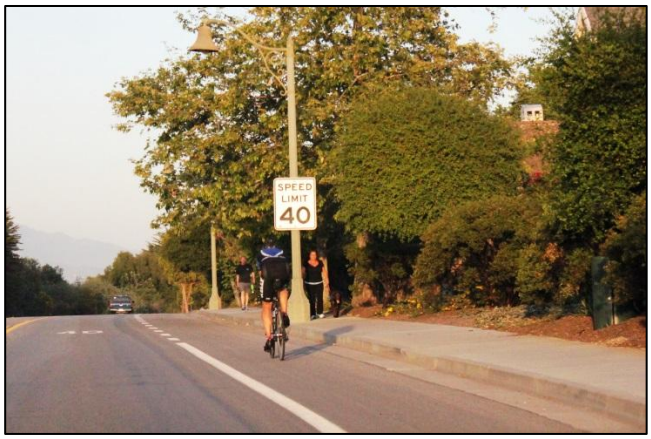
CITY OF GOLETA

FINAL
CLIMATE ACTION PLAN

July 2014



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CLIMATE ACTION PLAN

JULY 2014

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The Climate Action Plan (CAP) was prepared for the City of Goleta under the direction of Anne Wells, Advance Planning Manager. Key staff included Chandra Slaven, Senior Planner and Andy Newkirk, Consulting Planner.

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Acronyms and Abbreviations

AB	Assembly Bill
AB 32	Global Warming Solution Act
AR4	IPCC Fourth Assessment Report
ARB	California Air Resources Board
BAU	Business as Usual
BMR	below market rate
BRRP	Bridge Repair & Replacement Program
BTA	California's Bicycle Transportation Account
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Resources Recycling and Recovery
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CAPPA	Climate and Air Pollution Planning Assistant
CCA	Community Choice Aggregation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH4	methane
CIP	Capital Improvement Program
CIT	Climate Action Plan Implementation Team
City	City of Goleta
CMAQ	Congestion Mitigation and Air Quality Improvement Program, Section 1110
CO_2	carbon dioxide
CO_2e	Carbon Dioxide equivalent
CPUC	California Public Utilities Commission
DOC	State Department of Conservation
DOE	U.S. Department of Energy
DWR	California Department of Water Resources
EEAP	Energy Efficiency Action Plan
EEM	Energy Efficiency Mortgages
EEM	Environmental Enhancement and Mitigation
eGRID	Emissions & Generation Resource Integrated Database
EIA	Energy Information Administration

EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESPs	energy service providers
FCR	Flexible Congestion Relief
FHFA	Federal Housing Financing Agency
FTA	Federal Transit Administration
GHG	greenhouse gas
GPCD	gallons per capita per day
GWD	Goleta Water District
GWP	Global Warming Potential
HCFCs	hydrochlorofluorocarbons
HES	Home Energy SaverTM
HFCs	hydrofluorocarbons
ICF	ICF International
ICLEI	International Council for Local Environmental Initiatives
IOUs	investor-owned utilities
IPCC	Intergovernmental Panel on Climate Change
ITC	Investment Tax Credit
kW	kilowatts
LCFS	Low Carbon Fuel Standard
LGOP	Local Governments Operations Protocol
mpg	miles per gallon
MPOs	metropolitan planning organizations
MT	metric ton
MW	megawatt
N2O	nitrous oxide
NHS	National Highway System Fund
OBF	on-bill financing
ODS	ozone-depleting substances
OTS	Office of Traffic Safety
PFCs	perfluorinated carbons
PPA	power purchase agreement
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PSD	Prevention of Significant Deterioration

RAD	responsible appliance disposal
RPS	Renewable Portfolio Standard
RTAC	Regional Targets Advisory Committee
RTPs	Regional Transportation Plans
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act – Legacy for Users
SAR	IPCC Second Assessment Report
SB	Senate Bill
SB X7-7 target	SB X7-7, 5 percent reduction in urban per capita water use by December 31, 2020
SBCAG	Santa Barbara County Association of Governments'
SBCAPCD	Santa Barbara County Air Pollution Control District
SBCRIWMRRA	Santa Barbara County Regional Integrated Waste Management Reporting Regional Agency
SBMTD	Santa Barbara Metropolitan Transit District
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCEEP	South County Energy Efficiency Partnership
SCS	sustainable communities strategy
SEEC	Statewide Energy Efficiency Collaborative
SF6	sulfur hexafluoride
SGC	Strategic Growth Council
SHOPP	State Highway Operations and Protection Program
SONGS	San Onofre Nuclear Generating Stations
SR2S	Safe Routes to School
STP	Surface Transportation Program Fund, Section 1108
TDA	Transportation Development Act
TDM	travel demand management
TEA	Transportation Enhancement Activities
TFCA	Transportation Funds for Clean Air
TOD	transit-oriented development
U.S.	United States
UFMP	Urban Forest Management Plan
UNFCCC	United Nations Framework Convention on Climate Change
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled
WARM	Waste Reduction Model

Executive Summary

The City of Goleta's (City) 2014 Climate Action Plan (CAP) identifies both quantified and non-quantified measures to effectively meet greenhouse gas (GHG) reduction targets. Attainment of the reduction targets requires a commitment to local actions as well as continued implementation of federal and state mandates. These actions and associated co-benefits will contribute to the City's current and future prosperity and sustainability by: 1) conserving resources such as energy and water; 2) fostering the creation of green jobs; and 3) furthering Goleta's leadership in clean research and development (R&D) industries.

The 2014 CAP establishes a 2007 baseline inventory; a planning horizon of 2007 through 2030 and quantifies GHG emissions from the community-at-large and City operations; establishes reduction targets for 2020 and 2030; identifies measures to reduce GHG levels, focusing on those that the City has authority to implement; and provides guidance for monitoring progress on an annual basis. Consistent with the State of California's objectives outlined in AB 32, the City added Conservation Element Implementation Action 5 (CE-IA-5) to its 2006 General Plan/Coastal Land Use Plan in 2009 to develop a Greenhouse Gas Reduction Plan supporting State implementation of AB 32. This CAP outlines a framework to reduce community GHG emissions by 2020 and 2030 in a manner that meets the intent of CE-1A-5 and is supportive of AB 32 and Executive Order S-3-05.

While CE-IA-5 does not specify a reduction target, the City has decided to use a target of 11 percent below 2007 emissions for emissions in 2020 and 26 percent below 2020 levels for 2030. Measures contained in this CAP are intended to increase the energy and water efficiency of buildings and expand alternative transportation choices. In turn, the energy savings increase the capacity for local residents and businesses to purchase other goods and services. If spent locally, this can boost our local and regional economy and help to create jobs.

The CAP includes the following reduction categories of GHG sources and associated reduction measures:

- The *Building Energy* measures aim to reduce GHG emissions by improving the energy efficiency of both new and existing residential and commercial buildings, increasing the use of renewable and improving communitywide understanding of energy management.
- The *On-Road Transportation and Land Use* measures focus on reducing emissions by reducing vehicle miles traveled (VMT) through multimodal transportation options, reduces emissions by supporting design guidelines that will result in more compact, walkable, and transit-accessible neighborhoods.
- The *Water Consumption* measure aims to reduce water demand and conserve water, whereby saving energy and avoid associated emissions under the water energy nexus.
- The *Off-Road Transportation and Equipment* measures aim to increase the use of alternative fuels in construction and landscaping off-road equipment and vehicles and reduce the consumption of fossil fuels.
- The *Solid Waste* measures reduce emissions by diverting waste from landfills, and supports continual improvement in equipment and operations for landfill management.

Chapter 1 entails the development process that was undertaken by the City and the consultant team in deciding the appropriate tone, vision, and path for greenhouse gas reductions for the City. A general background is provided for the reader on the science of climate change to an overview of the actions taking place at the federal, state, regional, and local level that supports GHG reductions. *Chapter 2* identifies the GHG emissions as they relate to key sources such as transportation and energy, and provides more details about the 2007 baseline inventory and the 2020/ 2030 emission forecasts. *Chapter 3* follows with a detailed review of the GHG reduction measures to meet the 2020/2030 targets. The CAP closes with *Chapter 4*, which introduces implementation strategies, economic considerations, and the Monitoring Report that will track the progress of GHG emissions reductions.

Chapter 1: Introduction

1.1 Overview of the Climate Action Plan

Assembly Bill (AB 32) codified the State's greenhouse gas (GHG) emissions target by requiring that the State's GHG emissions be reduced to 1990 levels by 2020. The Scoping Plan for AB 32, developed and implemented by the ARB, identifies specific measures to achieve these reductions and articulates a key role for local governments, recommending they establish GHG reduction targets for both their municipal operations and the community that are consistent with those of the State. Executive Order S-3-05 is an Executive Order of the State of California signed by Governor Arnold Schwarzenegger in June 2005 that set greenhouse gas emissions reduction targets. Specifically, the Executive Order established these targets:

1. By 2010, reduce GHG emissions to 2000 levels
2. By 2020, reduce GHG emissions to 1990 levels
3. By 2050, reduce GHG emissions to 80 percent below 1990 levels.

In support of AB 32 and Executive Order S-3-05, the City of Goleta (City) has taken significant, voluntary steps towards tackling climate change. In 2009, the City added Implementation Action CE-IA-5 to the General Plan, which calls for a climate action plan (CAP). As stated in CE-IA-5: "…the City of Goleta will develop a Greenhouse Gas Reduction (GHG) Plan with implementation to commence 12 months thereafter." The Plan is intended to address City activities, as well as activities and projects subject to ministerial and/or discretionary approval by the City.

At a minimum, the Plan will:

a) Establish an inventory of current GHG emissions in the City of Goleta including, but not limited to, residential, commercial, industrial, and agricultural emissions.
b) Forecast GHG emissions for 2020 for City operations.
c) Forecast GHG emissions for areas within the jurisdictional control of the City for business-as-usual conditions.
d) Identify methods to reduce GHG emissions.
e) Quantify the reductions in GHG emissions from the identified methods.
f) Establish requirements for monitoring and reporting of GHG emissions.
g) Establish a schedule of actions for implementation.
h) Identify funding sources for implementation.
i) Identify a reduction target for the 2030 Planning Horizon.
j) Consider a biological resource component.

This CAP fulfills CE-IA-5. The CAP provides a foundation for future work to achieve the City's GHG emissions reduction target. Additionally, a biological resource component was considered, but was not included as it does not fit the standard framework for a CAP.

1.1.1 Purpose of the Climate Action Plan

The CAP includes an inventory of all GHG emissions resulting from community activities in 2007 (2007 Inventory) and business-as-usual (BAU) emissions forecasts to 2020 (2020 Forecast) and 2030 (2030 Forecast). Performing an inventory helps the City identify sectors (e.g., transportation, building energy use) with the highest emissions. The City can then develop emissions reduction measures specific to these sectors. By using an inventory and forecast to focus its efforts on those sectors that contribute the most GHG emissions, the City can ensure that it chooses for the CAP measures that, when implemented, will have the greatest impact on the City's overall emissions.

The CAP identifies an emissions reduction target for 2020 and measures for reducing future GHG emissions. The City's emissions reduction targets are designed to support California's larger effort under AB 32 and Executive Order S-3-05 to reduce statewide emissions. Based on the City's existing and future emissions profile, the plan recommends specific actions the City can take to meet this target. In addition, the CAP seeks to analyze the costs and savings associated with proposed measures. This analysis, alongside the GHG inventory and forecast, allows the City to balance the cost of a measure with its effect on overall emissions, ensuring a cost-effective path towards reducing GHG emissions.

The CAP also identified an emission reduction target for 2030 and presents an emissions reductions scenario to achieve the target, under the auspices of the Executive Order S-3-05. Since statewide planning for reductions to 2030 has not been completed at this time and there is no current legislative mandate for reductions to 2030, the City plans to develop its specific measures for the period from 2020 to 2030 after the state has clarified its approach for statewide measures. The CAP includes a commitment to update the plan to take into account any additional necessary reduction measures for the period after 2020 on or before 2020.

1.1.2 Development of the Climate Action Plan

The City completed the 2007 Inventory and 2020 and 2030 Forecasts in 2011, which fulfilled items a. and c. of CE-IA-5 (outlined above under Section 1.1, *Overview of the Climate Action Plan*). In 2012, the City developed a municipal GHG inventory and Energy Efficiency Action Plan using funds from Southern California Edison (SCE), fulfilling item b. of CE-IA-5. Adopted in 2012, the EEAP assesses the City's current (2012) progress in energy efficiency by quantifying discrete actions that have already been taken at municipal facilities, identifies additional actions for the City to implement, and quantifies the potential energy savings. While CE-IA-5 does not specify a reduction target, the City has decided to use a target of 11 percent below 2007 emissions for emissions in 2020 and 26 percent below 2020 levels for 2030. The reduction targets are discussed further in Chapter 3, Emissions Reduction Plan.

After developing the community and municipal inventories, the City began researching, developing, and reviewing feasible measures that could reduce GHG emissions. Public workshops were held in September and November 2013 to solicit community feedback and to educate the public on the CAP process. The list of GHG reduction measures was finalized and the measures were analyzed for their GHG reduction potential and the associated costs of implementation.

Upon City Council's adoption of the CAP, the reduction measures (identified in Chapter 3) will be implemented. Implementation includes identification of responsible parties for each measure, development of funding protocols, scheduling, ongoing monitoring, and progress reporting. Figure 1-1 depicts the City's CAP planning process.

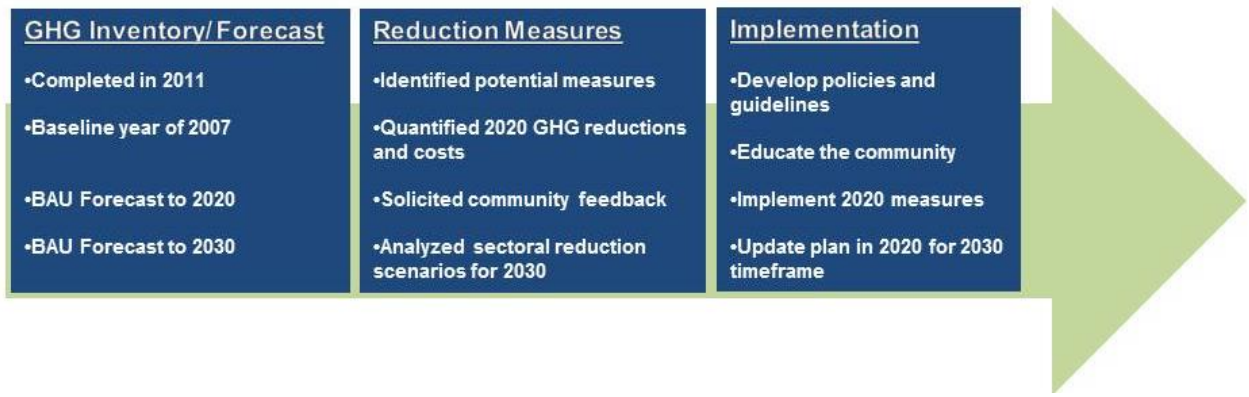

Figure 1-1. The CAP Planning Process

1.2 The Science of Climate Change

The phenomenon known as the greenhouse effect keeps the earth's atmosphere near the surface warm enough for successful habitation by humans and other forms of life. GHGs present in the Earth's lower atmosphere play a critical role in maintaining the Earth's temperature as they trap some of the long-wave infrared radiation emitted from the Earth's surface that otherwise would have escaped to space.

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs in excess of natural levels enhance the greenhouse effect, which contributes to global warming. Warming of the earth's lower atmosphere induces large-scale changes in ocean circulation patterns, precipitation patterns, global ice cover, biological distributions, and other changes to the earth system that are collectively referred to as climate change (Intergovernmental Panel on Climate Change 2007a).

The Intergovernmental Panel on Climate Change (IPCC) has been established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC estimates that the average global temperature rise between the years 1900 and 2100 could range from 1.5° Celsius to more than 2° Celsius (Intergovernmental Panel on Climate Change 2013a). Large increases in global temperatures could have substantial adverse impacts on the natural and human environments on the planet and in California.

AB 32 identifies the following compounds as the major GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorinated carbons (PFCs), and sulfur hexafluoride (SF_6). Each gas discussed in Section 1.2.1 (*Intergovernmental Panel on Climate Change 2007a*).

1.2.1 Principal Greenhouse Gases

The GHGs listed by AB 32 (CO_2, CH_4, N2O, HFCs, PFCs, and SF_6) are documented in this section in order of abundance in the atmosphere. Water vapor, although the most abundant GHG in the atmosphere, is not included in this list because of its concentration is an effect of feedback of changes.[1] The sources and sinks[2] of each of these gases are discussed in detail below. Generally, GHG emissions are quantified in terms of Metric Tons (MT) of carbon dioxide equivalents (CO_2e) emitted per year. To simplify reporting and analysis, GHGs are commonly defined in terms of a Global Warming Potential (GWP). The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO_2e. The GWP of CO_2 is, by definition, one (Intergovernmental Panel on Climate Change 2007b).

The GWP values used in this report are based on the IPCC Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines. Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (Intergovernmental Panel on Climate Change 2007a).

Carbon Dioxide

CO_2 is the most important anthropogenic GHG and accounts for more than 75 percent of all GHG emissions caused by humans. Its atmospheric lifetime of 50 to 200 years ensures that atmospheric concentrations of CO_2 will remain elevated for decades even after mitigation efforts to reduce GHG concentrations are promulgated (IPCC 2007a). The primary sources of anthropogenic CO_2 in the atmosphere include the burning of fossil fuels (including motor vehicles), gas flaring, cement production, and land use changes (including deforestation).

Methane

CH_4, the main component of natural gas, is the second most abundant GHG and has a GWP of 21 (IPCC 1996). Sources of anthropogenic emissions of CH4 include growing rice, raising cattle, combusting natural gas, landfill outgassing, and mining coal (National Oceanic and Atmospheric

[1] Water vapor is the most abundant and important greenhouse gas in the atmosphere. However, human activities have only a small direct influence on the amount of atmospheric water vapor. Indirectly, humans have the potential to affect water vapor substantially by changing climate. For example, a warmer atmosphere contains more water vapor (IPCC 2007b). Water in the troposphere is a feedback effect; it is not a forcing agent. Artificial changes in water vapor concentrations are too short lived to change the climate.

[2] A *sink* removes and stores GHGs in another form. For example, vegetation is a sink because it removes atmospheric CO_2 during respiration and stores the gas as a chemical compound in its tissues.

Administration 2005). Atmospheric CH4 has increased from a pre-industrial[3] concentration of 715 parts per billion (ppb) to 1,803 ppb in 2011 (IPCC 2013).

Nitrous Oxide

N_2O is a powerful GHG, with a GWP of 310 (IPCC 1996). Anthropogenic sources of N_2O include agricultural processes (e.g., fertilizer application), nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. N_2O also is used in rocket engines, racecars, and as an aerosol spray propellant. In the United States (U.S.) more than 70 percent of N_2O emissions are related to agricultural soil management practices, particularly fertilizer application. N_2O concentrations in the atmosphere have increased 18 percent from pre-industrial levels of 270 ppb to 324 ppb in 2011 (IPCC 2013).

Hydrofluorocarbons

HFCs are human-made chemicals used in commercial, industrial, and consumer products and have high GWPs (U.S. Environmental Protection Agency 2013a). HFCs are generally used as substitutes for ozone-depleting substances (ODS) in automobile air conditioners and refrigerants. As seen in Table 1-1, the most abundant HFCs, in descending order, are HFC-134a (63 parts per trillion [ppt]), HFC-23 (24 ppt), and HFC-152a (6.4 ppt) (IPCC 1996, 2001, 2007a, 2013b). Concentrations of HFCs have risen from zero to over 35 ppt since pre-industrial times (IPCC 2007b).

Perfluorocarbons

The most abundant PFCs are CF_4 (PFC-14) and C_2F_6 (PFC-116). These human-made chemicals are emitted largely from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are destroyed only by very high-energy ultraviolet rays, resulting in very long lifetimes (10,000 to 50,000 years). The IPCC estimates that global concentrations of CF_4 have risen to over 79 ppt (IPCC 2013b).

Sulfur Hexafluoride

SF_6, a human-made chemical, is used as an electrical insulating fluid for power distribution equipment in the magnesium industry and in semiconductor manufacturing and also as a tracer chemical for the study of oceanic and atmospheric processes (U.S. Environmental Protection Agency 2013a). In 2011, atmospheric concentrations of SF_6 were 7.3 ppb and steadily increasing in the atmosphere. SF_6 is the most powerful of all GHGs listed in IPCC studies, with a GWP of 23,900 (IPCC 1996, 2007b).

