

Cosumnes Community Services District

Climate Action Plan / Sustainability Action Plan



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Prepared by





TABLE OF CONTENTS

1.	Introduction	1-1
1.1	PURPOSE AND SCOPE OF THE CAP/SAP	1-1
1.2	PLANNING AREA AND LOCAL SETTING	1-3
1.3	PLANNING	1-3
1.4	USING THE CAP/SAP	1-5
2.	Climate Change Science and background	2-1
2.1	PRINCIPLES OF THE EARTH'S CLIMATE	2-1
2.2	REGULATORY SETTING	2-5
3.	Regional Impacts of Climate Change	3-1
3.1	AREAS OF POTENTIAL IMPACTS	3-1
4.	Emissions Quantification	4-1
4.1	BASELINE EMISSIONS INVENTORY	4-1
4.2	SERVICE POPULATION PROJECTIONS	4-4
4.3	EMISSIONS FORECASTING	4-6
4.4	SETTING REDUCTION GOALS	4-3
5.	Emissions Reduction, Sustainability, and Adaptation Measures	5-1
5.1	EMISSIONS REDUCTION MEASURES	5-1
6.	Implementation	6-1
6.1	IMPLEMENTATION OF REDUCTION MEASURES	6-1
6.2	UNCERTAINTY AND FUTURE UPDATES	6-1
6.3	PARTNERSHIPS & FUNDING	6-2
7.	References	7-3

Appendices

Appendix A: Emissions Calculations

1. INTRODUCTION

California has affirmed the need for action to reduce statewide greenhouse gas (GHG) emissions through the adoption of multiple executive orders as well as legislative actions. Taken together, the executive orders and legislative requirements establish statewide GHG reduction goals. The majority of the mandated reductions would be accomplished through statewide programs; however, implementation of local measures to reduce GHG emissions will likely be needed to achieve the statewide reductions mandated by Assembly Bill (AB) 32 and Senate Bill (SB) 32. The Cosumnes Community Services District's (Cosumnes CSD's) efforts regarding GHG emissions reductions are intended to work in concert with the efforts being undertaken on a statewide level.

Because the Cosumnes CSD is not a local government municipality, but rather a California Special District, the Cosumnes CSD is in a unique position to collaborate with local governments in achieving their GHG reduction goals, while also aiming towards increasing the sustainability of the Cosumnes CSD's future operations. Increasing the sustainability of the Cosumnes CSD's operations is an elective goal that is intended to maintain and improve the level of services provided by the Cosumnes CSD, while also reducing the environmental impacts of Cosumnes CSD in areas other than GHG emissions, such as biological resources or the consumption of natural resources. Thus, the Cosumnes CSD has prepared this Climate Action Plan / Sustainability Action Plan (CAP/SAP).

1.1 PURPOSE AND SCOPE OF THE CAP/SAP

This CAP/SAP is intended to increase the sustainability of the Cosumnes CSD in terms of GHG emissions as well as long-term operational efficiency, resource conservation, waste prevention, and economic prosperity. While a typical CAP often presents concrete GHG reduction goals, this CAP/SAP is also focused on encouraging environmentally-conscious and low impact practices. Thus, the measures included in this CAP/SAP are not only intended to reduce GHG emissions, but are also anticipated to reduce operating costs, reduce the consumption of natural resources, and minimize or eliminate potential adverse effects to the environment that could otherwise occur during future Cosumnes CSD operations. Finally, while this CAP/SAP will aid Cosumnes CSD's efforts to reduce the harmful effects of climate change, it is also necessary for the Cosumnes CSD to identify ways in which the Cosumnes CSD can adapt to certain anticipated changes and impacts. Thus, many of the measures and strategies included in this document relate to adapting the Cosumnes CSD's operations to address the impacts of climate change.

The following sections summarize the content included in subsequent chapters of the CAP/SAP.

Climate Change Science and Background

Chapter 2 of this CAP/SAP provides an explanation of climate science and the principles that drive anthropogenic climate change, and an overview of the various international, federal, State, and local regulations regarding GHG emissions.

Regional Impacts of Climate Change

Potential impacts of climate change that would specifically affect the operations of the Cosumnes CSD and the surrounding region are identified and discussed within this chapter. In general, climate change has begun shifting precipitation patterns and surface temperatures away from the reliable historic patterns that human society has come to rely on. For instance, climate change resulting from human emissions of GHGs may result in increased surface air temperatures throughout Elk Grove, Galt, and the surrounding region. Increased surface air temperatures can result in human health effects such as heat exhaustion and heat stroke, as well as increased rates of respiratory problems related to exacerbated air pollution, and increased costs to businesses related to higher demands for landscaping or agricultural irrigation. Increased surface air temperatures represent only one of many potential regional impacts related to climate change, other potential impacts may include, but are not necessarily limited to, increased wildfire risk and costs associated with fire suppression, increased public health risks, and decreased availability of water resources. An in-depth discussion of such regional impacts is included in Chapter 3 of this CAP/SAP.

Emissions Quantification

Cosumnes CSD GHG emissions were quantified by using the most-up-to-date methodology provided by the Statewide Energy Efficiency Collaborative (SEEC). SEEC is an alliance of private companies, public utility companies, and non-governmental organizations that provide information and technical assistance to California cities and counties to aid in the reduction of GHG emissions and increase energy efficiency. To facilitate such goals, the SEEC prepared ClearPath California. ClearPath California is a suite of tools designed to measure and track GHG emissions within communities in California. Based on user-provided data such as community energy use, vehicle use, water consumption, wastewater treatment, and solid waste generation, ClearPath provides GHG inventories for the operations of organizations and municipal governments. The baseline GHG inventory was prepared based on information provided by various departments within the Cosumnes CSD, including information regarding the Cosumnes CSD's vehicle fleet, information regarding the Cosumnes CSD's water and wastewater infrastructure, and information related to the Cosumnes CSD's facilities. Further information used in drafting this CAP/SAP was provided by Sacramento Municipal Utility District (SMUD), Pacific Gas and Electric (PG&E), and the Elk Grove Water District.

In addition to allowing for the quantification of current GHG emissions, the ClearPath suite of tools allows for the forecasting of future emissions. Forecasting of future emissions from Cosumnes CSD operations is based off of projected population growth in the Cosumnes CSD service area. As the Cosumnes CSD service population grows, so will the demand for Cosumnes CSD parks, facilities, and fire protection services. Based on the estimated population growth rates, emission intensity factors, and existing GHG emissions, ClearPath can generate emissions estimates for various future dates. Further discussions regarding emissions quantification and forecasting is provided in Chapter 4 of this CAP/SAP.

Emissions Reduction, Sustainability, and Adaptation Measures

This CAP/SAP includes both GHG reduction measures and sustainability measures. The GHG reduction measures work to reduce emissions that could otherwise result from Cosumnes CSD activities. In general, the sustainability measures do not result in direct, measurable reductions in GHG emissions, but otherwise contribute to water or energy conservation, waste reduction, and economic efficiency. Although many of the measures included in this CAP/SAP are either specifically targeted to reduce GHG emissions or promote sustainability, there is great overlap

between the concepts of GHG emissions reductions and sustainability; thus, the implementation of all of the measures included in this CAP/SAP is intended to increase the sustainability of the Cosumnes CSD's operations. Furthermore, the measures taken to reduce GHG emissions and increase sustainability will, in many cases, help the Cosumnes CSD adapt to challenges resulting from climate change.

The measures are organized into sectors, each of which address the major sources of emissions associated with Cosumnes CSD operations.

Implementation

Emissions reduction measures included in this CAP/SAP will be implemented through actions undertaken by the Cosumnes CSD. The party responsible for implementing suggested measures set forth within this CAP/SAP, as well as the anticipated timeline for measure implementation are identified within the Implementation chapter of this CAP/SAP Cosumnes CSD.

CAP/SAP Process

In order to gather public feedback on the CAP/SAP, a Community Outreach Meeting was held on July 29, 2020. Verbal comments received at the Community Outreach Meeting were considered in preparation of the CAP/SAP, and the CAP/SAP was revised accordingly. Following completion of the Draft CAP/SAP, a Board of Directors meeting was held October 7, 2020. The Board of Directors provided further feedback, which was integrated into the Draft CAP/SAP.

1.2 PLANNING AREA AND LOCAL SETTING

The Cosumnes CSD service area encompasses the cities of Galt and Elk Grove, as well as portions of unincorporated Sacramento County, located in Northern California's Central Valley (Figure 1).

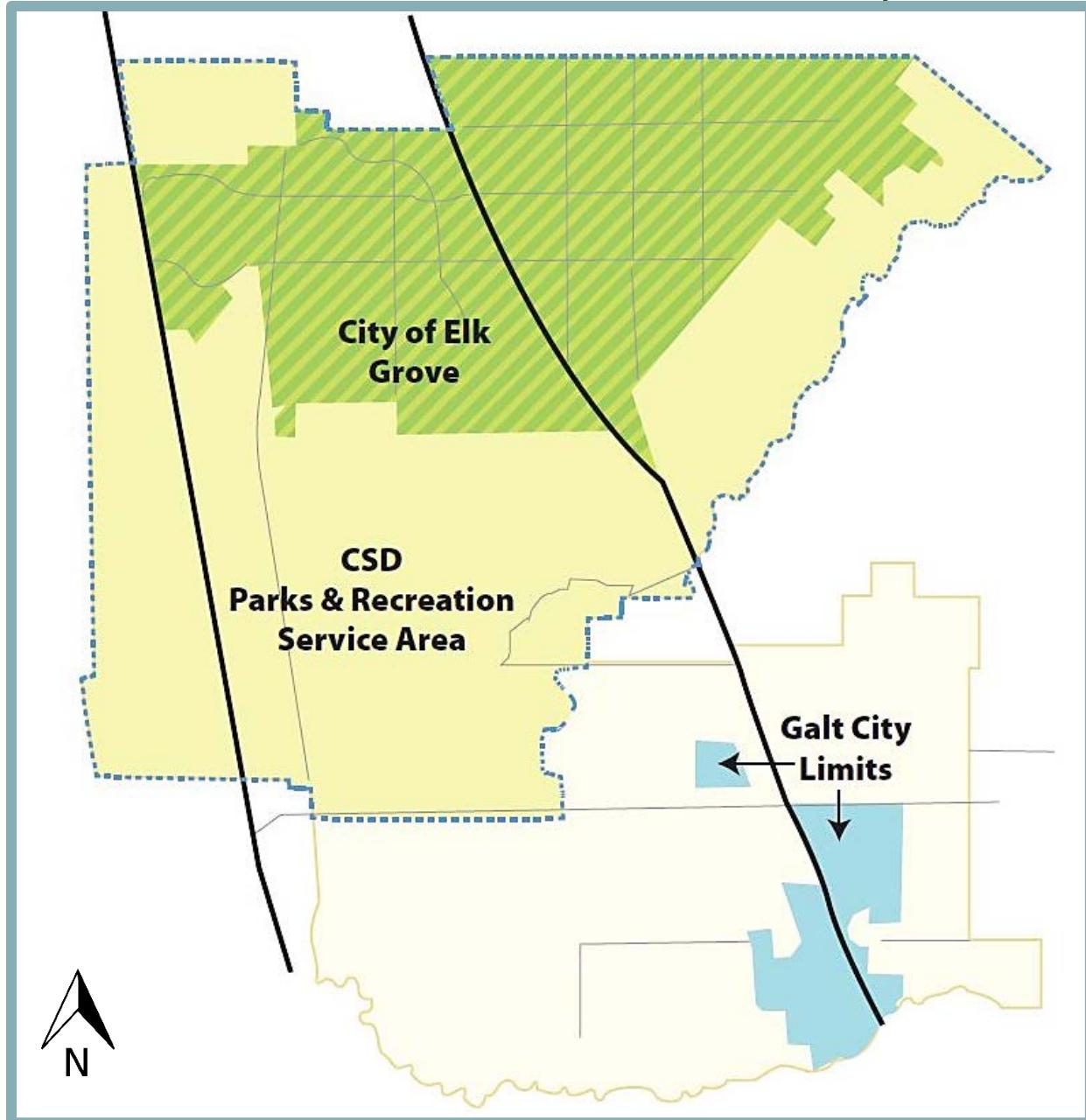
As illustrated in Figure 1, the Cosumnes CSD Parks and Recreation Service Area is shown in dark yellow. The area shaded in light yellow, including the City of Galt and the southeastern portions of unincorporated Sacramento County, are not part of the Parks and Recreation Service Area, and represent the service area for the Cosumnes CSD Fire Department only.

1.3 PLANNING

New development within the Cosumnes CSD, including parks, recreation facilities, community centers, fire stations, and others, must adhere to a number of local policy documents, building code requirements, development standards, design guidelines, and standard practices that collectively further the goals and actions included in this CAP/SAP.

In addition, various other local agencies provide guidance and regulations pertaining to air quality and greenhouse gasses. The Cosumnes CSD is within the boundaries of the Sacramento Valley Air Basin (SVAB) and under the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD). SMAQMD is responsible for monitoring air pollution within the SVAB and for developing and administering programs to reduce air pollution levels below the health-based standards established by the State and federal governments. As part of SMAQMD's efforts to reduce GHG emissions within the district in compliance with AB 32 and SB 32, SMAQMD has adopted thresholds of significance for GHG emissions from new projects. SMAQMD has a role in reviewing development projects and ensuring that projects comply with the thresholds of significance adopted by the district as applicable.

Figure 1
Cosumnes CSD Service Area Boundaries Map



Source: Cosumnes Community Services District. Parks & Recreation 2019-2022 Strategic Plan [pg. 9]. 2018.

The City of Elk Grove adopted a CAP in February of 2019, and the City of Galt adopted a CAP in March of 2020. The goal of this CAP/SAP is to establish compliance with both local CAPs and facilitate implementation of the climate goals therein.

1.4 USING THE CAP/SAP

To ensure the success of this CAP/SAP, the Cosumnes CSD will integrate the goals and strategies of the Plan into their planning, operations, and maintenance processes. As a means of integrating the CAP/SAP into future operations, the Cosumnes CSD may choose to designate a sustainability coordinator who will be responsible for coordinating GHG reduction and sustainability efforts as well as monitor and report progress of the goals herein. Successful implementation requires regular monitoring and reporting. Details regarding future updates to this CAP/SAP, as well as the incorporation of CAP/SAP consistency analyses in ongoing planning, operations, and maintenance processes are presented in Chapter 6, Implementation, of this CAP/SAP. Implementation of this CAP/SAP, in coordination with the local CAPs and statewide planning efforts, will ensure achievement of considerable GHG reductions in the short- and long-term and consistency with State GHG reduction targets and goals.

2. CLIMATE CHANGE SCIENCE AND BACKGROUND

This chapter includes a discussion of the principles of climate science and climate change, as well as background information about the climate-related rules and regulations set forth by federal, State, and local governing bodies. The Cosumnes CSD is located within southern Sacramento County. Because climate and weather act on a broad geographic range, the entire County of Sacramento is discussed throughout this chapter. It should be noted that references to Sacramento County refer solely to the geographic region, and not necessarily the municipality.

2.1 PRINCIPLES OF THE EARTH'S CLIMATE

The following section will provide a brief overview of the scientific understanding of the earth's climate system, with specific focus on the principles of climate change.

Climate vs. Weather

Although sometimes used interchangeably, the terms "climate" and "weather" represent two related, but different concepts. Weather refers to the immediate state of the atmosphere. Questions such as, is it hot or cold outside right now; what is the humidity today; and how cloudy will it be this afternoon, are all concerned with the day-to-day conditions of the atmosphere. Climate, on the other hand, is the average of a given location's weather over time.¹ Because climate information is considered on a longer temporal time scale than weather, climate is often discussed in statistical terms and can be used to answer such questions as what is the average temperature within Sacramento County during the month of June; how many inches of rain does the County receive each year; and what month is usually the coldest month of the year in the County. Because climate is the pattern of weather over a given time, questions regarding climate can be spatially and temporally broad. For instance, discussions on climate can focus on Sacramento County, California, North America, or the entire globe, and can concern periods of weeks, years, decades, millennia, and beyond.

Understanding a region's climate provides important insights into a region's average weather, as well as a region's likelihood of experiencing extreme weather events such as heat waves, storms, floods and droughts.² Extreme weather events are often the most attention-grabbing features of a region's climate, consider drought in California or hurricanes in Florida; however, average climactic conditions can also greatly impact a region's suitability for agriculture, forestry, and general human habitation. For instance, California's Mediterranean type climate, with mild wet winters and dry summers, makes the State uniquely suited for agricultural activities.

Factors Controlling Earth's Climate

Considering the importance of the region's climate to our society, we must understand the factors that affect climate. The climate within southern Sacramento County is interconnected with the

¹ National Snow & Ice Data Center. *All About Climatology and Meteorology*. Accessible at https://nsidc.org/cryosphere/arctic-meteorology/climate_vs_weather.html. Accessed February 2020.

² U.S. Global Change Research Program. *GlobalChange.gov*. Accessible at <http://www.globalchange.gov/>. Accessed January 2017.

climate of the State, continent, and globe in what is called a climate system. The main driver of the earth's climate system and, thus, the continent's, State's and County's climate, is energy radiated by the sun hitting the earth.³ Several factors can alter the amount of solar energy hitting the earth such as: the distance of the earth from the sun, the intensity of solar activity, and the tilt of the earth on the earth's axis. However, these factors are generally stable, and act on what is known as a geologic timescale, often discussed in hundreds of thousands, to millions and billions of years. Because such factors are stable and predictable, the amount of solar energy hitting the earth is known and has been relatively constant over much of human history.⁴

Although humans cannot change the amount of solar energy reaching the Earth, humans can alter how much of this incoming heat remains. The Earth's atmosphere functions as a natural heat regulation system by balancing incoming solar energy from the sun and outgoing thermal radiation, which is first absorbed from the sun and then reemitted by the land, oceans, and atmosphere. This naturally occurring phenomenon, known as the greenhouse effect, enables the Earth to have equilibrium temperatures supportive of life.

Certain gases intensify the greenhouse gas effect, however, by trapping thermal radiation and not emitting them out into space again – like a blanket or the walls of a greenhouse. These greenhouse gases (GHGs) include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), ozone (O₃), and fluorinated gases (such as hydrofluorocarbons or HFCs). The higher the concentration of greenhouse gases in the atmosphere, the thicker the glass walls of the greenhouse, and the more heat is trapped on Earth. This concept is illustrated in Figure 2.

On a geologic timescale, over hundreds of thousands of years, the Earth has cycled between cooler periods of glaciation (ice ages) and warmer interglacial periods. Natural changes in the atmospheric concentration of carbon dioxide and other GHGs contributed to these gradual changes in the Earth's average temperatures and climate conditions, with higher levels of GHGs associated with warmer, tropical periods and lower levels linked to ice ages.⁵

While the amount of GHGs in the atmosphere has fluctuated naturally in the Earth's past, they are now rising at unprecedented rates due to human activities such as the burning of fossil fuels (coal, gasoline, and natural gas), land conversion, industrial processes (e.g., cement production and artificial nitrogen fixation for fertilizer), food production, and many other daily activities.⁶

The foregoing activities have been releasing vast quantities of GHGs into the atmosphere continuously since the Industrial Revolution (Figure 3 and Figure 4).

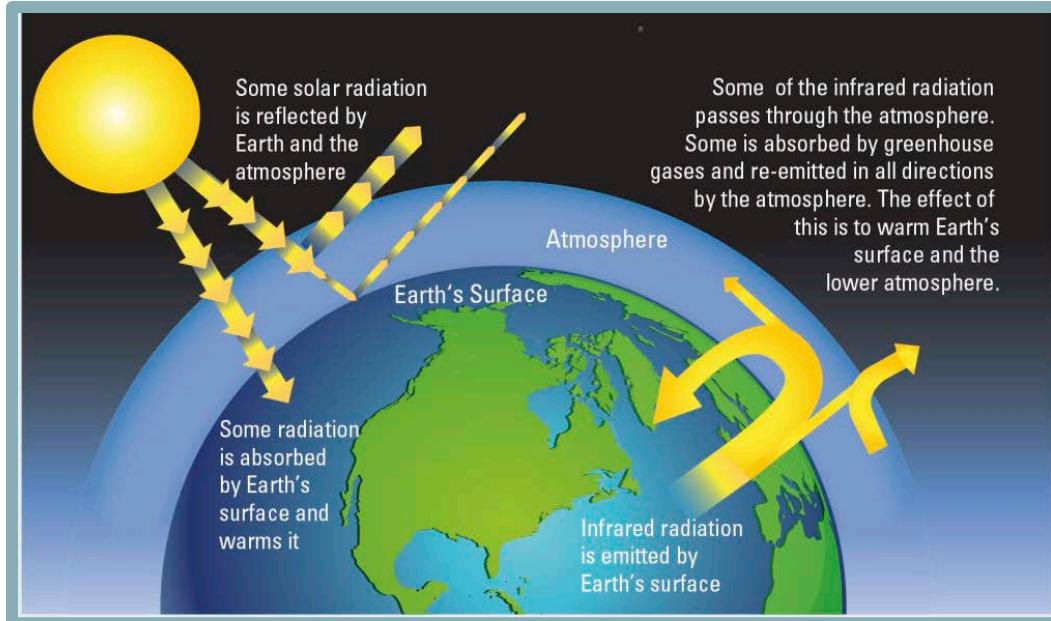
³ Masson-Delmotte, V., M. Schulz, A. Abe-Ouchi, J. Beer, A. Ganopolski, J.F. González Rouco, E. Jansen, K. Lambeck, J. Luterbacher, T. Naish, T. Osborn, B. Otto-Bliesner, T. Quinn, R. Ramesh, M. Rojas, X. Shao and A. Timmermann, 2013: *Information from Paleoclimate Archives*. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

⁴ National Aeronautics and Space Administration. *Paleoclimatology: Explaining the Evidence*. Available at http://earthobservatory.nasa.gov/Features/Paleoclimatology_Evidence/. Accessed on March 10, 2017.

⁵ Masson-Delmotte, V., M. Schulz, A. Abe-Ouchi, J. Beer, A. Ganopolski, J.F. González Rouco, E. Jansen, K. Lambeck, J. Luterbacher, T. Naish, T. Osborn, B. Otto-Bliesner, T. Quinn, R. Ramesh, M. Rojas, X. Shao and A. Timmermann, 2013: *Information from Paleoclimate Archives*. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

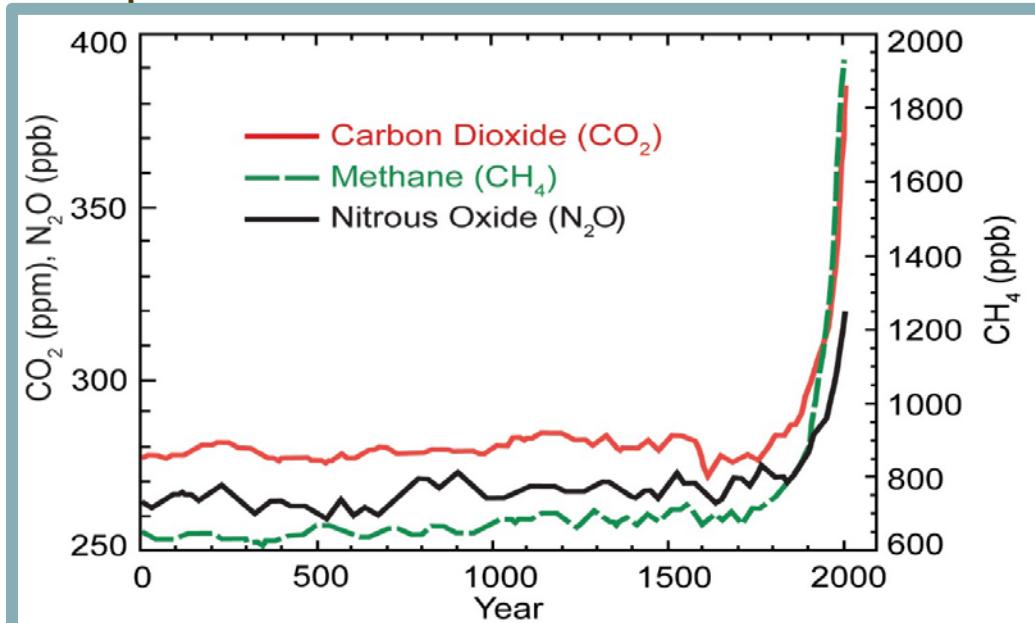
⁶ *Ibid.*

Figure 2
The Greenhouse Effect



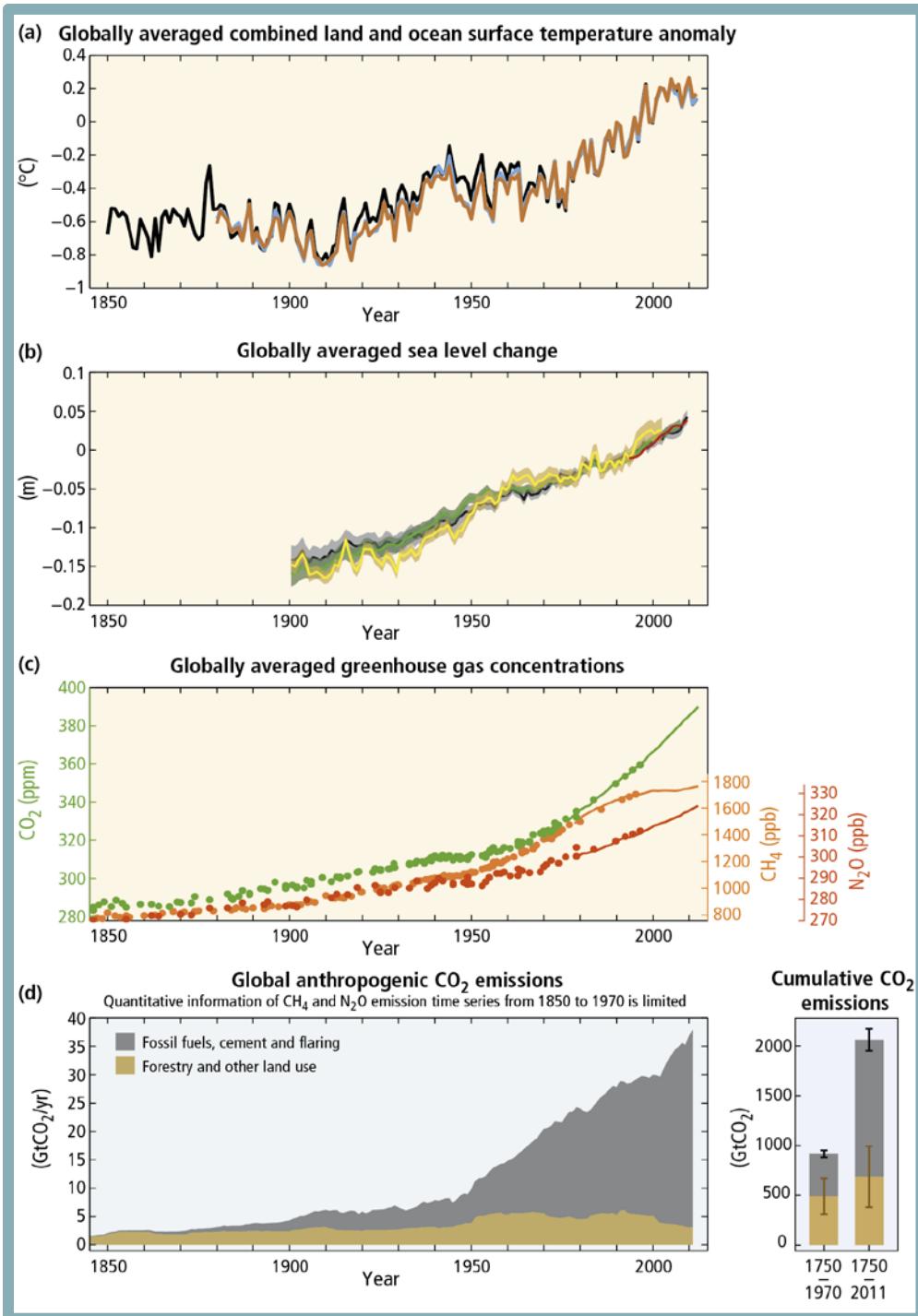
Source: *The Royal Society. The Basics of Climate Change.* Available at <https://royalsociety.org/topics-policy/projects/climate-change-evidence-causes/basics-of-climate-change/>. Accessed July, 2018.

Figure 3
Atmospheric Concentrations of Common GHGs Over Time



Sources: Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. A. Betts, D. W. Fahey, J. Haywood, J. Lean, D. C. Lowe, G. Myhre et al. Changes in Atmospheric Constituents and in Radiative Forcing. In *Climate Change 2007: The Physical Basis*, edited by S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller, 129-234. Vol. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York, NY: Cambridge University Press, 2007. Blasing, T. J. Recent Greenhouse Gas Concentrations. 2008.

Figure 4
Temperature, Sea Level, and Atmospheric GHGs Since the Industrial Revolution



Source: IPCC, 2014: *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]*. IPCC, Geneva, Switzerland, 151 pp.

The increases of GHGs in the atmosphere can be thought of as thickening the glass walls of the Earth's greenhouse, causing more and more heat to be trapped within the Earth's system. This leads to warmer global average temperatures (Figure 4 and Figure 5), which in turn contributes to rising sea levels, more droughts, and more extreme weather conditions due to the added energy in global climate systems (Figure 4). Current GHG levels are at their highest in the past 800,000 years – before modern humans appeared on Earth – and continue to increase at unprecedented rates.

In conclusion, human society depends on stable, predictable climate patterns. At lower concentrations, GHGs retain heat within the atmosphere to provide the stable climate that humans rely on. However, human activities across the globe are drastically altering the Earth's atmospheric composition by causing large increases in GHG concentrations, mainly CO₂ but also methane, nitrous oxide, and fluorinated gases. Such human-induced changes to atmospheric GHG concentrations are increasing average land and ocean temperatures, contributing to rising sea levels (Figure 4), and threaten to alter the earth's climate system.⁷

This CAP/SAP will chart a course forward for the Cosumnes CSD, which will focus on measures that encourage growth within the Cosumnes CSD, while also encouraging climate change protection and sustainability measures throughout the community. The actions of the Cosumnes CSD, combined with other local groups and statewide and global initiatives to reduce GHG emissions, will allow for on-going prosperity without diminishing the ability of future generations to enjoy the same standard of living.

2.2 REGULATORY SETTING

GHG emissions are monitored and regulated through the efforts of various international, federal, State, and local government agencies. Agencies work jointly and individually to reduce GHG emissions through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies responsible for regulating GHG emissions within the County of Sacramento, and thus, the Cosumnes CSD, are discussed below.

