought conditions, and increased water demands due to population growth will likely affect the quality and quantity of water supplies.

#### POPULATIONS

Increasing temperatures and changes in precipitation may lead to intensified drought conditions, which decreases the availability and quality of water for human use. This includes increased exposure to health hazards including wildfires, dust storms, extreme heat events, flash flooding, and degraded water quality (CDPH 2017). Most of the imported water used in the region comes from the Sierra Nevada range. Reduced winter precipitation levels and snowpack reduction have resulted in less fresh water available for communities throughout California. Continued decline in snowpack is expected, which may lead to lower volumes of water available for City residents (WRCOG 2014).

*Severity of Impacts on Populations:* ***High***

#### STRUCTURES AND FUNCTIONS

Extreme weather events (e.g., storms, flooding) cause fatal and nonfatal injuries from drowning, being struck by objects, fire, explosions, electrocution, or exposure to toxic materials. A widespread weather-related natural disaster may destroy or ruin housing, schools, and businesses and cause temporary or permanent displacement (CDPH 2017). Changes in precipitation patterns may increase the presence of weeds, pest insects, and other organisms that damage agricultural products as well as affect agricultural yields and increase stress on crops and animals (WRCOG 2014)

*Severity of Impacts on Structures and Functions:* ***Medium***

### 1.2.3 Increased Wildfire Risk

Increased temperatures and changes in precipitation associated with climate change are expected to increase the potential severity of wildland fires both within and beyond the boundaries of the City. As previously described, the annual mean hectares burned is projected to increase by 15 percent by 2050 and by 11 percent by 2099 under the high-emissions scenario. As higher temperatures last for longer periods of time, dead fuels of wider diameter will also become drier and contribute to increased wildfire intensity (CAL FIRE 2009).

As the climate changes, the amount of area at elevated risk for such spatially limited hazards such as wildfires increases (CEC 2012). Areas that are currently vulnerable to wildfires may face more frequent hazards, and the wildfires themselves may be more severe. Wildfires may also begin to affect areas that are not currently vulnerable, and these risks may be exacerbated by high development pressure, resulting in more buildings and infrastructure built in high-risk areas (WRCOG 2014).

#### POPULATIONS

Different areas of the community and populations are especially vulnerable or resilient to wildfires in the City, particularly for hazards where rapid evacuation may be necessary. Factors that make residents or

employees more vulnerable to wildfire include individuals with disabilities, access to vehicles, income levels, buildings located in high-risk areas, and working conditions (WRCOG 2014).

Six percent of the City's population under 65 lives with a disability, and approximately nine percent of the City's population lives below the poverty level (U.S. Census Bureau 2017). Individuals with disabilities could have limited mobility and could be medically dependent on electronic devices. Physically disabled individuals may have limited mobility in case of evacuation, and respiratory problems could be aggravated by smoke. Low income individuals are less likely to have access to high quality housing units, support networks, or other resources that limit exposure to poor air quality or protect against fire. They are also less able to recover and rebuild their quality of life if fire results in the destruction of their property or affects their health.

In addition to increased threats to human safety, the increased risk of catastrophic 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 invulnerable populations such as the elderly, children, agricultural and outdoor workers, and those suffering from preexisting cardiovascular or respiratory conditions (CDPH 2017).

*Severity of Impacts on Populations: **High***

### STRUCTURES AND FUNCTIONS

While periodic fires originate from natural processes and provide important ecological functions, catastrophic fire events that cannot be contained or managed can cause serious threats to homes and infrastructure, especially for properties located at the wildland-urban interface. Damage to ecological functions may result as the risk of fire increases. When rain falls in burn scarred areas, there is a higher potential for soil erosion and mudflows into roads, ditches, and streams, and potentially resulting in property damage or loss.

Increased industrial complexes, transportation networks, utility networks, and general development along the wildland-urban interface increases the risk for wildfires to affect structures. Hazardous materials, associated with the development of industrial buildings and potentially present along transportation networks could increase the risk associated with wildfires (County of Riverside [County] 2012). The undeveloped hillside areas in and adjacent to the City present a potentially serious hazard due to the high potential for large scale wildland fires. The western boundary of the City has high wildland fire threats and is currently developed with various low-density residential neighborhoods.

Wildfires often result in the closure of roadways and/or damage to transportation infrastructure which may cause increased congestion or delay during and for months after a wildfire event. Road closures could create additional issues related to evacuating affected areas, and providing emergency vehicle access to affected buildings and populations.