1.2.2 Emission Sources in the United States and California

The majority of GHG emissions generated by the United States (U.S.) are the result of burning fossil fuels. Of these GHGs, 99 percent are in the form of CO_2, and less than 1 percent are CH_4 and N_2O (U.S. Environmental Protection Agency 2013b). Fossil fuels are burned to power vehicles,

[3] *Pre-industrial* refers to the period prior to the Industrial Revolution and is nominally defined as prior to 1750, subsequent to which industrial activity energy use utilizing fossil fuel sources (initially primarily with coal) started to contribute to changes in atmospheric carbon dioxide levels (IPCC 2007b).

create electricity, and generate heat. Vehicle emissions are the largest source of CO_2 emissions in California, representing 38 percent of statewide emissions in 2011. Electrical generation is the second largest source of emissions in California (California Air Resources Board 2013). On a national level, electrical generation is the largest emissions sector, and transportation is the second largest sector (U.S. Environmental Protection Agency 2013a). Other sources of GHG emissions generated within the U.S. and California include agriculture, land clearing, the waste disposal in landfills, refrigerants, and certain industrial processes.

Although many nations, including the U.S., regularly monitor and report GHG emissions, comprehensive federal legislation to reduce global emissions has not been adopted and is the subject of much debate. The U.S. Environmental Protection Agency (EPA) is presently pursuing regulation of GHGs through the Clean Air Act (CAA) following a U.S. Supreme Court ruling clarifying that it has the authority under the CAA to do so. Many states, including California as a prominent leader, have passed legislation to reduce GHG emissions. California's GHG regulatory framework is discussed further below in Section 1.3.2, State Regulation.

1.3 Climate Change Regulation

Summaries of key policies, legal cases, regulations, and legislation at the federal and State levels that are relevant to the City are provided below.

1.3.1 Federal Regulation

Although there is currently no overarching federal law specifically related to climate change or the reduction of GHGs, the EPA is now issuing regulation under the CAA. Examples of the EPA regulations under the CAA follow, and Figure 1-2 displays a timeline of key State and federal regulatory activity.

Massachusetts et al. vs. U.S. Environmental Protection Agency (2007)

Twelve U.S. states and cities, including California, in conjunction with several environmental organizations, sued to force EPA to regulate GHGs as a pollutant pursuant to the CAA in Massachusetts et al. vs. Environmental Protection Agency 549 US 497 (2007). The U.S. Supreme Court ruled that the plaintiffs had standing to sue, GHGs fit within the CAA's definition of a pollutant, and the EPA's reasons for not regulating GHGs were insufficiently grounded in the CAA.

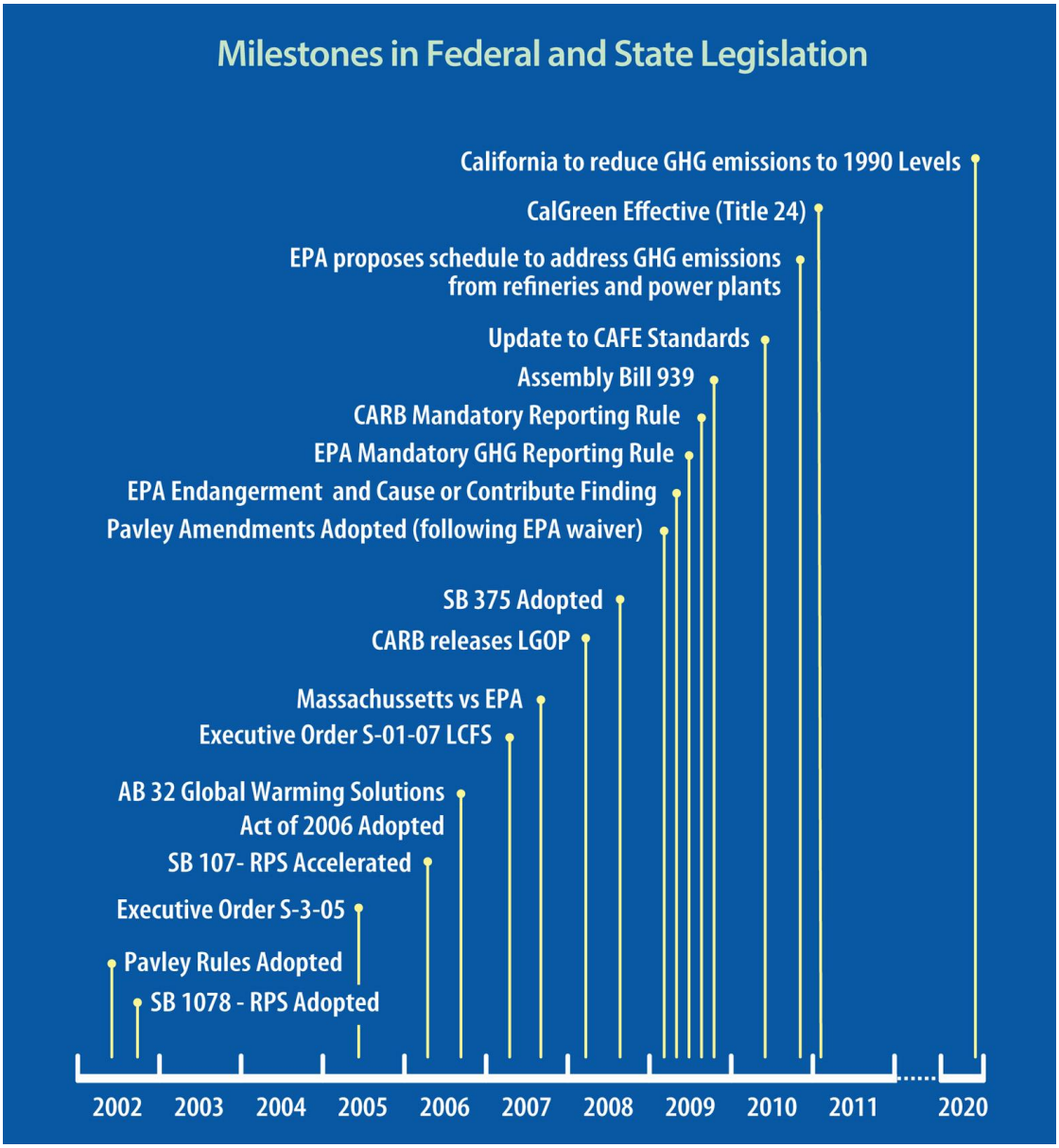

Figure 1-2. Key Milestones in Federal and State Climate Legislation

United States Environmental Protection Agency Mandatory Reporting Rule for Greenhouse Gas Emissions.

Under the Mandatory Reporting Rule, suppliers of fossil fuels, manufacturers of vehicles and engines, and facilities that emit 25,000 MT or more per year of GHGs are required to report annual emissions to EPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, were submitted to EPA in 2011. The Mandatory Reporting Rule does not limit GHG emissions but establishes a standard framework for emissions reporting and tracking of large emitters (U.S. Environmental Protection Agency 2010).

Update to Corporate Average Fuel Economy Standards (2010/2012)

The Corporate Average Fuel Economy (CAFE) standards establish stricter fuel economy requirements and require automakers to cut GHG emissions in new vehicles by roughly 25 percent by 2016. New standards for model years 2017 to 2025 were issued in 2012 and will achieve a fleet average in 2025 of 54.5 miles per gallon (mpg) (U.S. Environmental Protection Agency 2012).

United States Environmental Protection Agency Regulation of GHG Emissions under the Clean Air Act (2010 and ongoing)

Under the authority of the CAA, EPA is beginning to regulate GHG emissions starting with large stationary sources. In 2010, EPA set GHG thresholds to define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. In 2013, EPA proposed a carbon pollution standard for new power plants. The new proposed standards, in response to President Obama's nationwide Climate Action Plan, would be consistent with investments in clean energy technologies, and ensure that the nation's energy source profile would be sufficiently diverse. The EPA has initiated the first steps for developing regulations for existing power plants by meeting with stakeholders, states, and the public (U.S. Environmental Protection Agency 2013d).

1.3.2 State Regulation

California has adopted statewide legislation addressing various aspects of climate change and GHG emissions mitigation. Much of this legislation is not directed at citizens or jurisdictions specifically, but rather establishes a broad framework for the State's long-term GHG reduction and climate change adaptation program. The previous and current governors have also issued several EOs related to the State's evolving climate change policy. Of particular importance to local governments is the direction provided by the AB 32 Scoping Plan, which recommends local governments reduce their GHG emissions by a level consistent with State targets.

Executive Order S-03-05 (2005)

Executive Order (EO) S-03-05 established the following GHG emission reduction targets for California's State agencies.

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The Secretary of the California Environmental Protection Agency (CalEPA) is required to report to the governor and State legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this EO. The City's GHG reduction targets have been established based on the reduction targets specified under EO S-03-05.

Assembly Bill 1493—Pavley Rules (2002, Amendments 2009, 2012 rule-making)

Known as Pavley I, AB 1493 standards were the nation's first GHG standards for automobiles. AB 1493 required ARB to adopt vehicle standards that would lower GHG emissions from new light duty autos to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (Advanced Clean Cars) was adopted for vehicle model years 2017 to 2025. Together, the two standards are expected to increase average fuel economy to roughly 43 mpg by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14 percent. The new federal CAFE standards, described above, are the analogous national policy. The City will achieve GHG reductions from the Pavley Rules in the On-Road Transportation sector.

Senate Bills 1078, 107 and 2—Renewables Portfolio Standard (2002, 2006, 2011)

Senate Bills (SB) 1078 (2002), 107 (2006) and 2 (2011), California's Renewables Portfolio Standard (RPS), obligate investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure additional retail sales per year from eligible renewable sources with the long-range target of procuring 33 percent of retail sales from such sources by 2020. Because building energy is a large portion of the City's GHG inventory and forecast, RPS is responsible for a substantial portion of the City's GHG reductions in 2020.

Assembly Bill 32—California Global Warming Solutions Act (2006)

AB 32 codified the State's GHG emissions target by requiring that the State's global warming emissions be reduced to 1990 levels by 2020. Since being adopted, ARB, CEC, CPUC, and the Building Standards Commission have been developing regulations that will help meet the targets of AB 32 and EO S-03-05. The Scoping Plan for AB 32 identifies specific measures to reduce GHG emissions to 1990 levels by 2020 and requires ARB and other State agencies to develop and enforce regulations and other initiatives for reducing GHGs. Specifically, the Scoping Plan articulates a key role for local governments, recommending they establish GHG reduction targets for both their municipal operations and the community consistent with those of the State. The City has established its GHG reduction targets based on AB 32.

Executive Order S-01-07—Low Carbon Fuel Standard (2007)

EO S-01-07 essentially mandates: (1) that a statewide target be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020; and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.[4]

[4] CARB approved the LCFS on April 23, 2009 and the regulation became effective on January 12, 2010 (California Air Resources Board 2011). The U.S. District Court for the Eastern District of California ruled in December 2011 that the LCFS violates the Commerce Clause of the U.S. Constitution. CARB appealed this ruling in 2012 and on September 18, 2013, a 9th U.S. Circuit Court of Appeals panel upheld the LCFS, ruling that the program does not violate the Commerce Clause, but remanded the case to the Eastern District to rule on whether the LCFS was preempted by Section 211 (o) of the Clean Air Act (this section of the Act deals with Renewable Fuel programs). While the appellate court ruling could be appealed to the U.S. Supreme Court as of April 2014, no such appeal has been filed.

Senate Bill 375—Sustainable Communities Strategy (2008)

Senate Bill (SB) 375 provides for a new planning process that coordinates land use planning, regional transportation plans, and funding priorities in order to help California meet the GHG reduction targets established in AB 32. SB 375 requires regional transportation plans, developed by metropolitan planning organizations (MPOs) to incorporate a sustainable communities strategy (SCS) in their Regional Transportation Plans (RTPs). The target of the SCS is to reduce regional vehicle miles traveled (VMT) through land use planning and consequent transportation patterns. The regional targets were released by ARB in September 2010. SB 375 also includes provisions for streamlined California Environmental Quality Act (CEQA) review for some infill projects, such as transit-oriented development. The Santa Barbara County Association of Governments' (SBCAG) 2040 Regional Transportation Plan includes the region's SCS and was adopted in August 2013. Because the City's transportation measures reduce VMT through land use planning and transportation patterns, they are consistent with SB 375.

California Energy Efficiency Standards for Residential and Non-residential Buildings — Green Building Code (2011), Title 24 Update (2014)

California has adopted aggressive energy efficiency standards for new buildings and has been continually updating them for many years. In 2008, the California Building Standards Commission adopted the nation's first green building standards, which include standards for many other built environment aspects apart from energy efficiency. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (24 California Code of Regulations [CCR]). Part 11 establishes voluntary standards that became mandatory in the 2010 edition of the code, including planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The voluntary standards took effect on January 1, 2011. The last update of the Title 24 energy efficiency standards was drafted in 2012 and adopted by the City on November 19, 2013. These new standards will take effect on July 1, 2014 (California Energy Commission n.d. 2). The City will achieve energy savings and GHG reductions through the Title 24 Standards.

CEQA Guidelines (2010 Update)

The State CEQA Guidelines require lead agencies to estimate GHG emissions that would result from a project and confirm the discretion of lead agencies to determine appropriate GHG significance thresholds. The guidelines also require the preparation of an environmental impact report (EIR) if "there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with adopted regulations or requirements" (Section 15064.4).

State CEQA Guidelines section 15126.4 includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions, which may include, among others, measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision; implementation of project features, project design, or other measures which are incorporated into the project to substantially reduce energy consumption or GHG emissions;

offsite measures, including offsets that are not otherwise required, to mitigate a project's emissions; and, measures that sequester carbon or carbon-equivalent emissions.

Greenhouse Gas Cap-and-Trade Program (2013)

On October 20, 2011, ARB adopted the final cap-and-trade program for California. The California cap-and-trade program creates a market-based system with an overall emissions limit for affected sectors. The program is proposed to regulate more than 85 percent of California's emissions and will stagger compliance requirements according to the following schedule: (1) electricity generation and large industrial sources (2013); (2) fuel combustion and transportation (2015). The first auction occurred in late 2012 with the first compliance year in 2013. Potential GHG reductions from the Cap-and-Trade Program have not been quantified for this analysis.

Chapter 2: Greenhouse Gas Emissions Inventory and Forecasts

2.1 Analysis Procedures

To support development of the CAP, the City prepared a 2007 community GHG inventory and 2020 and 2030 community emissions forecasts in 2011. Consistent with State and federal guidance (e.g., CARB, IPCC), the community inventory includes GHG emissions occurring in association with the land uses within the City's jurisdictional boundary. The inventory also includes emissions that occur outside the jurisdictional boundary, but only to the extent that such emissions are due to land uses within the City (e.g., transporting water from outside the City to within the City produces GHG emissions, yet these emissions do not necessarily occur within City limits). Emissions generated by municipal activities (e.g., City-owned facilities) are also included in the 2007 Inventory. The 2007 Inventory represents the baseline inventory, or existing conditions.

The City's 2020 and 2030 Forecasts are a prediction of community emissions that would occur in 2020 and 2030, absent any federal, State, or local reduction measures designed to reduce GHG emissions. This approach is consistent with ARB's definition of the Statewide 2020 emissions forecast, as outlined in the AB 32 Scoping Plan (California Air Resources Board 2008). The forecasts provided some challenges as a result of the closing of SONGS. SONGS was a nuclear power plant that generated carbon-free electricity for SCE in 2007 (the inventory year). The facility was permanently shut down in 2013, requiring the reinstatement of several natural gas plants and dramatically altering SCE's power mix.

The California Public Utilities Commission (CPUC) approved a final decision (Rulemaking 12-03-014) regarding the long-term procurement for local capacity requirements due to the permanent retirement of SONGS in March 2014.[5] The decision outlines a strategy that will replace electricity generated by SONGS with a range of renewable, energy storage, natural gas, and other resources. The decision allows for procurement flexibility of renewable/energy storage that ranges between 40 percent and 60 percent. For the purposes of this analysis, a midpoint between the range of 50 percent renewable/energy storage and 50 percent natural gas (including "other resources") was used. Therefore, electricity-related community emissions were forecasted to 2020 and 2030 assuming that SONGS will be replaced by 50 percent renewable and 50 percent natural gas resources.

[5] See http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M088/K979/88979084.PDF.

2.1.1 Emission Sectors Analyzed

The 2007 Inventory and 2020 and 2030 community emissions forecasts analyzed GHG emissions from the following sectors.

- *Building Energy*. Emissions due to natural gas and electricity consumption in commercial and residential buildings within the City.
- *On-Road Transportation and Land Use*. Emissions due to fuel combustion in vehicles on local road and State highways in the City.[6]
- *Off-Road Transportation and Equipment*. Emissions due to fuel combustion in equipment and vehicles used for off-road purposes, such as agricultural equipment, landscaping equipment, and construction equipment.
- *Refrigerants*. Fugitive emissions of GHGs leaking from refrigeration and air conditioning equipment.
- *Solid Waste Generation*. Methane emissions from waste generated by the community and deposited in landfills.
- *Water Consumption*. Electricity consumption associated with water importation.
- *Wastewater Treatment*. Process emissions from wastewater treatment, including fugitive emissions, as well as stationary emissions from stationary fuel combustion at the wastewater treatment facility.
- *Agriculture*. Fugitive nitrogen-based emissions from the application of fertilizer on agricultural land.

The 2007 Inventory does not include an analysis of GHG emissions from carbon sequestration. At the time of the original inventory, standard acceptable methodology and emission factors for quantifying these emissions had not been developed by ARB, The Climate Registry, or other any other entity. Likewise, a detailed inventory of existing and future vegetation within the City was not available. Emissions from stationary sources (e.g., generators) were also not included, as these are regulated by ARB and SBCAPCD. Emissions from stationary sources are nonetheless presented as an informational item in this analysis.

2.1.2 Quantification Protocols

The City calculated GHG emissions under existing conditions using activity data specific to the City's operations. The primary protocols consulted for the analysis are listed below.

- U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (ICLEI 2012).
- Local Government Operation Protocol (LGOP) for the quantification and reporting of GHG emissions inventories (California Air Resources Board 2010b).
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006)[7].

[6] Transportation emissions have been quantified consistent with statewide Regional Targets Advisory Committee (RTAC) recommendations, which excluding pass-by trips and weighting trips that either originate or terminate (but not both) within a jurisdiction by 0.50 (see Appendix B for additional information).

- 2009 General Reporting Protocol (Version 3.1) for reporting entity-wide GHG emissions (California Climate Action Registry 2009).

2.2 Goleta Greenhouse Gas Emissions

2.2.1 2007 Community Emissions Inventory

In 2007, the City produced 325,532 MT CO_2e, excluding stationary sources. This is equivalent to the annual GHG emissions generated by approximately 68,000 passenger vehicles (U.S. Environmental Protection Agency 2011). As shown in Table 2-1, the largest source of emissions within the City is building energy emissions (including electricity and natural gas for residential and nonresidential buildings), which contributed 44 percent of total 2007 emissions. On-road vehicle emissions represented 40 percent of total community emissions in 2007.[8] On-road vehicle and building energy emissions accounted for 84 percent of total community emissions. The third largest source is off-road vehicles, with a contribution of 8 percent of the total 2007 emissions. The remaining sources and their contributions towards total emissions are refrigerants (6 percent), solid waste generation (1 percent), water consumption (0.43 percent), wastewater treatment (0.30 percent), and agriculture (0.02 percent).

Table 2-1. 2007 Community Greenhouse Gas Inventory

	2007 Inventory[a]	
Emissions Sector	**MT CO_2e**	**Percent of Total Inventory**
Building Energy	142,855	44%
On-Road Transportation and Land Use	131,720	40%
Off-Road Transportation and Equipment	24,789	8%
Refrigerants	20,204	6%
Solid Waste Generation	3,514	1%
Water Consumption	1,413	0.43%
Wastewater Treatment	972	0.30%
Agriculture	64	0.02%
Total Emissions	**325,532**	**100%**
Stationary Sources [b]	**96,722**	

a. For more information, see Appendix A.

b. Emissions from stationary sources (e.g., generators) were not included in the CAP analysis, as these are regulated by ARB and Santa Barbara County Air Pollution Control District (SBCAPCD). Emissions from stationary sources are nonetheless presented as an informational item in this analysis.

[7] This is the latest IPCC guidelines for national GHG inventories. There is a 2013 supplement for wetlands, but wetlands are not included in the Goleta inventory.

[8] Some communities have a much higher proportion of their inventory due to transportation, sometimes as high as 50 to 60 percent. Goleta's transportation emissions are likely relatively lower due to the short commutes of students, faculty, and employees at UCSB who live in Goleta, potentially the higher relative bike use among students and others in the community, and potentially due to the number of other local employment options for Goleta residents.

2.2.2 Business as Usual Community 2020 Forecast

By 2020, community-wide emissions within the City are expected to reach 386,735 MT CO_2e; representing increases of approximately 19 percent more than 2007 levels. The increases are expected to occur primarily because of increases in population, jobs, and households. As population, employment and households in Goleta grow, transportation activity (on-road and off-road), energy consumption, refrigerant use, and solid waste generation will subsequently increase as well. Based on the baseline GHG inventory, on-road vehicles (43 percent), and building energy use (42 percent) are still expected to be the two largest emissions sources within the city in 2020.