Federal Regulations

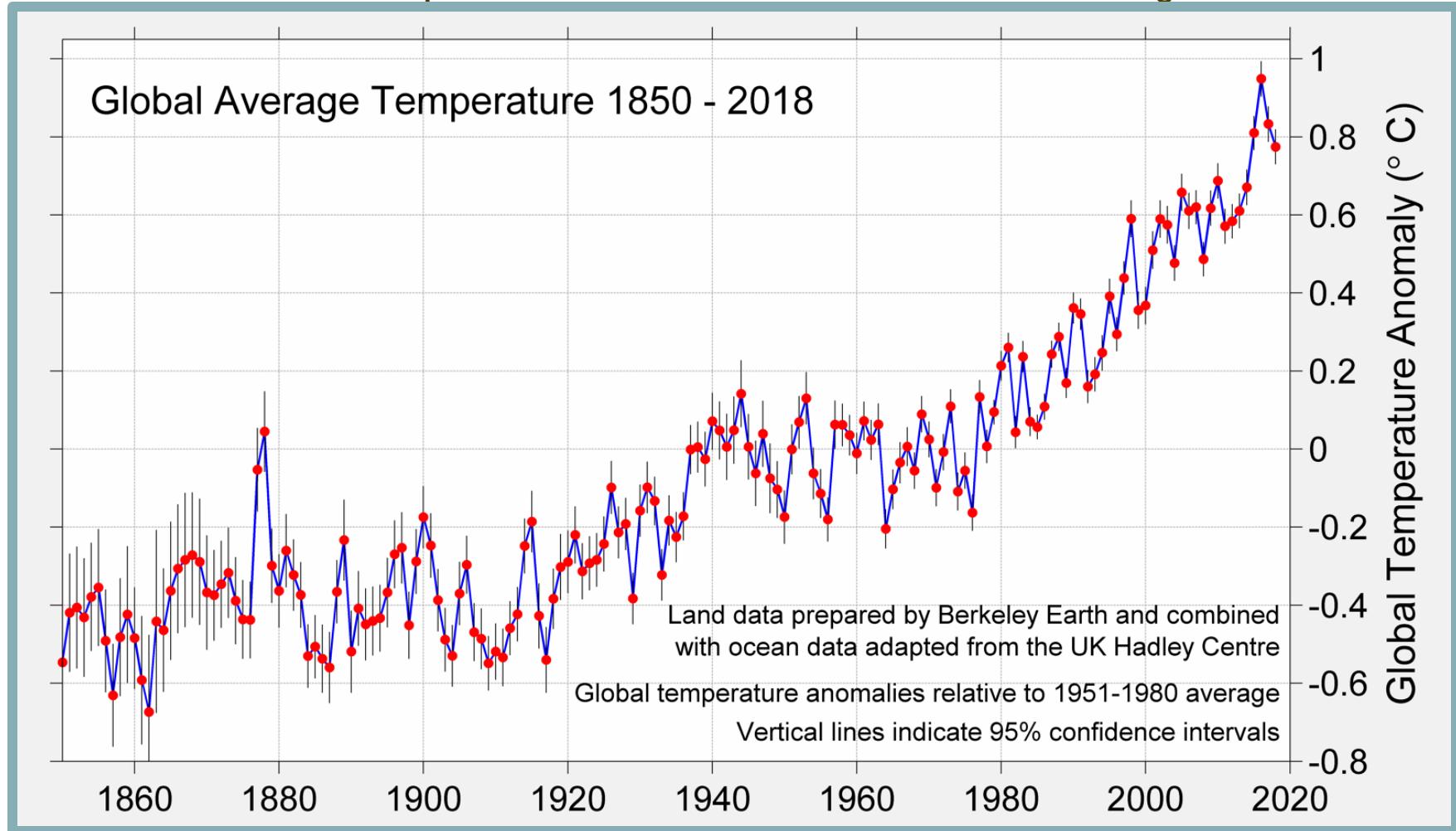
The most prominent federal regulation related to GHG emissions is the Federal Clean Air Act (FCAA), which is implemented and enforced by the United States Environmental Protection Agency (USEPA).

FCAA and USEPA

On December 7, 2009, USEPA issued findings under Section 202(a) of the FCAA concluding that GHGs are pollutants that could endanger public health. Under the so-called Endangerment Finding, USEPA found that the current and projected concentrations of the six key, well-mixed GHGs – CO₂, CH₄, N₂O, PFCs, SF₆, and HFCs – in the atmosphere threaten the public health and welfare of current and future generations. These findings do not, by themselves, impose any requirements on industry or other entities.

⁷ IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)], IPCC, Geneva, Switzerland, 151 pp.

Figure 5
Global Temperature Anomalies Relative to 1951-1980 Average



Source: Berkeley Earth. Global Temperature Report for 2018. Available at: <http://berkeleyearth.org/2018-temperatures/>. Accessed July 2019.

The USEPA has been directed to develop regulations to address the GHG emissions of cars and trucks. The Mandatory Reporting of Greenhouse Gases Rule requires reporting of GHG emissions from large sources and suppliers in the U.S., and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHG, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to the USEPA. To track the national trend in emissions and removals of GHG since 1990, USEPA develops the official U.S. GHG inventory each year.

State Regulations

California has adopted a variety of regulations aimed at reducing GHG emissions. The adoption and implementation of the key State legislation described in further detail below demonstrates California's leadership in addressing global climate change. Only the most prominent and applicable California GHG-related legislation are included below; however, an exhaustive list and extensive details of California air quality legislation can be found at the California Air Resources Board (CARB) website.⁸

Assembly Bill (AB) 1007

AB 1007, State Alternative Fuels Plan (Pavley, Chapter 371, Statutes of 2005), required development and adoption of a State plan to increase the use of alternative fuels. The final *State Alternative Fuels Plan* was adopted on December 5, 2007 and presented strategies and actions California must take to increase the use of alternative, non-petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-state production. Examples of such strategies include establishment of government incentive programs for alternative fuels, creation of a Low Carbon Fuel Standard to reduce the carbon intensity of transportation fuels, and the allowance of GHG emissions credits to entities using alternatively fueled vehicles. The plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-state production of biofuels without causing a significant degradation of public health and environmental quality. The Plan recommended goals for alternative fuel use as well as reductions in the carbon intensities of fuels such as gasoline and diesel, and lays a foundation for building a multi-fuel transportation energy future for California by 2050. As of 2017, decreases in the carbon intensity of conventional fuels have met or exceeded the compliance targets, and the use of alternative fuels has increased by approximately 800 million gallons of gas equivalence units.⁹

AB 1493

California AB 1493 (Stats. 2002, ch. 200) (Health & Safety Code, §42823, 43018.5), known as Pavley I, was enacted on July 22, 2002. AB 1493 requires that the CARB develop and adopt regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by the CARB to be vehicles whose primary use is noncommercial personal transportation in the State." On June 30, 2009, the USEPA granted a waiver of FCAA preemption to California for the State's GHG emission standards for motor vehicles, beginning with the 2009 model year. Pursuant to the FCAA, the waiver allows for

⁸ California Air Resources Board. *Laws and Regulations*. Available at: <http://www.arb.ca.gov/html/lawsregs.htm>. Accessed February 2018.

⁹ California Air Resources Board. *Low Carbon Fuel Standard Data Dashboard*. Available at: <https://www.arb.ca.gov/fuels/lcfs/dashboard/dashboard.htm>. Accessed May 2019.

the State to have special authority to enact stricter air pollution standards for motor vehicles than the federal government's. On September 24, 2009, the CARB adopted amendments to the Pavley regulations (Pavley I) that reduce GHG emissions in new passenger vehicles from 2009 through 2016. The second phase of the Pavley regulations (Pavley II) is expected to affect model year vehicles from 2016 through 2020. The CARB estimates that the regulation would reduce GHG emissions from the light-duty passenger vehicle fleet by an estimated 18 percent in 2020 and by 27 percent in 2030.

Renewable Portfolio Standard (RPS) and SB 100

Established in 2002 under SB 1078, accelerated in 2006 under SB 107, and expanded in 2011 under SB 2, California's RPS is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020.

Since the inception of the RPS program, the program has been extended and enhanced multiple times. In 2015, SB 350 extended the State's RPS program by requiring that publicly owned utilities procure 50 percent of their electricity from renewable energy sources by 2030. The requirements of SB 350 were expanded and intensified in 2018 through the adoption of SB 100, which mandated that all electricity generated within the State by publicly owned utilities be generated through carbon-free sources by 2045. In addition, SB 100 increased the previous renewable energy requirement for the year 2030 by 10 percent; thus, requiring that 60 percent of electricity generated by publicly owned utilities originate from renewable sources by 2030.

Executive Order S-03-05

On June 1, 2005, then-Governor Schwarzenegger signed Executive Order S-03-05, which established total GHG emission goals. Specifically, emissions are to be reduced to year 2000 levels by 2010, 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (Cal-EPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The Secretary is also directed to submit biannual reports to the governor and State legislature describing: (1) progress made toward reaching the emission goals; (2) impacts of global warming on California's resources; and (3) mitigation and adaptation plans to combat these impacts.

To comply with the Executive Order, the Secretary of the Cal-EPA created a Climate Action Team (CAT) made up of members from various State agencies and commissions. In March 2006, CAT released their first report. In addition, the CAT has released several "white papers" addressing issues pertaining to the potential impacts of climate change on California.

AB 32

In September 2006, AB 32, the California Climate Solutions Act of 2006, was enacted (Stats. 2006, ch. 488) (Health & Saf. Code, §38500 et seq.). AB 32 delegated the authority for its implementation to the CARB and directs CARB to enforce the State-wide cap. Among other requirements, AB 32 required CARB to (1) identify the State-wide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020, and (2) develop and implement a Scoping Plan. Accordingly, the CARB has prepared the Climate Change Scoping Plan (Scoping Plan) for

California, which was approved in 2008 and updated in 2014 and 2017.¹⁰ The following sections present further information regarding plans and programs that have been introduced in order to meet the statutory requirements of AB 32.

California Scoping Plan

The 2008 Scoping Plan identified GHG reduction measures that would be necessary to reduce statewide emissions as required by AB 32. Many of the GHG reduction measures identified in the 2008 Scoping Plan have been adopted, such as the Low Carbon Fuel Standard, Pavley, Advanced Clean Car standards, RPS, and the State's Cap-and-Trade system.

Building upon the 2008 Scoping Plan, the 2014 and 2017 Scoping Plan Updates introduced new strategies and recommendations to continue GHG emissions reductions. The 2013 Scoping Plan Update created a framework for achievement of 2020 GHG reduction goals and identified actions that may be built upon to continue GHG reductions past 2020, as required by AB 32. Following the trajectory of the first update to the Scoping Plan, the 2017 Scoping Plan sets a path for the achievement of California's year 2030 GHG reduction goals.

California GHG Cap-and-Trade Program

California's GHG Cap-and-Trade Program was originally envisioned in the 2008 Scoping Plan as a key strategy to achieve GHG emissions reductions mandated by AB 32. The Cap-and-Trade Program is intended to put California on the path to meet the GHG emission reduction goal of 1990 levels by the year 2020, and ultimately achieving an 80 percent reduction from 1990 levels by 2050. Under cap-and-trade, an overall limit on GHG emissions from capped sectors has been established and facilities or industries subject to the cap are able to trade permits (allowances) to emit GHGs. The CARB designed the California Cap-and-Trade Program to be enforceable and to meet the requirements of AB 32.¹¹ The Program started on January 1, 2012, with an enforceable compliance obligation beginning with the 2013 GHG emissions. In recognition of the global scope of climate change and the need for international cooperation to curb GHG emissions, on January 1, 2014 California linked the State's cap-and-trade plan with Quebec's,¹² and on January 1, 2015 the program expanded to include transportation and natural gas fuel suppliers.¹³ AB 398 was adopted by the State's legislature in July 2017, which reauthorized the Cap-and-Trade program through December 31, 2030. The reauthorization and continued operation of the Cap-and-Trade program represents a key strategy within the State's 2017 Scoping Plan Update for the achievement of California's year 2030 GHG reduction goals.

Executive Order S-01-07

On January 18, 2007, then-Governor Schwarzenegger signed Executive Order S-01-07, which mandates that a State-wide goal be established to reduce carbon intensity of California's transportation fuels by at least 10 percent by 2020. The Order also requires that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California.

¹⁰ California Air Resources Board. AB 32 Scoping Plan. Accessible at: <https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>. Accessed February 2018.

¹¹ California Air Resources Board. Overview of ARB Emissions Trading Program. Available at: https://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf. Accessed February 2018.

¹² California Air Resources Board. Linkage. Available at: <https://www.arb.ca.gov/cc/capandtrade/linkage/linkage.htm>. Accessed May 2019.

¹³ California Air Resources Board. Overview of ARB Emissions Trading Program. Available at: https://www.arb.ca.gov/cc/capandtrade/guidance/cap_trade_overview.pdf. Accessed February 2018.

SB 375

In September 2008, SB 375, known as the Sustainable Communities and Climate Protection Act of 2008, was enacted, which is intended to build on AB 32 by attempting to control GHG emissions by curbing sprawl. SB 375 enhances CARB's ability to reach goals set by AB 32 by directing CARB to develop regional GHG emission reduction goals to be achieved by the State's 18 metropolitan planning organizations (MPOs), including the SACOG. Under SB 375, MPOs must align regional transportation, housing, and land-use plans and prepare a "Sustainable Communities Strategy" (SCS) to reduce the amount of vehicle miles traveled in their respective regions and demonstrate the region's ability to attain its greenhouse gas reduction goals. SB 375 provides incentives for creating walkable and sustainable communities and revitalizing existing communities, and allows home builders to get relief from certain environmental reviews under CEQA if they build projects consistent with the new sustainable community strategies. Furthermore, SB 375 encourages the development of alternative transportation options, which will reduce traffic congestion.

Executive Order S-13-08

Then-Governor Arnold Schwarzenegger issued Executive Order S-13-08 on November 14, 2008. The Executive Order is intended to hasten California's response to the impacts of global climate change, particularly sea level rise, and directs State agencies to take specified actions to assess and plan for such impacts, including requesting the National Academy of Sciences to prepare a Sea Level Rise Assessment Report, directing the Business, Transportation, and Housing Agency to assess the vulnerability of the State's transportation systems to sea level rise, and requiring the Office of Planning and Research and the Natural Resources Agency to provide land use planning guidance related to sea level rise and other climate change impacts.

The order also required State agencies to develop adaptation strategies to respond to the impacts of global climate change that are predicted to occur over the next 50 to 100 years. The adaption strategies report summarizes key climate change impacts to the State for the following areas: public health; ocean and coastal resources; water supply and flood protection; agriculture; forestry; biodiversity and habitat; and transportation and energy infrastructure. The report recommends strategies and specific responsibilities related to water supply, planning and land use, public health, fire protection, and energy conservation.

AB 197 and SB 32

On September 8, 2016, AB 197 and SB 32 were enacted with the goal of providing further control over GHG emissions in the State. SB 32 built on previous GHG reduction goals by requiring that the CARB ensure that statewide GHG emissions are reduced to 40 percent below the 1990 level by the year 2030. Additionally, SB 32 emphasized the critical role that reducing GHG emissions would play in protecting disadvantaged communities and the public health from adverse impacts of climate change. Enactment of SB 32 was predicated on the enactment of AB 197, which seeks to make the achievement of SB 32's mandated GHG emission reductions more transparent to the public and responsive to the Legislature. Transparency to the public is achieved by AB 197 through the publication of an online inventory of GHG and toxic air contaminants emissions from facilities required to report such emissions pursuant to Section 38530 of California's Health and Safety Code. AB 197 further established a six-member Joint Legislative Committee on Climate Change Policies, which is intended to provide oversight and accountability of the CARB, while also adding two new legislatively-appointed, non-voting members to the CARB. Additionally, AB 197 directs the CARB to consider the "social costs" of emission reduction rules and regulations, with particular focus on how such measures may impact disadvantaged communities.

Executive Order B-55-18

On September 10, 2018, then-Governor Brown established a statewide goal of carbon neutrality as soon as possible, and no later than 2045. Following achievement of carbon neutrality, net negative emissions should be pursued as the new emissions goal. The executive order directed the CARB to work with relevant State agencies to develop frameworks for implementation and tracking of the new goal, and further directed the CARB to support the carbon neutrality goal through future updates to the State Scoping Plan. The implementation of carbon sequestration targets and projects for natural and working lands is identified as a necessary measure to achieve carbon neutrality and net negative emissions.

SB 1383

SB 1383 enacts the strictest regulations on short-lived but high global warming potential (GWP) gases in the U.S. The high GWP of the gases targeted by SB 1383 means that the release of such gases can have global warming impacts hundreds of times greater than that of carbon dioxide. Because some high GWP gases have a shorter lifetime in the atmosphere, reducing their emissions can have an immediate and significant contribution to reducing climate change. SB 1383 requires a 50 percent reduction in black carbon, a 40 percent reduction in methane, and 40 percent reduction in hydrofluorocarbons from 2013 levels by 2030. Sources of these emissions include landfills, especially the decomposition of organic wastes (including food), agriculture, refrigeration, air-conditioning, and aerosol products.

California Building Standards Code

California's building codes (California Code of Regulations [CCR], Title 24) are published on a triennial basis, and contain standards that regulate the method of use, properties, performance, or types of materials used in the construction, alteration, improvement, repair, or rehabilitation of a building or other improvement to real property. The California Building Standards Code (CBSC) is responsible for the administration and implementation of each code cycle, which includes the proposal, review, and adoption process. Supplements and errata are issued throughout the cycle to make necessary mid-term corrections. The 2019 Code has been prepared and will become effective January 1, 2020. The CBSC applies State-wide; however, a local jurisdiction may amend a building code standard if the jurisdiction makes a finding that the amendment is reasonably necessary due to local climatic, geological, or topographical conditions.

California Green Building Standards Code

The 2019 California Green Building Standards Code, otherwise known as the CALGreen Code (CCR Title 24, Part 11), is a portion of the CBSC, which will become effective with the rest of the CBSC on January 1, 2020. The purpose of the CALGreen Code is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices. The provisions of the Code apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure throughout California.

The CALGreen Code encourages local governments to adopt more stringent voluntary provisions, known as Tier 1 and Tier 2 provisions, to further reduce emissions, improve energy efficiency, and conserve natural resources. If a local government adopts one of the tiers, the provisions become mandates for all new construction within that jurisdiction.

Building Energy Efficiency Standards

The 2019 Building Energy Efficiency Standards is a portion of the CBSC (CCR Title 24, Parts 6 and 11) that expands upon energy efficiency measures from the 2016 Building Energy Efficiency Standards. As compared to standards structures built under the 2016 Standards, operation of residential structures built under the 2019 Standards would consume seven percent less energy, while commercial structures would consume 30 percent less energy. Energy reductions relative to previous Building Energy Efficiency Standards would be achieved through various regulations including, but not limited to, requirements for the use of high efficacy lighting, improved water heating system efficiency, and high-performance attics and walls.

Fleet Rule for Transit Agencies

On December 14, 2018, the CARB unanimously approved the Innovative Clean Transit regulation. The Innovative Clean Transit regulation requires transit agencies to begin transitioning existing fleets to zero-emission vehicles, and requires that future vehicle purchases be zero-emission vehicles. The result of the Innovative Clean Transit regulation will be that by 2040, all transit vehicles within California will be zero-emissions vehicles.

Local Regulations

The following are the regulatory agencies and regulations pertinent to the proposed project on a local level.

Sacramento Metropolitan Air Quality Management District

Various local, regional, State and federal agencies share the responsibility for air quality management in Sacramento County. The Sacramento Metropolitan Air Quality Management District (SMAQMD) operates at the local level with primary responsibility for attaining and maintaining the federal and State Ambient Air Quality Standards (AAQS) in Sacramento County. The SMAQMD is tasked with implementing programs and regulations required by the FCAA and the California Clean Air Act (CCAA), including preparing plans to attain federal and State AAQS. The SMAQMD works jointly with the USEPA, CARB, SACOG, other air districts in the Sacramento region, county and city transportation and planning departments, and various non-governmental organizations to improve air quality through a variety of programs. Programs include the adoption of regulations, policies and guidance, extensive education and public outreach programs, as well as emission reducing incentive programs.

Nearly all development projects in the Sacramento region have the potential to generate air pollutants and GHG emissions. Therefore, for most projects, evaluation of air quality and GHG emissions impacts is required to comply with CEQA. In order to help public agencies evaluate air quality impacts, the SMAQMD has developed the Guide to Air Quality Assessment in Sacramento County.¹⁴ The SMAQMD's guide includes recommended thresholds of significance, including mass emission thresholds for construction-related and operational GHG emissions as well as GHG emissions from stationary sources. Projects resulting in emissions in excess of the SMAQMD's mass emissions thresholds are required to implement all feasible mitigation to reduce GHG emissions.

¹⁴ Sacramento Metropolitan Air Quality Management District. *Guide to Air Quality Assessment in Sacramento County*. Adopted December 2009. Updated September 2018.

Elk Grove CAP

The City of Elk Grove adopted their CAP in February of 2019. The CAP identifies means through which the City can achieve the State targets discussed above, and provides reduction strategies to reduce the City's annual per capita GHG levels. The CAP corresponds with the City's General Plan through key goals and policies, primarily "GOAL NR-5: Reduced GHG Emissions that Align with Local, State, and Other Goals." Therefore, consistency with the Elk Grove CAP would also imply consistency with the Natural Resources Element of the General Plan. Some reduction strategies proposed in the Elk Grove CAP include the following:

- BE-1. Building Stock: Promote Energy Conservation by residents and businesses in existing structures in close coordinated with other agencies and local energy providers, including SMUD and PG&E.
- BE-7. Building Stock: Promote installation of on-site solar PV systems in existing residential and commercial development.
- RC-1. Waste Reduction: The City shall facilitate recycling, reduction in the amount of waste, and reuse of materials.
- TACM-9. EV Charging Requirements: Adopt an EV charging station ordinance that establishes minimum EV charging standards for all new residential and commercial developments.

Galt CAP

The City of Galt adopted a Citywide CAP in 2020. The Galt CAP provides recommended measures to reduce GHG emissions throughout the City. Compliance with the Galt CAP, once finalized, would correspond with compliance with State and federal emissions goals. Some of the reduction measures featured in the Galt CAP include:

- Transportation Measure 2. In consultation with South County Transit and SACOG, the City of Galt shall seek to upgrade existing infrastructure for alternative transportation and require new development to include infrastructure for alternative transportation with a specific focus on accommodating the continued use of public transit within the City of Galt.
- Land Use Measure 3. The City of Galt shall seek funding for the preparation of an Urban Tree Management Plan.
- Building Efficiency Measure 2. The City of Galt shall seek to phase in the zero-net energy (ZNE) requirements for residential development by 2020 and commercial development by the year 2030.

Sacramento County CAP

Sacramento County began work on a CAP in 2016, and is currently working to finish the community-wide document.

3. REGIONAL IMPACTS OF CLIMATE CHANGE

This chapter discusses the means in which climate change is expected to impact the southern Sacramento County region, and how these changes could subsequently impact the Cosumnes CSD.

3.1 AREAS OF POTENTIAL IMPACTS

Executive Order S-13-08 directed the Natural Resources Agency to prepare a climate adaptation strategy identifying the potential risks to California posed by climate change.¹⁵ The initial climate adaptation strategy was prepared in 2009, with updates published in 2014 and 2018. The 2018 publication from the Natural Resources Agency titled *Safeguarding California Plan: 2018 Update*, known as the Safeguarding California Plan, is the most recent climate adaptation strategy.¹⁶

The Safeguarding California Plan focuses on the increasingly visible effects of climate change, with specific focus on how climate change is currently impacting, and will continue to impact, some of California's most valuable assets. While many of the climate change impacts identified in the Safeguarding California Plan act on a statewide or global scale, this section of the CAP/SAP will focus on those impacts that could directly impact the Cosumnes CSD and the service population. Based on the Safeguarding California Plan, global climate change will cause the following modifications to local conditions:

1. More intense and frequent heat waves.

This could impact:

- irrigation requirements in parkland and outdoor spaces;
- biodiversity in wildland spaces;
- cancellation of programs and events;
- expenditures required to keep Cosumnes CSD facilities cool; and
- increased demand on emergency services to respond to incidences of heat exhaustion and heat stroke.

2. More intense and frequent drought, shrinking snowpack, less precipitation.

This could impact:

- irrigation requirements in parkland and outdoor spaces;
- biodiversity in wildland spaces;
- water availability for Cosumnes CSD facilities, including spray-parks, aquatic centers, and fire services; and
- the cost of potable water leading to fiscal impacts to the Cosumnes CSD's operating budget.

3. More severe and frequent wildfires.

This could impact:

- biodiversity in wildland spaces;

¹⁵ State of California, Office of Governor Arnold Schwarzenegger. *Executive Order S-3-08*. November 14, 2008.

¹⁶ State of California, Natural Resources Agency. *Safeguarding California Plan: 2018 Update*. January 2018.

- demand for fire protection services through mutual aid agreements;
- the cost of water for fire suppression;
- cancellation of programs and events;
- the cost associated with hiring and training additional staff, especially fire personnel; and
- increased demand for emergency services to respond to community members impacted by asthma and other acute respiratory health impacts.

The foregoing changes are expected to directly influence the activities and services offered by the Cosumnes CSD, as well as the public health of those within southern Sacramento County. The specific regional impacts are discussed in further detail below.

Landscape Irrigation Demands

A likely result of climate change is increased temperatures in the Cosumnes CSD's Service Area. In general, as temperatures increase, the water demand for irrigation of plants increases proportionally.¹⁷ The Sacramento County Water Agency's Urban Water Management Plan anticipates that demand for water deliveries will increase between three and nine percent to meet increased demand due to higher irrigation demands.¹⁸ Although increased temperatures will drive increases in water demand, such increases may be tempered by increased proliferation of efficient irrigation systems and controls. For instance, a recent study of irrigation in nearby Yolo County demonstrated that despite an anticipated 30 percent increase in water demand due to climate change, a mixture of altered plant choice and increased water use efficiency through improved irrigation technologies could allow for irrigation demand to achieve a 12 percent decrease from existing levels.¹⁹

The information provided above depicts both the challenge and opportunity facing the region due to increased temperatures and on-going irrigation demands. In terms of future operational water demands from the Cosumnes CSD, the combined effect of increased demand due to rising regional temperatures and reduced demand due to changes in species selected for planting and improved irrigation efficiency could not be determined in this analysis. Thus, the growth in water demand anticipated in this CAP/SAP is based solely on the Cosumnes CSD's anticipated rate of increase in the number of facilities. As local documents such as Urban Water Management Plans are produced that provide more in-depth information regarding changes in irrigation demand in the Cosumnes CSD's service area, future iterations of this CAP/SAP will likely be able to refine this analysis.

Changes to Water Resources

Water is of crucial importance to everyday life and influences all facets of the Cosumnes CSD's operations. Potential impacts on water supply due to changes in precipitation are discussed in further depth below.

The Elk Grove Water District, Sacramento County Utilities, and the City of Galt Public Works Department provide water that is used by the Cosumnes CSD. All of the foregoing water

¹⁷ U.S. Department of the Interior, Bureau of Reclamation. *Sacramento and San Joaquin Rivers Basin Study*. March 2016.

¹⁸ Sacramento County Water Agency. *2015 Urban Water Management Plan*. June 2016.

¹⁹ Mehta, Vhisal K.; Haden, Van R.; Joyce, Brian A.; Purkey, David R.; Jackson, Louise E. *Irrigation Demand and Supply, Given Projections of Climate and Land-Use Change, in Yolo County, California. Agricultural Water Management, Volume 117* [pages 70-82]. January 31, 2013.

conveyors rely upon groundwater from the Cosumnes Subbasin (DWR Groundwater Basin Number 5-22.16) of the San Joaquin Valley Groundwater Basin as the sole source of domestic potable water for current and future water demand. Groundwater in the Cosumnes Subbasin is recharged by seepage from surface waters flowing from the Sierra Nevada, such as the Cosumnes River, the Mokelume River, Dry Creek, and Skunk Creek. In turn, the foregoing waterways rely predominantly on precipitation and snowmelt within their respective watersheds for flow. In areas outside of the direct influence of the Cosumnes River, historic groundwater pumping has led to declining groundwater levels within the subbasin; however, the basin has experienced certain periods of significant recovery of groundwater levels. Fluctuations between groundwater decline and recovery have occurred in response to precipitation patterns within the Central Valley. For instance, during the drought of 1987-1992, water levels declined within the subbasin by 10 to 15 feet, before recovering by 15 to 20 feet during the non-drought years of 1993 through 2000.²⁰ Thus, the amount of groundwater recharge within the Cosumnes Subbasin can be seen to respond to fluctuations in surface water seepage, which is affected by the amount of precipitation within the region. Considering the link between precipitation and groundwater levels and the current reliance on groundwater to meet potable water demand, local water supply is dependent on climactic trends and precipitation patterns within the State. It should be noted that water supplies derived from surface water resources in the State are similarly dependent on climactic trends and precipitation patterns.

Although uncertainty exists regarding the specific outcomes of climate change on precipitation patterns within the State, scientists agree that climate change will alter the hydrologic patterns within the State. In particular, climate change is anticipated to affect the frequency, magnitude, and duration of extreme weather events, and result in declining snowpack, as well as more frequent, and longer droughts.²¹ Furthermore, an increased proportion of winter precipitation is anticipated to fall as rain, rather than snow, and the snow that does accumulate is anticipated to melt earlier in the year. The combined effect of less overall snowfall and earlier melting will be a change in the timing and volume of snowmelt, which will alter streamflow. Such changes to precipitation regimes could result in reduced or irregular groundwater recharge within the Cosumnes Subbasin. Should groundwater recharge be altered, the portion of the Cosumnes Subbasin that supplies water to the Cosumnes CSD would experience declines in groundwater levels, which would have the potential to result in changing groundwater quality and availability of water supplies.

In terms of Cosumnes CSD facilities, the Cosumnes CSD requires potable water for sinks, toilets, and drinking fountains in the buildings, and water for irrigating landscaped areas. In addition, the Cosumnes CSD requires water to irrigate vegetation at most parks, Emerald Lakes Golf Course, baseball and softball fields, soccer fields, landscaped areas at Cosumnes CSD-owned facilities and fire stations, trails, landscape corridors, roadway medians, and more. Properly maintained sports, golf and play fields require healthy, even grass cover and appropriate water application and drainage to ensure their viability for continued use by patrons. As heat waves pass through the southern Sacramento County region, a higher volume of water would be required to sustain healthy grasses on sports fields and healthy vegetation in landscaped areas. During future droughts, the water level in the Cosumnes Subbasin is expected to deepen, which could lead to increase costs of water collection. The increased demand for water compounded with decreased

²⁰ California Department of Water Resources. *San Joaquin Valley Groundwater Basin Cosumnes Subbasin; Bulletin 118*. Updated February 03, 2006.

²¹ State of California, Natural Resources Agency. *Safeguarding California Plan: 2018 Update*. January 2018.

water availability could present an expensive challenge for the Cosumnes CSD, and require reductions in water usage.

In addition to the water demanded by the recreation and landscaping facilities discussed above, the fire protection services provided by Cosumnes CSD are almost entirely dependent on water resources to perform fire response. Protection of public health is currently, and will remain, the highest priority for water use within the Cosumnes CSD's jurisdictional area. As such, future droughts or water shortages are not anticipated to substantially curtail the availability of water for fire suppression; however, should water supplies overall become more constrained, the Cosumnes CSD could face restrictions on training activities or increased difficulty in obtaining adequate amounts of water for fire prevention and response.

Decline in Biodiversity

The Cosumnes CSD manages approximately 1,000 acres of parks, corridors, and nature trails. The success of the Cosumnes CSD's Parks and Recreation Department relies heavily on the health of the local natural environment.