*Severity of Impacts on Structures and Functions: **High***

## 1.2.4 Increased Flood Risk

The City is located within the inland portion of the Santa Margarita River Basin. Murrieta Creek and Temecula Creek are the main tributaries of the Santa Margarita River. Stream flows for Murrieta Creek have been highly variable and flooding frequently occurs along sections that lack formal flood control, even in moderate rain. A total of 1,021.2 acres in the City are within the 100-year flood zone. Portions of the City are

also subject to potential flooding in the event of dam failure at Lake Skinner or Diamond Valley Lake (City 2012). While it is uncertain exactly how climate change will affect flooding events in the City and to what extent, any increase in flooding is likely to have serious ramifications as the area is already vulnerable.

The rivers in western Riverside County are typically dry or nearly dry for most of the year and generally only pose flood threats to developments within the floodplain during general storms of long duration. Increased urbanization and the resulting increase in impervious surfaces has increased flood potential (County 2014).

### POPULATIONS

Flooding will most adversely affect populations living in 100-, 200-, and 500-year floodplains. Flood events can result in population displacement, death from drowning, injuries, and water- and food-borne diseases from sewage overflow (CDPH 2017). Populations with limited mobility (e.g., dependent on public transportation, without a vehicle) are considered more vulnerable to flood events because the ability to use sandbags or evacuate is reduced. Flooding could result in the release of sewage and hazardous and/or toxic materials if wastewater treatment plants are inundated, storage tanks are damaged, or pipelines are severed (WRCOG 2014). Flash flooding could occur as a result of heavy rain on burn scarred areas, and regular flooding already occurs in certain areas of the City. In the event of a normal flood condition, residents would have advanced notice to the threat of rising flood waters, providing adequate time to prepare and/or evacuate. While areas of the City are threatened by increased flooding, the population would generally have adequate time to identify and react to direct threats to their health and safety.

*Severity of Impacts on Populations:* ***Medium***

### STRUCTURES AND FUNCTIONS

Increased flooding associated with climate change will stress communities and infrastructure, and may also threaten the biodiversity that occurs along the streams and creeks within the City. Unlike natural flooding regimes, wherein seasonal flooding results in the deposition of useful sediment (resulting in increased soil fertility as well as groundwater recharge), flash flooding and increased flood events could lead to the destruction of crops along streams, erosion of topsoil, and excessive soil saturation.

Flooding may also result in economic losses through closure of businesses and government facilities, disrupt communications and the provision of utilities, and result in increased expenditures for emergency services. Roadways exposed to high volumes of water become more susceptible to damage from excess moisture (California Department of Transportation [Caltrans] 2013).

*Severity of Impacts on Structures and Functions:* ***Medium***

## 1.3 STEP 4: ADAPTIVE CAPACITY

The evaluation of the adaptive capacity of populations, functions, and structures identified in Steps 2 and 3 involves determining a community's current ability to address the points of sensitivity and impacts associated with climate change. This step includes a review of the City's existing policies, plans, programs, resources, and institutions to reflect its current ability to adapt to climate change and reduce vulnerability. Adaptive capacity to each of the climate change impacts is rated low, medium, or high. A low adaptive capacity indicates that a community is unprepared, while a high adaptive capacity indicates that sufficient measures are already in place to address the points of sensitivity and impacts associated with climate change.

The City, County, and WRCOG address current and future impacts related to existing natural hazards through their planning processes. The following plans, produced by these agencies, address various hazards and climate change impacts at local and regional levels.

- The City Safety Element (Chapter 14 of the City's General Plan Update) describes hazards that exist in the City and the measures being taken to address them.
- The City Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, and national security emergencies in or affecting the City. The EOP establishes the framework for implementation of State emergency management systems.
- The City of Murrieta Local Hazard Mitigation Plan (LHMP), produced by the County, identifies vulnerabilities, provides recommendations for prioritized mitigation actions, evaluates resources and identifies shortcomings, and provides future mitigation planning for the City.
- The WRCOG has created the Subregional Climate Action Plan (Subregional CAP) Adaption and Resiliency Strategy, providing an overview of expected climate change effects, assets in the subregion that are vulnerable to climate change effects, and adaptation strategies intended to reduce vulnerability and increase resilience. The strategies provided represent actions that increase resilience to natural hazards regardless of the rate and severity of climate change.