The 2020 Forecast was estimated using socioeconomic data (population, employment, households) estimates for 2020 from the Santa Barbara County Association of Governments 2007 forecasts, adjusted using the 2010 U.S. Census. It is possible that the 2020 Forecast may be somewhat optimistic due to the economic downtown. If population, employment, and housing growth is less than that estimated at present, then the estimate of 2020 GHG emissions presented below may overestimate the emissions levels in 2020. Overly conservative projections of population, employment, and households would be detrimental to the CAP. The CAP should cover the actual expected growth in the City to 2020. Thus, the socioeconomic data used for this analysis are considered representative of likely growth that could occur under the City's General Plan to 2020. Table 2-2 summarizes GHG emissions for each inventory sector in 2020. Figures 2-1 and 2-2 provide a graphical representation of the values presented in Tables 2-1 and 2-2. Additional detail on inventory assumptions and calculations are presented in Appendix A.

Table 2-2. 2020 Community Greenhouse Gas Forecast

Sector	2020 Emissions (MT CO_2e)[a]	Percent of 2020 Emissions
Building Energy	167,533	43%
On-Road Transportation and Land Use	163,012	42%
Off-Road Transportation and Equipment	27,654	7%
Refrigerants	22,090	6%
Solid Waste Generation	3,825	1%
Water Consumption	1,744	0.5%
Wastewater Treatment	858	0.2%
Agriculture	19	<0.1%
Total Emissions	**386,735**	**100%**
Stationary Sources [b]	**107,986**	

a. For more information, please refer to Appendix A.

b. Emissions from stationary sources (e.g., generators) were also not included, as these are regulated by ARB and Santa Barbara County Air Pollution Control District (SBCAPCD). Emissions from stationary sources are nonetheless presented as an informational item in this analysis.

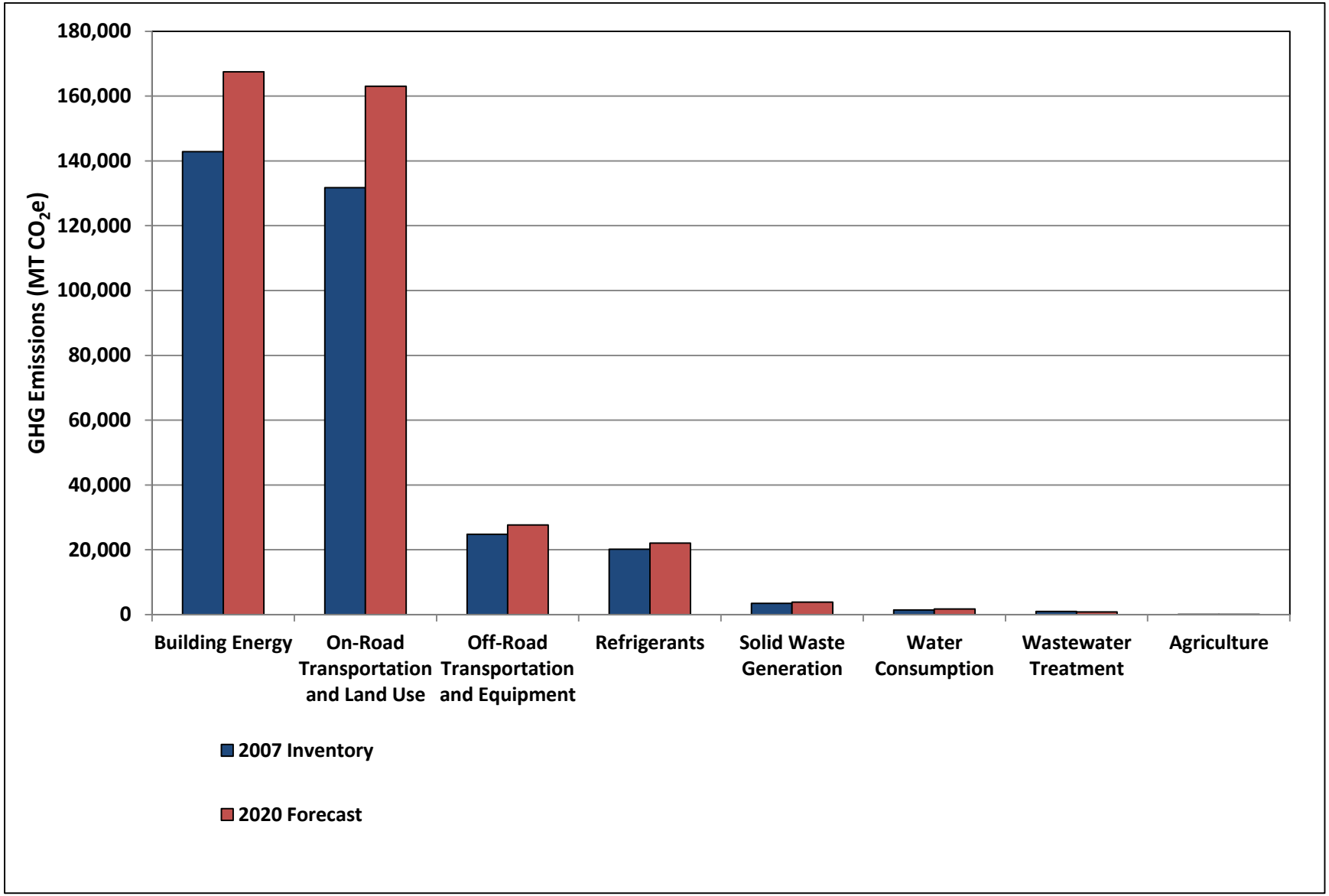

Figure 2-1. Community Greenhouse Gas Emissions: 2007 Inventory and 2020 Forecast

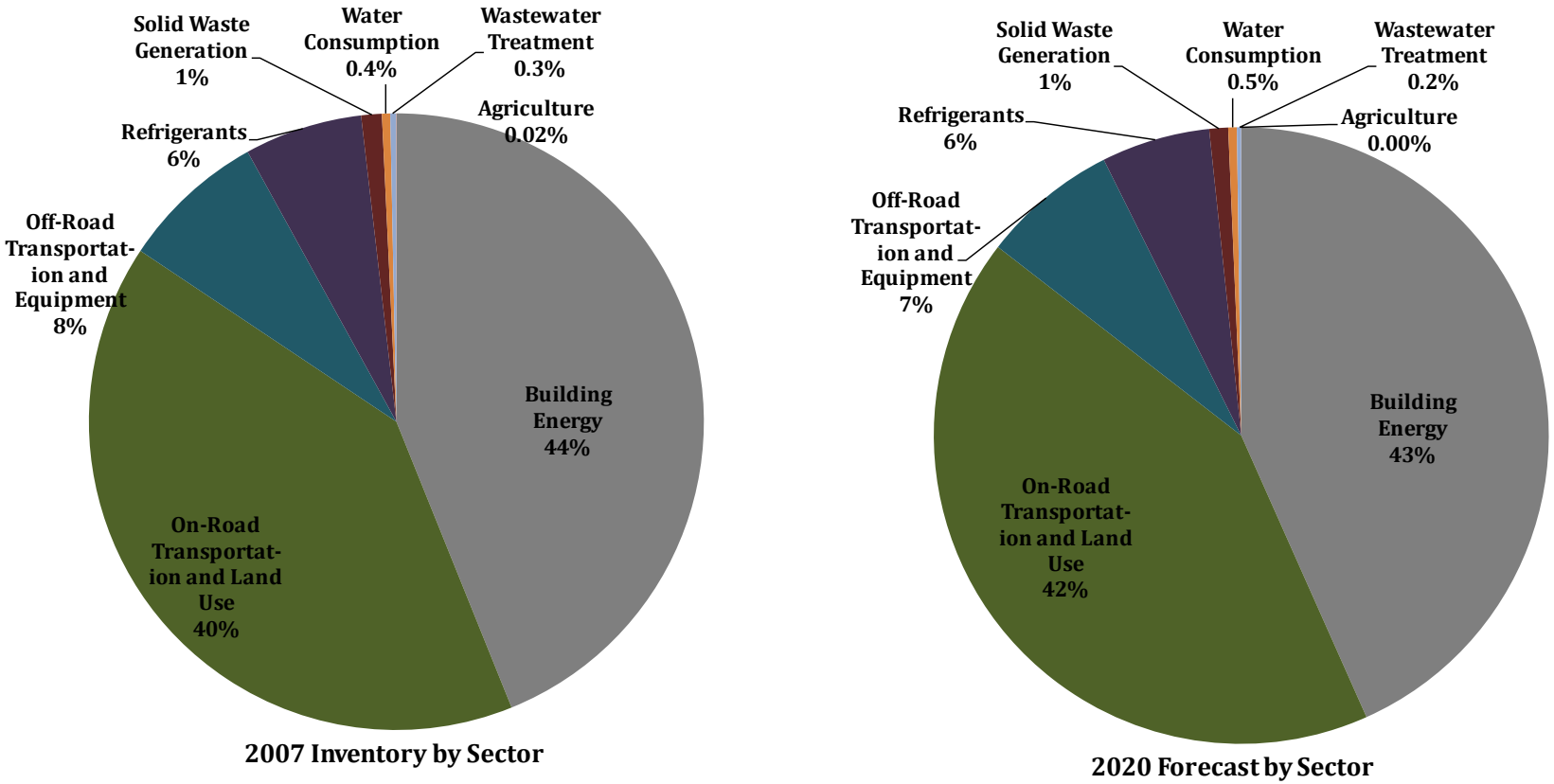

Figure 2-2. Detailed View - Greenhouse Gas Emissions: 2007 Inventory and 2020 Forecast

2.2.3 Business as Usual Community 2030 Forecast

By 2030, under business as usual conditions, community-wide emissions within the City are expected to reach 429,295 MT CO_2e; representing increases of approximately 32 percent more than 2007 levels. The increases are expected to occur primarily because of increases in population, jobs, and households. As population, employment and households in Goleta grow, transportation activity (on-road and off-road), energy consumption, refrigerant use, and solid waste generation will subsequently increase as well. Based on the BAU Forecast, on-road vehicles (44 percent), and building energy use (42 percent) are still expected to be the two largest emissions sources within the city in 2030.

The 2030 Forecast was estimated using socioeconomic data (population, employment, households) estimates for 2030 from the Santa Barbara County Association of Governments 2007 forecasts, adjusted using the 2010 U.S. Census. Table 2-3 summarizes GHG emissions for each inventory sector in 2030.

Table 2-3. 2030 Community Greenhouse Gas Forecast

Sector	2030 Emissions (MT CO_2e)[a]	Percent of 2030 Emissions
Building Energy	180,847	42%
On-Road Transportation and Land Use	187,646	44%
Off-Road Transportation and Equipment	30,082	7%
Refrigerants	23,883	6%
Solid Waste Generation	4,080	1%
Water Consumption	1,834	0.4%
Wastewater Treatment	915	0.2%
Agriculture	8	<0.1%
Total Emissions	**429,295**	**100%**
Stationary Sources [b]	**117,535**	

a. For more information, please refer to Appendix A.

b. Emissions from stationary sources (e.g., generators) were also not included, as these are regulated by ARB and Santa Barbara County Air Pollution Control District (SBCAPCD). Emissions from stationary sources are nonetheless presented as an informational item in this analysis.

2.2.4 Municipal Emissions: 2007 Inventory and 2020 Forecast

As a component of the 2007 Inventory[9] and 2020 forecast, the Goleta municipal government produced 1,207 MT CO_2e in 2007 and 1,295 in 2020 MT CO_2e. This is equivalent to the annual GHG emissions generated by approximately 251 passenger vehicles for 2007 emissions and 270 passenger vehicles for 2020 emissions (U.S. Environmental Protection Agency 2011). The largest source of emissions resulting from municipal operations in both years was public lighting, which accounted for 46 percent and 48 percent of municipal emissions in 2007 and 2020, respectively. The second largest source of municipal emissions was from building energy consumption in City-owned

[9] Municipal emissions are a subset of the larger community emissions and are included in the total emission values in the GHG Inventory.

buildings, which represented 30 percent and 29 percent of municipal emissions in 2007 and 2020, respectively. Transportation-related emissions—employee commuting and City-vehicle fleet emissions—are the third and fourth largest sources at 16 percent and 5 percent of total 2007 municipal emissions, respectively. Employee commuting and vehicle fleet emissions account for 16 percent and 3 percent of 2020 emissions, respectively. Taken together, lighting, building energy, and transportation emissions accounted for 96 percent of total municipal emissions in both 2007 and 2020. The remaining sources and their contributions are water consumption (4 percent) and solid waste generation (0.3 percent) for both 2007 and 2020.

General Plan Implementation Action CE-IA-5 requires preparation of a 2020 forecast for municipal operations. Recognizing that municipal emissions are approximately 0.3 percent of overall community wide emissions, it was decided that the City would not prepare a 2030 forecast for municipal emissions.

Table 2-4. Municipal Operations GHG Emissions: 2007 Inventory and 2020 Forecast

	2007		2020	
	MT CO_2e	**Percent of Total**	**MT CO_2e**	**Percent of Total**
Lighting	553	46%	625	48%
Building Energy	358	30%	380	29%
Employee Commute	189	16%	202	16%
Vehicle Fleet	57	5%	39	3%
Water Consumption	46	4%	46	4%
Solid Waste Generation	4	0.31%	4	0.31%
Total Emissions	**1,207**	**100.0%**	**1,295**	**100.0%**

Chapter 3 Emissions Reduction Plan

3.1 Introduction

The City's CAP sets forth a framework for reducing 2020 community emissions that is consistent with AB 32. Successful implementation of the CAP will require commitment and action throughout the community, including government, residents, businesses, and employers. Based on the City's GHG emission inventory (see Chapter 2, *Greenhouse Gas Emissions Inventory and Forecasts*), the CAP targets the following seven sectors[10].

- Building Energy
- On-Road Transportation and Land Use
- Water Consumption
- Off-Road Transportation and Equipment
- Solid Waste Generation
- Refrigerants
- Municipal Operations

The following sections identify the City's emission reduction target, describe the CAP framework and measures for meeting this target, summarize emission reductions that will be achieved, and describe limitations and recommendations for further CAP refinement. Appendix B contains detailed information for each individual measure, including the assumptions and methodologies used to quantify emissions reductions. This section also discusses planning for after 2020 based on a sectorial-based scenario analysis and potential state and local strategies after 2020 to meet a preliminary 2030 reduction targets.

3.2 2020 and 2030 Emissions Reduction Targets

ARB, which is the lead agency empowered to implement AB 32, adopted the AB 32 Scoping Plan in December 2008. In the AB 32 Scoping Plan, ARB recommended, but did not require, an emissions reduction target for local governments of 15 percent below "current"[11] emissions to reach 1990 levels by 2020 (California Air Resources Board 2008). The 15 percent target was determined using emissions estimates available in 2008. ARB prepared subsequent inventories of actual emissions that indicate statewide emissions will need to be reduced by about 10 percent below "current" levels to reach 1990 levels by 2020. The exact reduction target depends on a community's baseline inventory year (i.e., the "current" year, for GHG reduction planning purposes). Based on the most recent data, California's statewide emissions in 2007 (the baseline year for the Goleta GHG inventory and CAP) were 485.54 million $MTCO_2e$, and emissions in 1990 were 433.29 million $MTCO_2e$. Accordingly, the

[10] The inventory analysis evaluated emissions for nine sectors. Some of these sectors, such as wastewater treatment and agriculture were found to have little potential for GHG reductions; accordingly, reduction measures were developed for only the seven sectors above.

[11] "Current," as it pertains to the AB 32 Scoping Plan, is commonly understood as sometime between 2005 and 2008.

statewide reduction target relative to 2007 emission levels would be 10.8 percent[12] (California Air Resources Board 2007, 2013). Based on this State-level calculation, the City's GHG emissions reduction target is 11 percent below its 2007 emissions.

As shown in Table 2-2, the estimated community emission level for the City in 2020 is 386,735 MT CO_2e. To achieve the identified target of 11 percent below this level, the City will need to limit emissions to 290,374 MT CO_2e by 2020. This equates to a GHG reduction of 96,659 MT CO_2e during the period from 2007 to 2020. The measures described in the CAP will meet this target.

To fulfill CE-IA-5, the City has chosen to adopt a 2030 target that is derived based on the linear trajectory between the 2020 reduction target and the 2050 target established by Executive Order S-3-05 (80 percent below 1990 levels). This target is approximately 26 percent below the 2020 reduction target which will require lowering emissions to approximately 213,000 MT CO_2e, which corresponds to an additional 77,000 MT CO_2e in GHG reductions during the period from 2020 to 2030. It is important to note that the 2030 target is preliminary, not a binding target, and will likely be adjusted in the future. The 2030 GHG reduction target, and potential strategies that the City could adopt to reach the target, are discussed in more detail in Section 3.5 below and in Appendix C.

3.3 Developing the Climate Action Plan Framework

The City's CAP includes a variety of voluntary strategies that will affect emissions in both the existing built environment, as well as emissions from new development expected to occur by the year 2020. The CAP builds on current statewide initiatives (such as the RPS) and prior local initiatives.

3.3.1 Reduction Measure Selection Process

The City's CAP includes several local reduction measures that are proposed in addition to State legislation and policy. The reduction measures were selected following a comprehensive review of potential strategies that could be feasibly taken to reduce GHG emissions from the City's community activities. The list of potential strategies drew from State-level resources and existing CAPs throughout California. The list of measures was circulated among the public during workshops that were held in September and November 2013.

3.3.2 Quantification of Emission Reductions

The quantification of GHG reductions was based on guidance provided by the California Air Pollution Control Officers Association (CAPCOA) and the City consultant's professional experience obtained from preparing CAPs for other jurisdictions in California. The majority of calculations were performed using standard factors and references rather than performing a specific analysis of individual technologies. To the extent feasible, information specific to the City, such as electricity and natural gas consumption, was used in the calculations.

[12] The 11% reduction target was determined using the following assumptions (all units are in million MT CO_2e): 2007 emissions (485.54) – 1990 emissions (433.29)/2007 emissions (485.54) = 10.8%. This amount was rounded up for ease of reference, but the actual target is 10.8%.

Some measures currently do not support a quantitative reduction analysis. Although these measures are identified qualitatively, they will likely result in GHG reductions and help the City achieve its reduction target. See Appendix B for a detailed discussion of the assumptions and methodologies used to quantify emissions reductions for each individual measure.

3.3.3 Quantification of Costs

The cost analysis estimated the additional costs and savings associated with implementing each reduction measure over the assumed lifetime of the measure. While many measures require upfront investments, they may result in savings over time that helps offset those costs. The cost analysis estimated the following metrics for each measure. Please see Appendix B for more detail about the methods used to estimate costs.

Upfront Costs/Capital Investments. These are the costs of purchasing new equipment, retrofitting equipment, planting trees—the one-time costs associated with implementing a reduction measure. In many cases, these one-time costs are assumed to occur at the same time; however, there are a few cases in which these one-time costs are actually spread over several years as the measure is fully implemented.

Annual Net Costs/Savings. Annual costs generally represent maintenance costs. Annual savings often represent avoided energy costs or avoided maintenance costs. Net annual costs/savings can vary by year, so this document presents the annual net costs anticipated in 2020.

Net Present Value. The net present value was calculated by considering the stream of all costs and savings over the lifetime of the equipment and applying a discount rate for future costs or savings. In some cases, there is no associated lifetime of equipment, and total costs/savings were calculated up to the 2020 time period. A discount rate of 5 percent was used.

Annualized Discounted Net Costs/Savings per Metric Ton of CO_2e Reduction in 2020 ($/ton). The total costs/savings were divided by an annuity factor to estimate the annualized costs/savings. This value considers annual costs and savings, taking into account the time value of money. Because costs and savings are incurred over a period of several years, it is necessary to calculate the annualized so that it can be evaluated against the GHG reductions that occur in a single year (2020). This value provides an estimate of the cost per metric ton of implementing the measure.

Simple Payback Period. The simple payback period is calculated by dividing the one-time costs by the annual savings or, when annual costs vary, by calculating the break-even point. In some cases, the payback period will exceed the lifetime of the equipment, and this never will actually be repaid. These instances are noted as "NA" (for Not Applicable) in the summary tables. Note that the savings and costs are sometimes born by different entities, so the payback period does not necessarily indicate that a given entity will actually receive payback on its investment.

The numbers presented in this document are meant to provide order-of-magnitude estimates and assist in evaluating the relative costs/savings of each reduction measure. There are numerous factors

that will affect the actual costs incurred if the measures are implemented. For instance, sometimes assumptions had to be made about the specific actions needed to implement a measure, although the actual approach to implementing the measure could vary. It is also important to understand that in many cases, costs and savings are borne by different entities. For example, a local government may incur costs associated with planting and maintaining urban trees, but the savings from reduced electricity bills due to shading may accrue to benefit local businesses and residents. Where appropriate, the below description of emission reductions and measures distinguishes among the key entities incurring the costs and savings.

Where measures are being enacted pursuant to State regulations and/or prior adopted City policy, they are not considered to result in additional costs/savings due to the adoption of the CAP, as these costs/savings would occur regardless of the CAP implementation.