Biodiversity refers to the variety of living things in an ecosystem, including plants, animals, microbes, habitats, and even genetic diversity within a species. A diverse ecosystem is considered to be a robust and resilient ecosystem. Genetic diversity allows organisms to adapt to their environment as the environment changes or new diseases come into play. In addition, humans often depend on biodiversity in local parklands and open space areas for spirituality, inspiration, aesthetic enjoyment and recreation.²² Humans also benefit from the ecosystem services provided by biodiverse habitats, which include nutrient cycling, pollination, air purification, stormwater control, and others.

Climate change can cause a decline in biodiversity by altering the availability of water and nutrient resources, creating an environment suitable for new plant and animal diseases, and leading to a decrease in the overall resilience of ecosystems. A warming earth can also cause plants to flower earlier in the year and shift the timing of bird migration, which can subsequently affect other inter-related natural processes.²³

A decrease in biodiversity could mean that fewer species are able to survive in southern Sacramento County, including the Cosumnes CSD parks and open spaces. The anticipated decrease in biodiversity could lead to increased expenditures by the Cosumnes CSD if, for example, trees require frequent removal or replacement or flowers require seasonal replanting due to changes in the prevalence of pest populations or the spread of new botanical diseases. Not only would a decrease in biodiversity require increased spending by the Cosumnes CSD to support landscaping, but a decrease in biodiversity could also reduce the aesthetic value of Cosumnes CSD's park facilities.

Increased Demand for Fire Protection Services

A warmer and drier climate would increase the frequency and intensity of fires within the region.²⁴ An increase in the frequency and severity of wildfires would create an increased demand for fire

²² United Nations Environment Programme. *Global Environment Outlook GEO4 Environment for Development*. 2007.

²³ Center for Health and the Global Environment at Harvard Medical School. *Biodiversity: Its Importance to Human Health*. 2002.

²⁴ National Oceanic and Atmospheric Administration. *The Impact of Wildfires on Climate and Air Quality*. 2019.

services, which are provided by the Cosumnes CSD to locations within the District as well as through mutual aid agreements with other jurisdictions and agencies.

More frequent and intense fires can threaten communities across the State, whether in heavily forested regions or regions surrounded by grassland. Recent grassland fires within the Sacramento Valley have caused evacuations of residents. For instance, in 2019, grassland fires in proximity to the City of Fairfield quickly forced the evacuation of residents. Both the cities of Elk Grove and Galt are bordered by mixtures of agricultural land and grassland that could be subject to such fire risks. Furthermore, both cities contain riparian corridors that include thick vegetation in close proximity to existing developments. Prolonged drought would result in increased vulnerability of such vegetation corridors to fire, which would pose immediate risks to structures and residents within each city. The potential for riparian and grassland vegetation to become more vulnerable to fire provides an example of how the impacts of climate change can interact to increase potential impacts. An increase in forest fires in surrounding areas in Northern California would also severely impact the Cosumnes CSD's fire resources due to mutual aid relationships between the Cosumnes CSD and surrounding jurisdictions as well as the California Department of Forestry and Fire Protection (CalFire).

Increased demand for fire protection would apply economic pressure on the Cosumnes CSD. The Cosumnes CSD could be required to hire more staff members and potentially expand facilities or incur increased expenses related to personnel overtime in order to adequately respond to emergency situations. More frequent demand for fire protection services could also require more frequent use of water, thereby increasing water demand and the required purchase of water. This potential increase in water demand would occur in tandem with increasingly stressed and constrained supplies.

Wildfires also have a negative impact on air quality, and can emit substantial amounts of volatile organic compounds as well as particulate matter. Inhalation of these toxicants can have a detrimental effect to the general public, but also to the first responders at the Cosumnes CSD. Youth sport games and practices and other outdoor events could be cancelled or postponed in the event of bad air quality days due to fire, which has adverse implications for the Cosumnes CSD's Parks and Recreation Department. Decreased air quality most severely impacts individuals with existing respiratory ailments, such as asthma, and can result in increased demand for emergency services from individuals within the communities served by Cosumnes CSD.

Increased risk of fire in populated areas also entails the risk of fire damage to Cosumnes CSD-owned facilities. Not only could nearby fires pose a risk to human safety, but could be costly if Cosumnes CSD property were to be damaged.

Economic Disadvantages

As discussed above, an increased demand for fire protection services is anticipated to increase operating costs of the Cosumnes CSD. The Fire Department may require additional funding for the expansion of facilities, new equipment, additional employee salaries, employee overtime, and new employee training.

In addition, the expected variability in water supply could increase the price of water. The Cosumnes CSD relies on water for fire protection, landscaping, irrigating public parks, and for use in buildings. Coupled with warmer temperatures, outdoor plants and sports fields would require more frequent and higher-volume watering, further increasing the volume of water that would be

purchased. In addition, warmer temperatures and future heat waves would require more intensive use of air conditioning in Cosumnes CSD facilities, which could exacerbate the cost of facilities maintenance.

Impacts to Public Health and Recreational Programs

Climate change poses multiple threats to public health including risks related to extreme heat events and declining air quality. Increases in average and maximum air temperatures would contribute to increased risk of dehydration, heat exhaustion, heat stroke, and other heat related illnesses throughout southern Sacramento County.

The California Energy Commission and University of California Berkeley have developed the Cal-Adapt tool to help local agencies and the public identify and understand the potential impacts of climate change on a local scale.²⁵ A useful way of understanding potential impacts resulting from climate change is by comparing anticipated conditions with conditions from a baseline period in the past. For instance, Cal-Adapt allows for the comparison of extreme heat events during the period of 1961 to 1990 with anticipated extreme heat events from the years 2045 to 2055. According to Cal-Adapt, the Cities of Galt and Elk Grove, which are within the Cosumnes CSD boundaries, experienced an average of four days per year and seven days per year, respectively, with temperatures above 101.6 degrees Fahrenheit. However, due to climate change induced increases in extreme heat events, between the years 2045 and 2055, the City of Galt is anticipated to experience an average of 24 days above 101.6 degrees Fahrenheit per year, and the City of Elk Grove is anticipated to experience an average of 22 days above 101.6 degrees Fahrenheit per year. The substantial increase in the frequency of extreme heat events in Galt and Elk Grove can be extrapolated to include the entire Cosumnes CSD service area.

In addition to the direct physical impacts that can occur due to excessive heat exposure, higher temperatures have the potential to degrade air quality, which can affect the respiratory health of residents. Higher temperatures increase the formation of unhealthy air pollutants such as ozone and particulate matter; thus, while the emission of pollutants may remain constant, the quality of the air is still degraded due to the increased formation of harmful air pollutants. Ozone and particulate matter contribute to a variety of health problems such as asthma, acute respiratory diseases, cardiovascular diseases, and decreased lung capacity.

Groups vulnerable to the negative health effects of poor air quality include infants, the elderly, and people exercising or recreating outdoors. Young athletes may prove to be especially vulnerable, as young adults typically perceive themselves to be healthier and more resilient, and because negative impacts of poor air quality may not express themselves immediately, athletes may wrongly assume that poor air quality is not affecting their health. In reality, impacts of poor air quality can increase with long-term exposure, and may not manifest immediately upon initial exposure. Consequently, any resident that works, recreates, or spends any substantial amount of time outside would be impacted by decreased air quality.

Air quality and heat waves could have a substantial impact on the Cosumnes CSD's Parks and Recreation Department. The department organizes youth and adult sports leagues, summer camps, and other outdoor activities. In the event of a significant heat wave or poor air quality day, recreational events could be cancelled. Not only would this effect public health and happiness, but also Cosumnes CSD revenue. Poor air quality could influence the ability of park staff to perform outdoor tasks, such as routine maintenance. In addition, most of the staff working within

²⁵ California Energy Commission. *Cal-Adapt*. Available at <https://cal-adapt.org/>. Accessed March 2020.

the Golf and Operations Division spend a majority of their time working outside and could be affected by changes in air quality and temperature.

Conclusion

Many members of the community rely on the Cosumnes CSD for access to natural spaces, sports and recreation facilities, and fire protection. Each component could be impacted by global climate change, and the Cosumnes CSD has made a decision to take action. The sections above outline some of the potential impacts that could occur in individual areas of the Cosumnes CSD's operations. Although the potential impacts are discussed independently, it is crucial to realize that effects of climate change may not be felt in isolation and may be exacerbated by issues not related to climate change. The additive nature of potential impacts is clearly illustrated by the events of the spring and summer of 2020. For instance, in August of 2020, the State as a whole was faced with an unprecedented heat wave that lead to rolling electricity black outs and flex alerts. Although SMUD was not subject to rolling black outs during 2020, SMUD customers may be subject to rolling black outs in the future. Rolling black outs would constrain the ability of cooling centers to operate, which affects any resident seeking relief from the heat at a Cosumnes CSD operated cooling center. The challenge of rolling black outs and extreme heat was compounded by the difficulty of protecting public and employee health during the non-climate change related global COVID-19 pandemic, which had already forced the shutdown of many Cosumnes CSD facilities and recreation programs. At the same time that the Cosumnes CSD was meeting the challenge of providing adequate and safe cooling centers, California experienced an unprecedented wave of wildfires (while the COVID-19 pandemic is not a consequence of climate change. Cosumnes CSD's Fire Department was called on by the California Office of Emergency Services to aid responses to multiple wildfires. This constellation of events represents a combined threat to the health and safety of Cosumnes CSD employees and the community, an unprecedented challenge to the recreation services provided by the Cosumnes CSD, and a stark example of the dire consequences that unchecked climate change presents to the future of the Cosumnes CSD.

Considering the potential impacts of climate change on water supply, biodiversity, fire safety, economic growth, public health, and other resources of public interest, the State has enacted various laws in an attempt to curb such impacts of climate change. Laws including AB 32, SB 97, SB 375, and SB 32 establish statewide efforts to reduce GHG emissions in order to avoid the anticipated effects of climate change. In an effort to work towards achieving the emissions reductions required by the foregoing State laws and various executive orders, the Cosumnes CSD is doing its part to protect environmental health, human safety, and prosperity within the region. Such actions, taken on a community level, will work in concert with the actions taken by the County, the State, and the vast majority of countries on earth, to reduce the threat of climate change. While reducing Cosumnes CSD emissions and increasing sustainability through implementation of this CAP/SAP would serve to ultimately reduce some of the impacts of climate change, this CAP/SAP further seeks to provide a means of adapting the Cosumnes CSD's operations to the climate change related impacts that are already occurring, to ensure that the Cosumnes CSD can continue to provide services to the community.

4. EMISSIONS QUANTIFICATION

The following sections of this chapter will present the methodology used to estimate emissions related to Cosumnes CSD operations. In particular, to estimate future emissions from the Cosumnes CSD, emissions from existing activities must be inventoried and quantified. Following the inventory and quantification of existing Cosumnes CSD emissions, existing planning documents were used to estimate growth in future emissions levels.

4.1 BASELINE EMISSIONS INVENTORY

The baseline GHG inventory was completed using the International Council for Local Environmental Initiative's (ICLEI's) ClearPath software. ClearPath is a suite of tools designed to measure and track GHG emissions within communities in California. Based on user-provided data such as community energy use, vehicle use, water consumption, wastewater treatment, and solid waste generation, ClearPath provides GHG inventories for both the operation of municipal governments and the larger community that such municipalities serve. Due to the availability of data, the year 2018 was used as the basis for the inventory. The Cosumnes CSD's total emissions were estimated to be 5,995 metric tons of carbon dioxide equivalence units (MTCO₂e) for the 2018 inventory year. Table 1 and Figure 6 present a breakdown of the baseline emissions inventory for Cosumnes CSD activities, separated per sector. The following section includes a detailed discussion of each sector: Buildings and Facilities; Vehicle Fleet; Business-Related Travel; Solid Waste; Water and Wastewater; and Process and Fugitive Emissions.

Buildings and Facilities

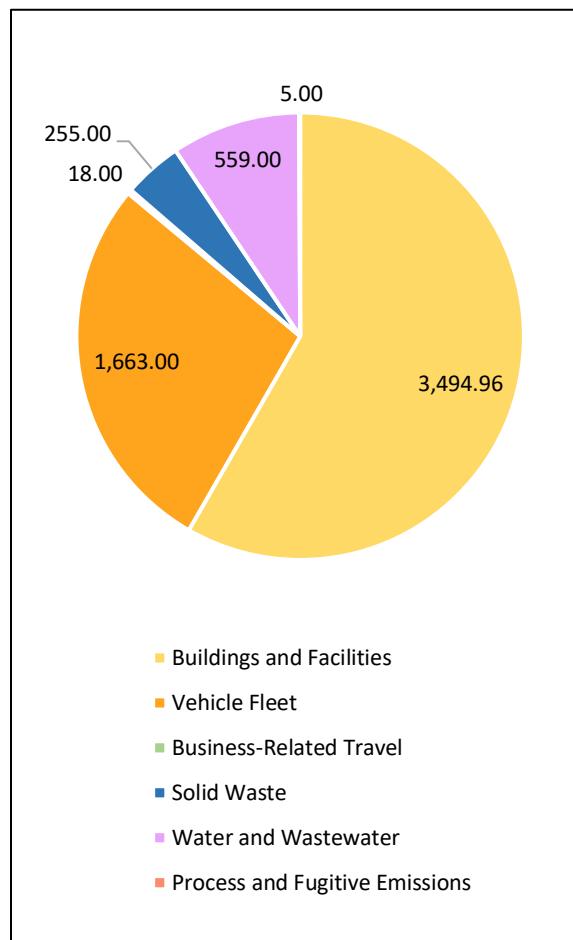
Electricity is required for lighting, appliances, refrigeration, electronics, and other uses in Cosumnes CSD buildings and facilities. Total electricity use in Cosumnes CSD buildings was provided by Sacramento Metropolitan Utility District (SMUD). Based on the SMUD billing records, the Cosumnes CSD used a total of 2,407,645 kilowatt hours (kWh) of electricity throughout the 2018 fiscal year. Although the consumption of electricity does not result in direct GHG emissions within Cosumnes CSD buildings and facilities, the generation of electricity by SMUD does involve GHG emissions at the source. Thus, consumption of electricity results in indirect GHG emissions, which are related to the sources of electricity provided by SMUD. According to the California Energy Commissions, SMUD supplied electricity in the year 2018 was derived from 20 percent renewable sources, 26 percent large hydroelectric, and 54 percent natural gas.²⁶ Based on the carbon intensity associated with SMUD's electricity production, the Cosumnes CSD electricity use would result in the emissions of approximately 509.59 MTCO₂e.

Natural gas is typically used in space and water heating appliances and building features. Natural gas use in Cosumnes CSD facilities was estimated using billing information. PG&E charges an average rate of three cents per therm of natural gas sold, which, based on annual billing, suggests approximately 56,086.74 million British thermal units (MMbtu) were consumed by Cosumnes CSD facilities during the inventory year. The consumption of 56,086.74 MMbtu of natural gas equates to roughly 2,973.7 MTCO₂e per year.

²⁶ California Energy Commission. 2018 Power Content Label: Sacramento Municipal Utility District. July 2019.

Table 1 Baseline Inventory Emissions	
Source of Emissions	MTCO₂e
Buildings and Facilities	
Natural Gas Generators	0.59
Propane Generators	1.98
Diesel Generators	1.40
SMUD Electricity	514.00
PG&E Natural Gas	2,977.00
Total	3,494.96
Vehicle Fleet	
CSD Gasoline Fleet	371.00
CSD Diesel Fleet	760.00
Procida Landscaping	334.00
Coast Landscaping	158.00
EGP Landscaping Gasoline Fleet	19.00
EGP Landscaping Diesel Fleet	21.00
Total	1,663.00
Business-Related Travel	
Air Travel	18.00
Total	18.00
Solid Waste	
Procida Solid Waste	12.00
Republic Services Solid Waste	243.00
Total	255.00
Water and Wastewater	
Wastewater Collection	274.00
Water Conveyance	285.00
Total	559.00
Process and Fugitive Emissions	
Fertilizer Use	5.00
Total	5.00
Total GHG Emissions	5,995

Figure 6
Baseline Inventory Emissions (MTCO₂e)



Due to the Cosumnes CSD's responsibility to provide emergency services to the Cosumnes CSD's service area, the Cosumnes CSD occasionally uses natural gas-, propane-, and diesel-powered emergency generators for electricity generation when grid-supplied electricity is not available, for instance during power outages. In order to ensure that the Cosumnes CSD's generators operate properly during power outages, routine maintenance and periodic runs of the Cosumnes CSD owned generators is also required. The Cosumnes CSD keeps a thorough log of emergency generator use. By applying hourly use, fuel type, and horsepower of each piece of equipment, the generators were calculated to result in approximately 3.9 MTCO₂e for the 2018 inventory year.

Vehicle Fleet

GHG emissions from the use of vehicles associated with Cosumnes CSD activities were estimated by collecting vehicle use data (i.e., fuel type, miles driven, miles per gallon) from Cosumnes CSD-owned cars and trucks, as well as landscaping vehicles that are hired for maintenance of Cosumnes CSD facilities. Emissions from Cosumnes CSD-owned vehicles as well as those vehicles used under contract for landscaping at Cosumnes CSD-owned facilities were calculated at 1,663 MTCO₂e for the inventory year.

Business-Related Travel

According to the International Air Transportation Association, aviation accounts for two percent of global carbon emissions.²⁷ Cosumnes CSD staff are occasionally required to use air travel to commute to conferences and meetings. Employee air travel was estimated to produce approximately 18 MTCO₂e in 2018.

Solid Waste

For this analysis, solid waste refers to any garbage, compost, biomass, or other waste that is directed to a landfill. When waste decomposes, landfill gas (primarily CH₄ and CO₂) is released as a natural byproduct of the aerobic and anaerobic breakdown processes.²⁸ While Cosumnes CSD landscaping does generate a large volume of green waste, only solid waste was considered in the baseline inventory because Cosumnes CSD green waste is recycled or composted rather than landfilled. GHG emissions from solid waste generation were estimated to be approximately 255 MTCO₂e.

Water and Wastewater

The Elk Grove Water District (EGWD) and Sacramento County Water Agency (SCWA) provide water service to the Cosumnes CSD. Both water districts rely almost entirely on groundwater, which requires electric motors for extraction.²⁹ In addition, electricity is used to carry water along the infrastructure system and into Cosumnes CSD facilities.

The EGWD and SCWA provided the total volume of water purchased by the Cosumnes CSD for the 2018 fiscal year. The Cosumnes CSD purchased 196.6 million gallons (MG) from EGWD, and 567.4 MG from SCWA. The EGWD also provided the total amount of electricity used by the entire EGWD for water collection and distribution. Cosumnes CSD water use accounts for six percent of the EGWD's business and, thus, accounts for 6 percent of the EGWD electricity consumption. Based on the EGWD's total electricity consumption and the proportion of the total water demand attributable to the Cosumnes CSD, water provided by the EGWD results in the consumption of one kWh of electricity per every 527.77 gallons of EGWD supplied water. Due to lack of information availability, the same conversion factor (572.77 gallons/kWh) was applied to the water conveyance system used by SCWA. Based on the Cosumnes CSD's total annual water consumption in 2018 of 764.0 MG, a total of 1,333,821 kWh of electricity use can be attributed to the Cosumnes CSD's water use. Based on the carbon intensity of electricity generation, the electricity use was estimated to result in approximately 285 MTCO₂e.

Water for fire protection throughout Elk Grove is provided by the EGWD and SCWA, while water provided within the City of Galt for the same purpose is provided by the City of Galt Public Works Department. Water for fire service in the City of Galt was not accounted for in the water volume listed above because Galt has adopted a CAP that has already accounted for all emissions associated with citywide water consumption.³⁰ In addition, because fire protection services are a public safety necessity, it is not feasible to reduce water consumption as it relates to fire protection. As such, GHG emissions associated with water conveyance from the City of Galt

²⁷ International Air Transportation Association. *Climate Change*. Available at: <https://www.iata.org/en/policy/environment/climate-change/>. Accessed June 3, 2020.

²⁸ Environmental Protection Agency. *Basic Information about Landfill Gas*. Available at: <https://www.epa.gov/lmop/basic-information-about-landfill-gas>. Accessed June 3, 2020.

²⁹ National Groundwater Association. *Background: U.S. Energy Utilization for Groundwater Supply*. February 2017.

³⁰ City of Galt. *City of Galt Climate Action Plan*. February 2020.

Public Works Department is not included in this baseline inventory, but is accounted for by the City of Galt's CAP.

According to Tables WW.15.2 and WW.15.3 of the ICLEI's *Appendix F: Wastewater and Water Emission Activities and Sources*, the median value for wastewater collection energy intensity is 280 kWh/MG, and the energy intensity for a large (>50 MGD) conventional aerobic wastewater treatment facility is 1,400 kWh/MG.³¹ Based on the conservative assumption that all 764.0 MG of water is converted to wastewater, electricity use associated with wastewater conveyance and treatment can be estimated. Wastewater collection would require approximately 213,913.8 kWh, and wastewater treatment would use approximately 1,069,569.2 kWh. Based on the carbon intensity of electricity generation, the electricity use associated with both wastewater collection and treatment was estimated to result in approximately 274 MTCO₂e.

It should be noted that the wastewater electricity estimate above does not account for the GHG emissions associated with the actual wastewater treatment process, which involves direct emission of GHGs (such as CH₄ and N₂O) as byproducts of anaerobic metabolism. Because the Cosumnes CSD does not have control over the wastewater treatment process, emissions from the treatment process were not included in the baseline inventory.

Process and Fugitive Emissions

The application of synthetic fertilizer is known to result in off-gassing of GHGs, particularly the high GWP gas, N₂O.³² As part of normal maintenance, fertilizer is applied to Cosumnes CSD landscaped areas. The recorded use of fertilizer by the Cosumnes CSD's subcontracted landscaping companies was calculated to result in approximately 5.09 MTCO₂e.

4.2 SERVICE POPULATION PROJECTIONS

The following discussion is based on the Cosumnes CSD's 2018 Parks, Recreation & Facilities Master Plan,³³ Elk Grove General Plan,³⁴ 2030 Galt General Plan,³⁵ City of Elk Grove CAP,³⁶ and City of Galt CAP.³⁷

In order to determine projections for future emissions related to operations of the Cosumnes CSD, the Cosumnes CSD's expected service population growth must be determined. Projections for future emissions will subsequently be used to determine emissions reductions goals in this CAP/SAP. The Cosumnes CSD Parks and Recreation Department services Elk Grove and unincorporated portions of southern Sacramento County. Therefore, as the populations of Elk Grove and unincorporated southern Sacramento County grow, the demand for parks and recreational facilities will also grow. In addition, the Cosumnes CSD Fire Department serves the cities of Elk Grove and Galt and unincorporated portions of southern Sacramento County. As the populations of such areas grow, demand for fire protection services is expected to grow as well. Overall, the projected increase in demand for parks, recreational facilities, and fire protection

³¹ ICLEI – Local Governments for Sustainability USA. *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions Appendix F: Wastewater and Water Emission Activities and Sources Version 1.1*. July 2013.

³² Millar, N., Doll, J.E., & Robertson, G.P. *Management of Nitrogen Fertilizer to Reduce Nitrous Oxide Emissions from Field Crops*. October 19, 2015.

³³ Cosumnes Community Services District. *Plan for Play: Parks, Recreation & Facilities Master Plan*. 2018.

³⁴ City of Elk Grove. *City of Elk Grove General Plan*. December 2019.

³⁵ City of Galt. *2030 Galt General Plan Policy Document*. April 2009.

³⁶ City of Elk Grove. *City of Elk Grove Climate Action Plan: 2019 Update*. February 2019.

³⁷ City of Galt. *City of Galt Climate Action Plan*. February 2020.

services are a function of population growth within the Cosumnes CSD service area. The following sections discuss the expected growth of the two sectors of the Cosumnes CSD (i.e., the Parks and Recreation Department and the Fire Department), separately. To maintain consistency with statewide emissions reductions goals as well as the recently adopted CAPs for the cities of Elk Grove and Galt, emissions projections are represented for the years 2030 and 2050.

The following projections are based primarily off of the population data for the cities of Elk Grove and Galt because the two cities represent the majority of growth anticipated in the Cosumnes CSD's service area. It should be noted that southern portions of Sacramento County would be served by the Cosumnes CSD as well. However, location-specific population information was not available for unincorporated Sacramento County, and the population residing in unincorporated Sacramento County that relies on Cosumnes CSD services is expected to be small in comparison with the populations of Elk Grove and Galt. Therefore, population information from unincorporated portions of southern Sacramento County is not included in this analysis.

Parks and Recreation Department

The Cosumnes CSD parks and recreation system is expansive, with more than 1,000 acres of developed parks, trails, and greenbelts. As of 2018, the Cosumnes CSD parks and recreation system included 97 parks, 21 miles of trails, 36 multipurpose sports fields, two aquatic centers, eight recreation buildings, and countless other facilities. The Cosumnes CSD Parks and Recreation Department and hundreds of greenbelts serves a population of approximately 171,059, which is based on the population of Elk Grove. Recreation buildings and maintenance facilities are also part of the Cosumnes CSD parks and recreation system. As the Elk Grove and Sacramento County communities grow, the Cosumnes CSD parks and recreation system will grow concurrently to meet community needs. As noted in the *Parks, Recreation & Facilities Master Plan*, the Cosumnes CSD strives to maintain a ratio of at least five acres of parkland per 1,000 residents.

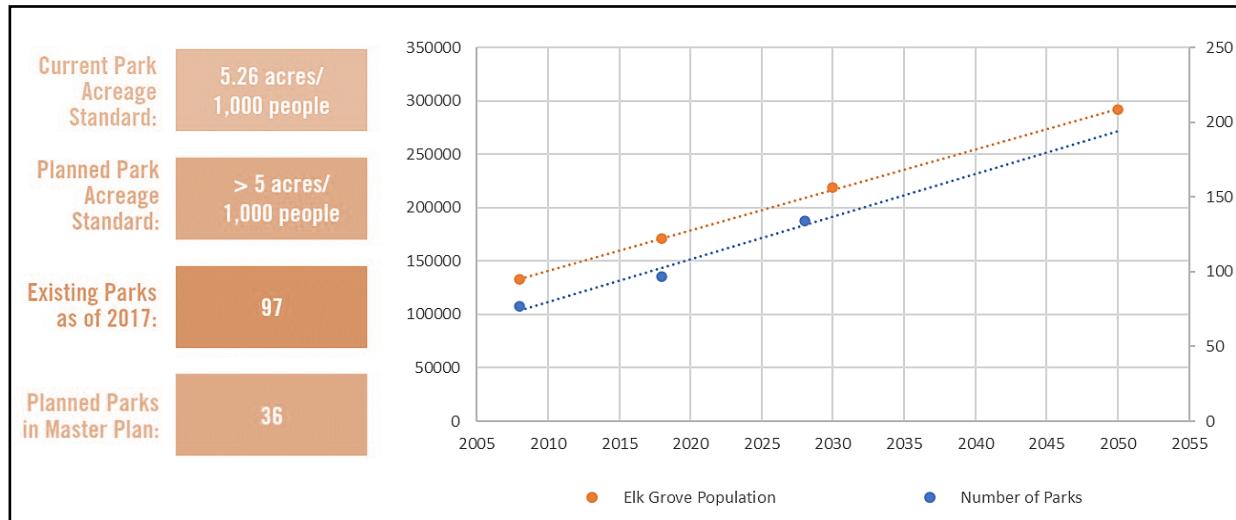
Over the past decade, 20 new parks were developed throughout the Cosumnes CSD. Per the *Parks, Recreation & Facilities Master Plan*, 37 additional parks are planned for development between the years 2018 and 2028. Based on the Elk Grove CAP, the City of Elk Grove is expected to have a population of 218,503 residents by the year 2030, and 291,481 residents by the year 2050. Figure 7 demonstrates the relationship between the population of Elk Grove and the number of Cosumnes CSD park facilities. Based on the population projections for Elk Grove, and the desired level of parkland per resident, the Cosumnes CSD could require approximately 145 parks by 2030, and almost 200 parks by 2050. In addition, the Cosumnes CSD plans to construct a 30,000-sf Community Center by the year 2024.

Fire Department

The Cosumnes Fire Department provides all-hazards emergency response and risk reduction services, including emergency medical services and fire suppression to the cities of Elk Grove and Galt, as well as the surrounding southern Sacramento County communities. Currently, the Cosumnes Fire Department employs 170 personnel and operates eight fire stations, along with a business headquarters office and a training center. As noted in the 2015 *Standards of Cover and Headquarters Services Assessment*, three additional fire stations (Stations 77, 78b, and 79) are proposed for construction in southern Elk Grove.³⁸ In addition, the 2030 Galt General Plan denotes space for two future fire stations on Figure LU-1: Land Use and Circulation Diagram.

³⁸ Citygate Associates, LLC. *Standards of Cover and Headquarters Services Assessment for the Cosumnes CSD Fire Department: Volume 2 of 3 - Technical Report*. May 26, 2015.

Figure 7
Cosumnes CSD Parks and Recreation Department Projected Growth



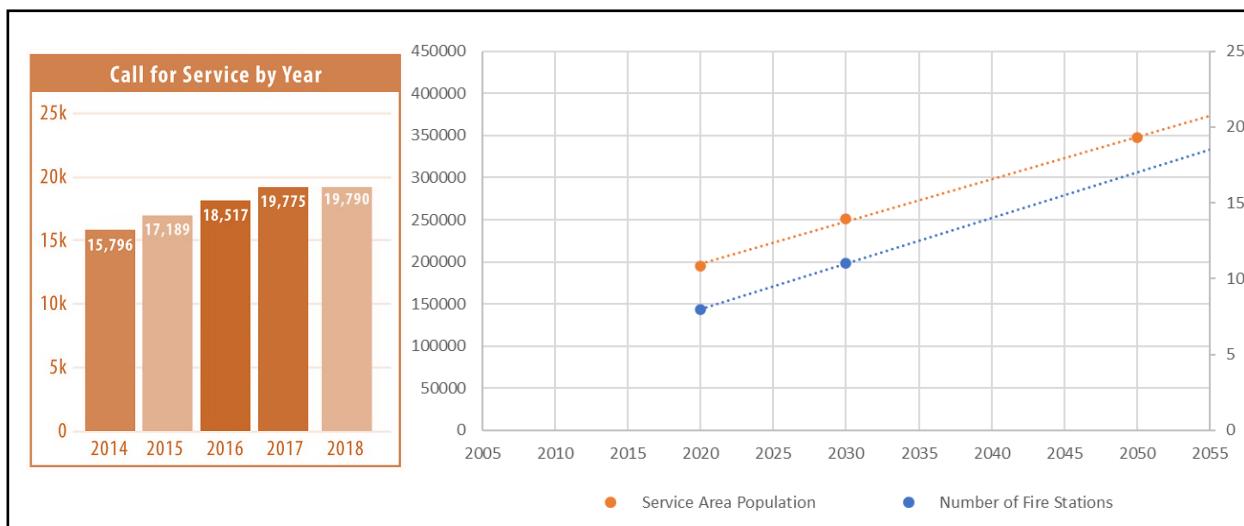
Based on the Galt CAP, the City of Galt is expected to increase to a population of 32,108 residents by the year 2030, and 56,090 residents by the year 2050. When summed with the Elk Grove population projections listed previously, the populations of both cities are anticipated to reach 250,611 residents in 2030, and 347,571 residents in 2050. An increase in residents will inevitably lead to an increase in demand for emergency services. As shown on the left side of Figure 8, Calls for Service have been increasing annually, which is likely a product of service area population growth. On the right side of Figure 8, the relationship between service area population and number of fire stations is represented. As shown in the graph, the demand for fire stations and fire safety personnel is expected to increase as population increases.