### 1.3.1 Adaptive Efforts Related to Increased Temperature

Efforts occurring in the City to adapt to or reduce the impacts of extreme heat days, heat waves, and urban heat islands are summarized below:

- The U.S. Department of Energy (DOE) Weatherization Assistance Program (WAP) provides grants to states, territories, and Native American tribes to improve the energy efficiency of low-income homes. Recipients then contract with local governments and nonprofit agencies to provide weatherization services to low-income homes in need of energy upgrades (DOE n.d.). The California WAP program allocates funds to various local governments, which provide grants to the entities that apply for them. WAP-related upgrades (e.g., replacing windows, weather-stripping, insulating attics and water heaters) in Sacramento County are provided by various organizations such as the Community Resource Project, Inc. and GRID Alternatives. Increasing the affordability of energy appliances provides low-income residents the financial capacity to air condition their homes during times of high heat. The State Greenhouse Gas Reduction Fund (GGRF) also provides funding for weatherization, residential rooftop solar and tree planting in disadvantaged communities.
- The County and City participate in the Home Energy Opportunity (HERO) Program, which is a part of the Property Assessed Clean Energy Program. HERO helps homeowners reduce energy bills and decrease water consumption through special financing options.
- WRCOG, in collaboration with Riverside Public Utilities, offers incentives for residential customers to upgrade the efficiency of a variety of equipment within eligible homes. The program encourages residents to upgrade appliances, building materials, and home furnishings with high-efficiency products to reduce water and energy use.
- The Subregional CAP includes the following recommended adaption strategies related to increased temperatures, extreme heat days, heat waves, and urban heat islands:
    - Strategy 1.3: Incorporate extreme heat and air quality annexes into emergency management plans.

- Strategy 2.4: Identify and map cooling centers in locations accessible to vulnerable populations and establish standardized temperature triggers for when they will be opened.
- Strategy 2.5: Identify ways for individuals with restricted mobility to reach cooling centers.
- Strategy 3.4: Work with local volunteer emergency response teams to include extreme heat as a hazard of concern and update core competencies to address the health-related risks of extreme heat events.
- Strategy 4.1: Use materials and features in transportation infrastructure that can improve resiliency to extreme heats.
- Strategy 6.1: Promote and expand the use of drought-tolerant green infrastructure, including street trees, and landscaped areas as part of cooling strategies in public and private spaces.
- Strategy 6.2: Amend the local development code to require high-reflectivity pavement or increased tree cover in large commercial parking lots.

The City and region have numerous adaptation plans and services available for extreme heat events and heat waves (i.e., cooling centers, heat wave advisories), and the City is improving the means by which residents are educated about existing plans (i.e. improved alert systems to notify residents of cooling center locations and extreme temperature events). In general, many of the policies and plans provide only recommendations to improve energy efficiency and reduce the impacts of temperature increases.

*Adaptive Capacity for Increases in Temperature:* ***Medium***

### 1.3.2 Adaptive Efforts Related to Changes in Precipitation

Efforts occurring in the City to adapt to or reduce the impacts of precipitation changes, extreme storms, and droughts are summarized below:

- The City has one designated severe weather center which is open and accessible when a Public Health "Heat/Cold Warning" is issued. The City utilizes the County Public Health Department heat and cold advisories to activate the center. The City also utilizes protocols to ensure the safety of residents during extreme residents such as "spray downs" during extreme heat events at large gatherings.
- The County and City participate in the HERO Program, which is a part of the Property Assessed Clean Energy Program. HERO helps homeowners reduce energy bills and decrease water consumption through special financing options.
- The City and its Community Services District have taken proactive measures to reduce water costs and use by replacing old technology for irrigation, exchanging overhead spray systems with drip (point-to-point) irrigation, and by replacing outdated landscaping with water-wise material. The City also provides information to residents on water consumption rebates provided by the various water districts serving the community.
- WRCOG, in collaboration with Riverside Public Utilities, offers incentives for residential customers to upgrade the efficiency of a variety of equipment within eligible homes. The program encourages residents to upgrade appliances, building materials, and home furnishings with high-efficiency products to reduce water and energy use.