3.4 GHG Emission Reductions and Measures for 2020

When combined with federal and State efforts, the local GHG reduction measures described in the City's CAP will reduce community GHG emissions by 96,659 MT CO_2e in 2020. The sectors that contribute the largest portions of GHG reductions include on-road transportation and land use, building energy (energy efficiency, renewable energy, and community choice aggregation), and off-road transportation and equipment. Actions not currently quantified (see Chapter 4, *Implementation Strategies*) could also contribute to additional reductions in the future if implemented. Local effects of California's cap-and-trade program, once implemented, could also contribute addition reductions in the City. Section 3.5 discussed emissions scenario reductions for 2030 separately below.

Table 3-1 summarizes local GHG emissions reductions; Figures 3-1 provides a graphical representation of the contribution of the local measure GHG reductions presented in Table 3-1 as well as the State measure GHG reductions. As shown in Table 3-1, approximately 55 percent and 45 percent of the GHG reductions achieved by the CAP are attributed to State- and local-level measures, respectively. The City has limited control over the implementation of State measures, as these measures are organized and operated by State agency staff, and the City is mandated to comply. Conversely, the State must defer to the City for certain planning decisions that are made at a local level, such as the adoption of local zoning regulations, which remain under the jurisdiction of local governments. The reduction measures described below outline a path for reducing community emissions in conjunction with planned State actions.

On a per-metric ton basis, costs/savings ranged from net savings of $317 per metric ton to net costs of $941 per metric ton. If solar measures are implemented using power purchase agreement (PPA) approaches, then overall implementation of the CAP by the City and the community is expected to result in net savings to the community overall. If the solar measures were entirely owner-financed, which is considered unlikely given the prevalence of PPA approaches (particularly in the existing residential market), and then the solar measures will result in net costs.

3.4.1 State Measures

Actions undertaken by the State will contribute to GHG reductions in the City. For example, as discussed in Chapter 1, *Introduction*, the State requires electric utility companies to increase their procurement of renewable resources by 2020. Renewable resources, such as wind and solar power, produce the same amount of energy as coal and other traditional sources but do not emit any GHGs. By generating a greater amount of energy through renewable resources, electricity provided to the City will be cleaner and less GHG-intensive than if the State had not required the renewable standard. Even though State measures do not always require local government action, emissions reductions achieved by this and other State measures will help lower GHG emissions in the City.

The City has quantified seven (7) statewide initiatives that will contribute to community reductions within Goleta. The majority of these programs will improve building energy efficiency and renewable energy generation. Specifically, Title 24 standards for new residential and nonresidential buildings will require that building shells and components be designed to conserve energy and water. Similarly, energy efficiency strategies required by AB 1109 will reduce electricity consumption from lighting. Finally, the State's RPS will increase the amount of electricity generated by renewable resources.

Over the past several decades, California has become a leader in establishing initiatives to reduce fuel consumption and on-road vehicle emissions. The proposed Advanced Clean Car initiative will introduce new standards for model years 2017 to 2025, and will increase fuel economy up to 62 mpg by 2025. These new fuel economy standards are more stringent than what is currently required under federal CAFE standards. ARB has also adopted the Low Carbon Fuel Standard, which requires a 10 percent reduction in the carbon intensity of California's transportation fuels by 2020 as well as several other efficiency measures in the AB 32 Scoping Plan. Together, these measures will reduce light- and heavy-duty vehicle emissions.

Finally, the City's emissions associated with refrigerant use and other high-GWP gases in 2020 will also be reduced through statewide action. High-GWP gases are typically emitted at lower rates than the three primary GHGs (CO_2, CH_4, and N_2O), but these gases contribute to climate change more due to their greater ability to trap infrared radiation in the atmosphere. As a result, the ARB has set restrictions on the use of sulfur hexafluoride and refrigerant canisters for automobiles. The ARB will also likely implement additional measures in the future to address high GWP gases in vehicles (California Air Resources Board, 2011). These actions at the state level will result in refrigerant emissions reductions at the City level. Table 3-2 presents a complete list of State measures included in the City's CAP, as well as anticipated GHG reductions.

Table 3-1. 2020 Greenhouse Gas Emission Reductions

Measure No.	GHG Reduction Measures (Only those that were Quantified)	2020 GHG Reduction (MT CO_2e)	Percent of Individual Sectors[a]	Percent of Total Reductions
Building Energy Efficiency				
BEE-1	Continue Implementation of the Residential and Commercial Building Code that Exceeds Title 24 Standards by 15 percent effective through Code Expiration (July 2014)	620	1.44%	0.64%
BEE-2	Aide Public Participation in Energy Efficiency Retrofit Programs for Low-Income Housing Through Outreach Program	283	0.66%	0.29%
BEE-3	Aide Public Participation in Funding, Incentive, or Rebate Programs that Provide Financing for Residential Energy Efficiency Retrofits Through Outreach Program	1,199	2.79%	1.24%
BEE-4	Aide Public Participation in Funding Programs that Provide Financing for Commercial Energy Efficiency Retrofits Through Outreach Program	1,084	2.52%	1.12%
BEE-5	Support Planting of New Trees in the City through Urban Forest Management Plan	33	0.08%	0.03%
Renewable Energy				
RE-1	Continue Implementation of Ordinance Requiring Construction of Solar-Ready Buildings	1,906	4.44%	1.97%
RE-2	Aide Public Participation in Funding Programs for Residential Solar Installations through Outreach Program	1,374	3.20%	1.42%
RE-3	Aide Public Participation in Funding Programs for Commercial Solar Installations through Outreach Program	269	0.63%	0.28%
RE-4	Encourage Solar Installation in New Residential	355	0.83%	0.37%
CCA-1	Pursue a Community Choice Aggregation Program	22,222	51.74%	22.99%
On-Road Transportation and Land Use				
T-1	Develop Design Guidelines for Increased Density for New Developments	229	0.51%	0.24%
T-2	Develop Design Guidelines for Increased Destination Accessibility for New Developments	229	0.51%	0.24%
T-3	Create an Incentive Program for Increased Diversity for New Developments (Mixed Use)	229	0.51%	0.24%
T-4	Develop Design Guidelines for Improved Design for New Developments	229	0.51%	0.24%
T-5	Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development	229	0.51%	0.24%
T-6	Create an Incentive Program for Integrating Below-Market Rate Housing	115	0.26%	0.12%
T-7	Implement General Plan Policy TE 11: Bikeways Plan	2,588	5.80%	2.7%
T-8	Encourage Bicycle Parking through Development of Design Guidelines and Policies	2,588	5.80%	2.7%
T-9	Encourage SBMTD to Expand and Improve Transit Network	1,294	2.90%	1.3%
T-10	Develop Incentives to Encourage Employee-Based Commute Trip Reduction Programs	1,245	2.79%	1.3%
T-11	Encourage End-of-Trip Facilities	647	1.45%	0.67%
T-12	Develop Incentives for Employers to Provide Employer-Sponsored Shuttles	647	1.45%	0.67%
T-13	Coordinate with School Administrative Staffs to Adopt Programs Reducing Vehicular Travel to School	647	1.45%	0.67%
Water Consumption				
WR-1	Continue Compliance with SB X7-7: Reduce Per Capita Urban Water Use	597	100.00%	0.62%
Off-Road Transportation and Equipment				
OR-1	Encourage Alternatively Fueled Construction and Landscape Equipment	1,363	35.64%	1.41%
Solid Waste Generation				
WS-1	Require City Waste Franchise Diversion Rate Increase	806	100.00%	0.83%
Municipal Measures				
M-1	Develop a Water Conservation Plan for City Operations	22	No separate municipal sector in community inventory	0.02%
M-2	Conduct an Employee Commute Study	49		0.05%
M-3	Implement the Energy Efficiency Action Plan	48		0.05%
M-4	Implement Hybrid or Partial Zero Emission Vehicle Purchase Policy	Reductions not quantified.		
M-5	Conduct a Detailed Waste Study at all City Facilities	Reductions not quantified.		
M-6	Develop an Outreach Program for City Employees that Focuses on Energy Conservation	Reductions not quantified.		
State Measure GHG Reductions		**53,511**	**N/A**	**55%**
Local Measure GHG Reductions		**43,148**	**N/A**	**45%**
Total GHG Reductions		**96,659**	**N/A**	**100%**

Notes:

[a] The share of total sectorial reductions for the energy efficiency and renewable energy measures are calculated using the total building energy reductions. Total sector reductions include both state and local reductions.

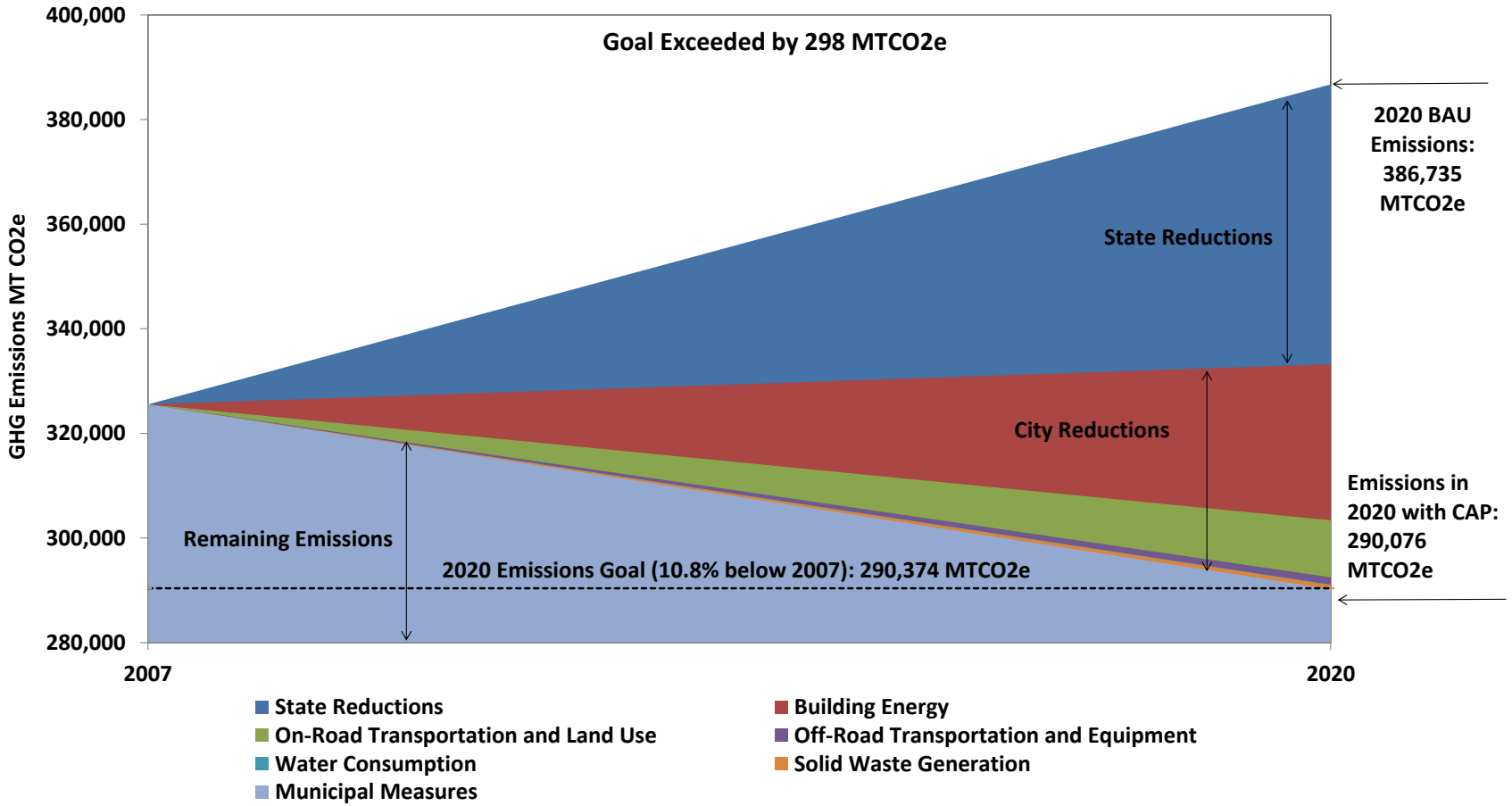

Figure 3-1. 2020 Greenhouse Gas Emissions Reductions by Sector

Table 3-2. 2020 Greenhouse Gas Reductions Achieved by State Measures (MT CO_2e)

State Actions to Reduce GHG Emissions	MT CO_2e
State-1: AB 1493 Pavley and Advanced Clean Cars [a]	18,840.3
State-2: Low Carbon Fuel Standard	15,094.3
State-3: Other Vehicle Efficiency Measures [b]	2,227.1
State-4: Renewable Portfolio Standard	11,606.9
State-5: Title 24 Standards	1,996.3
State-6: High Global Warming Potential GHGs	3,672.0
Total Reductions from State Programs	**53,511.3**

a. Reductions calculated based on the existing Pavley II standard, which applies to model years 2017 to 2020 and will improve fuel economy to 43 mpg.
b. Includes the following initiatives: tire pressure program, low friction oils, and heavy-duty aerodynamic efficiency.

3.4.2 Community Measures

The section summarizes local efforts that the City proposes to further reduce community-wide GHG emissions. The local measures identified by the City will improve building energy efficiency, increase renewable energy development, reduce vehicle and other transportation emissions, and reduce water consumption. This section describes the individual measures and their anticipated GHG emissions reductions. The City has used 2007 as the baseline year for its emissions inventory and to project the 2020 BAU emissions; therefore, the City can receive "credit" towards their GHG reduction target for actions that were implemented after 2007.

The City's CAP includes several actions for which GHG reductions cannot be quantified separately but will likely result in GHG savings. These strategies directly support implementation of the reduction measures presented below by creating education programs, securing funding, and/or developing policies and guidelines. Chapter 4, Implementation Strategies, identifies supporting actions that the City might undertake to facilitate implementation of the CAP.

Many of the reduction measures described in this section will result in financial, environmental, public health and other co-benefits for the City, its residents, and businesses. These co-benefits include cost savings over conventional activities, reductions in criteria air pollutant emissions, increased job growth, increased economic growth, and public health improvements. These co-benefits will be achieved in addition to the co-benefits gained from implementation of State measures, which include increases in gross State product, per capita income, and jobs.

The following sections describe the City's GHG reduction measures by sector. Expected co-benefits are discussed in these sections briefly and in more detail in Appendix B.

Building Energy

Energy consumption by the City's built environment will represent 43 percent community emissions in 2020. Reducing electricity usage and improving energy performance, therefore, are vital to the City's CAP. The City has identified 13 building energy measures (eight energy efficiency measures

and four renewable energy measures). It should be noted that three of the energy efficiency measures are qualitative measures and were not quantified.

The building energy measures will result in co-benefits for both small and large businesses, as well as households in the City. Less combustion of natural gas may produce local air quality and public health benefits. Overall, reductions in energy consumption and expenditures will enhance the ability for homeowners and business to withstand unexpected surges in future energy costs. Energy retrofits will also improve home value and likely contribute to economic growth by providing new jobs within the community.

BEE-1: Continued Implementation of Residential and Commercial Building Code that Exceeds Title 24 Standards by 15 percent effective through Code Expiration (July 2014)

Title 24, established in 1978, mandates energy efficiency standards that are periodically updated to account for new technologies and for residential and nonresidential development. Simply meeting the current Title 24 standards in 2020 will result in significant energy and GHG savings for the City (see Table 3-2). All new development is required to meet Title 24 standards, and reductions associated with these standards are quantified as part of the State measure.

In November 2010, the City adopted a building code that requires new residential and commercial buildings to exceed the existing California Title 24 standards by 15 percent. This "reach code" was developed in collaboration with SCE through the South County Energy Efficiency Partnership (SCEEP). The code requires the installation of ENERGY STAR®-rated appliances in new construction, as well as time-based, variable-speed motors for new swimming pools and spas. Because this measure was adopted after the baseline year of 2007, GHG emissions that result from this measure can be counted towards the City's GHG reduction target. In July 2014, the "reach code" will sunset when the more stringent Title 24 standards take effect. Thus, this measure captures the energy savings in construction between 2007 and 2014 that result from the City's "reach code."

BEE-2: Aide Public Participation in Energy Efficiency Retrofit Programs for Low-Income Housing through Outreach Program

Existing homes generate a considerable amount of GHG emissions through energy consumption. Older homes are typically less energy efficient and therefore consume greater amounts of electricity and natural gas relative to newly constructed homes. Conducting home energy audits can help homeowners identify energy retrofits that will improve energy efficiency and save money. Under this measure, the City will promote voluntary programs for existing homes to improve building-wide energy efficiency. This measure will target several of the primary energy-consuming sources in low-income houses in the City. This voluntary program would consist of the following measures:

- Replace high-use incandescent lamps with compact fluorescent lamps or light-emitting diodes LEDs.
- Replace electric clothes dryers with natural gas dryers.
- Install a programmable thermostat.
- Seal ducts and air leaks.
- Replace natural gas furnaces with an ENERGY STAR®-labeled model.

- Insulate building attics.
- Install gas water heaters with increased efficiency.

BEE-3: Aide Public Participation in Funding, Incentive, or Rebate Programs that Provide Financing for Residential Energy Efficiency Retrofits through Outreach Program
This measure involves the same voluntary energy efficiency retrofits as described for Measure BEE-2 but will target baseline (2007), non-low income houses.

BEE-4: Aide Public Participation in Funding Programs that Provide Financing for Commercial Energy Efficiency Retrofits through Outreach Program
Under this measure, the City will promote voluntary programs for existing commercial facilities to improve building-wide energy efficiency. In addition, the City will provide aid through public participation of a voluntary program that encourages existing commercial facilities to improve building-wide energy efficiency by 20 percent by 2020 (compared to 2007). The target penetration rate for this measure was assumed to be 5 percent of existing commercial units. Retrofits may include improving design and management of heating, ventilation, air conditioning systems and lighting.

BEE-5: Support Planting of New Trees in the City through Urban Forest Management Plan
Trees sequester varying amounts of atmospheric CO2 during respiration depending on the type, size, and age of the trees. Planting trees in commercial areas also increases shade and helps reduce the urban heat island effect. The GHG benefits achieved from tree planting vary based on the distance at which the tree is planted from the building; trees that are planted adjacent to a building result in the most energy reductions. In 2013, the City developed a draft of the 2012–2013 Urban Forest Management Plan (UFMP). The UFMP calls for an annual target of 100 new public trees per year.

BEE-6: Encourage Community-Wide Energy Efficiency through Outreach Program
BEE-6 is a qualitative supporting measure and is discussed in Table 4-6.

BEE-7: Encourage Public Participation in Energy-Efficient Appliance Programs through Outreach Program
BEE-7 is a qualitative supporting measure and is discussed in Table 4-6.

BEE-8: Monitor Gains of the Santa Barbara County Green Business Program or Initiate a Separate City Program
BEE-8 is a qualitative supporting measure and is discussed in Table 4-6.

RE-1: Continue Implementation of Ordinance Requiring Construction of Solar-Ready Buildings
Solar energy is a renewable, non-GHG emitting energy source. Buildings that utilize solar energy require less or no energy from the conventional sources typically provided by utility companies. Thus, the potential for GHG reductions is substantial when buildings displace their electricity from GHG-emitting sources with solar energy. City Policy CE 13.3 in the City's General Plan encourages the use of renewable energy sources for new projects so long as such sources do not present any adverse effects on the environment or adjacent residential uses. For Measure RE-1, the City will

continue implementation of the Solar-Ready Ordinance, which requires the development of solar-ready buildings for large projects that require legislative approval by City Council, such projects requiring a General Plan amendment or re-zone.

RE-2: Aide Public Participation in Funding Programs for Residential Solar Installations through Outreach Program
Measure RE-2 will target existing residences for solar energy installation. Several funding programs are accessible to Goleta residents for the purposes of installing solar energy systems at their existing residences. Such funding sources include SCE Home Energy Efficiency Rebate program, Energy Upgrade California, and California First. Through this measure, the City will identify available funding programs, provide information to residents, and set a target for the number of residential solar installations to be completed by 2020.

RE-3: Aide Public Participation in Funding Programs for Commercial Solar Installations through Outreach Program
Measure RE-3 will involve solar energy installations at commercial buildings. Funding sources for the solar installations include programs such as California First. Through this measure, the City will identify available funding programs and provide information to businesses.

RE-4: Encourage Solar Installation in New Residential
RE-4 calls for the installation of solar energy systems in new housing developments that do not require legislative action by the City Council. Similar to the other solar measures, the City will encourage residential homebuilders to utilize available incentives, rebates, and tax credits to offset capital costs.

CCA-1: Pursue a Community Choice Aggregation Program
Community Choice Aggregation (CCA) is a program that could be implemented in the City to increase renewable energy generation. A CCA would allow individual citizens or businesses in the City to purchase their electricity, collectively, from independent alternative energy suppliers. In concept, customers of the CCA program could have at least two options to buy electricity. One option would allow customers to have an electricity profile with 50 percent from renewable energy sources and 50 percent from conventional sources. A second, more aggressive option would allow customers to purchase electricity from a CCA that is 100 percent from renewable energy sources. Goleta residents who do not wish to participate in the CCA program would be able to opt out and continue receiving their electricity from SCE. Renewable energy sources would likely include solar, wind, and any other renewable energy sources that can be feasibly procured and utilized.