4.3 EMISSIONS FORECASTING

Based on the growth anticipated within the Cosumnes CSD service area, future emissions related to Cosumnes CSD activities were estimated for the years between 2018 and 2050. As discussed in Section 4.2, Service Population Projections, the Cosumnes CSD facilities, including parks, recreational facilities, and fire protection facilities, are expected to grow in proportion to the populations of Elk Grove and Galt. Future GHG emissions will be directly related to the operations of the Cosumnes CSD; thus, the projections for growth of the Cosumnes CSD facilities and operations form the basis of the estimated changes in future GHG emissions.

It should be noted that even in the absence of the adoption of a CAP, certain statewide actions are anticipated to lower GHG emissions from common sources, such as electricity generation and vehicle use.

Figure 8
Cosumnes CSD Fire Department Projected Growth



Such statewide actions include, but are not limited to, the RPS program that reduces the carbon intensity of electricity generation, and programs related to AB 1007, which include the Low Carbon Fuel Standard to reduce the carbon intensity of transportation fuels and promote alternatively fueled vehicles.

The foregoing statewide programs would result in demonstrable emissions reductions at a local level. For instance, the State's recently updated RPS program now requires that all electricity provided to customers by public utilities within the State be sourced solely from renewable sources by the year 2045. Because SMUD is subject to the State's RPS requirements, electricity consumption within Cosumnes CSD facilities in the years 2045 and beyond will not result in GHG emissions. Considering that electricity consumption represents one of the largest existing sources of GHG emissions from Cosumnes CSD activities, the elimination of such emissions due to implementation of the RPS program would result in the avoidance of a significant amount of GHG emissions. Similarly, statewide requirements for low carbon fuel standards, zero emissions vehicle integration, and vehicle efficiency standards will reduce the rate of emissions from vehicle use by the Cosumnes CSD, regardless of the Cosumnes CSD's adoption of this CAP/SAP.

The emissions forecast presented below, hereafter referred to as the Business As Usual (BAU) forecast scenario, includes required statewide actions that would reduce GHG emissions in the absence of this CAP/SAP. Figure 9 and Figure 10 depict a comparison of the composition of GHG emissions per sector in 2018 and the expected composition of GHG emissions per sector in 2050 under BAU conditions. Table 2 presents a numerical breakdown of GHG emissions per sector, and the net change compared to the 2018 emissions. The results of the emissions forecast are also presented in Figure 11.

As shown in the figures, the Buildings and Facilities and Vehicle Fleet sectors are anticipated to remain the primary contributors to Cosumnes CSD GHG emissions. As noted above, an increasing proportion of grid-electricity provided by SMUD is required to be generated through renewable sources, with 100 percent of electricity generated by renewable sources after 2045.

Figure 9
2018 Emissions Composition

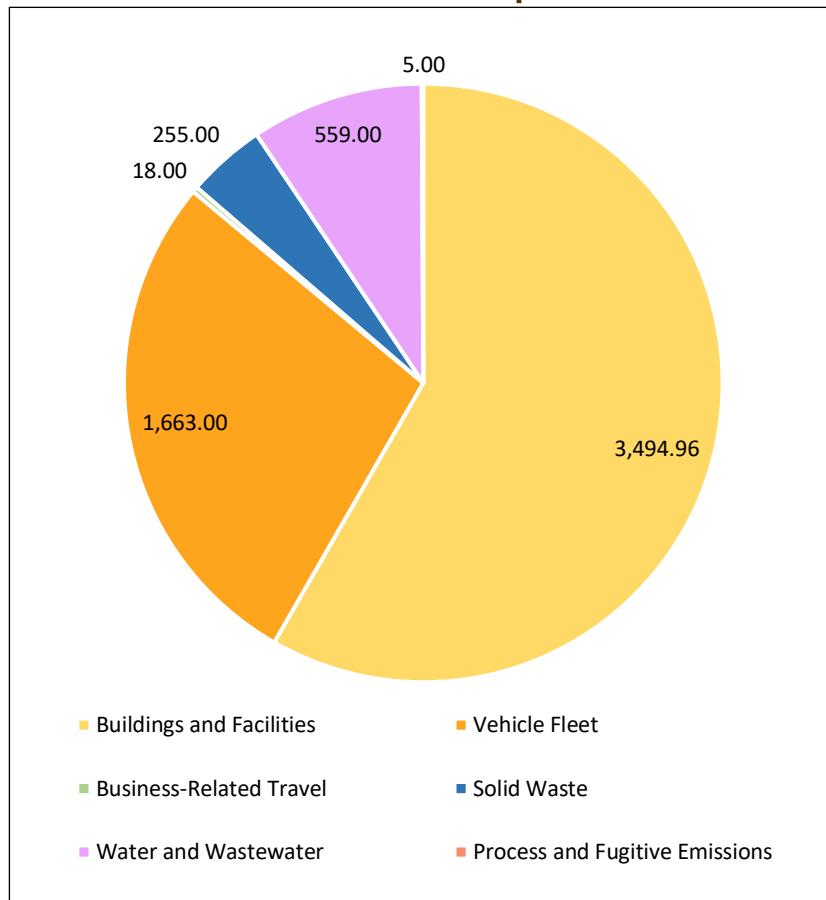


Figure 10
2050 Emissions Composition

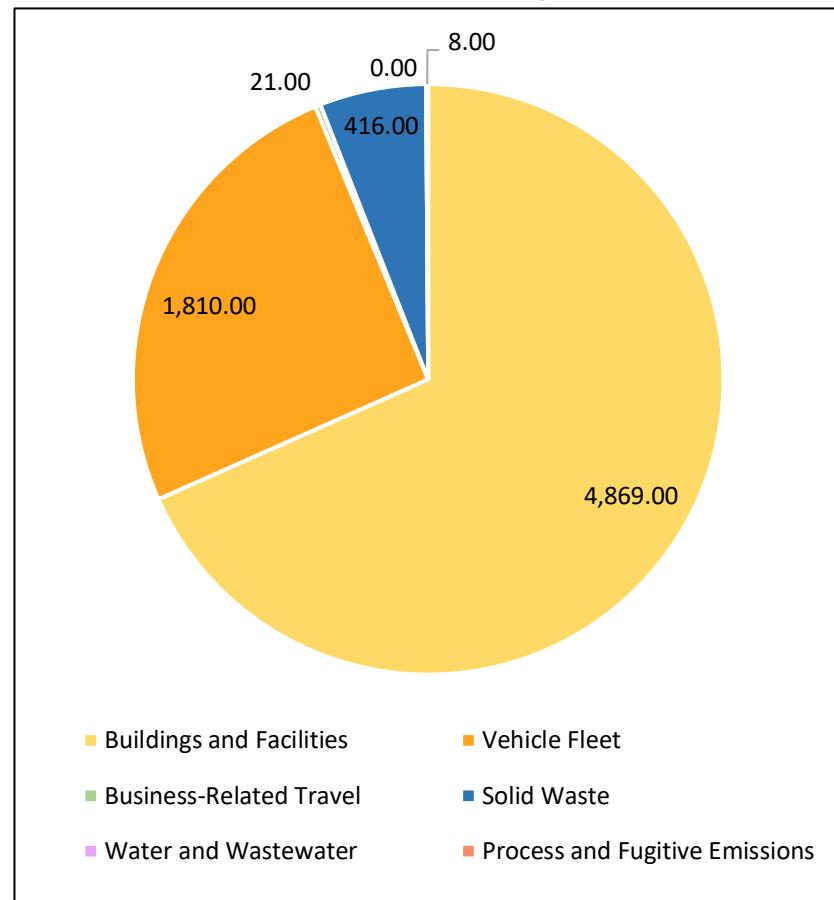
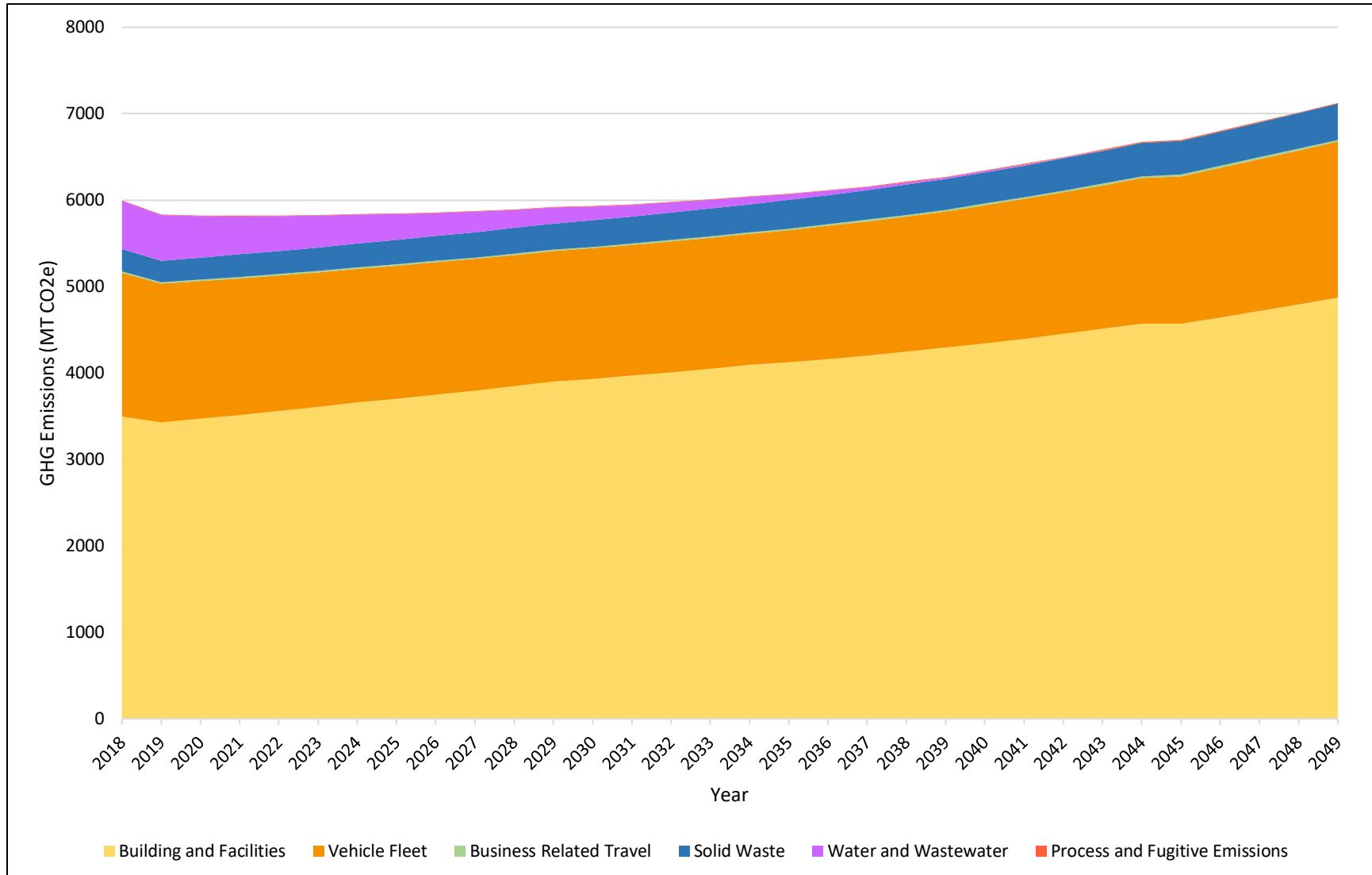


Table 2
Comparison of GHG Emissions Per Sector

Emissions Source	GHG Emissions (MTCO ₂ e)		
	2018	2050	Net Change
Buildings and Facilities			
Natural Gas Generators	0.5851	1	0.4149
Propane Generators	1.9782	3	1.0218
Diesel Generators	1.3981	2	0.6019
SMUD Electricity	514	0	-514
PG&E Natural Gas	2,977	4,863	1,886
<i>Total</i>	3,495	4,869	1,374.0386
Vehicle Fleet			
Gasoline Fleet	882	960	78
Diesel Fleet	781	850	69
<i>Total</i>	1,663	1,810	147
Business-Related Travel			
Air Travel	18	21	3
<i>Total</i>	18	21	3
Solid Waste			
Solid Waste	255	416	161
<i>Total</i>	255	416	161
Water and Wastewater			
Wastewater Collection	274	0	-274
Water Conveyance	285	0	-285
<i>Total</i>	559	0	-559
Process and Fugitive Emissions			
Fertilizer Use	5	8	3
<i>Total</i>	5	8	3
<i>Overall Total Emissions</i>	<i>5,995</i>	<i>7,124</i>	<i>1,129</i>

Figure 11
BAU 2050 Forecast: Emissions Per Sector



Therefore, while overall electricity consumption by Cosumnes CSD facilities would be anticipated to increase with the construction of new facilities (this includes both direct consumption of electricity as well as indirect consumption for instance through the transport and treatment of water), the increased consumption of electricity would not result in increased GHG emissions from the generation of electricity. The net effect of the growth in Cosumnes CSD facilities and the increased generation of electricity through renewable sources is that emissions related to electricity would gradually decrease, and consumption of electricity in the year 2045, and any year thereafter, would not result in any GHG emissions.

However, natural gas is used in buildings for water and space heating as well as various other appliances, and is anticipated to continue to be used in new structures. Each unit of natural gas burned releases a certain amount of GHGs, and the amount of GHG released per unit of natural gas, known as the GHG intensity of natural gas, remains constant into the future (i.e., unlike electricity, natural gas use would not become less GHG intensive into the future). Thus, despite the eventual elimination of GHG emissions from electricity, emissions from the Buildings and Facilities sector would grow due to the continued and increasing consumption of natural gas.

Pursuant to statewide policies, vehicle fuel and emissions efficiency will improve over time, and, as a result, each individual vehicle would leave a smaller carbon footprint in 2050 as compared to in 2018. Despite the State mandated vehicle efficiency improvements, growth in Cosumnes CSD's operations is anticipated to require the expansion of the Cosumnes CSD's vehicle fleet and overall emissions from the entire Vehicle Fleet sector would continue to grow as more vehicles are added to the fleet.

Air travel is expected to become more efficient over time due to technological improvements and lower carbon fuel standards. As such, even as the Cosumnes CSD grows and employs more personnel, GHG emissions from the Business-Related Travel sector would only minimally increase.

Emissions related to solid waste disposal would increase as the Cosumnes CSD expands over time. In 2050, the Cosumnes CSD would manage more parks with more park visitors and more facilities with more personnel, as compared to 2018. The increased operating scale of the Cosumnes CSD would result in more waste generation and, thus, more emissions from the Solid Waste sector. The CO₂ intensity of waste decomposition is not expected to change over time unless technological improvements are applied at the local landfill.

Due to the mandated RPS requirements, the electricity required for water and wastewater conveyance and wastewater treatment would be entirely renewable after 2045. As such, emissions from the Water and Wastewater sector would drop to zero by 2045, despite the overall increase in water demand and wastewater generation.

As Cosumnes CSD-owned parks and landscaped areas expand, a greater volume of fertilizer would be required as part of the standard maintenance procedure. Therefore, the Process and Fugitive Emissions sector would result in slightly more GHG emissions as the Cosumnes CSD grows.

4.4 SETTING REDUCTION GOALS

On June 1, 2005, then-Governor Schwarzenegger signed Executive Order S-03-05, which established statewide GHG emission targets. Specifically, statewide GHG emissions are to be

reduced to year 2000 levels by 2010, 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. The emissions reductions goal for the year 2020 included in Executive Order S-03-05 was legislated in Assembly Bill 32, and Senate Bill 32 legislated an interim goal of reducing statewide emissions by 40 percent below 1990 levels by the year 2030. By establishing an emissions reduction goal for the year 2030, the legislature has affirmed the overall emissions reductions trajectory required by Executive Order S-03-05 for the year 2050.

The foregoing emissions reductions goals are based on emissions from the year 1990; consequently, in order to establish GHG emissions reduction goals for Cosumnes CSD operations, emissions from Cosumnes CSD operations during the year 1990 have been quantified.

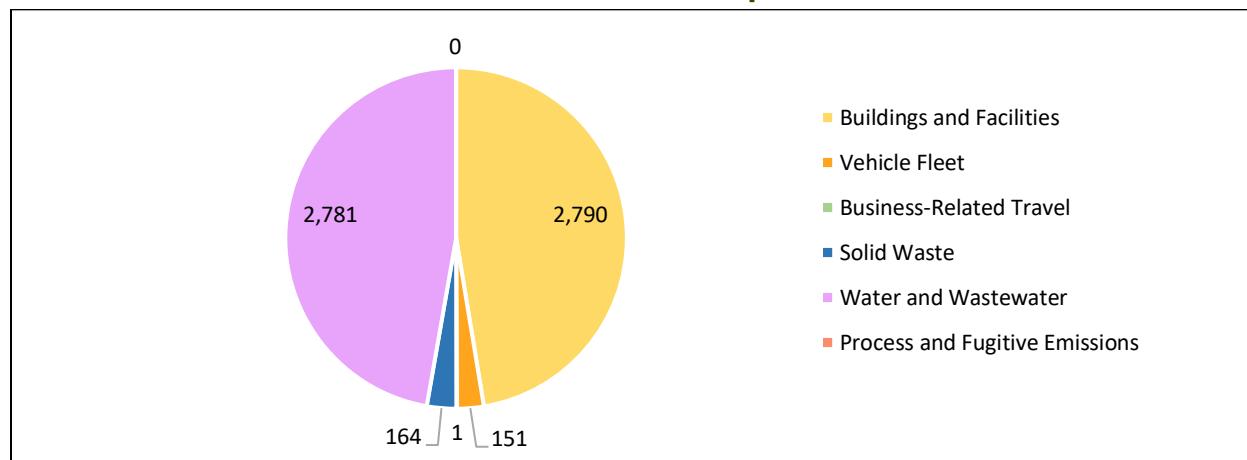
1990 Emissions Quantification

Although detailed data related to current and recent operations of the Cosumnes CSD was available for use in the emissions inventory presented above, data at the same level of detail was not available for operations in the year 1990. Due to the lack of data, emissions in the year 1990 were estimated using similar methodologies as implemented for the projection of emissions in the year 2050. For instance, the Cosumnes CSD's services have expanded in proportion to population growth within the service area since the year 1990. Thus, the population growth rate between 1990 and 2018 within the Cosumnes CSD service area was used to estimate the level of Cosumnes CSD activity in the year 1990.

As previously discussed, existing State legislation and regulations will lead to reductions in GHG emissions related to electricity production and vehicle operations into the future. Inversely, emissions from electricity production and vehicle operations in the year 1990 were comparatively more carbon-intensive than such activities presently. Emissions estimates for the year 1990 were therefore adjusted to compensate for more emission intensive electricity production and less efficient vehicles.

Based on the methodology described above, emissions from Cosumnes CSD operations were determined to equal approximately 5,887 MTCO₂e per year. Figure 12 presents the breakdown of GHG emissions per sector occurring in the year 1990.

Figure 12
1990 Emissions Composition



Per Capita Emissions

As noted previously, statewide GHG emissions reductions goals require that emissions should be reduced as compared to 1990 levels. However, in the case of the Cosumnes CSD, the service population has experienced substantial growth between the period of 1990 and 2018. Table 3 presents the observed and estimated population growth between the period of 1990 and 2050 for the cities of Elk Grove and Galt.

Table 3 Population Trends Elk Grove and Galt			
Year	Location		
	Elk Grove	Galt	Combined
1990	17,483	9,026	26,509
2018	172,886	26,440	199,326
2030	218,503	32,108	250,611
2050	291,481	56,090	347,571

Source: City of Elk Grove Climate Action Plan, City of Galt Climate Action Plan

Since 1990, operations of the Cosumnes CSD have expanded to meet the demand of the population in Elk Grove and Galt. In addition, the carbon efficiency of electricity generation has also dramatically increased from 1990 to 2018, and will continue to increase through 2045. Emissions from Cosumnes CSD operations have only nominally increased from the 1990 level of 5,887 MTCO₂e per year to the inventoried 2018 level of 5,995 MTCO₂e per year. This minor increase is likely due to the inverse relationship between population growth over time and electricity carbon intensity over time. In other words, although the service population of the Cosumnes CSD has increased almost seven-fold, the carbon intensity of electricity generation has decreased from approximately 312.05 MTCO₂/GWh to only 201.27 MTCO₂/GWh. While consideration of the total emissions is informative, several variables, such as service population and electricity generation efficiency, make it difficult to parse out the efficiency with which the Cosumnes CSD has provided parks, recreation, and emergency services to the Cosumnes CSD's service population.

A metric that better describes the efficiency with which the Cosumnes CSD provides services is the use of per capita emissions rates. Per capita emissions rates are dependent on both the total amount of emissions as well as the total service population. Because per capita emissions rely on both population and total emissions, the per capita emissions rate reveals the amount of GHG emissions released per person regardless of the overall size of the Cosumnes CSD. By focusing on the emissions per person, the per capita emissions rates reveal whether the Cosumnes CSD operations are becoming more or less emissions intensive per person regardless of the overall size of the Cosumnes CSD. Table 4 below presents the per capita emissions rates using the estimated total emissions and the Cosumnes CSD's total service population, in units of MTCO₂e per capita (MTCO₂e/SP).

As shown in Table 4, although the total emissions resulting from operations of the Cosumnes CSD have increased between the years 1990 and 2018, the per capita emissions rate has substantially decreased.

Table 4
Per Capita Emissions

Year	Total Emissions (MTCO ₂ e)	Service Population	Per Capita Emissions (MTCO ₂ e/SP)
1990	5,887	26,509	0.222
2018	5,995	199,326	0.030
2030	5,933	250,611	0.024
2050	7,124	347,571	0.020

Source: *ClearPath, June 2020.*

Such a pattern indicates that despite expansion of the Cosumnes CSD's operations between 1990 and 2018, the Cosumnes CSD's services have become less emissions intensive per person, which can be understood to mean the Cosumnes CSD's services have become more efficient from a GHG perspective. The trend of decreasing per capita emissions is anticipated to continue through 2050.

Per capita emissions not only provide a metric on how efficiently the Cosumnes CSD is providing services, but also provide a useful link to the Elk Grove and Galt CAPs, as well as the CARB's 2017 Scoping Plan.³⁹ The CARB's 2017 Scoping Plan provides a roadmap for meeting the statewide GHG emissions reductions targets. All three of the aforementioned documents use per capita emissions targets as a basis for analysis of citywide emissions in comparison to the statewide GHG reductions goals for the years 2030 and 2050.

Compliance with Statewide Emissions Reductions Targets

In comparison to the statewide reduction goals, the Cosumnes CSD's per capita emissions in the year 1990 (0.222 MTCO₂e/SP) would need to be reduced by 50 percent in 2030 and by 80 percent in 2050. To comply with the foregoing reductions, emissions in the year 2030 would need to be reduced to 0.111 MTCO₂e/SP, while emissions in 2050 would need to be reduced to 0.044 MTCO₂e/SP. As shown in Table 4, emissions in the years 2030 and 2050 are forecasted to achieve the required reductions regardless of the adoption of this CAP/SAP. The reduction in per capita emissions shown in the projections in Table 4 is largely driven by improvements in the vehicle emissions efficiency, as well as reductions in electricity related emissions. Because the Elk Grove and Galt CAPs are based on compliance with statewide emissions reductions targets, and the Cosumnes CSD's emissions would comply with statewide emissions reductions targets on a per capita basis, the Cosumnes CSD would comply with statewide reduction goals, and would not interfere with the emissions reduction goals established by the cities of Elk Grove and Galt in their respective CAPs.

Although future Cosumnes CSD operations have been shown to comply with local and statewide emissions reduction goals, the Cosumnes CSD is nevertheless committed to attaining further emissions reductions to achieve a more environmentally and fiscally sustainable operational pattern. Consequently, Chapter 5 of this CAP/SAP presents a detailed review of the existing efforts that the Cosumnes CSD has undertaken to reduce emissions, as well as the recommended reduction strategies that can be implemented to further reduce emissions from the forecasted levels presented in this chapter.

³⁹ California Air Resources Board. *The 2017 Climate Change Scoping Plan Update*. November, 2017.

5. EMISSIONS REDUCTION, SUSTAINABILITY, AND ADAPTATION MEASURES

The following chapter outlines the recommended GHG emissions reduction, sustainability, and adaptation measures.

5.1 EMISSIONS REDUCTION MEASURES

As discussed in Chapter 4 of this CAP, the emissions quantification has shown that due to implementation of statewide policies and regulations related to the reduction of GHG emissions, activities within the Cosumnes CSD are anticipated to comply with the statewide GHG reduction goals set forth in AB 32, SB 32, and Executive Order S-03-05. Nonetheless, the Cosumnes CSD is committed to attaining further emissions reductions to achieve a more environmentally and fiscally sustainable operational pattern.

The following reduction measures have been separated into several sectors based on the emissions estimations performed for the Cosumnes CSD and presented in Chapter 4. For each reduction strategy presented below, specific implementation actions are identified, a review of the Cosumnes CSD's existing efforts, and a quantification to indicate the efficacy of each measure.

Reduction Measure Quantification

To the extent feasible, the efficacy of each reduction measure was quantified independently using the ClearPath software. However, in some cases the parameters of ClearPath did not allow for the individual quantification of reduction measures. As such, some reduction measures may have been grouped and quantified together. In other cases, due to the limitations of the ClearPath software, emissions reductions attributable to some reduction measures, such as Landscape Measure-3, could not be quantified using the ClearPath software and were instead quantified using off-model calculations.

It should be noted that all reduction measures take into account statewide programs that would work to reduce emissions simultaneous to the Cosumnes CSD's efforts. For instance, the State's RPS, which requires increased use of renewable sources of electricity by publicly owned utilities, was included in the ClearPath emissions modeling for all reduction measures as were various programs related to vehicle emissions reductions, such as the State's Low Carbon Fuel Standard and Pavley fuel efficiency requirements. As discussed in Chapter 4 of this CAP, such statewide programs have also been considered during emissions forecasting. Because the emissions reductions from existing statewide programs have already been accounted for in the emissions forecasts, quantification of the following reduction measures was carefully crafted so as not to double-count reductions stemming from the statewide measures.

Although the central focus of this document on reducing GHG emissions, the Cosumnes CSD is deeply concerned with increasing the environmental sustainability of all of its operations. Thus, some of the measures discussed below do not correspond with direct GHG emissions reductions. However, the measures, hereafter referred to as "sustainability measures", otherwise contribute to the sustainability, efficiency, and cost-effectiveness of Cosumnes CSD operations.

All emissions quantifications are presented in Appendix A to this CAP.

Each reduction measure below either reduces GHG emissions or contributes to sustainability of Cosumnes CSD operations. The following symbols are used to represent which sector the reduction measure would affect.

-  **Buildings and Facilities:** GHG emissions related to electricity, indoor and outdoor lighting, natural gas use, etc.
-  **Vehicle Fleet:** GHG emissions related to Cosumnes CSD-owned vehicles.
-  **Business-Related Travel:** GHG emissions related to employee commutes and business-related travel
-  **Solid Waste:** GHG emissions related to waste generation and disposal.
-  **Water and Wastewater:** GHG emissions related to water use, water conveyance, wastewater generation, etc.
-  **Process and Fugitive Emissions:** GHG emissions related to fertilizer use and park maintenance.
-  **Sustainability Measure:** This label is applied to any measure that does not relate to quantifiable GHG emissions reductions, but otherwise contributes to Cosumnes CSD sustainability.
-  **Adaptation Measure:** This label is applied to any measure that contributes to Cosumnes CSD adaptability to climate change.

Building Design Measures

Measure BD-1:

Energy-Efficient Buildings. Improve energy efficiency in Cosumnes CSD buildings and facilities through the following measures:



- a) Encourage innovative site design and building orientations for new construction that incorporate passive and active solar designs and natural cooling techniques. Require all new roofing to include cool roofs in compliance with Tier 2 of the California Green Building Code.
- b) Implement a Cosumnes CSD-wide Energy Efficiency Plan to inventory existing structures and prioritize investment in energy efficiency upgrades. This measure is consistent with Elk Grove CAP measures BE-1 and BE-3.
- c) Establish green building standards for new Cosumnes CSD facilities, either through the California Green Building Code's Tier 1 or Tier 2 standards, the US Green Building Council's Leadership in Energy and Environmental Design (LEED) program, or through participation in SMUD's Integrated Design Solutions Program. This measure is consistent with Elk Grove CAP measure BE-4 and Galt CAP measures BE-1 and BE-2.

The Cosumnes CSD has already made progress towards item a) by installing shade structures at the Emerald Lakes Golf Course, Hal Bartholomew Sports Park, and Wackford Community and Aquatic Complex. Shade structures are useful in preventing urban heat islands, as well as providing UV protection for the people enjoying Cosumnes CSD recreational facilities.

The surface of pavements can reach temperatures up to 90°F hotter than the air on hot and sunny days, which contributes to a concept known as urban heat islands. Urban heat islands refer to developed areas where pavement and rooftops result in temperatures substantially hotter than what would occur in less developed areas. These hot temperatures result in increased energy consumption for air conditioning, human health impacts related to excessive heat, and reduced water quality.⁴⁰ By building shade structures and incorporating cool roofs, the Cosumnes CSD can work towards reducing local urban heat islands.

Items (b) and (c) both relate to energy efficiency standards for new developments. The California Green Building Standards Code, otherwise known as the CALGreen Code (CCR Title 24, Part 11), is a portion of the California Building Standards Code that includes requirements to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices. The CALGreen Code encourages local governments to adopt more stringent voluntary provisions, known as Tier 1 and Tier 2 provisions, to further reduce emissions, improve energy efficiency, and conserve natural resources. Tier 2 includes the most stringent energy efficiency measures. All new Cosumnes CSD buildings and facilities are required to comply with the mandatory CALGreen measures, and it is recommended that new facilities adopt Tier 1 or Tier 2 measures.

Increasing energy efficiency also acts as an adaptation measure by reducing the overall load on grid-supplied electricity. Reducing electricity demand can reduce the likelihood of rolling black outs caused by demand spikes, such as those that occurred in the late summer of 2020. Moreover, where emergency back-up power is required, energy efficient structures can be powered by smaller back-up generators or on-site back-up systems.

Some action items include: improve the efficiency of lighting fixtures (see Measure BD-2), replace natural gas appliances with electric models (see Measure BD-3), reach towards Zero Net Energy in new structures (see Measure BD-4), and promote water efficiency in facilities (see Measure BD-5).

⁴⁰ United States Environmental Protection Agency. *Heat Island Cooling Strategies*. Available at: <https://www.epa.gov/heat-islands/heat-island-cooling-strategies>. Accessed June 18, 2020.