- The Subregional CAP includes the following recommended adaption strategies related to changes in precipitation, extreme storms, and droughts:
  - Strategy 4.1: Use materials and features in transportation infrastructure that can improve resiliency to extreme events.
  - Strategy 5.5: Encourage the use of low-impact development practices in new development.
  - Strategy 6.1: Promote and expand the use of drought-tolerant green infrastructure, including street trees, and landscaped areas as part of cooling strategies in public and private spaces.
  - Strategy 6.3: Identify and implement municipal renewable energy projects for daily and emergency operations.
  - Strategy 7.2: Encourage efficient irrigation techniques and identify financial resources to support installation.
- Beginning in 2016, all retail water suppliers were required to comply with the water conservation requirements in Senate Bill X7-7 to be eligible for state water grants or loans. Each district is required to set targets and track progress toward decreasing daily per capita urban water use in an effort to meet the State's 20 percent water reduction goal. The City receives its water supply from four water districts: Rancho California Water District, El Sinore Valley Municipal Water District, Western Municipal Water District, and Eastern Municipal Water District. Each district has prepared and updated an urban water management plan for their respective service areas.

The City and region provide opportunities to reduce water usage in the community. The City is served by multiple retail water provides which reduces the City's ability to control the adaptability of its water supply to meet future demands or respond to threats. The City participates in various programs that assist with the reduction in residential energy and water usage. The City's municipal code has also incorporated adaptation measures into building and infrastructure design to improve water and landscaping efficiency (City municipal code 16.28 "Landscaping Standards and Water Efficient Landscaping")

*Adaptive Capacity for Changes in Precipitation:* ***Medium***

### 1.3.3 Adaptive Efforts Related to Increased Wildfire Risk

Efforts occurring in the City to adapt or reduce the impacts of wildfires are summarized below:

- The Murrieta Fire Department (Murrieta Fire and Rescue, MFR) engages in activities that are aimed at preventing fires and compliance with California Building Standards Code, Chapters 7 and 7A, and the California Fire Code. The MFR provides fire protection engineering, building inspections for code compliance, and hazardous materials inspections. The MFR also provides education and training in public safety and emergency preparedness.
- The MFR implements a Weed Abatement Program to reduce weed and brush fire hazards. This program provides for property inspections and enforcement on properties that pose a potential fire hazard due to weeds and brush.
- Conditions of development are currently required in the City under Title 15.24, "California Fire Code and California Fire Code Standards", of the City municipal code, such as Class A roofing (defined as the highest level of fire resistant roofing material, rated by ASTM E108) noncombustible siding, and 100-foot fuel buffer zones.

- The Subregional CAP includes the following recommended adaption strategies related to wildfire risk:
  - Strategy 5.1: Continue to provide information to homeowners about statutory vegetation management requirements.
  - Strategy 5.3: Establish neighborhood and building design standards that minimize fire hazards in high wildfire risk areas
- The City's LHMP includes the following objectives related to wildfire risk:
  - Objective 5.1: Continue efforts to reduce fire hazards associated with older buildings, multifamily housing, and fire-prone industrial facilities throughout the City.
  - Objective 5.2: Provide public safety education programs through the MFR to reduce accidents, injuries and fires, as well as train members of the public to respond to emergencies.
  - Objective 5.3: Continue to coordinate fire protection services with Riverside County, CAL FIRE, and all other agencies and districts with fire protection powers.
  - Objective 5.4: Ensure that outlying areas in the City can be served by fire communication systems as new development occurs.

A majority of the City's efforts to adapt to wildfire impacts of climate change correspond with general best practices for wildfire management and prevention. The City's adaptation strategies provide measures that reduce wildfire risk to people and property within the City. Climate change is projected to exacerbate the risk due to increased temperatures and changes in precipitation patterns. The City, with the assistance of the County, will need to continue to adapt to reduce these effects. The City currently has no defined emergency routes which reduces the capacity of the City to react during wildfire events.

*Adaptive Capacity for Wildfire Risk:* ***Medium***

### 1.3.4 Adaptive Efforts Related to Increased Flood Risk

Efforts occurring in the City to adapt or reduce the impacts of flooding are summarized below:

- The City's regulations with respect to flood damage prevention are included in the Murrieta Municipal Code Chapter 15.56, "Flood Damage Prevention Regulations." The purpose of this chapter is to promote the public health, safety, and general welfare, and to minimize the public and private losses due to flood conditions in specific areas.
- The City is located within Flood Control District Zone 7 of the Riverside County Flood Control and Water Conservation District. A Master Drainage Plan prepared for Murrieta Creek by the District evaluates drainage needs and proposes an economical drainage plan to provide flood protection for both existing and future development in the City. Improvements proposed for Murrieta Creek consist of the channelization of the creek and its major tributaries and include several concrete- lined open channels and a small network of underground storm drains.
- The City participates in the National Flood Insurance Program's (NFIP) Community Rating System (CRS) which provides a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed minimum NFIP requirements. Participation in this program provides discounted flood insurance premium rates to reflect the reduce flood risk resulting from the community actions.