A CCA developed by the City alone would be challenging financially because the City has a very small market share of electricity in southern California. The CCAs that have been adopted to date in Marin County and Sonoma County both involve multiple jurisdictions in order to have larger buying power which can help to control electricity costs. Goleta would most likely need to join with a number of other local jurisdictions in order to both increase purchasing power as well as to amortize administrative costs over a larger program instead of just Goleta. Therefore, the City is committing

to a Feasible Study that would examine the costs and benefits of pursuing a CCA in collaboration with other local and regional agencies.

On-Road Transportation and Land Use

Within Goleta, transportation represents one of the largest sources of emissions, comprising 43 percent of the City's inventory in 2020. As a result, transportation-related reduction measures have great potential in reducing the City's overall GHG emissions. Implementing transportation measures can be difficult because it involves influencing individuals' driving habits. However, it is important to note that the measures outlined below will also contribute to significant reductions in GHG emissions beyond 2020 as they will create a transportation and land use network that supports mixed-use, high-density development, and alternative modes of transportation.

Transportation measures can achieve significant co-benefits for individual residents and the community as a whole. Reductions in VMT and traffic congestion can reduce smog-forming emissions, toxic air contaminants, and diesel particulate matter (California Air Resources Board 2008). Alternative modes of transportation, such as bicycling, walking, and transit, may also help reduce many serious health risks associated with vehicle exhaust. Community well-being and quality of life may also be improved as individuals spend less time commuting, waiting for the bus, and/or sitting in heavy congestion.

The City has identified the following 17 on-road transportation and land use measures. By 2020, these measures will result in a reduction in VMT, compared to 2020 BAU conditions, of over 31 million miles per year, which represents a reduction of almost 9 percent of 2020 BAU VMT. VMT growth between 2007 and 2020 will be reduced from 25.3 percent under the BAU scenario to 14.6 percent with the transportation measures implemented. Moreover, as shown in Table 3-4, these measures result in a combined reduction of 10,918 MT CO_2e in 2020 emissions.

T-1: Develop Design Guidelines for Increased Density for New Developments

The City will develop design guidelines to promote increased development densities. Providing increased density (measured in terms of persons, jobs, or dwellings per unit area) reduces travel distances and provides opportunities for use of alternative modes of transportation. The City will prepare policies and incentives to encourage higher density development. Denser developments might include taller buildings, more units per building, smaller units, and less open space.

T-2: Develop Design Guidelines for Increased Destination Accessibility for New Developments

The City will develop design guidelines to encourage development in areas with high accessibility to destinations such as jobs, retail, and other attractions. Destination accessibility can be measured by the travel time (by walking, biking, or transit) to destinations. Projects that are located in areas that are highly accessible by transit, walking, or biking will reduce vehicle travel and, thus, VMT. The City will develop guidelines, policies, and incentives to encourage new development to be located in more centralized areas, adjacent to major commercial, residential, and employment areas within the City. As part of this strategy, the City will informally direct development to more centralized areas of the City.

T-3: Create an Incentive Program for Increased Diversity for New Developments (Mixed Use)

Land use form is a key determinant of travel behavior. Areas with higher levels of mixed-use, such as employment, retail, and housing, have lower VMT than areas where one of these uses predominates. Under this measure, the City will encourage mixed-use development and promote shorter and fewer vehicle trips. The City will create an incentive program to encourage increased levels of mixed use within existing and new developments. Providing residential units near retail and employment areas, as well as providing more employment options closer to predominately residential land uses, increases the diversity of the developments and encourages non-vehicle trips. Potential incentives could include parking variances, reductions in building and permit fees, and other related items.

T-4: Develop Design Guidelines for Improved Design for New Developments

The City will develop design guidelines that encourage new projects to include improved design elements to enhance walkability and connectivity. Pedestrian-friendly design may be evaluated in terms of building setbacks, reduced street widths, small block size, proportions of four-way intersections, sidewalk coverage, number of pedestrian crossings, presence of street trees, and other physical variables that enhance pedestrian-oriented environments. Barriers to pedestrian access and interconnectivity will be lessened. These barriers may include walls, landscaping, slopes, and other elements that reduce pedestrian circulation.

T-5: Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development

The City will develop design guidelines and incentives that encourage the location of new developments with high density near transit options, as recommended for Measure T-5, will facilitate the use of transit by people traveling to and from work. This will result in a shift from cars to transit, which reduces VMT. A project with a residential/commercial center designed around a rail or bus station, is called a transit-oriented development (TOD). For example, the City will have to provide guidelines and incentives to implement TOD in desired areas, such as the Hollister Avenue Transit Corridor.

T-6: Create an Incentive Program for Integrating Below-Market Rate Housing

The City will encourage residential projects to provide for a certain percentage of below-market rate (BMR) housing or contribute to an Affordable Housing Fund. The City already requires nonresidential projects to pay a housing impact fee to be deposited in the Affordable Housing Fund. BMR housing provides opportunity for lower income families to live closer to job centers and transit. Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. Level of auto ownership tends to be lower with lower income families. This may allow buildings to design for less parking, increasing the economic viability of new development. The City could choose to implement this strategy through a variety of means. One option will be to create an incentive system, whereby additional density or units will be provided in those projects. There is already policy language in the City's General Plan addressing affordable housing, so it is unlikely that additional policy support will be required.

T-7: Implement General Plan Policy TE 11: Bikeways Plan

The City will implement bicycle improvements consistent with the City's General Plan. The bike paths will be created to provide connections to major destinations and transit terminals. The network will be complemented with bicycle markings and signage to encourage bicycling and provide awareness for vehicle drivers. A comprehensive bicycle network encourages bicycle commuting and may reduce peak-hour vehicle trips. Improved bicycle facilities also increase accessibility to transit stations, thus encouraging transit commuting. This strategy involves enhancing the existing bicycle network by adding more bicycle facilities throughout the City. More facilities will provide better connectivity and accessibility to more destinations. Enhancing the existing facilities to provide bike lanes or signs, where appropriate, will create a more comfortable riding experience and encourage higher bicycle ridership. This measure could include the following additional bicycle facilities.

- Class I Bicycle Trails that use off-road trails and provide exclusive bicycle use.
- Class II Bike Paths that delineate the bicycle right-of-way on roadways.
- Class III Bike Routes that provide signage and awareness of shared roadways.

T-8: Encourage Bicycle Parking through Development of Design Guidelines and Policies

This measure will encourage nonresidential projects to provide short-term and long-term bicycle parking facilities to meet peak season maximum demand through City guidelines and related policies. It will also encourage residential, multi-family projects to provide long-term bicycle parking facilities for all residents. This measure will also encourage bicycle parking at public facilities such as the Amtrak Station and bus stations around the City. Bicycle parking facilities can include bicycle racks, bicycle lockers, or bicycle cages. The City will be responsible for developing guidelines and policies to encourage the placement of bicycle parking within private development. The City will also be responsible for placing bicycle parking racks at the public facilities identified above.

T-9: Encourage SBMTD to Expand and Improve Transit Network

Consistent with the City's General Plan, the City will, under Measure T-9, encourage the Santa Barbara Metropolitan Transit District (SBMTD) to expand existing transit service beyond the limited number of routes that currently operate within the City. As an example, SBMTD provides service along Hollister Avenue as Route 6. Service on this route is currently provided at 30 minute intervals at non-peak times and 20 minute intervals at peak times. Expanding service could include adding vehicles along existing routes to increase bus frequency. Additionally, service could be provided on new routes that are not currently served by the district. This strategy will require that the City coordinate with the transit providers, such as SBMTD, to provide additional service within selected areas of the City. Since the City does not provide transit service directly, it will be necessary to work with the transit service providers.

T-10: Develop Incentives to Encourage Employee-Based Commute Trip Reduction Programs

One way to reduce VMT is through the use of travel demand management (TDM) strategies, which encourage employees to use methods of travel other than single-occupant vehicles. TDM strategies are typically developed to be either mandatory programs, which all employers must participate in, or voluntary programs for which participation is encouraged but not required. It was assumed that

these programs will be voluntary as there are limited opportunities to compel employers within the existing regulatory framework. Potential strategies that could be implemented by employers include transit passes, parking cash out, bicycling subsidies, and privately operated shuttles. As TDM measures will be implemented through voluntary participation, the City would need to develop incentives to encourage employers to implement these programs. Potential incentives could include reductions in parking requirements, reductions in traffic impacts, additional density, and other related items.

T-11: Continue to Encourage End-of-Trip Facilities

End of trip facilities include bike lockers, showers, and changing rooms. These facilities often are used by cyclists and can encourage cycling use, particularly for commuting to work. To implement this measure, the City will continue to encourage developers through the discretionary review process to include end-of-trip facilities in new buildings that accommodate offices and larger retail uses. It is likely that this amendment will have certain qualifiers, such as excluding buildings below a certain size (buildings below 25,000 square feet, for example) or limiting the application to new construction only.

T-12: Develop Incentives for Employers to Provide Employer-Sponsored Shuttles

The City will encourage and provide incentives to local employers to establish or expand worker shuttle programs. For example, several wineries may collaborate to fund and operate a farm worker shuttle for its collective employees. Scheduling and ridership charges will be established by the employers. =

T-13: Coordinate with School Administrative Staffs to Adopt Programs Reducing Vehicular Travel to School

Consistent with the City General Plan, the City will encourage public and private schools to adopt TDM plans and to implement trip reduction programs for commuting students and parents. Potential measures include funding for safe routes to schools, encouraging transit providers to offer free or reduced-cost bus passes for students and employees, and increased funding of school buses. The City will coordinate with the various schools within Goleta to limit vehicular travel to the school. This coordination will occur through periodic coordination between City staff and the various school administrative staff.

T-14: Encourage Land Dedication for Trails

T-14 is a qualitative supporting measure and is discussed in Table 4-6.

T-15: Identify Opportunities for Bike Parking at Strategic Transit Locations

T-15 is a qualitative supporting measure and is discussed in Table 4-6.

T-16: Encourage Contributions for Transit Access Improvements as Condition for New Development along Transit Corridors

T-16 is a qualitative supporting measure and is discussed in Table 4-6.

T-17: Develop Incentives for Employers to Provide Preferential Parking
T-17 is a qualitative supporting measure and is discussed in Table 4-6.

Water Consumption

Not only is water an important resource with limited supplies, but the treatment, distribution, and conveyance of water requires considerable amounts of electricity. The generation of this electricity consumes fossil fuels and releases GHGs. Reducing water demand and conserving water can therefore save energy and avoid associated emissions.

The City has identified the following strategy to enhance community-wide water and resource conservation. This strategy will reduce water consumption, which will likewise contribute to reductions in building energy use. For example, efficient faucets that use less water require less electricity and natural gas for hot water heating. Additionally, energy required to transport, distribute, and treat water will be reduced. The consumption of less electricity and natural gas will ultimately translate to reductions in regional and local criteria pollutants, which may improve community health and well-being. Water measures that encourage building retrofits also have additional co-benefits of enhancing building value and resale. Table 3-5 summarizes anticipated GHG reductions from WR-1.

As previously discussed, WR-1 will achieve reductions in the building energy sector because of the energy required to transport and distribute water. Emissions reductions achieved by WR-1 through reduced hot water heating have been added to the building energy sector (see Table 3-1). Only emissions reductions associated with reduced water conveyance are reported in the water sector. Table 3-5 summarizes these emissions reductions.

WR-1: Continue Compliance with SB X7-7: Reduce Per Capita Urban Water Use
SB X7-7 was enacted in November 2009 and requires urban water agencies throughout California to increase conservation to achieve a statewide target of a 20 percent reduction in urban per capita water use by December 31, 2020. In the case of Goleta, the SB X7-7 target is not a clear-cut 20 percent reduction target. Goleta Water District (GWD), in their 2010 Urban Water Management Plan (UWMP), chose to develop the SB X7-7 compliance target using Method 3 of the State's guidance, which entails adopting a per capita target that is 95 percent of the applicable hydrologic region target. Goleta is in the Central Coast Hydrologic Region, which has a regional target of 123 gallons per capita per day (GPCD). However, the California Department of Water Resources (DWR) has set a maximum allowable GPCD target of 111. Because 95 percent of the applicable hydrologic region target (95 percent of 123 is 117 GPCD) is higher than the DWR maximum allowable target (111 GPCD), the DWR target takes precedence. GWD must meet this target relative to average baseline consumption, which was developed using annual data from a 5-year period from 2005 to 2009. The average annual 5-year baseline consumption is 117 GPCD; therefore,

GWD must reduce per capita water consumption by 5 percent[13] by 2020 (Goleta Water District 2011).

This measure assumes that the City will achieve a 5 percent decrease in per capita water consumption through two supporting measures, which are described in more detail in Chapter 4, *Implementation Strategies*. Indoor water conservation opportunities (i.e., water fixture upgrades) and the City's model landscape ordinance will help toward reaching the 5 percent decrease. Likewise, education and outreach programs can help educate individuals on the importance of water efficiency and how to reduce water use. Rebate and audit programs can help promote installation of water-efficient plumbing fixtures.

As discussed above, decreasing the City's water consumption will result in GHG reductions on two fronts. First, less water consumption will reduce the amount of water that needs to be conveyed and pumped to consumers. This results in less energy consumption (and the associated GHG emissions) at pumping facilities. Second, water fixture upgrades in residences will reduce the amount of water consumed at individual homes, which, in turn, reduce the amount of electricity or natural gas that will be required to heat the water. Thus, this measure will result in GHG reductions in the water sector and building energy sector of 96 MT CO_2e and 500 MT CO_2e, respectively.

WR-2: Encourage Indoor Water Conservation Opportunities for New Buildings through Outreach Program
WR-2 is a qualitative supporting measure and is discussed in Table 4-6.

WR-3: Continue Implementation the Model Landscape Ordinance
WR-3 is a qualitative supporting measure and is discussed in Table 4-6.

Off-Road Transportation and Equipment

Off-road transportation and equipment includes construction and landscaping equipment and vehicles. Equipment fuel combustion generates direct emissions of GHGs. Industries that use off-road transportation and equipment within the City include the agricultural, construction, industrial, entertainment, rail yards, and dredging sectors.

The City has identified the following measure to increase the use of alternative fuels in construction and landscaping off-road equipment and vehicles and reduce the consumption of fossil fuels. The off-road measure will reduce GHG emissions and will also achieve significant benefits for individuals and the community as a whole. For example, electrification of construction and landscaping off-road equipment will reduce fossil fuel consumption, thereby contributing to reductions in smog-forming emissions, toxic air contaminants, and diesel particulate matter (California Air Resources Board 2008). Serious health risks associated with heavy-duty vehicles may therefore be reduced, resulting in improvements in community health and well-being.

[13] The 5% goal can be derived using the following calculation: (117-111)/117 = 5%.

OR-1: Encourage Alternatively Fueled Construction and Landscape Equipment

In 2020, off-road equipment will be responsible for approximately 7 percent of total emissions within the City. Utilizing electric power instead of traditional fuels (e.g., gasoline and diesel) for construction and landscaping equipment will offset direct GHG emissions from fuel combustion. Indirect emissions from electricity transmission are significantly lower than direct emissions from fuel combustion. Under this measure, the City will provide information to the public about financial incentives available to electrify off-road vehicles and equipment. If 10 percent of construction and landscaping equipment fleets could be electrified, the City will reduce GHG emissions by 1,363 MT CO_2e in 2020, as shown in Table 3-6.

Solid Waste Generation

Waste diversion programs divert waste that would otherwise go into a landfill to recycling centers, composting operations, or other facilities that prevent waste from going into landfills. These programs result in GHG reductions because they reduce the amount of solid waste that is sent to decompose in landfills, which reduces the mass of material that will eventually be broken down via anaerobic bacteria into methane. Thus, less waste into landfills leads to less methane emissions into the atmosphere.

In addition to GHG emissions reductions, waste diversion programs may reduce waste-hauling and tipping fees, as well as fuel combustion emissions for transporting waste to landfills. Likewise, reductions in landfilled waste will reduce the need for landfill space, which may contribute to future land conservation. Increased recycling and reuse will reduce the need for raw material and energy manufacturing, thereby contributing fuel savings and criteria pollutant reductions. As shown in Table 3-7, this measure will result in a GHG reduction of 806 MT CO_2e in 2020.

WS-1: Require City Waste Franchise Diversion Rate Increase

In 2007, the City had a waste franchise[14] diversion rate of 31 percent. The City's waste franchise diversion rate is expected to increase under the City's waste contractor to 45 percent by 2020. This increase in waste diversion between the baseline year and 2020 will result in GHG reductions through reduced fugitive emissions at landfills. Additional GHG reductions will likely occur from reduced VMT associated with transporting waste to landfills, increased land conservation due to the reduced need for landfills, and reduced use of energy through increased recycling and reuse of waste. These secondary benefits were not included in the GHG reduction analysis, per standard protocols. GHG emissions from reduced fugitive emissions, however, will result in a reduction of 806 MT CO_2e in 2020.[15]

[14] The Goleta franchise diversion rate is different from the overall communitywide diversion rates (i.e. AB 939) that are traditionally utilized in other jurisdictions' CAPs. Overall diversion rates typically consider population, sales tax revenue, non-franchise waste streams (such as construction and demolition waste), etc. The franchise diversion rate discussed in this analysis is simply a calculation of the tonnage of diverted waste and total waste collected. The City is part of regional reporting authority with a regional diversion rate of 72 percent. As a community level diversion rate was not available for the City, the City made a policy decision to base the measure on the franchise rate instead.

[15] The Tajiguas Landfill, the primary landfill where the City's waste is sent, has a landfill gas collection system, which was installed at the landfill in 1998 and captures a portion of the landfill's fugitive emissions.

The diversion rate increase implied by this measure will be achieved through several supporting measures, which are described in more detail in Chapter 4, *Implementation Strategies*. For example, the City's waste contractor will expand recycling and composting services for both residences and commercial entities and continue to implement a variable rate structure (also known "pay-as-you-throw").

3.4.3 Municipal Measures

The City has identified a number of GHG reduction measures that can be implemented to improve energy efficiency, reduce employee-related VMT, promote water conservation, and reduce GHGs through other means. These measures will result in GHG reductions in addition to the GHG reductions achieved by the community measures. The City's municipal measures are presented in Tables 3-8.

M-1: Develop a Water Conservation Plan for City Operations

For this measure, the City will implement a plan to increase water conservation in City-owned and utilized facilities, through upgrades and the promotion of water conservation. A water savings target of 15 percent was used for this measure. Reducing water consumption will reduce GHG emissions resulting from water conveyance and heating water at City facilities.

M-2: Conduct an Employee Commute Study

Measure M-2 quantifies the emissions that result from the City's employee commute study. The study will result in VMT reductions by encouraging employees to carpool, telecommute, or use other alternative modes of transportation. Measure M-2 is discussed in more detail in the City's 2012 Energy Efficiency Action Plan (*City of Goleta, 2012*).

M-3: Implement the Energy Efficiency Action Plan

Measure M-3 quantifies the GHG emissions that will occur from implementing the City's Energy Efficiency Action Plan (EEAP). The EEAP will result in a variety of energy efficiency upgrades that will reduce building energy-related emissions at City facilities. Measure M-3 is discussed in more detail in the City's 2012 Energy Efficiency Action Plan (*City of Goleta, 2012*).

M-4: Implement a Hybrid or Partial Zero Emission Vehicle Purchase Policy

M-4 is a qualitative supporting measure and is discussed in Table 4-6.

M-5: Conduct a Detailed Waste Study at all City Facilities

M-5 is a qualitative supporting measure and is discussed in Table 4-6.

M-6: Develop an Outreach Program for City Employees that Focuses on Energy Conservation

M-6 is a qualitative supporting measure and is discussed in Table 4-6.

3.5 Emission Reduction Target and Reduction Scenario for 2030

In order to assess whether implementing the CAP will help to achieve the state's long-term climate targets, one must look beyond 2020 to see whether the emissions reduction measures included for the 2020 milestone set the City on the trajectory toward future greater reductions in the post-2020 period.

To date, there is no state or federal mandate requiring reduction of GHG emissions after 2020. AB 32 contains no post-2020 reduction target nor provides CARB with the authority to mandate compliance with a post-2020 target. SB 375, while it contains requirements for transportation planning for the MPO (SBCAG for Goleta) to promote reductions in the passenger and light duty vehicle sector, does not contain mandatory requirements for local jurisdictions to reduce their GHG emissions overall. Governor Schwarzenegger's Executive Order S-3-05 calls for an 80 percent reduction below 1990 greenhouse gas emission levels by 2050. However, as noted above, an executive order is only binding on state agencies, and does not represent a legal mandate for local governments or the private sector. Nevertheless, S-03-05 contains a reduction target that is based on a rough agreement on the basis of scientific understanding of the level of reduction needed in developed countries of the world in order to avoid the more catastrophic effects of climate change that could result from unabated rise in anthropogenic GHG emission.