Quantification: By requiring all new developments to comply with green building standards and exceed CALGreen requirements, new buildings would be less emissions-intensive. In fact, for non-residential buildings that use indoor lighting and mechanical systems, which applies to all Cosumnes CSD facilities, compliance with Tier 1 standards would result in a ten percent reduction in energy consumption, and compliance with Tier 2 standards would result in a 15 percent reduction in energy consumption.⁴¹ The GHG emissions reductions from compliance with Tier 1 and Tier 2 provisions is presented below. Because electricity in the year 2050 would not generate GHGs, all GHG emissions from energy used in buildings and facilities would be resulting from natural gas use. As such, the energy reduction required under Tier 1 or Tier 2 would be directly related to a reduction in natural gas use.

Measure BD-1	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
Off-Model – Tier 1	486.3
Off-Model – Tier 2	729.5

Note: See the Appendix A for calculation details.

Benefit-Cost Analysis: Benefits of this measure accrue in terms of GHG emissions reductions through reduced energy consumption, reduced consumption of natural resources resulting from the reduced demand on natural gas and electricity resources, and reduced costs due to reduced consumption of natural gas and electricity. Costs due to compliance with Tier 1 and Tier 2 are generally related to more expensive building materials and increased design costs. As noted above, compliance with Tier 1 and Tier 2 of the 2019 CALGreen Code result in energy demand reductions of approximately 10 and 15 percent respectively. A statewide analysis was conducted to determine the cost-effectiveness of achieving such reductions in energy demand. Although some areas of the State, notably areas within the San Joaquin Valley and Bay Area, could achieve a 15 percent reduction in energy demand in a cost-effective manner, the study concluded that cost-effective strategies were available to achieve a maximum of 14.7 percent energy demand reductions. Energy reductions in excess of this amount were not deemed cost-effective.⁴² Considering the conclusions of the statewide analysis, designing buildings to achieve levels of energy reduction equivalent to the requirements of Tier 1 of the CALGreen code would provide a **HIGH** benefit to cost ratio. Considering the recommendations of the statewide cost-effectiveness study, achieving the Tier 2 energy reductions requirements is conservatively considered to have a **MEDIUM-LOW** benefit to cost

⁴¹ California Energy Codes & Standards, A Statewide Utility Program. 2019 Reach Codes: Options and Opportunities [pg 2]. January 30, 2019.

⁴² TRC. Statewide Nonresidential Reach Code Cost Effectiveness Analysis. July 2017.

ratio; however, it should be noted that compliance with Tier 2 would result in significant Cosumnes CSD-wide reductions in GHG emissions.

Measure BD-2:



Improve Lighting Efficiency. Convert Cosumnes CSD-owned sports field lighting, parking lighting, and exterior building lighting to energy efficient technologies, such as LED bulbs or solar-powered lighting fixtures. Upgrade interior lighting at all Cosumnes CSD facilities to LED with occupancy sensors, timers, dimmers, and photosensors to increase energy and cost savings.

The Cosumnes CSD has already made progress towards this measure through their Energy Services Contract with ENGIE, formerly known as OpTerra. As part of the ENGIE Energy Services Contract, some Cosumnes CSD interior and exterior lighting fixtures have been replaced with LED bulbs. The majority of indoor lighting in Cosumnes CSD facilities were previously 32- to 34-watt lamps, and the exterior lighting fixtures were high-pressure sodium and metal halide lamps. Several interior and exterior lamps were replaced with LED lamps, and Exit signs were replaced with LED fixtures as well. By improving lighting efficiency, the Cosumnes CSD saved \$46,642.52 in electricity costs in the year 2018.⁴³

Similar to Measure BD-1 this measure would act as an adaptation strategy by reducing the demand on the electricity grid and by allowing for more efficient provision of emergency back-up power.

Quantification: By the year 2050, grid electricity would be generated from entirely renewable sources. Therefore, by 2050, electricity for lighting would not produce any GHGs. Nonetheless, this is a cost-effective sustainability measure.

For informational purposes, the electricity savings per year from lighting upgrades are presented below.

Measure BD-2	
Sustainability Measure	Electricity Saved per year (kWh/yr)
Interior/Exterior LED Upgrades	281,332
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: In the short-term, benefits from this measure would be related to GHG emissions reductions as well as cost-savings. However, given the existing mandates related to electricity production within the State, electricity consumed for lighting will eventually be produced completely from renewable energy sources, and eventually the measure will no longer serve to reduce GHG emissions. Nonetheless, the Cosumnes CSD's past experience working with

⁴³ OpTerra Energy Services. *Cosumnes CSD and OpTerra Energy Services Contract*. September 1, 2014.

ENGIE has demonstrated that lighting efficiency upgrades experience a **HIGH** benefit to cost ratio.

Measure BD-3:



Limit Natural Gas Use. Reduce the use of natural gas in existing and future Cosumnes CSD-owned facilities. Natural gas use can be reduced by replacing existing natural gas water heaters with all-electric versions, and designing new structures to include solar water heating, heat pumps, and other electricity-based water and space heating devices.

By removing natural gas appliances and devices, buildings would rely solely on electricity, which will be generated from progressively less carbon intensive sources over time. To support increased energy efficiency, SMUD administers various incentive programs for replacement of inefficient appliances in residences and commercial developments. Participation in SMUD programs would promote the replacement of energy inefficient appliances and the replacement of natural gas fueled appliances with comparable electric powered appliances.

The Cosumnes CSD has taken action towards this measure through the ENGIE Energy Services Contract, through which several HVAC systems have been upgraded with more efficient versions. The Cosumnes CSD can continue to take action towards this measure by continuing to upgrade HVAC systems in existing buildings, and limiting the installation of new systems that use natural gas in new buildings. Where natural gas is desired, for instance in large water heating devices where electrical equivalents do not exist or in cooking appliances, eliminating other natural gas appliances, such as natural gas space heating equipment can still provide substantial emissions reductions. For instance, eliminating natural gas use from all but cooking appliances can reduce natural gas usage in new developments by 75 percent.⁴⁴ All-electric equivalents of some large equipment, for instance natural gas and propane water heating systems at the Cosumnes CSD's Wackford Aquatic Complex and Jerry Fox Swim Center, may not yet be commercially available or feasible. Nevertheless, the Cosumnes CSD can investigate the availability of all-electric systems in the future as replacements for existing water heaters are necessary.

Quantification: If the Cosumnes CSD prohibits natural gas use for all systems except for cooking appliances, emissions would be reduced by 3,100.2 MTCO₂e in the year 2050. As noted previously, emissions reductions from compliance with the CALGreen requirements (Measure BD-1) would result from direct reduction in natural gas use. In order to avoid double-counting reduction credits, this measure was considered to apply as an additional 75 percent reduction in natural gas use after

⁴⁴ Sacramento Metropolitan Air Quality Management District. *Greenhouse Gas Thresholds for Sacramento County*. June 1, 2020.

assumed compliance with either Tier 1 or Tier 2 standards. In other words, BD-1 was already assumed to be completed, and the benefits from implementing this measure were applied to the already-reduced values. This calculation method ensures that GHG reduction estimates are conservative and realistic.

Measure BD-3	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
Off-Model – Tier 1	3,282.55
Off-Model – Tier 2	3,100.2
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Natural gas consumption in new and existing Cosumnes CSD operated structures is anticipated to represent the largest single source of GHG emissions into the future (see Table 2). Consequently, this measure provides the greatest potential GHG emissions reductions benefit of all measures included in this CAP/SAP. SMAQMD has previously completed cost-benefit analyses related to the elimination of natural gas appliances in applications such as water heaters, and found that non-natural gas appliances can provide cost-savings, or be cost-competitive with traditional systems in some scenarios.⁴⁵ In addition, the Rocky Mountain Institute has found that constructing all-electric structures is cost-effective in many scenarios.⁴⁶ Although the foregoing studies have shown that reducing natural gas appliance use can be cost-effective, it is important to note that generally, switching to all-electric appliances in existing structures is less cost-effective as opposed to building a new structure that is all electric. For instance, in a new structure cost savings occur if the structure is all electric and connections to natural gas infrastructure are not required. Further cost-savings occur where heat pumps can be effectively used, which provide both heating and cooling; such systems can be installed easily in new construction, but would require replacement of both space heating and air conditioning equipment to realize full cost-efficiency in existing structures. Thus, reductions in natural gas consumption are generally more cost-effective in new structures than existing. Nevertheless, considering the high level of GHG emissions reductions efficacy of this measure, as well as the proven cost-efficacy of natural gas use reductions in some scenarios, the measure has a **HIGH** benefit to cost ratio.

Measure BD-4:



Zero Net Energy. Commit to Phasing in Zero Net Energy (ZNE) standards for new construction, in compliance with, or ahead of, State standards (i.e. 2030 for non-residential structures).

⁴⁵ Ramboll. *Technical Memorandum to SMAQMD: Cost Analysis of Space Heating and Water Heating Systems*. June 22, 2016.

⁴⁶ Rocky Mountain Institute. *The Economics of Electrifying Buildings*. June 2018.

The California Energy Efficiency Strategic Plan established the goals that new commercial development shall achieve ZNE by 2030. On a building level, ZNE is defined by the California Department of General Services as an energy-efficient building where the actual consumed energy is less than or equal to the on-site renewable energy generated, on an energy source basis. That is, a ZNE building must generate as much energy as is consumed.⁴⁷ ZNE can be achieved through a combination of energy efficiency improvements, increased renewable energy generation, and upgrades to existing development.

This measure is consistent with Galt CAP measure BE-1 and BE-2 and Elk Grove CAP measure BE-5.

Quantification: Achievement of ZNE by energy source category is anticipated to require significant reductions in natural gas usage in future developments. As such, there is substantial overlap between achieving ZNE goals, requiring building efficiency (Measure BD-1) and limiting natural gas use (Measure BD-3), and quantifying these measures individually includes several confounding variables.

Furthermore, uncertainties exist at this time that prevent direct calculation of GHG reductions from this measure. For example, it is uncertain whether the Cosumnes CSD will entirely prohibit natural gas in new buildings, or limit natural gas to specific uses such as cooking appliances only. In addition, electricity would still result in GHG emissions in the year 2030, when ZNE is required. There is additional uncertainty regarding how much electricity would be used to compensate for the reduction of natural gas, and how such an increase in electricity consumption would affect GHG emissions.

For the aforementioned reasons, specific emissions reductions from this measure cannot be calculated at this time. Nonetheless, the Cosumnes CSD recognizes this measure as an important contribution to operational sustainability, and plans to achieve the ZNE goal, consistent with Galt CAP measure BE-2 and Elk Grove CAP measure BE-5.

Benefit-Cost Analysis: The goal of achieving ZNE would support the benefits discussed in Measures BD-1 and BD-3. Research on ZNE structures has demonstrated that commercial structures built to achieve ZNE have resulted in incremental cost increases between zero and ten percent. Thus, in some instances, ZNE buildings have been demonstrated to be no more costly than standard structures. The costs of ZNE buildings can often be off-set through appropriate tradeoffs, for instance increasing the office occupancy density (i.e., housing the same number of employee offices in a smaller overall space). Even in the case where tradeoffs at the time of construction are not available,

⁴⁷ California Public Utilities Commission. *Zero Net Energy*. Available at: <http://www.cpuc.ca.gov/zne/>. Accessed June 2020.

ZNE buildings often experience lower operating costs through, which can defray some of the initial cost increases.⁴⁸ Finally, the California Energy Efficiency Strategic Plan calls for all new commercial structures built after 2030 to achieve ZNE; fulfillment of the California Energy Efficiency Strategic Plan will result in all structures achieving ZNE, which would eliminate any increased costs for this measure. Based on the benefit to cost efficacy of Measures BD-1 and BD-3, and the potential for ZNE structures to be cost comparative to standard structures, the measure is considered to achieve a **MEDIUM-HIGH** benefit to cost ratio.

Measure BD-5:



Water Conservation in Facilities. Promote water conservation in Cosumnes CSD owned and operated facilities:

- a) Maintain an inventory of water use by facility;
- b) Audit facilities to identify potential water saving measures;
- c) Prioritize identified measures based on efficacy and cost effectiveness;
- d) Establish water efficiency standards and best management practices for new facilities.

The Cosumnes CSD, in preparing this document, has already worked towards item a) by creating a baseline inventory of water use. The next step is to separate water use per building and identify which facilities would benefit most from water-saving measures.

The following hypothetical example illustrates the potential efficacy of this measure: If the inventory of water use by facility (Item a) reveals that one particular building was consuming 10 million gallons of water per year from faucets and fixtures, upgrading all water fixtures at that facility would reduce water use by approximately 19 percent, or 1.9 million gallons per year.⁴⁹

By reducing water demand, this measure would allow the Cosumnes CSD to adapt to operating conditions where water supplies are generally more constrained than they are today due to climate change.

Quantification: As discussed previously, grid electricity in the year 2050 would be generated from entirely renewable sources. Therefore, by 2050, electricity for water conveyance would not produce any GHGs. Nonetheless, this is a cost-effective and drought-friendly sustainability measure.

For informational purposes, water savings have been quantified in ClearPath and presented below. If 20 low-flow showerheads are

⁴⁸ Davis Energy Group. *Pacific Gas and Electric Company, Zero Net Energy Program California, Zero Net Energy Buildings Cost Study*. December 19, 2012.

⁴⁹ California Air Pollution Control Officers Association. *California Emissions Estimator Model User Guide Version 2016.3.2* [pg 60]. November 2017.

installed per year, either in new facilities or as an upgrade to an existing building, 46,000 gallons of water would be saved per year. If 50 low-flow faucets are installed per year, 28,500 gallons of water would be saved per year. It should be noted that these water conservation strategies also correspond with natural gas savings, as many existing buildings rely on natural gas water heaters.

Measure BD-5	
Sustainability Measure	Water Savings (gallons)
Low-Flow Showerheads	46,000
Low-Flow Faucets	28,500
Total	74,500

Note: See the Appendix A for calculation details.

Benefit-Cost Analysis: Benefits of this measure include reduced consumption of natural resources, and reduced GHG emissions in the short-term. Because GHG emissions related to water consumption result from electricity demanded to transport water, and electricity will be carbon-free by the year 2045, this measure would not result in quantifiable GHG emissions reductions past the year 2045, but would continue to conserve natural resources and provide benefits related to adaptation to climate change impacts. Costs for implementation of this measure are generally low, as water efficient fixtures are generally inexpensive; however, high efficiency toilets and conducting water audits can result in higher upfront costs. While increasing water use efficiency would result in reduced costs over time, water utility rates are generally relatively low and the total savings may thus be limited. Nevertheless, recent studies have proven that replacement of fixtures that meet pre-1992 standards in California can be cost-effective in most scenarios.⁵⁰ Considering the uncertainty regarding the cost of upgrades resulting from implementation of this measure as well as the pricing of water utilities in the future, this measure is conservatively assigned a **MEDIUM** benefit to cost ratio, with the caveat that reducing water consumption would provide additional, unmeasured benefits related to adaptation to climate change.

Renewable Energy Measures

Measure RE-1:



Renewable Energy Production Plan. Formalize a Renewable Energy Production Plan. In collaboration with SMUD or another entity, the Cosumnes CSD shall:

- Inventory existing renewable energy installations within Cosumnes CSD owned/operated facilities;
- Establish a goal for renewable energy production within Cosumnes CSD owned/operated facilities; and

⁵⁰ Rand Corporation. *Evaluating the Benefits and Costs of Increased Water-Use Efficiency in Commercial Buildings*. 2007.

- c) Inventory potential Cosumnes CSD-owned facilities and properties that could be developed with renewable energy infrastructure.

The Cosumnes CSD may also consider enrolling in SMUD's Greenergy or SolarShares programs to support utility scale solar. The Greenergy program offers grid electricity from renewable sources, and SolarShares offers installation of rooftop solar panels at no additional cost.

This measure is consistent with Elk Grove CAP measures BE-7 and BE-8.

The Cosumnes CSD has already made progress towards this measure through their Energy Services Contract with ENGIE. Under the Energy Services Contract, several solar arrays for photovoltaic electricity generation were installed. Rooftop solar arrays were installed on six fire stations, the main Fire Department building, and on the Wackford Community and Aquatic Complex. In addition, standalone canopy solar array structures were installed at the Hal Bartholomew Sport Park, Emerald Lake Golf Course, and Wackford Community and Aquatic Complex. The solar panels produced 1,661,210.42 kWh of electricity during the 2018 fiscal year, which resulted in \$183,309.09 of electricity savings over the course of the year. The aforementioned electricity savings equates to approximately 0.35 MTCO₂e, based on calculations performed in ClearPath.

Quantification: As noted previously, grid electricity in the year 2050 would be generated from entirely renewable sources. Therefore, electricity use in 2050 would not produce any GHGs. Nonetheless, this sustainability measure would reduce the Cosumnes CSD's demand on grid electricity, resulting in cost savings and efficient use of power.

Based on the assumption that one additional solar array is developed per year, the electricity savings from on-site renewable energy generation in 2050 are been presented below for informational purposes.

Measure RE-1	
Sustainability Measure	Electricity Saved (kWh)
Renewable Energy	6,977,083.764
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Benefits of this strategy include reductions in GHG emissions in the short-term, and reduced consumption of natural resources. Cosumnes CSD's recent contracts with ENGIE have shown that solar arrays can be installed in a cost-effective manner that provides long-term financial benefits to the Cosumnes CSD. As noted above, the Cosumnes CSD produced 1,661,210.42 kWh in 2018, and

saved \$183,309.09 in electricity purchases as a result.⁵¹ Should these same cost-structures exist in the year 2050, production of 6,977,083.764 kWh in 2050 would save the Cosumnes CSD \$769,898.18 per year. The foregoing calculation is for illustrative purposes, as factors including the price of electricity and the price of photovoltaic (solar) panels may change in the future. Drafting a renewable energy production plan would require staff or consultant time, which would add costs to the implementation of this measure, in addition to the cost of installation of the solar arrays. Nevertheless, because installation of solar arrays within existing Cosumnes CSD facilities has proven to be cost-effective, this measure is anticipated to result in a **HIGH** benefit to cost ratio.

Measure RE-2:



On-site Renewable Energy Storage. Study the feasibility of combining on-site renewable energy production with on-site energy storage as a means of providing emergency power to fire facilities.

As noted above, the Cosumnes CSD already has taken action towards this measure by including solar arrays on facility roofs. The next step is to install renewable energy batteries for emergency power. This would eliminate or reduce the need for emergency generators, and save money on electricity.

Renewable energy availability tends to fluctuate based on weather (i.e., sunshine or wind availability). However, renewable energy storage can help meet electricity demand during peak hours or during emergencies. Several energy storage options are available, including compressed air energy storage, lithium-ion batteries, hydrogen fuel cells, and more. The most cost-effective option for the Cosumnes CSD at this time would be lithium-ion batteries, which offer 85 to 95 percent efficiency of electricity storage for up to eight hours.⁵²

On-site renewable energy storage would help the Cosumnes CSD adapt to climate change by allowing for continued operations even during power outages. The recent heat wave induced rolling black outs demonstrated that climate change may place increasing strain on the State's electric grid, and the ability to supply independent power could support the Cosumnes CSD's continued provision of emergency and support services during future black outs.

Quantification: Installation of on-site energy storage to provide emergency power would replace or reduce the need for natural gas-, propane-, and diesel-powered emergency generators. As such, all emissions from emergency generators in 2050 could be eliminated.

⁵¹ At the time of preparation of this CAP/SAP the total electricity savings accrued under the ENGIE contract were under dispute. Consequently, the calculations for this measure may require revision upon resolution of the dispute.

⁵² Environmental and Energy Study Institute. Fact Sheet: Energy Storage (2019). Available at: <https://www.eesi.org/papers/view/energy-storage-2019>. Accessed June 18, 2020.

Measure RE-2	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	6
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Benefits of this measure could accrue through multiple means. From a GHG emissions reduction perspective, using on-site energy storage coupled with on-site energy production could allow the Cosumnes CSD to reduce the use of fossil-fueled powered emergency generators and instead rely on stored grid-supplied or on-site generated electricity. The use of on-site energy storage can also provide financial benefits through other means, such as storing electricity when prices are low (off-peak hour charging), and selling electricity when prices are high (during peak hours), or through reducing a facility's grid-electricity demand when utility rates are highest (during peak hours). Such strategies have been shown to result in utility savings sufficient to pay-off the cost of installations and provide additional savings, in certain cases. However, the price of installation and planning for such systems can be high, and systems that are designed for emergency use may not be able to also serve demand reducing functions. Due to the low potential for GHG emissions savings, as well as the uncertain price structure of on-site energy storage systems, for the time being, this measure is considered to have a **LOW** benefit to cost ratio. However, the cost of such systems may decrease with proliferation, and on-site energy storage systems could provide a means of providing renewable, grid-independent power during power outages and other emergencies, which represents a strategy to adapt to impacts of climate change.

Land Use & Planning Measures

Measure LP-1:



Provide Bicycle Parking. Exceed local standards for bicycle parking at Cosumnes CSD-owned facilities. Inventory existing bicycle parking and identify opportunities to increase the safety or accessibility of existing bicycle parking. Require new Cosumnes CSD facilities to include provision of bicycle parking appropriate for the use (i.e., short- and/or long-term parking). The Cosumnes CSD may choose to partake in bike share partnerships, such as LIME Bikes or other similar programs, in order to further encourage bicycle use.

This measure is consistent with Elk Grove CAP measure TACM-4, and would build off the efforts of the City of Elk Grove's efforts in updating the Bicycle, Pedestrian, and Trails Master Plan.

Quantification: Implementation of bicycle parking is closely related to bicycle infrastructure improvements, as discussed below under Measure LP-2. To avoid double-counting bicycle-related emissions reductions, and to provide a conservative approach to emissions reduction estimation, this CAP has combined the emissions reductions

of Measure LP-1 and Measure LP-2, and emissions reductions are presented under Measure LP-2, below.

Benefit-Cost Analysis: Measure LP-1 would work in tandem with measure LP-2 to achieve the benefit of reduced vehicle use within the Cosumnes CSD service area. Costs from Measure LP-1 would be related to staff time needed to inventory existing facilities, as well as the cost of purchase and installation of bicycle parking infrastructure at existing and new facilities. The actual cost of material for bicycle racks is relatively limited, with bike racks often costing between \$64 and \$3,610, with a median price of \$540. Installation of bicycle racks can also be accomplished relatively simply where pavement exists already. In some situation, more expensive bicycle lockers may be desired, for instance at Cosumnes CSD offices where employees wish to secure their bicycles for the entire work day. Bicycle lockers are typically priced between \$1,280 and \$2,680 with a median of \$2,140. For comparison, construction of a vehicle parking space in a surface lot is approximately \$2,200 and parking for 10 to 12 bicycles can be accommodated within the space necessary for one vehicle space.⁵³ Considering the relatively low cost of bicycle parking infrastructure, the measure is considered to provide a **MEDIUM** benefit to cost ratio.

Measure LP-2:



Bicycle and Pedestrian Infrastructure Improvement. Promote pedestrian and bicycle connectivity between proposed and existing facilities and private development. This measure could be accomplished through early consultation during the development proposal process or preparation of guidelines of new development connection strategies in consultation with the City of Elk Grove and/or Sacramento County. Partner with the City of Elk Grove and other interested parties to make Cosumnes CSD facilities available for use as bike share hubs. Consider offering electric bicycle charging stations at Cosumnes CSD facilities either as part of the bike share partnerships or to the general public.

Improving bicycle and pedestrian infrastructure within the community would increase non-motorized travel and reduce emissions from vehicles. This measure would ensure that residents would have access to safe and clearly labeled bicycle and pedestrian routes to Cosumnes CSD parks and recreational facilities, reducing the need for community vehicle use.

This measure is consistent with Elk Grove CAP measure TACM-4.

Quantification: The reduction in vehicle miles travelled (VMT) due to improved bicycle infrastructure was calculated in ClearPath. Assuming that one tenth of the Cosumnes CSD service population would have access to the new infrastructure, and that the bicycle-riders would complete two two-mile rides per day, the measure would result in an

⁵³ Federal Highway Administration. *Costs for Pedestrian and Bicyclist Infrastructure Improvements*. October 2013.

annual reduction of 60,894 vehicle miles. Such a reduction in gasoline-fueled passenger vehicle miles would result in 22.08 MTCO₂e.

Measure LP-2	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	22.08
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Benefits of this measure are similar to those discussed in LP-2. In addition, it should be noted that this measure would aid the City of Elk Grove achieve some of the desired VMT reductions established in Elk Grove's CAP. This measure allows flexibility with regard to the infrastructure used to improve pedestrian and bicycle access to Cosumnes CSD facilities. For instance, construction of a new paved or unpaved trail within a Cosumnes CSD facility could provide connections between neighborhoods or otherwise promote pedestrian or bicycle access, and the ultimate price of such an improvement would be based on the length of the trail. The Cosumnes CSD could also find areas where pedestrian infrastructure could be improved with better crosswalk infrastructure. Such improvements could take the shape of mid-block median islands, flashing crossing beacons, or raised crosswalks, among other options. Alternatively, existing pedestrian crossings could be made safer by installation of curb extensions, chicanes, speed signs and trailers, or roadway signage. Considering the variety of potential projects and improvements that could be implemented to improve pedestrian infrastructure, and the intersection between the ownership of Cosumnes CSD facilities and the jurisdiction of the cities of Elk Grove and Galt, the type and number of facilities that would be installed is speculative at this time, making the estimation of costs difficult. In general, while the measure would not provide operational cost savings to the Cosumnes CSD and would require expenditures for planning and construction, the measure would support connections and accessibility of Cosumnes CSD's facilities, while also supporting relevant goals in the CAPs prepared by the City of Elk Grove and Galt. Nevertheless, the level of uncertainty regarding the actual implementation of this measure renders conclusions regarding benefit to cost ratios too speculative to include in this analysis and the benefit to cost ratio is considered **UNKNOWN** at this time.

Measure LP-3:



Provide Electric Vehicle Charging Infrastructure. Support the use of alternative fueled vehicles through the provision of electric vehicle charging stations at Cosumnes CSD-owned facilities. In partnership with SMUD (for instance, under the Commercial Charging Pilot program), the Cosumnes CSD may inventory existing parking lots and determine where installation of electric vehicle charging stations could be feasible.

This measure is consistent with Galt CAP measure TM-5 & -1 and Elk Grove CAP measure TACM-9.

Quantification: Due to information availability, the GHG reductions from this measure are based solely on vehicles owned by the Cosumnes CSD. In reality, non-Cosumnes CSD vehicles would benefit from this measure as well, and the GHG reductions would be substantially higher.

The reduction in Cosumnes CSD-owned gasoline-fueled vehicle use due to the provision of electric vehicle charging infrastructure was calculated in ClearPath. Based on the conservative assumption that two percent of vehicles would be replaced by electric versions by 2050, the measure would result in an annual reduction of 8,531 vehicle miles. Such a reduction in gasoline-fueled passenger vehicle miles would result in 3.09 MTCO₂e.

Measure LP-3	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	3.09
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Installation of electric vehicle charging infrastructure would allow for reductions in the use of fossil-fueled vehicles by Cosumnes CSD employees and support the use of electric vehicles in Cosumnes CSD fleet vehicles. Moreover, if charging stations are installed at existing and new public facilities, the Cosumnes CSD can contribute to increased electric vehicle usage within the communities served by the Cosumnes CSD. Reducing fossil fuel combustion in vehicles results in less GHG emissions, as well as fewer emissions of ozone forming pollutants and toxic air contaminants associated with refining, transporting, pumping, and combusting fossil fuels. Depending on the level of charging infrastructure desired, installation prices can vary between \$300 and \$51,000.⁵⁴ The large price range is related to the efficacy of the chargers, with relatively cheaper chargers at the low-end of the price range requiring 17-25 hours to achieve a full charge, while chargers at the high-end of the price range take only 20-30 minutes to deliver the same charge. The range of pricing and efficiency of chargers would provide Cosumnes CSD with a variety of options to fulfill Measure LP-3. For instance, the Cosumnes CSD could choose to install the most expensive DC Fast Chargers at locations such as fire stations or Cosumnes CSD owned facilities where electrically powered emergency vehicles could be kept. Meanwhile, chargers intended for public use could instead be installed at the cheaper Level 2 range, which provides 4- to 5-hour charge times with installation costs of \$400-\$6,500. In all cases, SMUD offers a

⁵⁴ U.S. Department of Energy, Energy Efficiency & Renewable Energy. *Costs Associated with Non-Residential Electric Vehicle Supply Equipment*. November 2015.

robust electric vehicle charging incentive program, with rebates ranging from \$1,500 per Level 2 charger, to \$80,000 per each DC Fast Charger. In addition to the installation costs, on-going maintenance of chargers would also be required, and the electricity consumed to charge electric vehicles may increase utility bills for facilities where chargers are installed. However, increased utility bills may be off-set if public chargers include payment requirements or if charging systems are combined with on-site renewable energy systems. Considering the above, installation of electric vehicle charging infrastructure can be accomplished at a range of prices and options that would allow the Cosumnes CSD to target investments and qualify for rebates to defray some of the upfront costs. Despite the anticipated on-going cost of maintenance and utilities, because this measure supports Measure TR-3, as well as measures in the City of Galt and Elk Grove CAPS, and targets the second largest sector of Cosumnes CSD operational emissions (i.e., the mobile emissions sector) this measure is considered to result in a **MEDIUM-HIGH** benefit to cost ratio.

Measure LP-4:



Heavy Equipment Upgrades. Work with SMAQMD and ARB to complete equipment upgrades, retrofits, and replacement for Cosumnes CSD-owned heavy-duty vehicles and equipment. Heavy equipment/heavy-duty vehicles refer to large, off-road machinery often used for executing construction tasks, such as backhoes, tractors, dump trucks, and loaders, as well as other equipment including stationary generators. Prioritize oldest or most emissions intensive pieces of equipment.

Quantification: Due to limitations in data availability, such as number of pieces of heavy equipment and hours of use per year, emissions reductions from this measure could not be quantified at this time.

Benefit-Cost Analysis: Although the ultimate emissions reductions occurring due to implementation of this measure cannot be quantified at this time, any improvement through upgrade, retrofit, or replacement of older equipment with newer equipment would likely result in direct reductions in GHG emissions, as well as reductions in emissions that lead to ozone and emissions that are toxic to humans. Furthermore, SMAQMD maintains incentive programs to support the replacement and retrofit of older machinery, which may help to defray costs related to implementation of this measure. Because the efficacy of this measure was not quantified and the ultimate cost of this measure is speculative at this time, the benefit to cost ratio is considered **UNKNOWN**.

Measure LP-5:



Cool Community Strategies. Implement Cool Community strategies, such as cool roofs and cool pavements.

Dark pavements and rooftops contribute to the urban heat island effect. Conventional pavement seal coats are asphalt-based and are typically black in color, ranging in initial solar reflectance from 0.05 to 0.15. Cool

pavement coatings provide a more reflective surface, with solar reflectance values between 0.31 and 0.44. The increase reflectance allows the cool pavements to absorb less sunlight than conventional seal coats, and thereby contribute to local cooling. In addition, the epoxy-acrylic coating is colorful, lasts longer than conventional coating, and can be applied over existing blacktop surfaces at the time of resurfacing.⁵⁵ Planting trees to shade paved surfaces or using permeable paving materials can serve to cool paved areas and provide other benefits, such as reduced stormwater runoff and reduced rates of infrastructure deterioration.