- In 1997, the U.S. Army Corps of Engineers initiated studies on Murrieta Creek resulting in the Murrieta Creek Flood Control, Environmental Restoration and Recreate Project. Limited funding has been appropriated for the construction of this project.
- The Subregional CAP includes the following recommended adaption strategies related to flood risk:
  - Strategy 5.2: Encourage retrofits of hardscaped areas to use permeable paving.
  - Strategy 5.4: Restore riparian corridors, soft-bottomed streambeds, and seasonal flood basins that reduce flood hazards.
  - Strategy 5.5: Encourage the use of low-impact development practices in new development.
  - Strategy 5.6: Avoid siting important infrastructure in or near flood areas.
- The City's LHMP includes the following objectives related to flood risk:
  - Objective 3.1: Cooperate with the Riverside County Flood Control and Water Conservation District to evaluate the effectiveness of existing flood control systems and improve these systems as necessary to meet capacity demands.
  - Objective 3.2: Actively participate in and strongly promote timely completion of regional drainage plans and improvement project which affect the City.
  - Objective 3.3: Identify natural drainage courses and designate drainage easements to allow for their preservation, or for the construction of drainage facilities if needed to protect the health, safety, and welfare of the community.
  - Objective 3.4: Require new construction within the 100-year floodplain to meet National Flood Insurance Program standards.
  - Objective 3.5: Develop and maintain floodplain inundation evacuation plans in cooperation with the Riverside County Flood Control and Water Conservation District and the Murrieta Fire Department.
  - Objective 3.6: Maintain an active swift water rescue response in the Murrieta Fire Department.

City residents living in areas at high-risk for flooding or dam inundation have limited adaptive capacity to deal with flooding. Structural improvements to modify or elevate homes and other structures as well as the purchase of flood insurance can reduce the financial burden of recovering from flooding, however, these options are not universally acquirable. Low-income, mobility-challenged, and physically- or linguistically-isolated persons are particularly vulnerable. Ultimately, the safety of City residents will be dependent on proper execution of evacuation procedures and durability of the systems in place to prevent flooding. Localized and tributary flooding will impact those living in near proximity to creeks and streams, as well as areas with older and constrained infrastructure that could back up when capacity is reached. The City is currently in the process of upgrading drainage infrastructure.

*Adaptive Capacity for Flood Risk:* ***Medium***

## 1.4 STEP 5: RISK AND ONSET

Risk and the project timeframe for which impact would occur is ranked by the likelihood or probability that a certain magnitude/extent/scale of a potential impact would occur. Risk is determined by a combination of

the estimate certainty of the science projecting the climate change impact and the certainty of sector (i.e., population, function, structure) sensitivity. This risk is ranked low, medium, or high. Certainty ratings are based on percent probability of global models created by IPCC (CNRA 2012a:29). The timeframe in which the impact is most likely to occur (based on risk) can be categorized as:

- Current: Impacts currently or imminently occurring (2018-2020)
- Near-term: 2020-2040
- Mid-term: 2040-2070
- Long-term: 2070-2100

The risk certainty for the City and the timeframe of potential climate change exposures is summarized in Table 1.4-1

**Table 1.4-1 Risk and Onset for the City of Murrieta Climate Change Impacts**

| Impact | Certainty Rating | Timeframe |
|---|---|---|
| Increased Temperatures | High | Current |
| Increased Frequency in Extreme Heat Events | High | Near-Term |
| Increased Frequency in Heat Waves | High | Near-Term |
| Increased Urban Heat Island Effect | High | Current |
| Changes to Precipitation Patterns | Medium | Current |
| Increased Frequency in Drought | Medium | Mid-Term |
| Increased Frequency of Severe Storms | Medium | Mid-Term |
| Increased Wildfire Risk | High | Near-Term |
| Increased Flood Risk | Medium | Mid-Term |

The table shows that increased temperature, increased frequency of heat waves and extreme heat events, and the increased wildfire risk are of high certainty rating. Temperature- and wildfire-related impacts are the most likely near-term climate change exposures facing the City and should be addressed and prioritized first in future adaption planning efforts. With populations increasing and water supply already strained in the region, future meteorology, snowpack, streamflow, and groundwater conditions should continue to be examined more closely with actions taken to enhance the conservation and management of water supply and storage.

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