At present (as of spring 2014), there is no actual state or federal plan as to how to achieve such ambitious reductions for 2050. The CARB 2008 AB 32 Scoping Plan did discuss a general scenario of potential reductions that would be needed by 2050 to meet these targets. CARB's AB 32 Scoping Plan 2014 Update discusses potential strategies for the post-2020 period but does not contain specific measures to achieve a 2030 or a 2050 target. The AB 32 Scoping Plan Update discusses potential 2030 targets as possibly 35 percent to 40 percent below 1990 levels for the state; it does not specifically propose any 2030 target to date. The state can help the City keep on track through 2030 by extending state action in the following ways, as described in the Scoping Plan (California Air Resources Board 2008):

- Expand vehicle efficiency regulations
- Increase California's use of renewable energy in electricity generation
- Reduce the carbon intensity of transportation fuels
- Increase energy efficiency and green building efforts
- Using a regional or national cap-and-trade system to further limit emissions

Assuming that emissions of 11 percent below 2007 levels is roughly equivalent to 1990 levels, a 2050 City target to match the S-3-05 targets would be to achieve a level of emissions of approximately 58,000 $MTCO_2e$ in 2050 (excluding stationary sources). Full implementation and expansion of the CARB's Scoping Plan to increase state efforts beyond 2020 and expansion of the local reduction strategies studied in the CAP could put the City on a path toward achieving these required long-term reductions. Taking a trend line from 2020 to 2050 matching the S-03-05 trajectory, the resultant 2030 city preliminary target would be approximately 213,000 $MTCO_2e$, which is equivalent to 26 percent below the 2020 CAP target.

The City will no doubt need to revisit the preliminary target during subsequent planning for the actual post-2020 CAP update. It is reasonably foreseeable that as California approaches its first milestone in 2020, focus would shift to a 2030 and possibly the 2050 target. A detailed plan for how the state would meet these targets is expected prior to 2020 accordingly. The City will monitor developments at the national and state levels.

While the specific strategies needed to meet the 2050 target are too far in the future to define in detail, one can examine the level of achievement that would be needed to keep the City on track through 2030.

Potential ways that the City can do its part to be on track through 2030 to meet the 2050 target include, but are not limited to the following actions:

- Increase energy efficiency and green building efforts (for city municipal buildings as well as private buildings in the City).
- Increase replacement of fossil-fuel based electricity with electricity generated using renewable energy.
- Continue to implement land use and transportation strategies to lower VMT and shift travel modes.
- Continue to utilize electric off-road construction and landscaping equipment.
- Continue to stress the importance of waste reduction in residences, business, and municipal buildings.
- Continue to work with Goleta Water District to improve local water efficiency and conservation.

The conceptual effects of these strategies are presented in Table 3-3. In total, the strategies described above could produce reductions to bring the City's GHG emissions to meet or exceed the preliminary 2030 reduction target. While the potential mix of future GHG reduction strategies presented in this Table 3-3 is only an example, it serves to demonstrate that the current measures in the CARB Scoping Plan and the CAP can not only move the City to its 2020 target, but can also provide an expandable framework for much greater long-term greenhouse gas emissions reductions.

Beginning in 2018, the City will commence planning for the post-2020 period. At this point, the City would have implemented the first phases of the CAP and would have a better understanding of the effectiveness and efficiency of different reduction strategies and approaches. The new post-2020 reduction plan should revisit the preliminary target for GHG reductions in 2030 and if supported by long-term planning at the state level, should also include preliminary planning for 2040 and 2050. The targets should be consistent with broader state and federal reduction targets and with the scientific understanding of the reductions needed by 2050. The City would adopt the post-2020 reduction plan by January 1, 2020, which would require the City to start a new inventory/assessment process by early 2018 at the latest.

Table 3-3. Potential State and City Reduction Strategies to Reach 2030 Target

Sector	Scenario for Additional State/Local Reductions by 2030	
	Additional Reductions beyond 2020 $MTCO_2e$	**Notes:**
Building Energy (Residential, Commercial, Industrial)	59,999	CARB Scoping Plan calls for doubling of energy efficiency reductions compared to pre-2020 efforts. The 2030 scenario assumes the City would achieve reductions from 2020 to 2030 that are equivalent to 20% of 2007 sectorial emissions. Strategies include continued de-carbonization of electricity at the public utility level, more aggressive retrofitting of existing buildings and greatly increased use of small scale renewables.
On-Road Transportation	58,945	CARB Scoping Plan calls for a doubling of GHG reductions from vehicle fleet and transportation fuels compared to pre-2020 effort. The 2030 scenario assumes the City will implement land use and transportation strategies that would result in lower VMT and shift travel modes resulting in reductions equivalent to 25% of 2007 sectorial emissions.
Off-Road Transportation and Equipment	5,454	CARB Scoping Plan calls for more than double the reduction of carbon intensity of transportation fuels compared to pre-2020 effort. The 2030 scenario assumes the City would continue to expand utilization of electric off-road construction and landscaping equipment resulting in reductions from 2020 to 2030 equivalent to 15 percent of 2007 sectorial emissions.
Solid Waste Management	527	Continue to stress the importance of waste reduction in residences, business, and municipal buildings. The 2030 scenario assumes the City's efforts would result in reductions from 2020 to 2030 equivalent to 15 percent of 2007 sectorial emissions.
Agriculture	0	No assumed change. This sector will be very small by 2020 within the City and thus is not likely to be a focus of reduction planning.
Wastewater Treatment	0	No assumed change. Additional measures may be identified in future reduction planning efforts.
Water Conveyance	283	Continue to work with Goleta Water District to improve local water efficiency and conservation. The 2030 scenario assumes the City's efforts would result in reductions from 2020 to 2030 equivalent to 20 percent of 2007 sectorial emissions.
Refrigerants	0	No assumed change. Additional measures may be identified in future reduction planning efforts.
Municipal	0	Energy, water, and waste savings from the actions described above would likely affect municipal buildings. No further municipal actions have been identified as stand-alone strategies at this time but are likely to be identified in future reduction planning efforts.
TOTAL	125,207	
Source:	Appendix C.	

3.6 Limitations and Recommendations for the Climate Action Plan

The CAP is the culmination of work by the City to identify and reduce community GHG emissions through feasible measures in light of their effectiveness and appropriateness for the City. The 2007 inventory was designed to capture all major emissions sources, identify data gaps, and make recommendations for future inventory updates (see Chapter 4, *Implementation Strategies*). The inventory is based on acceptable methods for quantifying GHG emissions. Through future tracking of economic activity and data, future inventories may be able to quantify certain emissions areas at a more disaggregated level, which will allow more precise estimates of reduction potential for different reduction strategies. However, the current inventory is based on standard practice and provides sufficient detail for the City to quantify and monitor effective emissions reduction measures.

Chapter 4 Implementation Strategies

4.1 Introduction

The success of Goleta's CAP depends on the cooperation, commitment, and participation of the community. This section outlines key steps that the City will take in order to ensure that the measures in the CAP are implemented effectively and efficiently in order to achieve maximum GHG benefits and cost savings. Successful implementation of the CAP will require developing a framework for the following components.

- Administration, resources, and staffing.
- Timelines for measure implementation.
- Supporting strategies.
- Community outreach and education.
- Monitoring, reporting, and adaptive management.
- Management post-2020.

Implementation guidelines and detailed action steps for individual measures are also required to facilitate the development of policies and regulations. In general, the City will have limited responsibility for implementing State programs, other than tracking the GHG benefits. Establishing a cohesive management approach is necessary to ensure the CAP measures are implemented in a timely manner. The following sections describe the potential strategies in City's overall plan to implement the CAP.

4.2 Climate Action Plan Implementation Plan

This section describes administration, staffing, financing, budgeting, and timelines. Table 4-1 summarizes overall costs of implementing the CAP.

4.2.1 Administration and Staffing

The City will develop a CAP Implementation Team (CIT), consisting of existing City staffs who are already working on projects related to energy conservation and GHG emissions reduction projects, to support new programs and streamline existing efforts. Individuals from various applicable city departments will serve as needed. The CIT will require a designated coordinator to oversee the successful implementation of all selected GHG reduction strategies. Both the implementation coordinator and the CIT will be responsible for monitoring and reporting on progress towards implementing the CAP, including tasks such as:

- Researching potential opportunities for funding GHG reduction measures and identifying existing resources that can be used to educate the community and harness community support for CAP implementation.
- Coordinating CIT meetings.
- Conducting outreach to local and regional climate action organizations and the community regarding emissions reduction efforts.
- Developing a protocol for monitoring the effectiveness of emissions reduction programs.
- Establishing guidelines for reporting and documenting emissions reduction progress.

- Submitting progress reports to the City Council.
- Developing a protocol for utilizing the real-time information collected through the verification process to modify and revise existing reduction programs.
- Tracking State and federal legislation and its applicability to the City.

Local reduction measures will require a variety of implementation activities, including amendments to existing ordinances or the creation of new code and ordinances, the development and administration of promotional programs, project planning, and tracking and monitoring efforts. This will require additional effort by City staff, but in most cases will involve expansion of current efforts. Table 4-2 shows estimated staff hours for implementation efforts.

4.2.2 Financing and Budgeting

Implementing the local GHG reduction measures will incur increased costs for capital improvements and other investments by the City and other public agencies, local businesses, developers/builders, and existing commercial building owners and households. Operations and maintenance costs will also increase, although in certain cases, operating costs are anticipated to decrease, offsetting some of the cost increases. This section presents existing and potential future funding sources that can pay for these costs. Tables 4-1 and 4-2 summarize costs of the reduction measures and City staff hours for implementation, respectively; and a discussion of funding and financing options follows. Because current economic and fiscal conditions limit funding resources and options and the related ability to finance costs associated with local reduction measures, this section also identifies additional funding sources that may become more feasible in the future.

Table 4-1. Summary of Costs and Benefits for Greenhouse Gas Reduction Measures [a]

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
State Measures											
State-1	AB 1493 Pavley and Advanced Clean Cars	18,840	No	Residents, business, City government, and other public agencies will incur additional costs for energy, transportation fuel and other expenses due to State initiatives, but will also incur savings where State requirements result in long-term efficiencies (for instance, from Title 24 requirements). However, these costs and savings will occur with or without adoption of the CAP.							
State-2	Low Carbon Fuel Standard	15,094	No	See State-1.							
State-3	Other Vehicle Efficiency Measures	2,227	No	See State-1.							
State-4	Renewable Portfolio Standard	11,607	No	See State-1.							
State-5	Title 24 Standards	1,996	No	See State-1.							
State-6	High GWP Gases	3,672	No	See State-1.							
Building Energy											
BEE-1	Continue Implementation of Residential and Commercial Building Code that Exceeds Title 24 Standards by 15 percent effective through Code Expiration (July 2014)	620	No	Costs not quantified							
BEE-2	Aide Public Participation in Energy Efficiency Retrofit Programs for Low-Income Housing Through Outreach Program	283	Yes	$508,241–$1,078,744	Building owners	($123,059)	Building owners and tenants	($275)/($103)	4/9	18	($910,433–$339,930)
BEE-3	Aide Public Participation in Funding, Incentive, or Rebate Programs that Provide Financing for Residential Energy Efficiency Retrofits Through Outreach Program	1,199	Yes	$1,942,942–$3,932,950	Homeowners and multi-family residential building owners	($504,491)	Homeowners and tenants	($275)/($133)	4/8	18	($3,853,648–$1,863,640)

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
BEE-4	Aide Public Participation in Funding Programs that Provide Financing for Commercial Energy Efficiency Retrofits Through Outreach Program	1,084	Yes	$4,572,490–$7,641,818	Building owners	($484,075)	Building owners and tenants	($86)/$156	9/16	18	$1,088,158–($1,981,170)
BEE-5	Support Planting of New Trees in the City through Urban Forest Management Plan	33	No	$130,500	City of Goleta	Private: ($1,024) Government: $45,004	Savings: Building owners, tenants Costs: City of Goleta	$921	Private: Net savings Government: Net cost	40	Private: ($16,001) Government: $545,036
BEE-6	Encourage Community-Wide Energy Efficiency through Outreach Program	Qualitative	Yes	Costs not quantified							
BEE-7	Encourage Public Participation in Energy-Efficient Appliance Programs through Outreach Program	Qualitative	Yes	Costs not quantified							
BEE-8	Monitor Gains of the Santa Barbara County Green Business Program or Initiate a Separate City Program	Qualitative	Yes	Costs not quantified							
Renewable Energy											
RE-1	Continue Implementation of Ordinance Requiring Construction of Solar-Ready Buildings	1,906	Yes	$6,223,636–$9,171,092	Building owners, developers	Direct Purchase: ($773,085)–($814,605) PPA: ($122,348)-($209,537)	Building owners and tenants	Direct Purchase: ($189)/($104) PPA: ($120)/($70)	NA	NA	NA
RE-2	Aide Public Participation in Funding Programs for Residential Solar Installations through Outreach Program	1,374	Yes	$5,363,571–$7,078,571	Homeowners	Direct Purchase: ($689,302) PPA: ($83,090)-($166,705)	Homeowners, tenants	Direct Purchase: ($233)/($142) PPA: ($136)/($70)	8/11	25	Direct purchase: ($3,224,409)–($1,970,009) PPA: ($1,883,813)–($966,853)

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
RE-3	Aide Public Participation in Funding Programs for Commercial Solar Installations through Outreach Program	269	Yes	$877,813–$1,294,626	Building owners	Direct Purchase: ($109,009)–($114,913) PPA: ($17,286)- ($29,572)	Building owners and tenants	Direct Purchase: ($189)/($103) PPA: ($120)/($70)	8/11	25	Direct purchase: ($701.496)–($384,096) PPA: ($445,744) – ($261,534)
RE-4	Encourage Solar Installation in New Residential	355	Yes	$1,379,204–$1,820,204	Building owners, developers	Direct Purchase: ($177,249) PPA: ($21,366–$42,867)	Building owners and tenants	Direct Purchase: ($231)/($141) PPA: ($135)/($69)	8/11	25	Direct purchase: ($2,785,715)–($4,559,515) PPA: ($1,367,191)–($2,663,829)
Community Choice Aggregation											
CCA-1	Pursue a Community Choice Aggregation Program	22,080	Yes	Costs not quantified							
On-Road Transportation and Land Use											
T-1	Develop Design Guidelines for Increased Density for New Developments	229	Yes	Costs not quantified							
T-2	Develop Design Guidelines for Increased Destination Accessibility for New Developments	229	Yes	Costs not quantified							
T-3	Create an Incentive Program for Increased Diversity for New Developments (Mixed Use)	229	Yes	Costs not quantified							
T-4	Develop Design Guidelines for Improved Design for New Developments	229	Yes	Costs not quantified							

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
T-5	Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development	229	Yes	Costs not quantified							
T-6	Create an Incentive Program for Integrating Below-Market Rate Housing	115	Yes	Costs not quantified							
T-7	Implement General Plan Policy TE 11: Bikeways Plan	2,588	Yes	$6,602,478	City of Goleta	Private: ($3,675,637) Government: $660,248	Private: Vehicle owners Government: City of Goleta	Not calculated	Net cost	15	Not calculated
T-8	Encourage Bicycle Parking through Development of Design Guidelines and Policies	2,588	Yes	$10,000–$50,000	City of Goleta	Private: ($3,675,637) Government: $0	Private: Vehicle owners Government: City of Goleta	Not calculated	Net cost	15	Not calculated
T-9	Encourage SBMTD to Expand and Improve Transit Network	1,294	Yes	Costs not quantified							
T-10	Develop Incentives to Encourage Employee-Based Commute Trip Reduction Programs	1,245	Yes	Costs not quantified							
T-11	Encourage End-of-Trip Facilities	647	Yes	Costs not quantified							
T-12	Develop Incentives for Employers to Provide Employer-Sponsored Shuttles	647	Yes	Costs not quantified							
T-13	Coordinate with School Administrative Staffs to Adopt Programs Reducing Vehicular Travel to School	647	Yes	Costs not quantified							
T-14	Encourage Land Dedication for Trails	Qualitative	Yes	Costs not quantified							

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
T-15	Identify Opportunities for Bike Parking at Strategic Transit Locations	Qualitative	Yes	Costs not quantified							
T-16	Encourage Contributions for Transit Access Improvements as Condition for New Development Along Transit Corridors	Qualitative	Yes	Costs not quantified							
T-17	Develop Incentives for Employers to Provide Preferential Parking	Qualitative	Yes	Costs not quantified							
Water Consumption											
WR-1	Continue Compliance with SB X7-7: Reduce Per Capita Urban Water Use	597	Yes	Total costs not quantified. For faucets, toilets, and showerheads, very little price difference is found between higher and lower efficiency fixtures, and thus the incremental cost is assumed to be zero. Smart irrigation systems could range from $300–$800 per residential system, or $1,500–$4,000 per commercial system.	Homeowners, building owners	Total savings not quantified. Per home annual savings for upgraded indoor fixtures is estimated around $200. Annual subscription services for smart irrigation systems can range up to $50 for residential and $200 for commercial.	Homeowners, building owners, tenants	Not calculated	<0 for indoor fixtures; not calculated for outdoor fixtures	~10	Not calculated
WR-2	Encourage Indoor Water Conservation Opportunities for New Buildings through Outreach Program	Qualitative	Yes	Costs not quantified							
WR-3	Continue Implementation the Model Landscape Ordinance	Qualitative	No	Costs not quantified							

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
Off-Road Transportation and Equipment											
OR-1	Encourage Alternatively Fueled Construction and Landscape Equipment	1,363	Yes	Total costs not quantified. Upfront cost assumed to be negligible; equipment costs vary significantly based on other features besides energy source. Annual cost savings associated with an electric leaf blower or chainsaw estimated at between $500–$600 per unit, assuming 960 hours of operation.	Annual cost savings associated with an electric leaf blower or chainsaw estimated at between $500–$600 per unit, assuming 960 hours of operation.	Equipment owners/renters	Not calculated	Net saving	9	Lifetime savings associated with an electric leaf blower or chainsaw estimated at between $3,000–$4,000 per unit.	Not calculated
Solid Waste Generation											
WS-1	Require City Waste Franchise Diversion Rate Increase	806	No	Costs associated with recycling and diversion facilities not quantified.		($63,602)–($255,367)	City of Goleta, waste haulers	($79)/($317)	Net cost	NA	Not calculated
WS-2	Expand Commercial and Residential Recycling and Composting Services	Qualitative	No	Costs not quantified							
Municipal Measures											
M-1	Develop a Water Conservation Plan for City Operations	22	Yes	Costs not quantified							
M-2	Conduct an Employee Commute Study	49	No	Costs not quantified							
M-3	Implement the Energy Efficiency Action Plan	48	No	Costs not quantified							
M-4	Hybrid or Partial Zero Emission Vehicle Purchase Policy	Qualitative	Yes	Costs not quantified							
M-5	Conduct a Detailed Waste Study at all City Facilities	Qualitative	Yes	Costs not quantified							
M-6	Develop an Outreach Program for City Employees that Focuses on Energy Conservation	Qualitative	Yes	Costs not quantified							

Measure Number	GHG Reduction Measure	GHG Reduction	Additional Cost of CAP?	Upfront Costs	Entity Incurring Upfront Cost	Net Costs/Savings (Lower Cost/ Higher Cost)	Entity Incurring Annual Net Costs/Savings	Avg. Cost (Savings)/ Metric Ton (Lower Cost/Higher Cost)	Avg. Simple Payback Period in Years (Lower Cost/Higher Cost)	Lifetime	Avg. Total Discounted Costs (Savings)
Total											
State Reductions		**53,511**		**–**	**–**	**–**	**–**	**–**			
Local Reductions		**43,148**		**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**
Total Reductions		**96,659**		**–**	**–**	**–**	**–**	**–**	**–**	**–**	**–**

[a] Values in parentheses indicate negative costs, which are savings.