As compared to grass sports fields, artificial turf fields are known to reach substantially higher surface temperatures. Grass releases water vapor through transpiration, and the evaporation of that water vapor leads to cooling. As a result, grass field surface temperatures rarely reach above 100° F, whereas artificial turf field surface temperatures can exceed 150° F during sunny conditions.⁵⁶ However, artificial turf requires little to no maintenance and conserves water for irrigation. While artificial turf contributes to the urban heat island effect to a greater extent than grass fields, the overall environmental benefits may outweigh the environmental costs. For instance, a study conducted in Southern California concluded that the replacement of grass surfaces with artificial turf resulted in net energy savings despite increased urban temperatures.⁵⁷ Considering the current uncertainty regarding the efficacy of artificial turf as a cool community strategy, this measure focuses on the conversion of asphalt paved surfaces and dark rooftops to more reflective, cool pavement surfaces.

The Cosumnes CSD has already made progress towards this measure, and several basketball courts are coated with light-colored sport court surfacing, which acts as a type of cool pavement, as compared to traditional grey or black surfaces. This measure could be extended to parking areas, Cosumnes CSD facility rooftops, and any other paved areas.

Quantification: This adaptation measure would help mitigate the urban heat island effect and reduce regional temperature increases resulting from climate change. The measure would not result in a quantifiable GHG reduction.

Benefit-Cost Analysis: Benefits of this measure depend largely on the methods chosen for implementation. Treating existing roof surfaces with materials to increase solar reflectance can decrease building heat gain, which reduces utility costs related to building cooling. While cool

⁵⁵ Gilbert, Haley, Mandel, Benjamin, and Levinson, Ronnen. *Keeping California Cool: Recent Cool Community Developments, Energy and Buildings*. June 6, 2015.

⁵⁶ Sonia Myrick, National Recreation and Park Association. *Synthetic Sports Fields and the Heat Island Effect*. May 8, 2019.

⁵⁷ Yaghoobian, Neda, Kleissl, Jan, and Krayenhoff, Eric. *Modeling the Thermal Effects of Artificial Turf on the Urban Environment*. *Journal of Applied Meteorology and Climatology* 49(3):332-345. March 2010.

roofs have not only been demonstrated to reduce the urban heat island effect, but can also result in energy cost savings,⁵⁸ the benefit cost balance of cool paving is less definitive. For instance, while cool paving typically allows for reductions in the number of lighting fixtures required to illuminate a given space, the ultimate energy savings from cool paving may not prove cost effective.⁵⁹ Although the use of cool paving may not provide demonstrable reductions in energy costs, use of permeable materials that provide similar cooling effects may provide other benefits related to aesthetics or stormwater runoff reductions. Considering the above, this measure is anticipated to result in a **MEDIUM-LOW** benefit to cost ratio.

Landscape Management Measures

Measure LM-1:



Tree Management Plan. In an effort to build off of the goals of Cosumnes CSD's *Plan for Play*, the Cosumnes CSD shall draft and implement a Tree Management Plan. The Plan may include strategies to reduce biogenic Volatile Organic Compound emissions (which is a component of urban smog), adapt to warmer temperatures, and calculate the carbon sequestration potential of new trees. Collaborate with the cities of Elk Grove and Galt to meet tree planting goals. Increase commitment to providing shade trees in parking areas of new or existing facilities beyond the level currently required by local jurisdictions.

This measure is consistent with Galt CAP measure LU-3 and Elk Grove CAP measure BE-9.

Carbon sequestration refers to the process in which atmospheric CO₂ is taken in by plants and stored in plant biomass through photosynthesis. When trees sequester carbon, the tree effectively removes CO₂ from the atmosphere and holds the CO₂ until the tree decomposes or is burned. As such, carbon sequestration through tree planting and tree management is a means to offset sources of CO₂ emissions.⁶⁰ The California Emissions Estimator Model (CalEEMod) software, which was developed by the California Air Pollution Officers Association in collaboration with the California Air Districts, includes values for carbon sequestration per tree. Pursuant to the CalEEMod User's Guide, trees typically actively accumulate carbon for the first 20 years of their lifetime, after which point carbon sequestration tapers off.

⁵⁸ Levinson, Ronnen; Akbari, Hashem; Konopacki, Steve; Bretz, Sarah; Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, Heat Island Group. *Inclusion of Cool Roofs in Nonresidential Title 24 Prescriptive Requirements*. December 2002.

⁵⁹ Pomerantz, Melvin, Lawrence Berkeley National Laboratory. *Are cooler surfaces a cost-effect mitigation of urban heat islands?* April 2017.

⁶⁰ United States Department of Agriculture Forest Service. *Carbon Sequestration*. Available at: [https://www.fs.fed.us/ecosystemservices/carbon.shtml#:~:text=Carbon%20sequestration%20is%20the%20process,%2C%20and%20roots\)%20and%20soils.&text=The%20United%20States%20carbon%20market%20is%20in%20its%20formative%20stages..](https://www.fs.fed.us/ecosystemservices/carbon.shtml#:~:text=Carbon%20sequestration%20is%20the%20process,%2C%20and%20roots)%20and%20soils.&text=The%20United%20States%20carbon%20market%20is%20in%20its%20formative%20stages..) Accessed June 18, 2020.

For the first 20 years of growth, an average tree sequesters approximately 0.0354 MTCO₂ per year.⁶¹

The Cosumnes CSD already manages a significant number of trees. As noted in Chapter 3, Regional Impacts, of this CAP, the Cosumnes CSD manages over approximately 1,000 acres of parks and nature trails. Based on a street tree inventory provided by the Cosumnes CSD, there are 28,556 street trees within the Cosumnes CSD service area. Over the lifetime of the existing Cosumnes CSD street trees, 1,010.8 MTCO₂e have been reduced. The foregoing reduction captures only the sequestration resulting from the existing street trees, the total sequestration occurring from all trees within Cosumnes CSD owned facilities is likely significantly higher than 1,010.8 MTCO₂e.

Trees can also affect air quality through the emission of biogenic volatile organic compounds (BVOCs), which are compounds that have the potential to react with atmospheric molecules and contribute to the greenhouse effect, and are also the main component in urban smog.⁶² Air quality benefits of a Tree Management Plan can be maximized by planting tree species with a low Tree BVOC Index.⁶³

Implementation of a Tree Management Plan would allow the Cosumnes CSD to adapt to changes in the regional climate and protect the District's existing stock of trees. Furthermore, the palette of trees planted in parks could be selected to adapt to increased heat or changes in precipitation patterns to provide reduced costs and increased longevity of planted trees.

Quantification: Due to limitations within the ClearPath software, emissions reductions from Measure LM-1 could not be directly quantified using ClearPath. Using the information derived from the CalEEMod user guide, potential GHG emissions reductions were calculated outside of ClearPath and are presented below. GHG reductions were calculated based on the assumption that 30 trees would be planted per year from the year 2030 through the year 2050. Carbon sequestration is assumed to last for 20 years for each new tree. Thus, the emissions reductions presented in the table below reflect all new trees planted under this measure between the years 2030 and 2050. It should be noted that although tree mortality is anticipated, the Cosumnes CSD is generally anticipated to replace trees that are removed, and material from removed trees would likely be used as mulch or for other purposes that would allow for carbon cycling or storage.

⁶¹ California Air Pollution Control Officers Association. *California Emissions Estimator Model User Guide Version 2016.3.2* [pg 61]. November 2017.

⁶² United States Environmental Protection Agency. *Report on the Environment: Atmospheric Concentrations of Greenhouse Gases*. Available at: <https://cfpub.epa.gov/roe/indicator.cfm?i=24#1>. Accessed June 22, 2020.

⁶³ Simpson, J.R. and McPherson, E.G. "The Tree BVOC Index." *Environmental Pollution*, Volume 159 (2011) 2088-2093.

Measure LU-1	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
Off-Model	245.32
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Benefits from this measure accrue through direct sequestration of GHG emissions, reductions in the urban heat island effect, protection of infrastructure, reduced stormwater runoff, increased habitat for wildlife, and positive aesthetic value. The Cosumnes CSD service area currently contains 28,556 street trees, and implementation of this measure would continue the Cosumnes CSD's history of supporting urban tree planting. Because existing and planned Cosumnes CSD operations already assume tree planting and care, implementation of this measure would not be anticipated to result in a large degree of increased cost. However, drafting and approving a formal Tree Management Plan would require staff time and resources. Once the Tree Management Plan is drafted, the Cosumnes CSD will likely need to update the plan on a decadal timeframe to ensure that the approach and species recommendations within the Tree Management Plan remain relevant. Despite the staff costs related to drafting the plan, the overall reduction in GHG emissions, as well as the existing investment in this measure by Cosumnes CSD staff and myriad of related benefits, implementation of this measure is anticipated to result in a **HIGH** benefit to cost ratio.

Measure LM-2:



Low-maintenance Nature Gardens. Integrate community butterfly gardens and nature gardens into existing and future Cosumnes CSD parks. Work with contractors to reduce reliance on fossil fuel-powered landscaping equipment. The Cosumnes CSD may consider adding requirements to contracts related to use of electric-powered landscaping equipment. To support future use of electric equipment, the Cosumnes CSD could require new facilities to be designed with outdoor electrical outlets sufficient to support such equipment.

Nature gardens inherently reduce the need for maintenance (i.e., mowing, trimming, pruning, fertilizing, watering). By promoting nature gardens in all new parks, this measure would reduce maintenance requirements and associated emissions.

Quantification: Due to limited access to information regarding fuel use in landscaping equipment, emissions reductions from this measure could not be quantified at this time. Nonetheless, this sustainability measure would directly reduce water consumption, fertilizer use, and fuel consumption.

Benefit-Cost Analysis: Cost savings from implementation of this measure would be accrued through reduced demand for water, fertilizer, fossil fuels, and direct labor costs. For example, conversion of grass lawns to xeriscape landscaping, which is considered low-

maintenance landscaping, can result in savings in both maintenance costs and purchased water for irrigation.⁶⁴ Although the switch to low-maintenance nature gardens may not provide demonstrable GHG reductions, implementation of this measure would provide cost-saving benefits along with sustained reductions in water demand. Considering the above, this measure is anticipated to result in a **MEDIUM** benefit to cost ratio.

Measure LM-3:



Reduce Fertilizer Use. Work with contractors to reduce fertilizer use within Cosumnes CSD facilities to the extent feasible. The amount of fertilizer can be tailored for specific landscaped areas, and applied directly to root areas to further reduce the amount required.

Where fertilizer continues to be used, consider use of less carbon intensive alternatives, such as organic or slow-release fertilizers. In addition, the Cosumnes CSD shall prohibit/discourage fertilizer application immediately before and during rain events, as fertilizer applied prior to rain is often washed away before being taken in by plants.

In concert with measure SW-2, Composting, the Cosumnes CSD could implement a fertilizing program that recycles compost collected from Cosumnes CSD park visitors and applies the compost to Cosumnes CSD landscaped areas as organic fertilizer.

The Cosumnes CSD has already made substantial progress towards implementing this measure. The Cosumnes CSD relies on slow-release fertilizers, and has reduced fertilizer use by 30 percent as compared to rates of conventional fertilizer use.

Quantification: Slow-release fertilizers can decrease emission by 50 percent or more as compared to conventional synthetic N fertilizers.⁶⁵ By reducing overall fertilizer use and replacing conventional fertilizer with slow-release or organic alternatives, the Cosumnes CSD would reduce emissions from fertilizer application by 4 MTCO₂e in the year 2050.

Measure LM-3	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	4
Note: See the Appendix A for calculation details.	

⁶⁴ Sovocool, Kent, Southern Nevada Water Authority. *Xeriscape Conversion Study: Final Report*. 2005.

⁶⁵ Millar, N., Doll, J.E., & Robertson, G.P. *Management of Nitrogen Fertilizer to Reduce Nitrous Oxide Emissions from Field Crops*. October 19, 2015.

Benefit-Cost Analysis: The cost of slow-release fertilizer is substantially greater than the cost of conventional fertilizers.⁶⁶ However, proper use of slow-release fertilizers requires less fertilizer application as compared to conventional fertilizers. Unfortunately, at the time of preparation of this CAP/SAP, sufficient empirical evidence was not available to allow for the comparison of the cost of traditional fertilizer use with the cost of reduced fertilizer use. Consequently, the benefit to cost ratio of this measure is currently **UNKNOWN**. Although the benefit to cost ratio cannot be determined at this time, the Cosumnes CSD has already implemented the use of slow-release fertilizer and continued use would not result in any new or greater costs than would occur in the absence of this CAP/SAP.

Measure LM-4:



Water-Efficient Irrigation Practices. The Cosumnes CSD has committed to maintaining water-efficient irrigation practices throughout their facilities. Cosumnes CSD staff currently track water use efficiency throughout all Cosumnes CSD irrigation applications.

Some actions previously implemented by the Cosumnes CSD to improve water efficiency include ensuring that landscaped areas are watered early in the morning and replacing sprinklers with drip irrigation systems or more targeted irrigation systems where practicable. If spray sprinklers are required, sprinkler heads have been upgraded to efficient models and spray patterns are adjusted to ensure that sprinklers do not apply water to non-target areas, such as sidewalks.⁶⁷ In addition, the Cosumnes CSD monitors precipitation to reduce irrigation when rain has occurred.

Continuing to implement water-efficient irrigation practices will allow the Cosumnes CSD to adapt to any future constraints in water supply due to climate change.

Considering that the Cosumnes CSD has already made substantial progress in implementing this measure. A next step could involve using reclaimed water to irrigate landscaped areas (see Measure LM-7 for more information). The Cosumnes CSD may also seek to ensure that water use is being tracked and shared with decision makers, such as the board of directors, to illustrate the water efficiency improvements and water use challenges confronting the District.

The commitment to water efficiency shall be sustained and incorporated into the planning for all new parks and facilities.

Quantification: Because electricity in the year 2050 would be produced from carbon-free sources, electricity for water conveyance

⁶⁶ International Fertilizer Industry Association. *Slow- and Controlled-Release and Stabilized Fertilizers: An Option for Enhancing Nutrient Use Efficiency in Agriculture* [pg 68]. 2010.

⁶⁷ Office of Energy Efficiency & Renewable Energy. *Best Management Practice #5: Water-Efficient Irrigation*. Available at: <https://www.energy.gov/eere/femp/best-management-practice-5-water-efficient-irrigation>. Accessed June 17, 2020.

would not result in any GHG emissions. While this measure does not result in a measurable GHG reduction, the measure would nonetheless improve Cosumnes CSD sustainability and efficiency.

Benefit-Cost Analysis: As noted above, the Cosumnes CSD has already made a transition from sprinklers to automated drip irrigation systems. As such, implementation of this measure would not require substantial upfront costs because the Cosumnes CSD has already acquired such equipment. Because the Cosumnes CSD currently uses efficient irrigation systems, any new facilities would likely be constructed with water efficient irrigation systems irrespective of this CAP/SAP measure. Therefore, implementation of this measure would result in financial benefits accrued from the reduced water demand, but would not increase existing operating costs or the costs of future development. Considering the Cosumnes CSD would not be subject to upfront equipment costs, would continue to implement sustainable water use practices, and would save money on purchased water annually, this measure is considered to have a **HIGH** benefit to cost ratio.

Measure LM-5:



Implement Landscaping Guidelines. Implement Cosumnes CSD-wide Landscaping Design Guidelines that shall include and enforce:

- a) Efficiency requirements for indoor and outdoor water fixtures;
- b) Best management practices related to irrigation infrastructure and monitoring;
- c) A list of preferred plants based on BVOC emissions rates, water use, maintenance requirements, biological benefits (native or non-native), and resiliency to future climate change. Preferred plants should continue to be suitable for the regional climate, and require decadal update and review;
- d) Compliance with the statewide Model Water Efficient Landscape Ordinance (MWELO); and
- e) Implementation of features from the River-Friendly Landscape Guidelines, as prepared by the Sacramento Stormwater Quality Partnership.⁶⁸

The Cosumnes CSD has already made substantial progress towards this measure by using efficient irrigation infrastructure, as discussed in further detail under Measure LM-4. In addition, the Cosumnes CSD incorporates appropriate plant species for landscaping based on the water use data provided in the Water Use Classification of Landscape Species (WUCOLS) database, prepared and updated by the University of California Davis. However, preparation and implementation of Cosumnes CSD Landscaping Design Guidelines would ensure that sustainable landscaping practices are applied uniformly and to the maximum extent feasible. By creating a user-friendly guidance

⁶⁸ Sacramento Stormwater Quality Partnership. *River-Friendly Landscape Guidelines: Sustainable Practices for the Landscape Professional*. January 2007.

document with straightforward requirements, this measure aims to make efficient landscaping as easy as possible.

Similar to Measure LM-4, this measure would serve to reduce water demand and support adaptation to potential constraints to water supplies in the future.

Quantification: This sustainability measure offers a framework for enforcing Measure LM-4.

Benefit-Cost Analysis: Costs of this measure would be incurred from staff time expended to initially formalize landscaping guidelines, and on-going costs would be incurred through periodic updates of the guidelines. However, much of this staff time is likely spent on individual project designs and decision-making processes that are currently made on a case-by-case basis. Implementation of broadly applicable guidelines may allow for some streamlining of future projects in parks and facilities managed or owned by Cosumnes CSD. Additional costs may be incurred if water efficient irrigation infrastructure (such as drip irrigation) is more costly than standard infrastructure (for instance sprinkler systems). Considering that Cosumnes CSD currently uses water efficient irrigation infrastructure the ultimate change in costs related to irrigation infrastructure is likely to be minute. Benefits from this measure would accrue through several means. Efficient irrigation systems reduce water demand, which reduces operating costs for the Cosumnes CSD while also providing climate change adaptation benefits. Adopting a preferred list of plants would streamline the design process for new planting areas and renovations, while also allowing staff to prioritize certain environmental benefits based on the location of the plantings or other factors. Finally, selecting plant species that are anticipated to adapt to a warming climate would reduce long-term planting costs by ensuring the longevity of the plant species being selected for planting. Considering the above, many of the costs associated with this measure would be similar to the costs of current operations, and formalizing landscaping guidelines with a goal of maximizing certain environmental benefits would allow the Cosumnes CSD to increase the efficiency and benefit of existing efforts. Accordingly, this measure is considered to have a **HIGH** benefit to cost ratio.

Measure LM-6:



Wildfire Adaptation. Wildfires represent a constant and multi-faceted threat to the operations of the Cosumnes CSD as well as the health and safety of the community served by the Cosumnes CSD. The main areas of focus of this measure are on planning for Cosumnes Fire Department staff deployments, reducing risks to communities within the Cosumnes CSD's service area, and adapting to increased prevalence of wildfire smoke.

In the fire season of 2018 and the current 2020 season, Cosumnes Fire Department staff have answered the call for mutual aid from the

California Office of Emergency Services (CAL OES) and responded to fires throughout the State. The evidence is clear that such deployments are becoming an increasingly common facet of the Department's operations; thus, it is crucial that the Department continues to plan for the deployment of staff and equipment over increasing portions of each year. While the mutual aid agreement with CAL OES provides for financial compensation for major events, it is important that preparedness and response to major wildfires remains an active component in the Department's fiscal and operational planning processes. As Cosumnes Fire Department staff respond to increasingly frequent wildfire incidents, the Cosumnes CSD as a whole must also recognize the on-going toll that such responses take on staff. The California legislature has sought to support fire fighting personnel through the California Fire Fighter Peer Support and Crisis Referral Services Act, which provides for on-going support of firefighter personnel. The Cosumnes CSD shall seek to engage in staff support programs to the maximum extent possible.

The Cosumnes CSD Service Area is located in an area of moderate to low wild fire hazard severity according to CalFire. Nevertheless, many portions of the City of Elk Grove and Galt are located in proximity to expanses of unmanaged grasslands, or riparian corridors with dense vegetation. Both unmanaged grasslands and riparian corridors can present wildfire risks to nearby residents, and such risks may be increased if the prevalence of drought within the region increases. Thus, the Cosumnes CSD shall continue to support the Fire Prevention Bureau as a crucial means of risk reduction and mitigation. Specific areas of focus related to climate change related impacts shall be promotion of defensible space in areas adjacent to riparian corridors and outlying areas of the cities of Elk Grove and Galt.

While taxing Cosumnes CSD Fire Department staff resources, the 2018 and 2020 fire seasons have also demonstrated the challenges and hazards posed by episodes of intense wildfire smoke. With air quality indices routinely reaching unhealthy and hazardous levels, outdoor activities became impossible to hold while employees needing to continue working outside were potentially exposed to unhealthy air quality. The reality that unhealthy air quality conditions such as these may become more prevalent presents a significant challenge to the Cosumnes CSD's on-going operations. However, the Cosumnes CSD is also uniquely positioned to prepare for, and respond to such conditions. For instance, in partnership with the City of Elk Grove and SMAQMD, the Cosumnes CSD may seek to use existing and planned facilities as clean air centers. Clean air centers can offer a respite from hazardous air quality conditions through the use of standard or enhanced HVAC and air filtration systems. These centers may also function as cooling centers if wildfires occur simultaneously with heat waves. In 2019 the California legislature established the Wildfire Smoke Clean Air Centers for Vulnerable Populations Incentive Pilot Program, to provide funding to establish clean air centers in certain

communities. The Cosumnes CSD may be eligible for funding under this pilot program, or through partnerships with other local agencies.

During the 2018 fire season many public safety agencies distributed N95 masks to help protect the public from hazardous levels of wildfire smoke. The availability of N95 masks was extremely diminished during the 2020 wildfire season, as most N95 masks were used instead to protect against the novel coronavirus causing COVID-19. Despite the current threat of COVID-19, in the future N95 masks will likely again be widely available. The Cosumnes CSD should plan to maintain a stockpile of N95 masks for use by Cosumnes CSD employees conducting outdoor work. Stockpiles should be based on the number of employees needing masks, and the expected length of time that masks may be needed. The Cosumnes CSD may also wish to maintain sufficient stockpiles to distribute masks to members of the public, and the Cosumnes CSD can identify specific locations where masks would be made available.

Based on the above, wildfire poses a severe threat to the health and safety of Cosumnes CSD employees and the public. To confront this threat the Cosumnes CSD shall:

- a) Continue to include wildfire response in fiscal and operational planning;
- b) Plan for and provide support services to Cosumnes Fire Department staff including participation in peer support services and crisis referral services;
- c) Support and promote the existing Fire Prevention Bureau within the Cosumnes Fire Department and identify areas particularly vulnerable to increased fire risk due to drought;
- d) Investigate providing clean air centers at existing and proposed Cosumnes CSD facilities; and
- e) Plan for and provide protection equipment, such as N95 masks, for employees and members of the public.

Quantification: This adaptation measure offers strategies to improve the resiliency of the Cosumnes CSD to wildfire related financial strains, provide support for Cosumnes CSD staff, protect the health of Cosumnes CSD staff and the public, and reduce wildfire risk in the Cosumnes CSD service area, but would not result in quantifiable GHG reductions.

Benefit-Cost Analysis: This measure is intended to mitigate effects of climate change related wildfires on the Cosumnes CSD service population. Costs from this measure would accrue through personal hours spent fighting and preventing wildland or grassland fires, as well as creating and implementing plans to use Cosumnes CSD facilities as clean air centers. Operating clean air centers would likely require investments in HVAC systems that can provide sufficient filtration of outside air as well as investment in materials necessary to support the

function of clean air facilities through extended periods of poor air quality. In addition, stockpiling and providing masks for employee or public use would require investment in and maintenance of supplies. The foregoing activities have little potential to result in operating cost savings, and would not necessarily result in GHG emissions reductions. However, implementation of this measure could result in a high benefit to the community in terms of protection from increasing wildfire risk. Because this measure is related specifically to adaptation and does not provide benefits in the same manner as the GHG emissions reduction and sustainability measures, a benefit-cost ratio is not assigned to this measure.

Measure LM-7:



Recycled Water. Implement a recycled water program to irrigate landscaped areas with treated wastewater from Cosumnes CSD facilities.

The Cosumnes CSD can promote the use of recycled water for appropriate and cost-effective uses. Recycling water is a water management strategy that relies on the reuse of purchased potable water for beneficial uses. Approved uses of recycled water include landscape and golf course irrigation, toilet flushing, construction activities, and others. Gray water refers to reusable wastewater from bathroom sinks, bath and shower drains, and clothes washing drains, that can be reused on-site, often for landscape irrigation. The use of gray water for irrigation is known to reduce the demand for fertilizer use.⁶⁹ Therefore, this measure would complement implementation of Measure LM-3.

Use of alternative sources of water would allow the Cosumnes CSD to adapt to constraints in water supplies due to climate change.

Quantification: This adaptation measure offers strategies to reduce water demand. Similar to previous measures related to reducing water demand, GHG emissions reductions have not been quantified for this measure. Furthermore, while this measure would reduce water consumption at Cosumnes CSD facilities, the extent to which water demand could be reduced depends on a wide-range of factors including the number and types of facilities that recycled water systems are installed in. Although quantification of potential GHG emissions reductions and water savings is not possible at this time, the savings could be calculated on a project-by-project basis in the future.

Benefit-Cost Analysis: Small scale, commercially-available water treatment systems that would be appropriate for on-site use at Cosumnes CSD facilities cost between \$6,000 and \$13,000. In addition, operational costs would involve the purchase of electricity, possibly chemicals, depending on the treatment method, and periodic

⁶⁹ U.S. Environmental Protection Agency. *Water Recycling and Reuse: The Environmental Benefits*. Available at: <https://19january2017snapshot.epa.gov/www3/region9/water/recycling/>. Accessed August 28, 2020.

maintenance visits. In order to reach a net financial savings, the water treatment system must recycle approximately 82,000 gallons of gray water per year.⁷⁰ The Cosumnes CSD consumes enough water for irrigation in order to see overall cost savings through implementation of this measure. In addition to savings on water costs, this measure would also result in benefits related to reduced potable water demand and increased sustainability of irrigation techniques. While implementation of this measure would require upfront costs for the provision of water treatment systems, the measure would result in long-term financial savings. As such, this measure would have a **MEDIUM-HIGH** benefit to cost ratio.

Transportation Measures

Measure TR-1:



Encourage Alternative Transportation. Work with e-tran and South County Transit to continue promoting existing bus lines serving the Cosumnes CSD facilities. Promote bicycle travel to and from events through provision of bicycle valet services or other means. Including transportation options on event websites (i.e., include a “How to Get Here” page outlining available transit and bike options). Make brochures available for transit schedules at events. Invite transit representatives to table at events and distribute information.

Quantification: Due to lack of information availability, such as the average VMT to and from Cosumnes CSD events, GHG reductions from this measure cannot be calculated at this time. However, there is substantial carryover between this measure and Measure TR-2. Therefore, some of the emissions reductions are accounted for in the total GHG emission reductions discussed in Measure TR-2, below.

Benefit-Cost Analysis: As noted above, substantial crossover exists between this measure and Measure TR-2. As such, specific financial costs are discussed in further detail below. Overall, implementation of this measure would require few costs associated with outreach and transit promotion, while the benefits of reducing VMT would be substantial. For this reason, this measure is considered to have a **HIGH** benefit to cost ratio.

Measure TR-2:



Reduce Employee Commutes. Reduce Cosumnes CSD employee commutes and associated vehicle emissions by:

- Implementing flextime work arrangements, including telecommuting and alternative work schedules, to decrease daily commuter trips.
- Instituting a Cosumnes CSD employee carpooling program. Set a goal for employee participation, for instance, by establishing a target number of employee carpools per month or a goal for total VMT avoided through carpooling.

⁷⁰ Yu, Zita, DeShazo, JR, Stenstrom, Michael, and Cohen, Yoram. *Cost-Benefit Analysis of Onsite Residential Graywater Recycling – A Case Study: the City of Los Angeles*. September 2014.

- c) Promoting bicycle commuting for employees. Set a goal for employee participation. This measure is consistent with Elk Grove CAP measure TACM-6.
- d) Participating in Traffic Management Associations (TMAs) formed by the City of Elk Grove or the City of Galt. In general, TMAs provide ongoing training and special assistance to TMA members for the implementation of commute alternative programs at work sites, including monthly networking meetings and assistance with work site program design. TMA activities include outreach to area employees and residents in an effort to provide varied commute choices, including bicycle and vanpool subsidies, vanpool formation assistance, and transit information. This measure is consistent with Galt CAP measure TM-6 and Elk Grove CAP measure TACM-3.

Quantification: The following calculations are based on the assumption that the Cosumnes CSD employment rate will consistently grow along with the Cosumnes CSD service population. Considering the Cosumnes CSD currently employs 325 full-time employees, in 2050, the Cosumnes CSD is expected to employ approximately 566 full-time employees. According to the Sacramento Area Council of Governments Metropolitan Transportation Plan/Sustainable Communities Strategy, the average commute for workers in the Sacramento area is 18.4 miles per day, and 14.8 percent of people carpool to work. The aforementioned rates are based on projections for the year 2036, as projections for 2050 are not yet available.⁷¹

Employers who offer flexible work schedules and preferential parking for those who carpool can see an increase in carpool participation up to 20 percent.⁷² Considering an average of 14.8 percent of workers already carpool, the following calculation conservatively assumes that carpool incentives increase carpool rates to 30 percent of workers (a 15.2 percent increase). When 30 percent of employees carpool to work, 813,346 VMT would be eliminated annually. Based on ClearPath, this mileage reduction equates to 294.91 MTCO₂e.

Based on SMAQMD's guidance stating that TMAs can reduce VMT by five percent, emissions reductions resulting from implementation of a TMA were calculated outside of ClearPath and are presented below. A five percent decrease in annual VMT would be 135,557 miles. Using ClearPath software, this mileage reduction equates to 49.15 MTCO₂e.

⁷¹ Sacramento Area Council of Governments. *Metropolitan Transportation Plan/Sustainable Communities Plan*. April 2012.

⁷² United States Environmental Protection Agency Office of Air and Radiation. *Carpool Incentive Programs: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters* [pg 11]. March 2005.

Measure TR-2	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
Off-Model - Carpooling	294.91
Off-Model - TMA	49.15
Total	344.06

Note: See the Appendix A for calculation details.

Benefit-Cost Analysis: Implementation of Item (d), participation in existing Transportation Management Associations, would require upfront costs. However, implementation of Items (a) through (c) would require minimal financial contribution from the Cosumnes CSD, with the exception of employee time associated with coordinating such alternative work schedules, carpool programs, and bicycle incentives. Cosumnes CSD employees who participate in this measure would benefit from direct fuel savings, and implementation of this measure would result in overall GHG reductions, as well as reductions of harmful air pollutants. Implementation of an employee VMT reduction program has been shown to result in average administrator costs of \$1 per MTCO₂e, but participant savings of approximately \$380 per MTCO₂e.⁷³ When applying this ratio to the GHG savings quantified above, the Cosumnes CSD can expect to spend approximately \$344 in total to implement this measure. However, the GHG reduction and employee benefits would be substantial. For this reason, the measure is considered to have a **HIGH** benefit to cost ratio.

Measure TR-3:



Optimize Cosumnes CSD Vehicle Fleet. Optimize the Cosumnes CSD vehicle fleet by conducting an inventory of all Cosumnes CSD owned vehicles including fuel consumed per year and fuel economy. Establish a target miles per gallon fuel economy for the entire fleet aimed at reducing fuel consumption by Cosumnes CSD-owned vehicles. Encourage future vehicle purchases be alternatively fueled vehicles (i.e., electric, natural gas, hydrogen, renewable diesel) where feasible.

As part of fleet optimization and fleetwide fuel economy improvements, the Cosumnes CSD shall ensure the proper maintenance of vehicles (such as proper tire inflation and properly timed oil changes) to ensure Cosumnes CSD vehicles operate at the maximum fuel efficiency possible, and educate Cosumnes CSD employees of the benefits of reducing vehicle idling times.

The Cosumnes CSD has already prepared a thorough inventory of vehicle types, miles traveled, and fuel efficiency per vehicle. Based on the 2018 dataset, the Cosumnes CSD gasoline fleet achieves an average of 16.3 MPG, and the diesel fleet averages approximately 7.7 MPG. The next step is to prepare fuel efficiency goals. For example,

⁷³ Energy Policy Initiatives Center, University of San Diego School of Law. *Climate Action Plan Cost-Effectiveness Analysis* [pg B-12]. January 2018.

the Cosumnes CSD may set a goal to upgrade their diesel-fueled vehicles, mostly ambulances and fire engines, to an average fuel efficiency of 20 MPG, and their gasoline-fueled vehicles to an average fuel efficiency of 40 MPG by the year 2050. While the foregoing goals may seem aggressive, because innovative new technologies such as electric and alternatively fueled heavy-duty vehicles as well as electric passenger vehicles and trucks are already becoming more widely available, the Cosumnes CSD may have the opportunity to quickly improve their fleet through early adoption of new technologies.

Quantification: The efficacy of this measure was quantified through the ClearPath software.

Measure TR-3	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath - Gasoline	445
ClearPath - Diesel	448
Total GHG Reduction	893

Note: See the Appendix A for calculation details.

Benefit-Cost Analysis: Improved fuel efficiency of the Cosumnes CSD vehicle fleet would result in fuel consumption savings as well as GHG emissions reductions. In fact, the fuel savings benefits have been shown to outweigh the upfront cost of the updated vehicle, especially considering that fleet vehicles are periodically updated regardless of implementation of this measure. That is, operations of the Cosumnes CSD would require the purchase of new vehicles regardless of implementation of this CAP/SAP, and Measure TR-3 simply serves to guide fleet vehicle turnover to a less emissions intensive path. The additional upfront cost of opting for a hybrid, electric, or otherwise fuel-efficient vehicle as compared to the cost of purchasing a traditional, less fuel-efficient vehicle is less than the overall fuel savings over the lifetime of the vehicle. Research conducted by the Energy Policy Initiatives Center indicates that the transition of vehicle fleets to more fuel-efficient vehicles result in an average savings of \$238 per MTCO₂e.⁷⁴ When applying this savings ratio to the anticipated 893 MTCO₂e saved by 2050, the Cosumnes CSD can expect to save approximately \$212,500 in total, or \$6,640 per year, through application of this measure. As such, this measure has a **HIGH** benefit to cost ratio.

Measure TR-4:



Reduce Vehicle Idling. Encourage a reduction in idling time for Cosumnes CSD-owned vehicles through education of Cosumnes CSD field crews and outreach to Cosumnes CSD employees.

Leaving the car engine on while not moving, otherwise known as idling, is a source of local air pollution. Health effects from long-term exposure

⁷⁴ Energy Policy Initiatives Center, University of San Diego School of Law. *Climate Action Plan Cost-Effectiveness Analysis* [pg B-21]. January 2018.

to vehicle pollutants include asthma, increased cancer risk, heart disease, and more. Idling also contributes to noise pollution, and wastes fuel. In fact, idling for more than ten seconds consumes more fuel than turning the car off and back on.⁷⁵ By reducing idling time among Cosumnes CSD-owned vehicles, this measure would reduce emissions of vehicle pollutants, including ozone and diesel particulate matter, and would save money on fuel.

Some of the vehicles leased by the Cosumnes CSD include devices that allow tracking of idling time. Thus, the Cosumnes CSD should begin tracking the idling time in all leased vehicles, and establish targets for reducing idling time through education and outreach to Cosumnes CSD employees.

Quantification: Considering specific information regarding vehicle idling times is not currently available for all Cosumnes CSD vehicles, emissions from this reduction measure could not be quantified at this time. However, this measure would directly reduce vehicle emissions and improve the fuel efficiency of Cosumnes CSD-owned vehicles.

Benefit-Cost Analysis: Implementation of this measure would require education of Cosumnes CSD staff and contracted landscapers on best practices for reducing idling. The cost of staff training and education would be minimal, and several benefits would result from implementation of this measure, including reduced local air pollution, reduced fuel consumption, and fewer instances of pollutant-related adverse health effects. However, as noted above, a quantifiable GHG reduction can not be calculated at this time. Considering the relatively low cost of this measure and the health-related benefits, the measure is considered to have a **HIGH** benefit to cost ratio.

Measure TR-5:



Reduce Air Travel. Promote train or bus travel as an alternative to long-flying for employee travel. Consider purchasing carbon off-sets for unavoidable air travel.

Figure 14, below, represents the efficiency of different modes of transportation that can be used for business-related travel. The most efficient mode, Coach/Bus, results in the fewest CO₂ emissions per passenger per mile. It should be noted that based on distance, some of the following modes of travel may not be feasible for certain destinations. Nonetheless, based on the data below, the Cosumnes CSD shall prioritize employee travel in the following order:

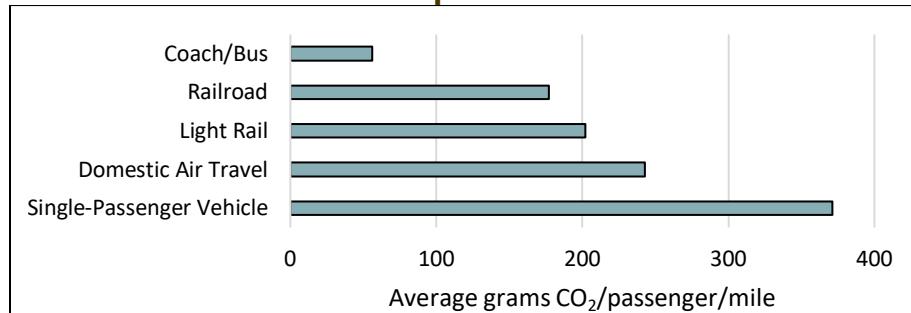
1. Coach/Bus
2. Railroad
3. Light Rail
4. Air Travel
5. Single-Passenger Vehicle

⁷⁵ Environmental Defense Fund. *Idling Gets You Nowhere: The Health, Environmental, and Economic Impacts of Engine Idling in New York City*. February 2009.

Quantification: If the Cosumnes CSD were to purchase carbon offsets for, or otherwise reduce, 50 percent of all employee air travel, overall annual emissions could be reduced by 10.5 MTCO₂e in the year 2050.

Measure TR-5	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	10.5
Note: See the Appendix A for calculation details.	

Figure 13
CO₂ Emissions from Different Modes of Transportation



Source: M.J. Bradley & Associates. *Comparison of Energy Use & CO₂ Emissions From Different Transportation Modes*. May 2007.

Benefit-Cost Analysis: Depending on the trip length, the cost-effectiveness of travel tends to fluctuate. In some cases, it may be less expensive and less carbon-intensive to travel by train rather than plane, in which case, travel by train would be the best option. However, in other cases, the only feasible means of travel may be single-passenger vehicle even though this option is the most carbon-intensive form of travel analyzed above. Considering the variable feasibility of certain forms of travel, uncertainty of timing limitations, the relatively minor GHG reduction, and the net cost associated with the purchase of carbon off-sets, this measure is considered to have a **LOW** benefit to cost ratio.

Solid Waste Measures

Measure SW-1:



Recycling. Develop and adopt a policy requiring the provision of recycling receptacles and proper handling of recyclable materials at all events requiring a permit or held on Cosumnes CSD-owned or operated property. The Cosumnes CSD could also partner with the USEPA's WasteWise program. WasteWise offers reduced purchasing and waste disposal costs, educational materials, and recognition for achieving recycling goals.⁷⁶

⁷⁶ United States Environmental Protection Agency. *WasteWise*. Available at: <https://www.epa.gov/smm/wastewise>. Accessed June 17, 2020.

By 2050, the Cosumnes CSD could aim for 50 percent of all events to be Zero Waste Events. Zero Waste Events use recyclable, compostable, or reusable products (i.e., compostable plates, cups, and utensils) and provide bins and clear signage to facilitate proper waste sorting. Reach out to local groups, such as the Sacramento State Sustainability Committee, that may be willing to volunteer as educators at Zero Waste Events. More information and a planning guide for Zero Waste Events can be found at the following website: <https://green.harvard.edu/tools-resources/how/zero-waste-event-guide>

This measure is consistent with Galt CAP measure WM 1 & 2 and Elk Grove CAP measure RC-1.

The Cosumnes CSD has already made great progress related to this measure. The Parks and Recreation Department produces a large amount of green waste, such as pruned branches and grass clippings. By recycling green waste and preventing such waste from decomposing in a landfill, the Cosumnes CSD has already saves approximately 1,844 MTCO₂e each year.

Quantification: According to the USEPA, in 2017, the United States recycled approximately 25 percent of all municipal waste.⁷⁷ If the national average is applied to Cosumnes CSD operations, 127 tons of waste would be recycled per year, which equates to an emissions reduction of 104 MTCO₂e.

Measure SW-1	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	104
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: Implementation of this measure would involve a net cost to the Cosumnes CSD, as required for outreach events, educational opportunities, the provision of recycling receptables, and enrollment in recycling program/service. Benefits would include GHG reductions, as shown above, as well as increased community involvement and public engagement in sustainability events. The average cost of implementing this measure is \$1.79 per MTCO₂e.⁷⁸ Based on the net cost associated with this measure, the benefit to cost ratio is considered **MEDIUM**.

⁷⁷ United States Environmental Protection Agency. *National Overview: Facts and Figures on Materials, Wastes and Recycling*. Available at: <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#:~:text=These%20Facts%20and%20Figures%20are,27%20million%20tons%20were%20composted>. Accessed June 17, 2020.

⁷⁸ City of Pleasanton. *Climate Action Plan Appendix D: Cost-Benefit Analysis of GHG Reduction Measures* [pg D.3-2]. 2012.

Measure SW-2:



Composting. Institute a composting program at Cosumnes CSD-owned or operated properties and/or Cosumnes CSD events. Expanding organics composting would reduce the amount of waste produced within the Cosumnes CSD, and reduce the amount of GHG emissions from waste disposal. Expansion of organics collection may also allow for diversion of such waste for other beneficial uses.

This measure is consistent with Galt CAP measure WM 1 & 2 and Elk Grove CAP measure RC-2.

Quantification: According to the USEPA, in 2017, the United States composted approximately 10 percent of all municipal waste.⁷⁹ If the national average is applied to Cosumnes CSD operations, 50.8 tons of waste would be composted each year, which equates to an emission reduction of 41.6 MTCO₂e.

Measure SW-2	
Calculation Method	Year 2050 Emissions Reductions (MTCO ₂ e)
ClearPath	41.6
Note: See the Appendix A for calculation details.	

Benefit-Cost Analysis: A startup cost would be required in order to purchase composting devices and implement a composting program. After the composting program has been instituted, the measure could result in cost savings on fertilizer, as well as the GHG reductions shown above. Implementation of this measure is anticipated to require a net cost, but would result in quantifiable GHG reduction. Therefore, the measure would have a **MEDIUM** benefit to cost ratio.

Measure SW-3:



Construction Waste Diversion. Commit to California Green Building Code (CALGreen) Tier 1 or Tier 2 construction and demolition waste diversion rates. CALGreen Tier 1 requires 65 percent of all construction and demolition waste to be diverted from local landfills, and Tier 2 requires that 80 percent be diverted. The Cosumnes CSD shall enforce this measure by adding a construction waste diversion requirement to future public works contracts.

Quantification: Construction and demolition waste production was not considered as a GHG source in the 2018 inventory. As such, specific GHG reductions cannot be calculated. However, this sustainability measure would reduce Cosumnes CSD waste generation as additional buildings and facilities are developed.

⁷⁹ United States Environmental Protection Agency. *National Overview: Facts and Figures on Materials, Wastes and Recycling*. Available at: <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#:~:text=These%20Facts%20and%20Figures%20are,27%20million%20tons%20were%20composted>. Accessed June 17, 2020.

Benefit-Cost Analysis: As noted above, this measure is not associated with a quantifiable GHG reduction at this time. However, other benefits of this measure would include improved sustainability of Cosumnes CSD construction activities, and exceedance of existing waste-related legislation. Implementation of this measure would require funding for employee salaries related to solid waste diversion programs as well as the cost associated with waste hauling and processing. Based on achieving a rate of 75 percent waste diversion, which falls between the Tier 1 and Tier 2 options listed above, implementation of this measure would result in a net cost of \$99 per MTCO₂e.⁸⁰ Considering this measure would result in an overall net cost to the Cosumnes CSD, and specific GHG reductions cannot be quantified at this time, this measure is considered to have a **LOW** benefit to cost ratio.

Sustainability Measure Summary

The sustainability measures have been listed below.

- Measure BD-2: *Improve Lighting Efficiency*
- Measure BD-5: *Water Conservation in Facilities.*
- Measure RE-1: *Renewable Energy Production Plan.*
- Measure LP-4: *Heavy Equipment Upgrades.*
- Measure LM-2: *Low-maintenance Nature Gardens.*
- Measure LM-4: *Water-Efficient Irrigation Practices.*
- Measure LM-5: *Implement Landscaping Guidelines.*
- Measure TR-4: *Reduce Vehicle Idling.*
- Measure SW-3: *Construction Waste Diversion.*

Implementation of the above sustainability measures would affect Cosumnes CSD operations by resulting in reduced demand for electricity, water, and fuel. In addition to reducing the Cosumnes CSD's demand on the foregoing resources the measures above would save the Cosumnes CSD money and contribute to improved regional air quality.

Adaptation Measure Summary

The adaptation measures have been listed below.

- Measure BD-1: *Energy-Efficient Buildings.*
- Measure BD-2: *Improve Lighting Efficiency*
- Measure BD-5: *Water Conservation in Facilities.*
- Measure RE-2: *On-site Renewable Energy Storage.*
- Measure LP-5: *Cool Community Strategies.*
- Measure LM-1: *Tree Management Plan.*
- Measure LM-4: *Water-Efficient Irrigation Practices.*
- Measure LM-5: *Implement Landscaping Guidelines.*

⁸⁰ Energy Policy Initiatives Center, University of San Diego School of Law. *Climate Action Plan Cost-Effectiveness Analysis* [pg B-41]. January 2018.

- Measure LM-6: *Wildfire Adaptation.*
- Measure LM-7: *Recycled Water.*

Implementation of Measures BD-1 and BD-2 would result in reduced electricity demand. Reduced electricity usage would help to reduce demand on the electricity grid, which may contribute to reductions in the likelihood of rolling black outs occurring in the future during heat waves. By implementing on-site energy storage, as recommended by Measure RE-2, facilities would be able to provide emergency power during power outages, including those caused by heat wave related electricity demand spikes or wildfire risk avoidance outages.

Measures BD-5, LM-4, LM-5, and LM-7 would all contribute to reducing the Cosumnes CSD's overall water demand, and would support more efficient water use. Reducing the Cosumnes CSD's overall water demand would allow for facilities to adjust to future constraints on water supply due to droughts. For instance, in times when water supply is low, the Cosumnes CSD would still be able to maintain landscaped areas by using already-purchased gray water for irrigation (Measure LM-7). Furthermore, by landscaping with a plant palette that is appropriate for the natural climate and has minimal additional water needs, Cosumnes CSD landscaped areas can thrive through future times of drought (Measure LM-5).

Measures LP-5 and LM-1 both contribute to regional cooling efforts, and implementation of the measures would work to reduce the impacts associated with the urban heat island effect. Furthermore, planting shade trees would increase carbon sequestration. As wildfire risk becomes a more prominent threat throughout the Central Valley, implementation of Measure LM-6 seeks to protect the Cosumnes CSD's financial security while protecting the health and safety of the Cosumnes CSD staff and service population. These measures would indirectly improve air quality, habitat health, and public safety for patrons throughout the Cosumnes CSD service area.

Implementation of the above adaptation measures are critical in increasing the adaptability of Cosumnes CSD operations as global climate change affects the Cosumnes CSD service area.

GHG Reduction Measure Summary

Full implementation of the foregoing GHG reduction measures would result in GHG emissions reductions as shown in Table 5. As shown in Table 5, the emissions reduction measures included in this CAP would reduce anticipated emissions in the year 2050 by 5,442.48 MTCO₂e, which equates to an approximately 76 percent reduction from the forecasted emissions level for 2050.

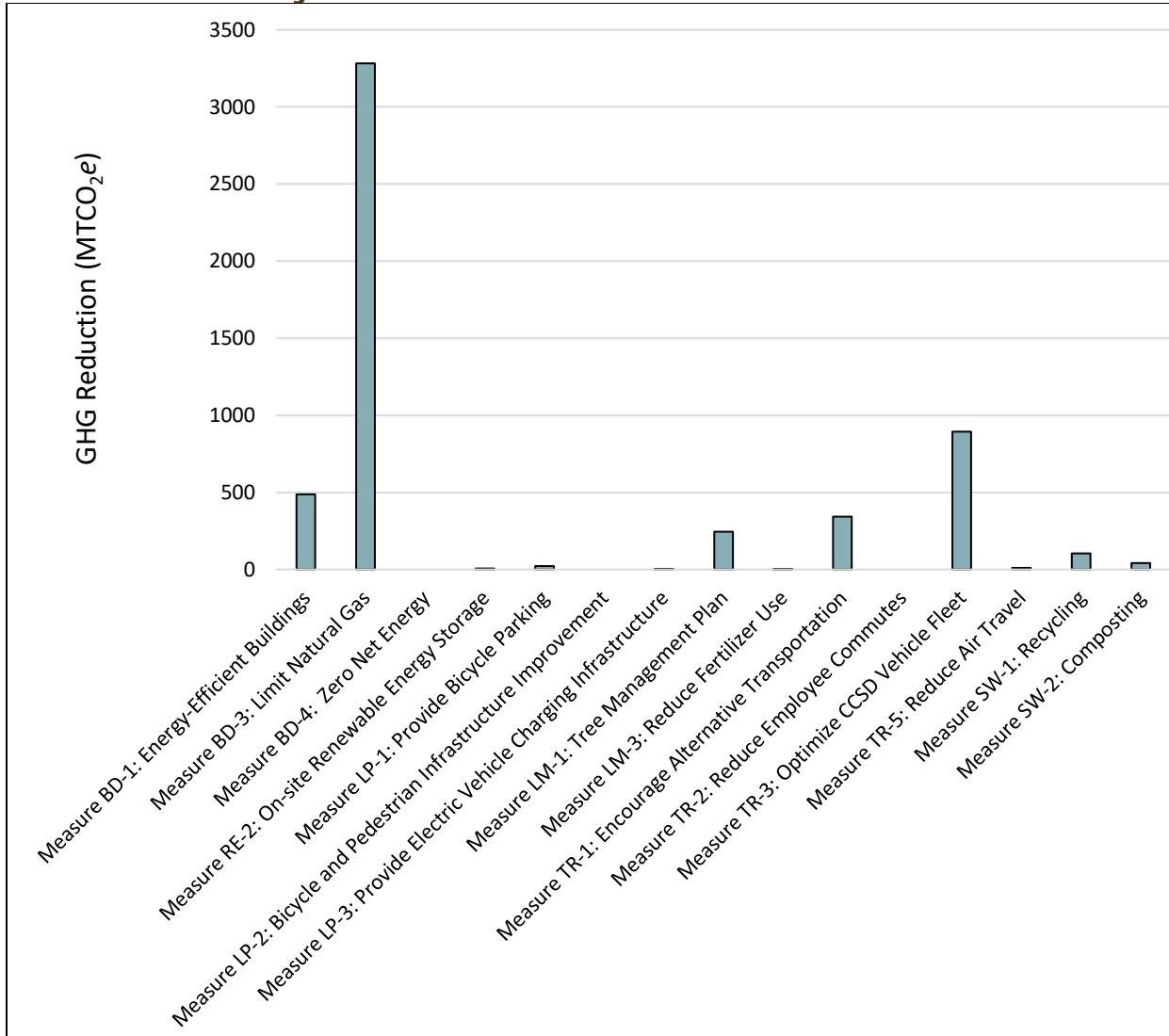
Figure 15 visually presents the efficacy of each GHG reduction measure. As shown in the figure, implementation of Measures BD-3, BD-1, and TR-3 would result in the greatest GHG reductions.

Table 5
GHG Reduction Measure Summary

Reduction Measure	Year 2050 Emissions Reductions (MTCO₂e)
Measure BD-1: <i>Energy-Efficient Buildings</i>	486.30 ¹
Measure BD-3: <i>Limit Natural Gas</i>	3,282.5 ¹
Measure BD-4: <i>Zero Net Energy</i>	--
Measure RE-2: <i>On-site Renewable Energy Storage</i>	6.00
Measure LP-1: <i>Provide Bicycle Parking</i>	
Measure LP-2: <i>Bicycle and Pedestrian Infrastructure Improvement</i>	22.08
Measure LP-3: <i>Provide Electric Vehicle Charging Infrastructure</i>	3.09
Measure LM-1: <i>Tree Management Plan</i>	245.32
Measure LM-3: <i>Reduce Fertilizer Use</i>	4.00
Measure TR-1: <i>Encourage Alternative Transportation</i>	
Measure TR-2: <i>Reduce Employee Commutes</i>	344.06
Measure TR-3: <i>Optimize Cosumnes CSD Vehicle Fleet</i>	893.00
Measure TR-5: <i>Reduce Air Travel</i>	10.50
Measure SW-1: <i>Recycling</i>	104.00
Measure SW-2: <i>Composting</i>	41.60
Total GHG Reductions	5,442.48

¹ Due to uncertainty regarding which goals the Cosumnes CSD will elect, compliance with Tier 1 was assumed so as to avoid overestimating reductions.

Figure 14
Efficacy of Each GHG Reduction Measure in 2050



GHG Emissions with the CAP Compared to GHG Emissions without the CAP

Figure 16 presents a comparison of the Cosumnes CSD's anticipated GHG emissions from the years 2025 to the year 2050 under two scenarios: CAP Scenario, and No CAP Scenario (otherwise known as Business As Usual [BAU]). The black line in the upper portion of the graph represents the No CAP Scenario/BAU forecast, which refers to the scenario in which the Cosumnes CSD does not adopt a CAP. As shown in Figure 16, the BAU line indicates that GHG emission would steadily rise with projected growth in Cosumnes CSD operations from approximately 6,000 MTCO₂e/yr in 2025 to over 7,000 MTCO₂e/yr by 2050. By comparison, the colored portion of the graph represent GHG emissions per sector that are anticipated to occur under the CAP Scenario, which refers to the scenario in which a CAP is adopted by the Cosumnes CSD. With implementation of the GHG reduction measures provided in this CAP/SAP, the Cosumnes CSD's GHG emissions would remain consistently under 2,000 MTCO₂e/yr. The difference in GHG emissions from the BAU scenario as compared to the CAP Scenario becomes more substantial as time goes on. While emissions under the BAU Scenario constantly grow with Cosumnes CSD growth, the GHG emissions under the CAP Scenario remain constant even though the Cosumnes CSD continues to grow. Therefore, implementation of the GHG reduction measures presented within this CAP/SAP would result in greater GHG reduction measures every year that the measures are carried out. Table 6 presents similar information in tabular form, with the reductions from each strategy calculated in five year increments between 2025 and 2050.

Benefit-Cost Analysis Ranking

The scatter plot depicted in Figure 16 represents all quantifiable sustainability, adaptation, and GHG reduction measures from highest benefit-cost to lowest benefit-cost as well as most effective at reducing GHG emissions. The measures that fall within the yellow box have the highest benefit-cost ratio and the highest measurable GHG emissions reduction.

Figure 15
Total GHG Emissions with Implementation of all GHG Reduction Measures

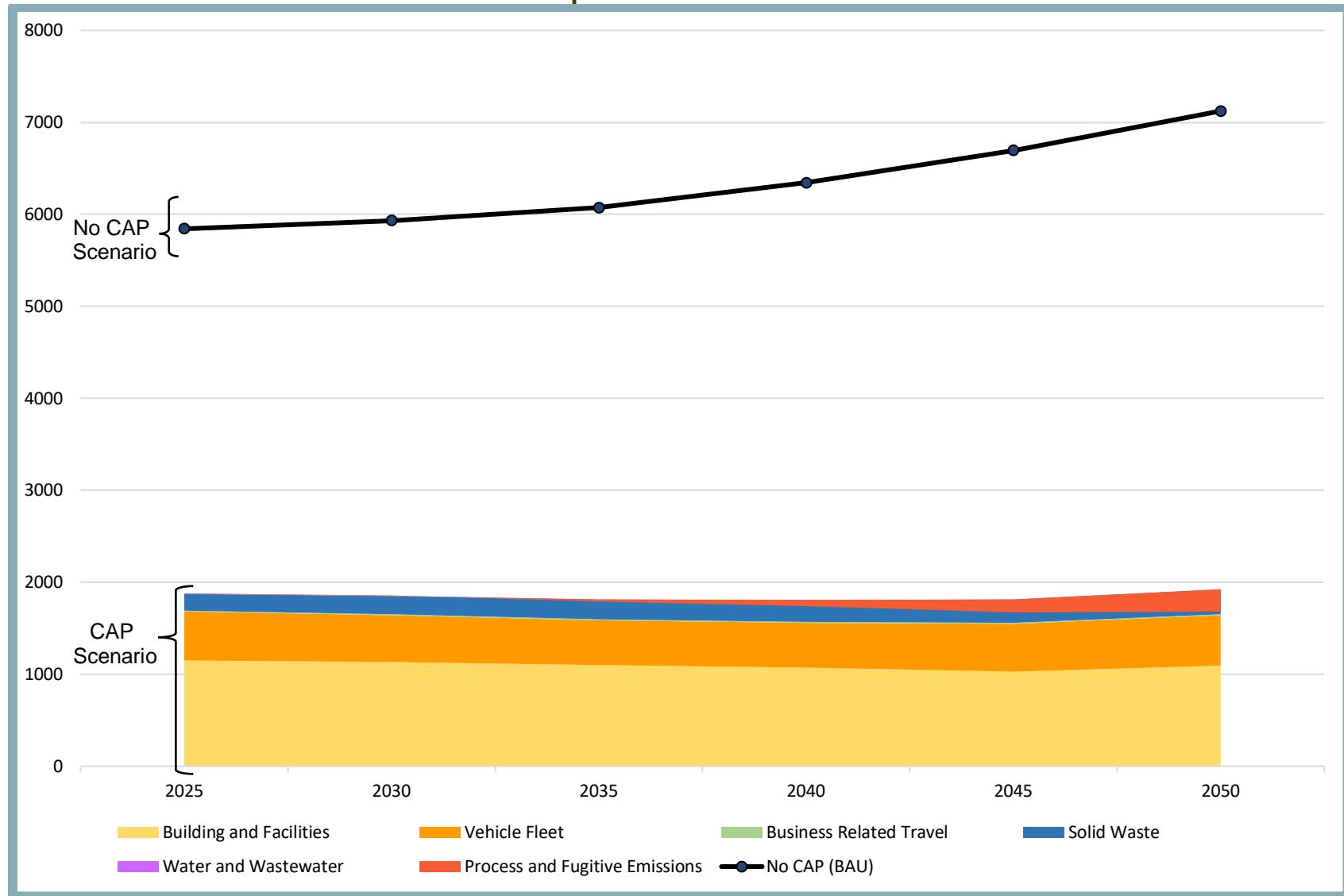
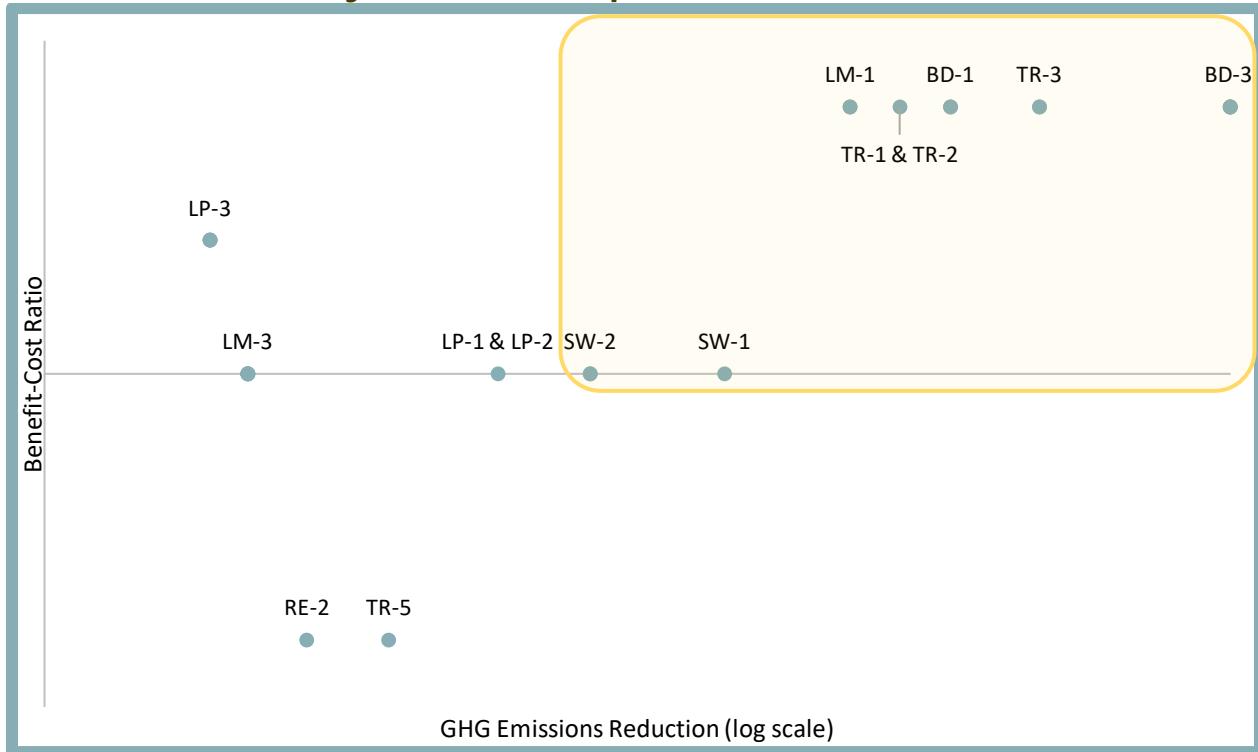


Table 6
GHG Reductions per Year with Implementation of all GHG Reduction Measures

GHG Reduction Measure	GHG Emissions Reduction (MTCO ₂ e)					
	2025	2030	2035	2040	2045	2050
Buildings and Facilities						
Measure BD-1: <i>Energy-Efficient Buildings</i>	369.8	392.8	412	433.8	456.4	486.3
Measure BD-3: <i>Limit Natural Gas</i>	2,184.9	2,403.2	2,611.5	2,835.9	3,080.7	3,282.5
Measure BD-4: <i>Zero Net Energy</i>	--	--	--	--	--	--
Measure RE-2: <i>On-site Renewable Energy Storage</i>	1.3	2.3	3.2	4.1	5.1	6
	<i>Subtotal</i>	2,556	2,798.3	3,026.7	3,273.8	3,542.2
						3,774.8
Vehicle Fleet						
Measure LP-1: <i>Provide Bicycle Parking</i>						
Measure LP-2: <i>Bicycle and Pedestrian Infrastructure Improvement</i>	14.6	15.9	17.6	19.1	20.5	22.1
Measure LP-3: <i>Provide Electric Vehicle Charging Infrastructure</i>	0.7	1.2	1.6	2.1	2.6	3.1
Measure TR-1: <i>Encourage Alternative Transportation</i>						
Measure TR-2: <i>Reduce Employee Commutes</i>	227.8	248.1	273.8	296.9	319.9	344.1
Measure TR-3: <i>Optimize Cosumnes CSD Vehicle Fleet</i>	758	744	747	788	842	893
	<i>Subtotal</i>	1,001.1	1,009.2	1,040.0	1,106.1	1,185.0
						1,262.3
Business-Related Travel						
Measure TR-5: <i>Reduce Air Travel</i>	8.5	8.5	9	9.5	10	10.5
	<i>Subtotal</i>	8.5	8.5	9	9.5	10
						10.5
Solid Waste						
Measure SW-1: <i>Recycling</i>	70.3	77	83.3	90.3	97.8	104
Measure SW-2: <i>Composting</i>	28.1	30.8	33.3	36.1	39.1	41.6
	<i>Subtotal</i>	98.4	107.8	116.6	126.4	136.9
						145.6
Process and Fugitive Emissions						
Measure LM-1: <i>Tree Management Plan</i>	0	1.1	22.3	70.1	144.4	245.3
Measure LM-3: <i>Reduce Fertilizer Use</i>	3	3	3.5	3.5	4	4
	<i>Subtotal</i>	3	4.1	25.8	73.6	148.4
						249.3
	<i>Total GHG Reductions Per Year</i>	3,667.0	3,927.9	4,218.1	4,589.4	5,022.5
						5,442.5

Figure 16
Benefit-Cost Analysis Ratio Compared to GHG Emissions Reduction



6. IMPLEMENTATION

The following chapter describes how the Cosumnes CSD shall generally proceed to implement the emissions reduction and sustainability measures presented in Chapter 5.