Table 4-2. Estimated Staff Hours for CAP Implementation

Measure No.	Description	GHG Reduction	Implementation / Estimated Tasks	Responsible Dept.	Hours		
					Phase I 2014–2015	Phase 2 2016–2017	Phase 3 2018–2020
STATE MEASURES							
State Measures	Energy, transportation, measures	53,511	No local implementation required, except changes in Title 24 requirements	PER1 (Completed)	Not Applicable		
LOCAL MEASURES—EXISTING OR IN PROGRESS							
BEE-1	Continue Implementation of Residential and Commercial Building Code that Exceeds Title 24 Standards by 15 percent effective through Code Expiration (July 2014)	620	City has already adopted the Reach Code. No further implementation tasks are likely because the Reach Code will expire in 2014.	PER	Existing program underway. No new costs or staff hours are associated with this measure.		
BEE-5	Support Planting of New Trees in the City through Urban Forest Management Plan	33	Planning and Environmental Review and Public Works staff will update the City's Tree Committee on CAP tree-planting target. Tree-planting updates will be included in annual Urban Forest Management Plan reports to track progress towards CAP tree-planting target.	PER/PW2	8	8	12
WR-3	Continue Implementation of the Model Landscape Ordinance	Qualitative	Continue to ensure the Model Landscape Ordinance is implemented.	PER/PW	Existing program underway. No new costs or staff hours are associated with this measure.		
WS-1	Require City Waste Franchise Diversion Rate Increase	806	Continue to work with the City's waste collector to monitor progress with the City's diversion rate.	PW	Existing program underway. No new costs or staff hours are associated with this measure.		
WS-2	Expand Commercial and Residential Recycling and Composting Services	Qualitative	Continue to work with the City's waste collector to monitor progress with expanded waste collection services.	PW	Existing program underway. No new costs or staff hours are associated with this measure.		
M-2	Conduct an Employee Commute Study	49	This measure has already been implemented. An updated study could be conducted in the future to measure the progress of alternative-commuting outreach efforts.	CMO3	Existing program underway. No new costs or staff hours associated with this program.		
M-3	Implement the Energy Efficiency Action Plan	48	Work with SCE to obtain funding associated with the EEAP.	PW/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
LOCAL MEASURES - NEW							
BEE-2	Aide Public Participation in Energy Efficiency Retrofit Programs for Low-Income Housing Through Outreach Program	283	Measures BEE-2, 3, 4, 5, 6, 7 and RE-2,3 are voluntary new measures that will require additional staff time to establish opportunities for education and outreach to the public and also to coordinate efforts with other agencies and organizations for outreach as well as potential funding opportunities. To maximize staff time, efforts to establish these measures will be addressed together. Develop education and promotional outreach programs for BEE 2,3,4,5, 6 and RE-2, 3. Collaborate with other agencies and organizations to identify and seek funding opportunities. Establish method for tracking effectiveness/progress of measures.	PER/CMO	140	140	140
BEE-3	Aide Public Participation in Funding, Incentive, or Rebate Programs that Provide Financing for Residential Energy Efficiency Retrofits Through Outreach Program	1,199					
BEE-4	Aide Public Participation in Funding Programs that Provide Financing for Commercial Energy Efficiency Retrofits Through Outreach Program	1,084					

Measure No.	Description	GHG Reduction	Implementation / Estimated Tasks	Responsible Dept.	Hours		
					Phase I 2014–2015	Phase 2 2016–2017	Phase 3 2018–2020
BEE-6	Encourage Community-Wide Energy Efficiency through Outreach Program	Qualitative					
BEE-7	Encourage Public Participation in Energy-Efficient Appliance Programs through Outreach Program	Qualitative					
BEE-8	Monitor Gains of the Santa Barbara County Green Business Program or Initiate a Separate City Program	Qualitative	Monitor interest in this program from city business owners. Create a database to track savings data of businesses that participate. Create framework for a separate program if enough interest from business owners is present.	PER/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
RE-1	Continue Implementation of Ordinance Requiring Construction of Solar-Ready Buildings	1,906	Ensure that newly constructed buildings that require legislative action comply with the solar-ready requirement of the Green Building Program.	PER	Existing program underway. No new costs or staff hours are associated with this measure.		
RE-2	Aide Public Participation in Funding Programs for Residential Solar Installations through Outreach Program	1,374	See BEE-2 through 6 above	PER/CMO	Refer to BEE 2-6		
RE-3	Aide Public Participation in Funding Programs for Commercial Solar Installations through Outreach Program	269	See BEE-2 through 6 above	PER/CMO	Refer to BEE 2-6		
RE-4	Encourage Solar Installation in New Residential	355	Consistent with IP-9B of the City's Housing Element, draft resolution to encourage installation of solar systems for new residential.	PER	Existing program underway. No new costs or staff hours are associated with this measure.		
CCA-1	Pursue a Community Choice Aggregation Program	22,080	Work with County or City of Santa Barbara to create a framework for a CCA program. Hold workshops and public meetings to gauge the public interest in a CCA program. Conduct feasibility evaluation for CCA in local region. Launch CCA if feasibility is verified and sufficient community interest is identified.	CMO	100	100	TBD
WR-1	Continue Compliance with SB X7-7: Reduce Per Capita Urban Water Use	597	Consult with GWD and the 2010 UWMP for potential education and incentive programs to reduce water consumption.	PW/CMO	24	24	36
WR-2	Encourage Indoor Water Conservation Opportunities for New Buildings through Outreach Program	Qualitative	No further action will likely be necessary for this measure beyond the tasks that will be required for WR-1.	PW/CMO	0	0	0
WR-3	Continue Implementation the Model Landscape Ordinance	Qualitative	No further action is required; the ordinance is already in place.	PER/PW	Existing program underway. No new costs or staff hours are associated with this measure.		
OR-1	Encourage Alternatively Fueled Construction and Landscape Equipment	1,363	Draft resolution that encourages electric landscaping equipment.	PER/PW/CMO	8	0	0

Measure No.	Description	GHG Reduction	Implementation / Estimated Tasks	Responsible Dept.	Hours		
					Phase I 2014–2015	Phase 2 2016–2017	Phase 3 2018–2020
T-1	Develop Design Guidelines for Increased Density for New Developments	229	Develop design guidelines to allow for increased development densities. Prepare policies and incentives to encourage higher density development. Denser developments might include taller buildings, more units per building, smaller units, and less open space.	PER	Included in the existing work program. No new costs or staff hours are associated with this measure		
T-2	Develop Design Guidelines for Increased Destination Accessibility for New Developments	229	Develop incentives to encourage development in areas with high accessibility to destinations such as jobs, retail, and other attractions. Develop design guidelines, policies, and incentives to encourage new development to be located in more centralized areas, such as the downtown area or adjacent to major commercial, residential, and employment areas within the City.	PER	Included in the existing work program. No new costs or staff hours are associated with this measure		
T-3	Create an Incentive Program for Increased Diversity for New Developments (Mixed Use)	229	Create an incentive program to encourage increased levels of mixed use within existing and new developments. Potential incentives could include parking variances, reductions in building and permit fees, and other related items.	PER	Existing program underway. No new costs or staff hours are associated with this measure.		
T-4	Develop Design Guidelines for Improved Design for New Developments	229	Develop design guidelines for new development that will address issues such as the placement of sidewalks, connectivity to the external transportation network, and limitations on barriers (e.g., walls and gates).	PER	Included in the existing work program. No new costs or staff hours are associated with this measure		
T-5	Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development	229	Provide design guidelines and incentives to implement TOD in desired areas, such as the Hollister Avenue Transit Corridor.	PER/PW	Included in the existing work program. No new costs or staff hours are associated with this measure		
T-6	Create an Incentive Program for Integrating Below-Market Rate Housing	115	Create an incentive system whereby additional density or units can be provided using the existing policies in the Housing Element.	PER	Existing program underway. No new costs or staff hours are associated with this measure.		
T-7	Implement General Plan Policy TE 11: Bikeways Plan	2,588	Expand available bicycle connections through implementation of the City's Transportation Element (particularly Policy TE11 Bikeway Plan) with focus on gap closure and bicycle safety to incentivize additional bicycle use. Seek State and federal grand opportunities to fund bicycle improvements.	PW/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
T-8	Encourage Bicycle Parking through Development of Guidelines and Policies	2,588	Developing guidelines and policies to encourage the placement of bicycle parking within private development. Place bicycle parking racks at public facilities.	PER/PW/CMO	40	40	40
T-9	Encourage SBMTD to Expand and Improve Transit Network	1,294	Partner with relevant transit districts to discuss transit expansion and coordination with transit facilities in new developments. Communication with relevant parties will focus on annual meeting of the South Coast Sub-Regional Planning Committee of SBCAG.	PW/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
T-10	Develop Incentives to Encourage Employee-Based Commute Trip Reduction Programs	1,245	Develop incentives to encourage employers to implement trip reduction programs. Potential incentives could include reductions in parking requirements, reductions in traffic impacts, additional density, and other related items.	PER/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
T-11	Encourage End-of-Trip Facilities	647	Encourage the placement of end-of-trip facilities in new buildings that accommodate offices and larger retail uses.	PER	Existing program underway. No new costs or staff hours are associated with this measure.		
T-12	Develop Incentives for Employers to Provide Employer-Sponsored Shuttles	647	Work with local employers to establish or expand worker shuttle programs.	CMO	40	40	40

Measure No.	Description	GHG Reduction	Implementation / Estimated Tasks	Responsible Dept.	Hours		
					Phase I 2014–2015	Phase 2 2016–2017	Phase 3 2018–2020
T-13	Coordinate with School Administrative Staffs to Adopt Programs Reducing Vehicular Travel to School	647	Consistent with the City General Plan, the City will encourage public and private schools to adopt TDM plans and to implement trip reduction programs for commuting students and parents. Potential measures include funding for safe routes to schools, encouraging transit providers to offer free or reduced-cost bus passes for students and employees, and increased funding of school buses. The City will coordinate with the various schools within Goleta to limit vehicular travel to the school. This effort will occur through periodic coordination between City staff and the various school administrative staff.	CMO			
T-14	Encourage Land Dedication for Trails	Qualitative	Expand available bicycle and pedestrian connections through implementation of the City's Transportation Element (particularly Policy TE10: Pedestrian Circulation and TE 11-Bikeway Plan) to expand bicycle and pedestrian access and use. Partner with local and State land use conservation agencies and State and federal funding partners to acquire land at strategic bicycle and pedestrian connection locations.	PW/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
T-15	Identify Opportunities for Bike Parking at Strategic Transit Locations	Qualitative	Meet with Amtrak and the SBMTD to discuss the opportunities to construct bike parking facilities at busy transit stations.	PW/CMO	16	0	0
T-16	Encourage Contributions for Transit Access Improvements as Condition for New Development Along Transit Corridors	Qualitative	Explore options for transit improvements as conditions of new development along transit corridor.	PER/PW/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
T-17	Develop Incentives for Employers to Provide Preferential Parking	Qualitative	Develop incentives for employers who implement parking for employees who carpool to work or develop land use requirements for preferential parking near public transportation, building front doors, and downtown centers.	PER/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
M-1	Develop a Water Conservation Plan for City Operations	22	Develop program with input from facilities managers and other City staff. Once program is developed, hold trainings or workshops to inform City employees. Alternatively, emails could be sent and signs strategically placed to increase awareness on water conservation.	CMO	40	20	20
M-4	Hybrid or Partial Zero Emission Vehicle Purchase Policy	Qualitative	Work with the appropriate City staff that set internal policies, specifically the staff who is involved with vehicle fleet purchasing.	PW/CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
M-5	Conduct a Detailed Waste Study at all City Facilities	Qualitative	Work with facilities managers, custodians, or other appropriate City staff to assess the feasibility of a waste study.	PW/CMO	16	TBD	TBD
M-6	Develop an Outreach Program for City Employees that Focuses on Energy Conservation	Qualitative	Develop program with input from facilities managers, and other City staff who may have input. Once program is developed, hold trainings or workshops to inform City employees. Alternatively, emails could be sent and signs strategically placed to increase awareness on energy conservation.	CMO	Existing program underway. No new costs or staff hours are associated with this measure.		
			Total Hours (All New Programs)		**432**	**3724**	**2884**

4.2.3 Costs and Savings

Some of the local GHG reduction measures will require capital/upfront costs, operations and maintenance costs, or both. Many measures will result in annual savings in the form of decreased electricity and natural gas energy bills, decreased vehicle/fuel use, and other reduced expenses. For measures that are already underway by the City or will be implemented by the City with or without a CAP (such as the Water Efficiency measure already required by SB X 7-7), the CAP will not represent new costs not already anticipated.

As indicated in Table 4-1, some of the measures will result in a net savings (discounted savings exceed discounted costs) and some will result in net costs (discounted costs exceed discounted savings). It is important to note that costs and savings are not necessarily borne by the same entities. That is, the entity making the upfront investment is not always the entity that experiences the reduction in utility bills or other savings. Therefore, it is important to understand that measures may overall be associated with net costs or net savings, but that does not imply that a given entity will experience those same net costs or savings. As noted previously, some costs cannot be estimated at this time as they depend on further program development to better define costs and savings.

Capital Costs

As shown in 4-1, capital costs were estimated for many of the local reduction measures. Assuming PPA financing approaches are used for voluntary solar measures, total capital costs are estimated to range between $27 and $39 million, with those costs spread across local governments and the private sector. It is important to note that many of the local reduction measures offer improvements in service, efficiency, and quality of life, providing co-benefits beyond the targeted reductions in greenhouse gas emissions.

Capital costs can be characterized as follows:

- Building Energy Measures fall predominantly to the private sector to undertake and fund. These measures envision several types of energy-efficiency and renewable-energy upgrades to new and existing development citywide. Capital costs for solar measures vary substantially depending on financing approaches. Building energy measures also have capital costs associated with planting new trees in urban areas, which are assumed to be borne by the local government.
- Transportation Measures have capital costs associated with changes to existing transportation infrastructure to reduce VMT or for increasing operational efficiency of vehicles. Public agencies will be responsible for undertaking and funding many of these measures but private development will have a role in certain measures.
- Water Measures aim to reduce water consumption and conveyance; capital costs are associated with installing new water-efficient fixtures and retrofits of existing plumbing fixtures in private and public buildings.
- Waste Measures comprise action necessary to increase the waste diversion rate citywide. No capital costs are foreseen for this measure at this time. Capital and operating costs likely incurred by waste providers will be passed on in terms of potential increased waste disposal fees.

Private Costs and Savings

Implementing local reduction measures will incur capital and operational costs and operational savings for the private sector. Because many of the measures in the CAP are voluntary (such as energy-efficiency and solar retrofits for existing buildings), the private sector will only incur associated costs and savings if they choose to take part.

Funding Opportunities and Financing Options

Private Funding

Some measures (e.g., BEE-3) encourage existing building owners/homeowners to install significant energy-efficiency upgrades. The cost of these retrofit improvements could be funded by increasing rents (commercial buildings) or recuperating the initial costs through the annual energy savings that will be achieved by the retrofits (households). However, long payback periods for some measures may inhibit widespread, private-sector participation, thus requiring public subsidies or incentives such as rebates offered by public utilities.

The City could also promote PPAs to promote energy savings. In a PPA, a private company or third party purchases and installs a renewable energy technology, often solar panels. The third party maintains ownership of the installed panels and also monitors and maintains the systems to ensure functionality. The contract period for a PPA is typically 15 years, at which point the third party will either uninstall the panels or sign a new agreement with the building owner. The power produced is sold to customers on a per kilowatt-hour basis at a contractually-established rate.[16]

In addition, the City could promote on-bill financing (OBF) to fund energy improvements to City businesses. OBF provides no-interest financing for businesses and government agencies to make energy efficiency retrofit improvements. The funding is provided in the form of a no-interest loan that is paid back through a monthly utility bill. Financing is available for many technologies, including lighting, refrigeration, HVAC and LED street light projects. Government agencies may qualify for loans between $5,000 and $250,000 per service account, with loan periods of up to 10 years. Business customers may qualify for loans between $5,000 and $100,000, with loan periods up to 5 years.[17]

Utility Rebates

The following rebates will help create incentives for building energy investments.

California Solar Initiative. SCE is one of three utilities participating in the State's Go Solar Initiative. This program provides a variety of rebates, incentives, and other types of support for both existing

[16] The rate is lower than what customers pay their utility today, and increases annually at a fixed percentage (usually 2.5 to 4.0%) that is typically lower than the rate escalation by the utilities.

[17] More information can be found at: https://www.sce.com/wps/portal/home/business/tools/on-bill-financing/!ut/p/b1/hc_LDoIwEAXQb3HBUjpSguiuGIQ2alWMYjcGDFYSpAZR4t9bjRuNj9ndybnJDBIoRqJMLrlM6lyVSXHPwtl03ICENALKo3AI1LNoMGZT7HaxBmsN4MsQ-NdfIfFGPOpoMiADzhm4zH4HwbxrAWVLf8S9jgW29QS9APyQcQ0WMwwUz2ASEYIBnCf4cSRDQhYqfTy8JmWKXYlEle2yKqvMc6XX-7o-nvoGGNA0jSmVkkVmbtXBgE-VvTrVKH6V6HiIadtkV6b1g21pezl/dl4/d5/L2dBISEvZ0FBIS9nQSEh/?from=business/onbill

and new homes. Program rebates apply to photovoltaic, thermal technologies, and solar hot water; the program is designed to accommodate single-family homes, commercial development, and affordable housing. These programs have a total budget of $2.2 billion between 2007 and 2016 for solar generation and $250 million between 2010 and 2017 for thermal systems (i.e., new solar hot water systems).

Energy Upgrade California. Energy Upgrade California is funded by the American Recovery and Reinvestment Act, California utility ratepayers, and private contributions. It is administered by participating utilities. Under this program, a homeowner selects one of two energy upgrade packages, basic or advanced, with each offering different enhanced options. The program connects homeowners with home energy professionals, including participating contractors and Whole-House Home Energy Raters. It also offers rebates, incentives, and financing. For instance, homeowners can get up to $4,000 back on an upgrade through a local utility. The City could help promote this program to City residents to encourage home energy upgrades.

State and Federal Funds

The following federal and State funding mechanisms can provide incentives to implement various GHG reduction measures.

Federal Tax Credits for Energy Efficiency

The City could promote the federal government's tax credits for energy efficiency to City residents. Tax credits available through 2016 provide a discount of 30 percent of cost with no upper limit for geothermal heat pumps, small wind turbines (residential), and solar energy systems. The 2016 tax credits also include 30 percent of the cost up to $500 per 0.5 kW of power capacity for fuel cells in a principal residence.

Energy Efficiency Mortgages

The City could promote Energy Efficiency Mortgages (EEM) to City residents. An EEM is a mortgage that credits a home's energy efficiency in the mortgage itself. EEMs give borrowers the opportunity to finance cost-effective, energy-saving measures as part of a single mortgage. To get an EEM a borrower typically has to have a home energy rater conduct a home energy assessment before financing is approved. This rating verifies for the lender that the home is energy-efficient. EEMs are typically used to purchase a new home that is already energy efficient, such as an ENERGY STAR-qualified home.

California Department of Resources Recycling and Recovery (CalRecycle)

The City could apply for CalRecycle grant programs, which are authorized by State legislation to assist public and private entities in the safe and effective management of the waste stream. Funds are intended to further reduce, reuse, and recycle all waste, encourage development of recycled-content products and markets, protect public health and safety and foster environmental sustainability. Incorporated cities and counties in California, as identified by the California Department of Finance, are eligible to receive funding.

California Air Resources Board

ARB has air pollution incentives, grants, and credit programs that could be used to help fund local measures. The following programs will offer grant opportunities over the next several years with the target of reducing emissions from on- and off-road vehicles and equipment.

- Air Quality Improvement Program (AB 118).
- Enhanced Fleet Modernization Program (AB 118).
- Carl Moyer Program – Voucher Incentive Program.
- Goods Movement Emission Reduction Program.
- Loan Incentives Program.
- Lower-Emission School Bus Program/School Bus Retrofit and Replacement Account.

State Funding for Infrastructure

Similarly, the State's Infill Infrastructure Grant Program may be able to provide funding toward Measure T-5 (Transit Oriented Development). This program seeks to promote infill housing development. Grants are available as gap funding for infrastructure improvements necessary for specific residential or mixed-use infill development projects.

Transportation-Related Federal and State Funding

Transportation programs will require a variety of federal and State funding sources suitable for transit, bicycle, and pedestrian improvements. A list of some of the State and federal transportation funding sources is provided in Table 4-4.

Local/Regional Funding

The City has a Capital Improvement Program (CIP) that provides funding for needed City infrastructure improvements. In many cases, the measures can be integrated into the City's CIP.

Table 4-4. State and Federal Transportation Funding Sources

Safe, Accountable, Flexible, Efficient Transportation Equity Act – Legacy for Users (SAFETEA-LU)
Surface Transportation Program Fund, Section 1108 (STP)
Congestion Mitigation and Air Quality Improvement Program, Section 1110 (CMAQ)
Transportation Enhancement Activities (TEA)
National Recreational Trails Program
National Highway System Fund (NHS)
National Highway Safety Act, Section 402
Transit Enhancement Activity, Section 3003
Section 3 Mass Transit Capital Grants
Bridge Repair & Replacement Program (BRRP)
Federal Transit Administration (FTA) 5309
FTA Small Starts
FTA Section 5311(f)
California's Bicycle Transportation Account (BTA)
Environmental Enhancement and Mitigation (EEM) Program
Safe Routes to School (SR2S)
Office of Traffic Safety (OTS)

Transportation Development Act (TDA) Article III
Transportation Funds for Clean Air (TFCA, formerly AB 434)
Flexible Congestion Relief (FCR) Program
State Highway Operations and Protection Program (SHOPP)

Santa Barbara Metropolitan Transit District

While the City does not have control over how SBMTD chooses to expend its resources, it is possible that SBMTD could take the following measures to generate revenue that will lead to reductions in GHG emissions.

- *Bus Stop Sponsorships*. Sponsorship of bus stops through advertising has been utilized as a revenue source.
- *Transit Fare Increases*. Increased fares could help fund capital improvements, though increases also have the potential to decrease ridership in the short term.

Implementation Funding

City implementation costs will be integrated into the City's existing operating budget and CIP because the City and other public agencies will be responsible for implementing local reduction measures. Given fiscal constraints, it may be necessary to support increased operating costs with charges applied to capital programs, or grants, fees, and other new revenue sources. For example, the City could pursue DOC SGC planning grants, described above under State and Federal Funds.