6.1 IMPLEMENTATION OF REDUCTION MEASURES

Chapter 5, Emissions Reduction Measures, of this CAP/SAP presents various information related to specific measures designed to aid the Cosumnes CSD in reducing present and future GHG emissions and improve sustainability of operations. Each emissions reduction and sustainability measure presented in Chapter 5 includes specific actions to be taken by Cosumnes CSD personnel.

Some of the emissions reductions occurring due to the measures included in Chapter 5 would occur directly through actions taken by Cosumnes CSD. For instance, replacing an aging vehicle with an electric vehicle would result in on-going emissions reductions. Other measures included in Chapter 5 would facilitate emissions reductions by other entities. For instance, installation of bicycle facilities at Cosumnes CSD properties may allow some Cosumnes CSD employees to bike instead of driving to events or locations, but such a measure would also allow residents to bike instead of drive to Cosumnes CSD facilities. Allowing residents to bike instead of drive would reduce emissions that would otherwise occur within the City of Elk Grove or unincorporated portions of Sacramento County within the Cosumnes CSD's service area.

The measures included in Chapter 5 of this CAP/SAP would be implemented on varying timeframes. Many measures would be implemented on an on-going basis, while others may only be implemented during the planning and execution of specific new facilities. To aid in the implementation of the sustainability measures and emissions reduction measures presented in Chapter 5, Table 7 has been included at the end of this chapter that presents a guide to the timing of implementation and the Cosumnes CSD Department that would be responsible for implementation of each measure.

Sustainability Webpage

To aid in the implementation of the emissions reduction measures above, the Cosumnes CSD may consider creating a specific page on the Cosumnes CSD's website that describes the ongoing sustainability efforts, identifies partnerships, and provides educational resources and opportunities for community members.

6.2 UNCERTAINTY AND FUTURE UPDATES

Emission forecasts used throughout this CAP/SAP are based on buildup forecasts of the cities of Galt and Elk Grove, and data on anticipated growth from the adopted CAPs of both jurisdictions. The foregoing sources of development data represent the most up-to-date sources of information for growth projections in the Cosumnes CSD's service area; however, uncertainty exists related to the amount of growth that will be realized in future years, with the level of uncertainty increasing the farther into the future projections are focused. For instance, the Cosumnes CSD's *Parks, Recreation & Facilities Master Plan* provides a roadmap for development and maintenance of

Cosumnes CSD infrastructure for the ten-year period between 2018 and 2028. With a Master Plan in place, the growth of Cosumnes CSD operations over that period can be known with a high degree of certainty. With growth anticipated to continue through the 2028 horizon of the Master Plan, the rate of growth, number of new facilities added, and services provided becomes increasingly uncertain and speculative. Nevertheless, by tying the growth assumptions to the most recent growth estimates from the cities of Elk Grove and Galt, the Cosumnes CSD has ensured that efforts to reduce GHG emissions and increase sustainability of Cosumnes CSD operations will comply with and amplify the efforts undertaken by Elk Grove and Galt in their respective CAPs.

Considering the uncertainty surrounding the rate of future growth within the Cosumnes CSD service area and the potential for future regulations to place further requirements on new Cosumnes CSD facilities, future updates to this CAP/SAP may be necessary to ensure that Cosumnes CSD operations continue to achieve the meaningful progress towards decreasing GHG emissions and increasing operational sustainability. A logical avenue for future updates to the CAP/SAP would be integration of the CAP/SAP process with the Master Plan Update process. Updating the CAP/SAP along with or shortly after each Master Plan would allow the CAP/SAP to integrate the most up-to-date growth estimates, and respond to any changes in operational focuses that are included in the Master Plan.

Updating the CAP/SAP will not only allow for future iterations of the CAP/SAP to respond to the realized rate of growth within the Cosumnes CSD's service area, but would also provide the Cosumnes CSD to a means of incorporating emerging technologies, respond to changing legislative and regulatory requirements, and track the progress of implementation of measures within this CAP/SAP. As growth occurs the emissions inventories prepared for future CAP/SAP updates would also provide a more detailed picture of on-going Cosumnes CSD GHG emissions, while also increasing the accuracy of future emissions forecasts. Specific areas of focus could be the integration of low-emitting vehicles into the Cosumnes CSD's operational fleet, potential increases in the use of electric landscaping equipment, as well as improved water consumption and wastewater production tracking.

6.3 PARTNERSHIPS & FUNDING

Many of the measures included in this CAP/SAP are anticipated to be implemented by the Cosumnes CSD through building design decisions, contracting, and on-the-ground monitoring activities. However, significant opportunities exist to initiate partnerships and seek funding to support many of the measures presented in Chapter 5.

SMUD has already acted as an instrumental partner in the drafting of this CAP/SAP by providing data crucial to the estimation of existing Cosumnes CSD operational emissions. Being the electricity utility for the Cosumnes CSD's service area, SMUD will continue to play an integral part of Cosumnes CSD's operations, and will likely be an effective partner in implementing many of the CAP/SAP measures. For example, SMUD offers rebates and expertise related to energy efficiency upgrades, which could aid the implementation of Measure BD-1 and BD-1. SMUD employees may also be able to contribute to expertise in pursuit of designing buildings to meet Measure BD-4 and installing electric vehicle parking infrastructure in line with LP-3. In addition to SMUD, the Sacramento Metropolitan Air Quality Management District (SMAQMD) has partnered with area businesses to promote the adoption of clean air vehicles. Thus, SMAQMD staff may be able to assist the Cosumnes CSD's implementation of LP-3, LP-4, and TR-3. Urban tree plantings, such as those promoted under LM-1, are often supported through grant funding by organizations such as CalFire. In addition, private companies such as Uber, which administers the JUMP bike

program in the region, may emerge as a partner to promote the use of bicycles in-line with TR-1 and TR-2.

The Cal-EPA maintains a database of available funding opportunities through the CoolCalifornia.org. Through the CoolCalifornia.org program the Cal-EPA promulgates best practices for emissions reductions, examples of such emissions reductions practices, and funding sources. Through the continued distribution of Cap-and-Trade program funds and legislative action on the State level, diverse funding sources are anticipated to remain available into the foreseeable future.

This CAP/SAP may also provide a basis for the Cosumnes CSD to pursue funding for climate change resiliency programs. Based on the anticipated regional effects of climate change, such programs may include increasing the availability of cooling centers during summer months, supporting urban forestry, increasing flood protection, and/or protecting regional groundwater supplies.

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>Measure BD-1: Energy-Efficient Buildings.</p> <p>Improve energy efficiency in Cosumnes CSD buildings and facilities through the following measures:</p> <ul style="list-style-type: none"> a) Encourage innovative site design and building orientations for new construction that incorporate passive and active solar designs and natural cooling techniques. Require all new roofing to include cool roofs in compliance with Tier 2 of the California Green Building Code. b) Implement a Cosumnes CSD-wide Energy Efficiency Plan to inventory existing structures and prioritize investment in energy efficiency upgrades. c) Establish green building standards for new Cosumnes CSD facilities, either through the California Green Building Code's Tier 1 or Tier 2 standards, the US Green Building Council's Leadership in Energy and Environmental Design (LEED) program, or through participation in SMUD's Integrated Design Solutions Program. 	<ul style="list-style-type: none"> a) During the planning process, prior to construction of new facilities. b) Following adoption of this CAP/SAP. c) Following adoption of this CAP/SAP. 	<p>Planning, Design & Construction Division</p>	<p>Tier 1 – HIGH Tier 2 – MEDIUM-LOW</p>
<p>Measure BD-2: Improve Lighting Efficiency</p> <p>Convert Cosumnes CSD-owned sports field lighting, parking lighting, and exterior building lighting to energy efficient technologies, such as LED bulbs or solar-powered lighting fixtures. Upgrade interior lighting at all Cosumnes CSD facilities to LED with occupancy sensors, timers,</p>	<p>Ongoing, as funding becomes available.</p>	<p>Planning, Design & Construction Division; Fire Operations Division</p>	<p>HIGH</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
dimmers, and photosensors to increase energy and cost savings.			
Measure BD-3: Limit Natural Gas Reduce the use of natural gas in existing and future Cosumnes CSD-owned facilities. Natural gas use can be reduced by replacing existing natural gas water heaters with all-electric versions, and designing new structures to include solar water heating, heat pumps, and other electricity-based water and space heating devices. By removing natural gas appliances and devices, buildings would rely solely on electricity, which will be generated from progressively less carbon intensive sources over time. To support increased energy efficiency, SMUD administers various incentive programs for replacement of inefficient appliances in residences and commercial developments. Participation in SMUD programs would promote the replacement of energy inefficient appliances and the replacement of natural gas fueled appliances with comparable electric powered appliances.	Upgrades shall be ongoing, as funding becomes available. This measure shall be applied to new facilities as part of the planning process, prior to construction.	Planning, Design & Construction Division; Fire Operations Division	HIGH
Measure BD-4: Zero Net Energy Commit to Phasing in Zero Net Energy (ZNE) standards for new construction, in compliance with, or ahead of, State standards (i.e. 2030 for non-residential structures). The California Energy Efficiency Strategic Plan established the goals that new commercial development shall achieve ZNE by 2030. On a building level, ZNE is defined by the California Department of General Services as an energy-efficient building where the actual consumed energy is less than or equal to the on-site	During all planning efforts for new Cosumnes CSD facilities following adoption of this CAP/SAP.	Planning, Design & Construction Division; Fire Operations Division	MEDIUM-HIGH

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
renewable energy generated, on an energy source basis. That is, a ZNE building must generate as much energy as is consumed. ZNE can be achieved through a combination of energy efficiency improvements, increased renewable energy generation, and upgrades to existing development.			
<p>Measure BD-5: Water Conservation in Facilities</p> <p>Promote water conservation in Cosumnes CSD owned and operated facilities:</p> <ul style="list-style-type: none"> a) Maintain an inventory of water use by facility; b) Audit facilities to identify potential water saving measures; c) Prioritize identified measures based on efficacy and cost effectiveness; d) Establish water efficiency standards and best management practices for new facilities. 	<ul style="list-style-type: none"> a) Ongoing. b) Ongoing. c) Following adoption of this CAP/SAP. d) Following adoption of this CAP/SAP. 	Planning, Design & Construction Division; Fire Operations Division	MEDIUM
<p>Measure RE-1: Renewable Energy Production Plan</p> <p>Formalize a Renewable Energy Production Plan. In collaboration with SMUD or another entity, the Cosumnes CSD shall:</p> <ul style="list-style-type: none"> a) Inventory existing renewable energy installations within Cosumnes CSD owned/operated facilities; b) Establish a goal for renewable energy production within Cosumnes CSD owned/operated facilities; and 	<ul style="list-style-type: none"> a) Ongoing. b) Following adoption of this CAP/SAP. c) Ongoing. 	Planning, Design & Construction Division; Fire Operations Division	HIGH

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>c) Inventory potential Cosumnes CSD-owned facilities and properties that could be developed with renewable energy infrastructure.</p> <p>The Cosumnes CSD may also consider enrolling in SMUD's Greenergy or SolarShares programs to support utility scale solar. The Greenergy program offers grid electricity from renewable sources, and SolarShares offers installation of rooftop solar panels at no additional cost.</p>			
<p>Measure RE-2: On-site Renewable Energy Storage</p> <p>Study the feasibility of combining on-site renewable energy production with on-site energy storage as a means of providing emergency power to fire facilities.</p>	<p>Following adoption of this CAP/SAP and during planning process for new facilities.</p>	<p>Planning, Design & Construction Division; Fire Operations Division</p>	<p>LOW</p>
<p>Measure LP-1: Provide Bicycle Parking</p> <p>Exceed local standards for bicycle parking at Cosumnes CSD-owned facilities. Inventory existing bicycle parking and identify opportunities to increase the safety or accessibility of existing bicycle parking. Require new Cosumnes CSD facilities to include provision of bicycle parking appropriate for the use (i.e., short- and/or long-term parking). The Cosumnes CSD may choose to partake in bike share partnerships, such as LIME Bikes or other similar programs, in order to further encourage bicycle use.</p>	<p>Following adoption of this CAP/SAP begin inventory of existing bicycle parking resources. Establish guidelines for bicycle parking at new Cosumnes CSD facilities. Begin outreach efforts for bike share partnerships. Collaborate with Elk Grove to aid implementation of the Elk Grove Bicycle, Pedestrian, and Trails Master Plan should the plan be adopted.</p>	<p>Planning, Design & Construction Division; Fire Operations Division</p>	<p>MEDIUM</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>Measure LP-2: Bicycle and Pedestrian Infrastructure Improvement</p> <p>Promote pedestrian and bicycle connectivity between proposed and existing facilities and private development. This measure could be accomplished through early consultation during the development proposal process or preparation of guidelines of new development connection strategies in consultation with the City of Elk Grove and/or Sacramento County. Partner with the City of Elk Grove and other interested parties to make Cosumnes CSD facilities available for use as bike share hubs. Consider offering electric bicycle charging stations at Cosumnes CSD facilities either as part of the bike share partnerships or to the general public.</p>	<p>Following adoption of this CAP/SAP reach out to relevant departments at the City of Elk Grove and/or Sacramento County to communicate the intent of this measure (for instance Elk Grove Planning Division and Sacramento County Planning & Environmental Review).</p> <p>On an on-going basis provide comments on proposals for new developments within the Cosumnes CSD's service area to ensure new developments provide connectivity to Cosumnes CSD's facilities.</p>	<p>Planning, Design & Construction Division; Fire Operations Division</p>	<p>UNKNOWN</p>
<p>Measure LP-3: Provide Electric Vehicle Charging Infrastructure</p> <p>Support the use of alternative fueled vehicles through the provision of electric vehicle charging stations at Cosumnes CSD-owned facilities. In partnership with SMUD (for instance, under the Commercial Charging Pilot program), the Cosumnes CSD may inventory existing parking lots and determine where installation of electric vehicle charging stations could be feasible.</p>	<p>Following adoption of this CAP/SAP, coordinate with SMUD to determine existing available resources. Begin inventorying existing parking facilities to determine where installation of electric vehicle charging facilities is feasible, and determine schedule for</p>	<p>Planning, Design & Construction Division; Fire Operations Division</p>	<p>MEDIUM-HIGH</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
	installation of electric vehicles. Include electric vehicle parking infrastructure in all new facilities.		
Measure LP-4: Heavy Equipment Upgrades Work with SMAQMD and ARB to complete equipment upgrades, retrofits, and replacement for Cosumnes CSD-owned heavy-duty vehicles and equipment. Prioritize oldest or most emissions intensive pieces of equipment.	Following adoption of this CAP/SAP, coordinate with SMAQMD regarding existing programs for replacement of heavy-duty equipment. Prioritize highest emitting equipment for replacement or retrofit (typically the oldest equipment).	Fire Administration Division; Fire Operations Division	UNKNOWN
Measure LP-5: Cool Community Strategy Implement Cool Community strategies, such as cool roofs and cool pavements. Strategically plant trees to shade pavement and structures. The Cosumnes CSD has already made progress towards this measure, and several basketball courts are coated with cool pavements. This measure could be extended to parking areas, Cosumnes CSD facility rooftops, and any other paved areas.	Following adoption of this CAP/SAP consider Cool Community strategies in all new development, and when resurfacing existing paved areas. Incorporate shade tree planning into the Tree Management Plan adopted as part of Measure LM-1.	Planning, Design & Construction Division	MEDIUM-LOW
Measure LM-1: Tree Management Plan Draft and implement a Tree Management Plan. The Plan may include strategies to reduce biogenic Volatile Organic Compound emissions (which is a component of urban smog), adapt to warmer temperatures, and calculate the carbon sequestration potential of new trees. Collaborate	Following adoption of this CAP/SAP create a timeline for adoption and implementation of a Tree Management Plan, ideally	Planning, Design & Construction Division	HIGH

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
with the cities of Elk Grove and Galt to meet tree planting goals. Increase commitment to providing shade trees in parking areas of new or existing facilities beyond the level currently required by local jurisdictions	within five years of adoption of this CAP/SAP.		
Measure LM-2: Low-maintenance Nature Gardens Integrate community butterfly gardens and nature gardens into existing and future Cosumnes CSD parks. Work with contractors to reduce reliance on fossil fuel powered landscaping equipment. The Cosumnes CSD may consider adding requirements to contracts related to use of electric-powered landscaping equipment. To support future use of electric equipment, the Cosumnes CSD could require new facilities to be designed with outdoor electrical outlets sufficient to support such equipment.	Following adoption of this CAP/SAP seek to include language applying measure during future contract negotiations. Incorporate low-maintenance design principles into future updates to Cosumnes CSD's Parks Design Principles. During design of new facilities ensure outdoor electric outlets are provided where feasible.	Planning, Design & Construction Division, Park & Golf Operations Division	MEDIUM
Measure LM-3: Reduce Fertilizer Use Work with contractors to reduce fertilizer use within Cosumnes CSD facilities to the extent feasible. The amount of fertilizer can be tailored for specific landscaped areas, and applied directly to root areas to further reduce the amount required. Continue the substantial progress Cosumnes CSD has already made in this effort. In addition, the Cosumnes CSD shall prohibit/discourage fertilizer application immediately before and during rain events, as	Following adoption of this CAP/SAP seek to include language applying this measure during future contract negotiations. Include fertilizer application standards in new contracts. Seek to implement a Cosumnes CSD composting program to re-use green	Planning, Design & Construction Division, Park & Golf Operations Division	UNKNOWN

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>fertilizer applied prior to rain is often washed away before being taken in by plants.</p> <p>In concert with measure SW-2, Composting, the Cosumnes CSD could implement a fertilizing program that recycles compost collected from Cosumnes CSD park visitors and applies the compost to Cosumnes CSD landscaped areas as organic fertilizer.</p>	<p>waste as a sustainable source of fertilizer.</p>		
<p>Measure LM-4: Water-Efficient Irrigation Practices</p> <p>Continue to maintain water-efficient practices and monitoring. Examples of actions that are currently taken by Cosumnes CSD and should be continued include use of drip irrigation systems where practical, monitoring of spray irrigation systems to ensure efficient use, and monitoring of precipitation events to avoid over-watering.</p> <p>Considering that the Cosumnes CSD has already made substantial progress in implementing this measure. A next step could involve using reclaimed water to irrigate landscaped areas (see Measure LM-7 for more information). The Cosumnes CSD may also seek to ensure that water use is being tracked and shared with decision makers, such as the board of directors, to illustrate the water efficiency improvements and water use challenges confronting the District.</p> <p>The commitment to water efficiency shall be sustained and incorporated into the planning for all new parks and facilities.</p>	<p>Draft best management practices for irrigation timing and duration and implement such practices within first year following adoption of this CAP/SAP.</p>	<p>Planning, Design & Construction Division, Park & Golf Operations Division</p>	<p>HIGH</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>Measure LM-5: Implement Landscaping Guidelines</p> <p>Implement Cosumnes CSD-wide Landscaping Design Guidelines that shall include and enforce:</p> <ul style="list-style-type: none"> a) Efficiency requirements for indoor and outdoor water fixtures; b) Best management practices related to irrigation infrastructure and monitoring; c) A list of preferred plants based on BVOC emissions rates, water use, maintenance requirements, biological benefits (native or non-native), and resiliency to future climate change. Preferred plants should continue to be suitable for the regional climate, and require decadal update and review; d) Compliance with the statewide Model Water Efficient Landscape Ordinance (MWELO); and e) Implementation of features from the River-Friendly Landscape Guidelines, as prepared by the Sacramento Stormwater Quality Partnership. 	<p>Draft and implement guidelines within first year following adoption of this CAP/SAP.</p>	<p>Planning, Design & Construction Division, Park & Golf Operations Division</p>	<p>HIGH</p>
<p>Measure LM-6: Wildfire Adaptation</p> <p>Wildfire poses a severe threat to the health and safety of Cosumnes CSD employees and the public. To confront this threat the Cosumnes CSD shall:</p> <ul style="list-style-type: none"> a) Continue to include wildfire response in fiscal and operational planning; b) Plan for and provide support services to Cosumnes Fire Department staff including 	<p>Upon adoption of this CAP/SAP the Cosumnes CSD shall seek to immediately implement the following measures:</p> <ul style="list-style-type: none"> a) Account for wildland fire deployments during fiscal and operational planning; 	<p>All Agency Departments</p>	<p>Not Assigned</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>participation in peer support services and crisis referral services;</p> <p>c) Support and promote the existing Fire Prevention Bureau within the Cosumnes Fire Department and identify areas particularly vulnerable to increased fire risk due to drought;</p> <p>d) Investigate providing clean air centers at existing and proposed Cosumnes CSD facilities; and</p> <p>e) Plan for and provide protection equipment, such as N95 masks, for employees and members of the public.</p>	<p>b) Participate in support services on an on-going basis;</p> <p>c) Identify areas currently at risk of wildfire and those areas that may experience heightened risk during future droughts;</p> <p>d) Before the 2021 fire season seek collaboration with the City of Elk Grove and SMAQMD; and</p> <p>e) Before the 2021 fire season and dependent upon the COVID-19 pandemic and supply availability, seek to create a reasonable stock-pile of N95 masks for personnel.</p>		
<p>Measure LM-7: Recycled Water</p> <p>Implement a recycled water program to irrigate landscaped areas with treated wastewater from Cosumnes CSD facilities.</p> <p>The Cosumnes CSD can promote the use of recycled water for appropriate and cost-effective uses. Recycling water is a water management strategy that relies on the reuse of purchased potable water for beneficial uses. Approved uses of recycled water include landscape and golf course</p>	<p>Within the next five-years, investigate the feasibility of installing recycled water systems at new Cosumnes CSD. If proven to be feasible, begin designing future facilities with recycled water systems.</p>	<p>Planning, Design & Construction Division</p>	<p>MEDIUM-HIGH</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
irrigation, toilet flushing, construction activities, and others. Gray water refers to reusable wastewater from bathroom sinks, bath and shower drains, and clothes washing drains, that can be reused on-site, often for landscape irrigation. The use of gray water for irrigation is known to reduce the demand for fertilizer use. ⁸¹ Therefore, this measure would complement implementation of Measure LM-3.			
Measure TR-1: Encourage Alternative Transportation Work with e-tran and South County Transit to continue promoting existing bus lines serving the Cosumnes CSD facilities. Promote bicycle travel to and from events through provision of bicycle valet services or other means. Including transportation options on event websites (i.e., include a "How to Get Here" page outlining available transit and bike options). Make brochures available for transit schedules at events. Invite transit representatives to table at events and distribute information.	Within first year of adoption of this CAP/SAP begin consultation with e-tran and South County Transit. Begin including transportation options on event websites and brochures within one year of adoption of this CAP/SAP.	Planning, Design & Construction Division; Recreation & Community Services Division	HIGH
Measure TR-2: Reduce Employee Commutes Reduce Cosumnes CSD employee commutes and associated vehicle emissions by: a) Implementing flextime work arrangements, including telecommuting and alternative work schedules, to decrease daily commuter trips.	Seek to implement an employee commute reduction plan within first two years following adoption of the CAP/SAP. Once implemented, begin tracking success of the program on a quarterly or biannual basis.	All Agency Departments	HIGH

⁸¹ U.S. Environmental Protection Agency. Water Recycling and Reuse: The Environmental Benefits. Available at: <https://19january2017snapshot.epa.gov/www3/region9/water/recycling/>. Accessed August 28, 2020.

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>b) Instituting a Cosumnes CSD employee carpooling program. Set a goal for employee participation, for instance, by establishing a target number of employee carpools per month or a goal for total VMT avoided through carpooling.</p> <p>c) Promoting bicycle commuting for employees. Set a goal for employee participation.</p> <p>d) Participating in Traffic Management Associations (TMAs) formed by the City of Elk Grove or the City of Galt. In general, TMAs provide ongoing training and special assistance to TMA members for the implementation of commute alternative programs at work sites, including monthly networking meetings and assistance with work site program design. TMA activities include outreach to area employees and residents in an effort to provide varied commute choices, including bicycle and vanpool subsidies, vanpool formation assistance, and transit information.</p>			
<p>Measure TR-3: Optimize Cosumnes CSD Vehicle Fleet</p> <p>Optimize the Cosumnes CSD vehicle fleet by conducting an inventory of all Cosumnes CSD owned vehicles including fuel consumed per year and fuel economy. Establish a target miles per gallon fuel economy for the entire fleet aimed at reducing fuel consumption by Cosumnes CSD-owned vehicles. Encourage future vehicle purchases be alternatively fueled vehicles (i.e.,</p>	<p>Following adoption of this CAP/SAP seek to establish target miles per gallon within one year. Review and update any existing fleet maintenance guidelines or draft new guidelines to ensure proper tire inflation,</p>	<p>Planning, Design & Construction Division, Park & Golf Operations Division, Fire Fleet Maintenance</p>	<p>HIGH</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
<p>electric, natural gas, hydrogen, renewable diesel) where feasible.</p> <p>As part of fleet optimization and fleetwide fuel economy improvements, the Cosumnes CSD shall ensure the proper maintenance of vehicles (such as proper tire inflation and properly timed oil changes) to ensure Cosumnes CSD vehicles operate at the maximum fuel efficiency possible, and educate Cosumnes CSD employees of the benefits of reducing vehicle idling times.</p>	<p>properly timed oil changes, and reduce idling time.</p>		
<p>Measure TR-4: Reduce Vehicle Idling</p> <p>Encourage a reduction in idling time for Cosumnes CSD-owned vehicles through education of Cosumnes CSD field crews and outreach to Cosumnes CSD employees.</p>	<p>Following adoption of this CAP/SAP promulgate an idling reduction fact sheet outlining the costs of idling and benefits of reducing idling to all Cosumnes CSD employees that are authorized to use Cosumnes CSD vehicles. Integrate anti-idling information into training for new employees.</p>	<p>Planning, Design & Construction Division, Park & Golf Operations Division, Fire Fleet Maintenance</p>	<p>HIGH</p>
<p>Measure TR-5: Reduce Air Travel</p> <p>Promote train or bus travel as an alternative to long-flying for employee travel. Consider purchasing carbon off-sets for unavoidable air travel. The Cosumnes CSD shall prioritize employee travel in the following order:</p> <ol style="list-style-type: none"> 1. Coach/Bus 2. Railroad 	<p>Following adoption of this CAP/SAP during any future occasions necessitating employee travel.</p>	<p>All Agency Departments</p>	<p>LOW</p>

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
3. Light Rail 4. Air Travel 5. Single-Passenger Vehicle			
Measure SW-1: Recycling <p>Develop and adopt a policy requiring the provision of recycling receptacles and proper handling of recyclable materials at all events requiring a permit or held on Cosumnes CSD-owned or operated property. The Cosumnes CSD could also partner with the Environmental Protection Agency's (EPA's) WasteWise program. WasteWise offers reduced purchasing and waste disposal costs, educational materials, and recognition for achieving recycling goals.</p> <p>By 2050, the Cosumnes CSD could aim for 50 percent of all events to be Zero Waste Events. Zero Waste Events use recyclable, compostable, or reusable products (i.e., compostable plates, cups, and utensils) and provide bins and clear signage to facilitate proper waste sorting. Reach out to local groups, such as the Sacramento State Sustainability Committee, that may be willing to volunteer as educators at Zero Waste Events. More information and a planning guide for Zero Waste Events can be found at the following website: https://green.harvard.edu/tools-resources/how/zero-waste-event-guide</p>	Within first five-years following adoption of this CAP/SAP develop and implement recycling policy. Prior to 2050 begin promoting and implementing Zero Waste Events.	All Agency Departments	MEDIUM
Measure SW-2: Composting <p>Institute a composting program at Cosumnes CSD-owned or operated properties and/or Cosumnes CSD events. Expanding organics composting</p>	Within first five years following adoption of this CAP/SAP determine	All Agency Departments	MEDIUM

Table 7
Implementation Table

Measure	Timing	Responsible Entity	Benefit to Cost Ratio
would reduce the amount of waste produced within the Cosumnes CSD, and reduce the amount of GHG emissions from waste disposal. Expansion of organics collection may also allow for diversion of such waste for other beneficial uses.	feasibility of independent Cosumnes CSD composting program. Seek consultation with solid waste provider for Cosumnes CSD facilities to determine feasibility of organics collection at Cosumnes CSD facilities.		
Measure SW-3: Construction Waste Diversion Commit to California Green Building Code (CALGreen) Tier 1 or Tier 2 construction and demolition waste diversion rates. CALGreen Tier 1 requires 65 percent of all construction and demolition waste to be diverted from local landfills, and Tier 2 requires that 80 percent be diverted. The Cosumnes CSD shall enforce this measure by adding a construction waste diversion requirement to future public works contracts.	During all planning efforts for new Cosumnes CSD facilities following adoption of this CAP/SAP.	Planning, Design & Construction Division Fire Department Administration Division,	LOW

7. REFERENCES

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