Local Fees

The City is not proposing any local fees or taxes at this time. While current economic conditions and fiscal realities limit funding options for the local reduction measures, additional funding sources that are currently infeasible may become realistic as the economy recovers. One potential future funding source is described below.

AB 811 Districts (PACE)

AB 811 is a California environmental law passed in 2008 to help California municipalities accomplish the targets outlined by the Global Warming Solutions Act of 2006. AB 811 authorized all California cities and counties to designate areas where property owners could enter into contractual assessments to receive long-term, low-interest loans for energy- and water-efficiency improvements and renewable energy installations on their property. The financing is repaid through property tax bills. AB 811 only allows for financing of the purchase and installation of appliances that are permanently attached to real property.

The Property-Assessed Clean Energy (PACE) finance program is the AB 811 funding mechanism. The program uses a land-secured loan to finance the installation of energy and water improvements within a home or business; the borrower repays the amount through property assessments. CaliforniaFIRST is a commercial and multifamily energy funding tool that uses PACE to support low cost project financing. The program is currently in a pilot phase, and the City is not part of the pilot program. However, the California Statewide Communities Development Authority (California

Communities), sponsor of the PACE program, intends to extend CaliforniaFIRST to include all interested counties and cities that are members of California Communities, including Goleta.
Eligible projects under the CaliforniaFIRST Program may include, but are not limited to: air sealing, wall and roof insulation, energy-efficient windows, tankless water heaters, solar photovoltaic and low-flow toilets.

PACE financing for residential customers was interrupted due to a 2010 statement by the Federal Housing Financing Agency (FHFA), advising Fannie Mae and Freddie Mac to avoid acquiring mortgages on homes that participate in a PACE program. The concern is with PACE program's "first liens" (i.e., superior to the mortgage). In response to the FHFA statement, many PACE programs halted their residential programs (only residential properties get Fannie Mae/Freddie Mac financing) due to concern about potential effects on federally-backed mortgages in the area of the residential PACE program.

Despite the FHFA statement and in lack of any formal rule or enforcement action, certain PACE residential programs have been developed, in which participants are made aware of the potential risks concerning potential actions that could be taken by federal mortgage agencies. Some PACE program proponents argue that that the federally backed housing lenders are not actually banned from serving PACE customers – they simply have to require the mortgage to be paid first and that as long as homeowners understand the risks involved, then they can still legally participate in PACE. Some PACE programs also make the PACE loan a junior lien to the mortgage, but this can make such programs less attractive to private investors.

The HERO program in Western Riverside County, which is also being rolled out by San Bernardino County and other locations in California, is extending PACE funding to residential customers. The program addressed the FHFA's requirements by giving homeowners two cautionary messages. The first message tells homeowners they should review their mortgages for any provisions that may be triggered by the assessment. The second message says they may have to pay off their assessments when they sell or refinance their homes. There is no constraint for PACE-style financing districts for commercial properties because FHFA is not involved in commercial property loans.

4.2.4 Implementing Actions

The City will need to undertake a series of steps in order to move local reduction measures into action. The nature of these tasks ranges widely and includes both regulatory and discretionary actions on the part of the City.

- *Refine cost estimates*. As described above, the estimated costs for local reduction measures are based on a variety of participation, per-unit, and other assumptions. As programs are developed, cost estimates should be refined with more precise implementation-level data.

- *Adopt or update ordinances and/or codes.*[18] Some local reduction measures represent a continuation of recently enacted ordinances, while others will require new ordinances. Staff will need to coordinate these efforts in conjunction with the City Council.
- *Pursue outside funding sources.* A range of funding from State and federal agencies has been identified. The City may pursue these (and other emerging) funding sources as a part of implementation efforts.
- *Create monitoring/tracking processes.* Several local reduction measures will require program development, tracking, and/or monitoring.
- *Identify economic indicators to consider future funding options.* Economic recovery may occur rapidly or slowly. Whatever the timeframe, the City will need to determine the point at which certain additional funding sources will become feasible or desirable. Identification and monitoring of economic indicators, such as home prices, unemployment rates, or real wage increases, can help the City decide when to further explore the potential for funding local reduction measures through additional taxes, surcharges, and/or fees on existing and new development.

4.2.5 Timelines for Phased Measure Implementation

It is anticipated that the CAP will be implemented in phases. The following is an outline of key priorities for three (3) implementation phases.

- Phase 1 (2014–2015). The City will create a planning framework to guide implementation of the voluntary measures. Measure funding and a finance plan will be developed. The City will encourage implementation of cost-effective measures identified in the CAP.
- Phase 2 (2016–2017). The City will continue to implement measures that were begun in Phase 1. It will evaluate the effectiveness of these measures and adapt management procedures accordingly. Likewise, the City will conduct an updated community GHG inventory to monitor emissions trends. The City will also select and encourage implementation of Phase 2 measures (as shown in Table 4-5).
- Phase 3 (2018–2020). The City will continue to implement and support measures begun in Phases 1 and 2, and encourage implementation of all remaining CAP measures (Phase 3 measures as shown in Table 4-5). An analysis of the effectiveness of Phase 1 and 2 measures will be conducted, as well as an updated community GHG inventory. The City will begin developing plan for post-2020 actions.

[18] Many measures identified in the CAP, such as RE-1, represent a continuation of programs already underway or programmed to be implemented by the City. It is not anticipated that these measures would present substantial additional capital costs to the City.

Table 4-5. Potential Phasing and Ease of Implementation for GHG Reduction Measures

Title	Measure	Phase	Implementation Effort
Building Energy			
BEE-1	Continue Implementation of Residential and Commercial Building Code that Exceeds Title 24 Standards by 15 percent effective through Code Expiration (July 2014)	1	Low
BEE-2	Aide Public Participation in Energy Efficiency Retrofit Programs for Low-Income Housing Through Outreach Program	1,2,3	High
BEE-3	Aide Public Participation in Funding, Incentive, or Rebate Programs that Provide Financing for Residential Energy Efficiency Retrofits Through Outreach Program	1,2,3	High
BEE-4	Aide Public Participation in Funding Programs that Provide Financing for Commercial Energy Efficiency Retrofits Through Outreach Program	1,2,3	High
BEE-5	Support Planting of New Trees in the City through Urban Forest Management Plan	1,2,3	Low
BEE-6	Encourage Community-Wide Energy Efficiency through Outreach Program	1,2,3	Medium
BEE-7	Encourage Public Participation in Energy-Efficient Appliance Programs through Outreach Program	1,2,3	High
BEE-8	Monitor Gains of the Santa Barbara County Green Business Program or Initiate a Separate City Program	1,2,3	Low
Renewable Energy			
RE-1	Continue Implementation of Ordinance Requiring Construction of Solar-Ready Buildings	1,2,3	High
RE-2	Aide Public Participation in Funding Programs for Residential Solar Installations through Outreach Program	1,2,3	Medium
RE-3	Aide Public Participation in Funding Programs for Commercial Solar Installations through Outreach Program	1,2,3	Medium
RE-4	Encourage Solar Installation in New Residential	1,2,3	Medium
Community Choice Aggregation			
CCA-1	Pursue a Community Choice Aggregation Program	1,2,3	High
On-Road Transportation and Land Use			
T1	Develop Design Guidelines for Increased Density for New Developments	1,2,3	High
T2	Develop Design Guidelines for Increased Destination Accessibility for New Developments	1,2,3	High
T3	Create an Incentive Program for Increased Diversity for New Developments (Mixed Use)	1,2,3	High
T4	Develop Design Guidelines for Improved Design for New Developments	1,2,3	Medium
T5	Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development	1,2,3	Medium
T6	Create an Incentive Program for Integrating Below-Market Rate Housing	1,2,3	Medium
T7	Implement General Plan Policy TE 11: Bikeways Plan	1,2,3	Medium
T8	Encourage Bicycle Parking through Development of Design Guidelines and Policies	1,2,3	Low
T9	Encourage SBMTD to Expand and Improve Transit Network	1,2,3	High

Title	Measure	Phase	Implementation Effort
T10	Develop Incentives to Encourage Employee-Based Commute Trip Reduction Programs	2,3	Low
T11	Encourage End-of-Trip Facilities	2,3	Medium
T12	Develop Incentives for Employers to Provide Employer-Sponsored Shuttles	2,3	Medium
T13	Coordinate with School Administrative Staffs to Adopt Programs Reducing Vehicular Travel to School	2,3	Medium
T14	Encourage Land Dedication for Trails	1,2,3	Medium
T15	Identify Opportunities for Bike Parking at Strategic Transit Locations	2,3	Low
T16	Encourage Contributions for Transit Access Improvements as Condition for New Development Along Transit Corridors	2,3	Low
T17	Develop Incentives for Employers to Provide Preferential Parking	2,3	Low
Water Consumption			
WR-1	Continue Compliance with SB X7-7: Reduce Per Capita Urban Water Use	1,2,3	Medium
WR-2	Encourage Indoor Water Conservation Opportunities for New Buildings through Outreach Program	1,2,3	Medium
WR-3	Continue Implementation the Model Landscape Ordinance	1,2,3	Medium
Off-Road Transportation and Equipment			
OR-1	Encourage Alternatively Fueled Construction and Landscape Equipment	3	High
Solid Waste Generation			
WS-1	Require City Waste Franchise Diversion Rate Increase	1,2,3	Low
WS-2	Expand Commercial and Residential Recycling and Composting Services	2,3	Medium
Municipal Measures			
M-1	Develop a Water Conservation Plan for City Operations	1,2,3	Medium
M-2	Conduct an Employee Commute Study	2,3	Low
M-3	Implement the Energy Efficiency Action Plan	1,2,3	Medium
M-4	Hybrid or Partial Zero Emission Vehicle Purchase Policy	2,3	Medium
M-5	Conduct a detailed waste study at all City facilities	2,3	Low
M-6	Develop an Outreach Program for City Employees that Focuses on Energy Conservation	2,3	Low

The implementation coordinator will develop a CAP implementation timeline to encourage implementation of all reduction measures. Measure prioritization will be based on the following factors.

- Cost/Funding—How much does the measure cost? Is funding already in place for the measure?
- Greenhouse Gas Reductions—How effective is the measure at reducing greenhouse gases?
- Other Benefits—Does the measure improve water quality or conserve resources? Will it create jobs or enhance community wellbeing?
- Consistency with Existing Programs—Does the measure compliment or extend existing programs?
- Impact on the Community—What are the advantages and disadvantages of the measure to the community as a whole?

- Speed of Implementation—How quickly can the measure be implemented and when will the City begin to see benefits?
- Implementation Effort—How difficult will it be to develop and implement the program?

Table 4-5 presents a preliminary timeline and phasing schedule for the GHG reduction measures. A qualitative appraisal of implementation effort for the City is also provided. Measures of effort are categorized based on the following conventions.

- Low—Measure will require limited staff resources to develop. In some cases, existing programs may be utilized to facilitate program implementation. Policy or code revisions may be necessary, although internal and external coordination efforts will likely be limited.
- Medium—Measure will require staff resources beyond typical daily levels. Policy or code revisions may be necessary. Public outreach and coordination with stakeholders will be necessary to ensure program success.
- High—Measure will require extensive staff resources to develop and implement. A robust outreach campaign will be necessary to properly communicate program requirements and address public questions and issues.

4.3 Supporting Strategies

Successful implementation of individual GHG reduction measures requires the identification of key action items, known obstacles, and resources. The targets of several reduction measures can often be achieved through a variety of means, especially those related to building energy efficiency, renewable energy development, and improvements to the transportation network. Comprehensive implementation strategies for each measure would develop over time. However, supporting measures will complement or help the primary measures achieve their full reductions.[19] Supporting measures are shown in Table 4-6.

These supporting measures have not been quantified, either because they could not accurately be quantified as stand-alone measures, or the City preferred to leave some measures as "back-up" measures that will only be implemented in the event that the State or local measures are not successful or achieve fewer emissions reductions than expected. If it is necessary to utilize any of these support measures in the future, they will be re-evaluated and quantified at that time to determine which ones will be most appropriate and feasible for implementation.

[19] At this time, none of these measures are quantified in terms of reductions. In the future, some may be.

Table 4-6. Qualitative Supporting Measures

Building Energy Measures	
BEE-6: Encourage Community-Wide Energy Efficiency through Outreach Program	This supporting measure will promote energy conservation in the community through campaigns targeted at residents, businesses, schools, and other groups. While the other building energy measures in the CAP will reduce energy consumption through retrofits and technological improvements, this measure will encourage residents to modify their consumption habits to reduce electricity and natural gas usage. This measure was not quantified due to a lack of data. If, in the future, if the City sets up an outreach program with a system to track data (e.g., number of participants, utility bill changes), this measure could be quantified.
BEE-7: Encourage Public Participation in Energy-Efficient Appliance Programs through Outreach Program	This measure will encourage residents to upgrade their appliances to newer, more energy-efficient models. This measure will overlap with measures BEE-2 and BEE-3, however, so it was not analyzed as a stand-alone measure. Nevertheless, it can support the implementation of the more difficult components of BEE-2 and BEE-3 (appliance upgrades). Incentives from SCE should be utilized to help implement this measure. For example, SCE provides incentives for refrigerator recycling and upgrades.
BEE-8: Monitor Gains of the Santa Barbara County Green Business Program or Initiate a Separate City Program	The County of Santa Barbara has a Green Business Certification Program. If City businesses comply with specifications of the Santa Barbara County Program, document that all improvements were made after 2007, and document the amounts of savings (kwh, therms, gallons, tons of waste or VMT reduced), the City could take credit for the associated GHG reductions. This measure was not quantified due to a lack of data. If, in the future, City businesses participate in this program and track the benefits, this measure could be quantified, and the GHG reductions will be credited to the City.
On-Road Transportation and Land Use Measures	
T-14: Encourage Land Dedication for Trails	This measure will require larger projects and developments to provide, contribute, or dedicate land for the provision of offsite bicycle trails. These trails should provide a continuous link to the project and fall in line with the City's bicycle network plans. This measure was not quantified as a stand-alone strategy, but it will complement the other transportation measures by enhancing the City's bicycle network and community, and, consequently, reducing vehicle trips. Dedications will need to have a nexus and proportionality to project-level impacts.
T-15: Identify Opportunities for Bike Parking at Strategic Transit Locations	This measure will provide short-term and long-term bicycle parking near rail stations, transit stops, freeway access points, and park-and-ride lots. Bicycle parking provides a "first-mile" solution to commuters who may have limited access to major transportation hubs. This measure was not quantified as a stand-alone strategy, but it will complement the other transportation measures by enhancing the City's transit network and bicycle community, and, consequently, reducing vehicle trips

T-16: Encourage Contributions for Transit Access Improvements as Condition for New Development Along Transit Corridors	This measure will require projects along transit corridors to provide for transit access improvements such as bus stops and bus shelters. This measure was not quantified as a stand-alone strategy, but it will complement the other transportation measures by enhancing the City's transit network and, consequently, reducing vehicle trips.
T-17: Develop Incentives for Employers to Provide Preferential Parking	This measure will require preferential parking in convenient locations such as near public transportation, building front doors, and commercial centers. This parking will be reserved for commuters who carpool, vanpool, ride-share, or use alternatively fueled vehicles. This measure was not quantified as a stand-alone strategy, but it will complement the other transportation measures by aiding in reducing commute trips.
Water Consumption Measures	
WR-2: Encourage Indoor Water Conservation Opportunities for New Buildings through Outreach Program	WR-2 will encourage developers of new buildings to utilize water efficient fixtures when constructing the buildings. This measure was not quantified as a stand-alone measure, as it will overlap with WR-1, Compliance with SB X7-7: Reduce Per Capita Urban Water Use. Consequently, WR-2 is a complementary measure to WR-1, as it will help the City achieve a 5 percent reduction in per capita water use.
WR-3: Continue Implementation the Model Landscape Ordinance	WR-3 calls for the implementation of the Model Landscape Ordinance, which was adopted by the City and will result in decreased water consumption for landscaping purposes. This measure was not quantified due to a lack of data, but it is included as a qualitative measure to complement WR-1. The Model Landscape Ordinance, while not quantified as part of this analysis, will help the City achieve the SBX 7-7 target of a 5 percent reduction in per capita water use, as laid out in WR-1.
Solid Waste Generation Measures	
WS-2: Expand Commercial and Residential Recycling and Composting Services	Under this measure, the City's waste collector will expand recycling and composting services to residences and businesses in the City. This measure cannot be quantified as a stand-alone measure without double counting emissions reductions from WS-1. The City's waste collector will achieve the contracted waste diversion rate (quantified in WS-1) through a number of actions. Expanding recycling and composting services is one of those actions.
Municipal Measures	
M-4: Implement Hybrid or Partial Zero Emissions Vehicle Purchase Policy	This measure will implement a City policy to purchase hybrid vehicles or other low-emissions vehicles for the City fleet. The City currently an informal policy in place to purchase low-emissions vehicles whenever possible, but it is unclear at this time how many vehicles will be purchased. As a result, this measure is qualitative, but GHG reductions associated with the policy could be quantified in the future with appropriate data tracking.

M-5: Conduct a Detailed Waste Study at all City Facilities	M-5 calls for the City to conduct a waste study within City-owned facilities. This measure will reduce GHG emissions associated with waste generated at City facilities, though the emissions reductions will likely be low. The measure was not quantified because it would be difficult to track waste generated at City facilities. Nevertheless, this measure could be quantified in the future if tracking waste in City facilities becomes more feasible.
M-6: Develop an Outreach Program for City Employees that Focuses on Energy Conservation	This measure will focus on developing an outreach program to City employees aimed at increasing energy conservation habits. Such a program will further reduce energy consumption in City facilities, but it was not quantified as part of this analysis due to a lack of and uncertainty about program specifics.

4.4 Community Outreach and Education

The citizens and businesses in Goleta are integral to the success of the CAP. Their involvement is essential, considering that several measures depend on the voluntary commitment, creativity, and participation of the community.

The City will collaborate with other local and regional agencies, businesses, and organizations to educate and inform stakeholders, such as businesses, business groups, residents, developers, and property owners, about the CAP and encourage participation in efforts to reduce GHG emissions. The CIT will schedule periodic meetings to facilitate formal community involvement in CAP implementation and adaptation over time. These meetings will be targeted to stakeholder groups and provide information on CAP implementation progress. Stakeholders will be provided an opportunity to comment on potential improvements or changes to the CAP. The CIT will also sponsor periodic outreach events to directly inform the community at large and solicit input, suggestions, and participation.

4.5 Regional Involvement

There are several regional partners and collaboration opportunities that will be essential to the CAP. The City will explore the potential to support implementation of the CAP by leveraging resources provided by these opportunities. Potential opportunities and partners include the following.

- *SBCAPCD*. SBCAPCD is the local agency responsible for developing and implementing air quality plans. The agency also sponsors various air quality programs that may support implementation of the off-road transportation measure. SBCAPCD offers incentives to replace off-road equipment and engines with lower-emissions equipment and engines. Future programs could support energy efficiency and renewable energy measures, depending on funding availability.
- *SCE*. SCE offers numerous incentives and rebate programs to encourage energy efficiency. Resources offered by SCE may reduce program implementation and administration costs.
- *Transportation Agency (SBMTD).* In order to fully implement the transportation reduction measures that promote mixed-use development, continued coordination with the regional transportation agency will be necessary. With SB 375 and its linkage to transportation funding, it will also be crucial for the City and SBMTD to develop a shared vision of how transportation and land use can be consistent with the next Regional Transportation Plan and the required SCS.
- *Santa Barbara County Resource Recovery & Waste Management Division*. WS-1 includes the adoption of a 45 percent City waste franchise diversion target. Coordination with the County to provide the facilities, programs, and incentives will help ensure this target can be achieved by 2020.
- *City of Santa Barbara*. The neighboring city of Santa Barbara has adopted a GHG reduction plan, with many local strategies similar to the City's. Cooperation with others in Santa Barbara County and elsewhere could help to find collective efficiencies in implementing GHG reduction strategies.

- *Goleta Water District*. The City can work with the water provider (Goleta Water District) to promote reductions in indoor and outdoor water use from existing developments and achieve the targets set forth by SB X7-7.

4.6 Monitoring, Reporting, and Adaptive Management

Regular monitoring is important to ensure programs are functioning as they were originally intended. Early identification of effective strategies and potential issues will enable the City to make informed decisions on future priorities, funding, and scheduling. Moreover, monitoring provides concrete data to document the City's progress in reducing GHG emissions. The implementation coordinator will be responsible for developing a protocol for monitoring the effectiveness of emissions reduction programs and for undertaking emissions inventory updates.

Effective monitoring will require regular data collection in each of the primary emissions sectors. For example, reports detailing annual building electricity usage and fuel consumption will be necessary. The implementation coordinator will coordinate with internal City departments, SCE, and other stakeholders to obtain and consolidate information into a repository that can be used to evaluate the effectiveness of individual reduction measures.

The implementation coordinator will also be responsible for tracking the State's progress on implementing the State-level programs. The CAP relies heavily on State-level measures. Close monitoring of the real gains being achieved by State programs will allow the City to adjust the CAP, if needed.

At a minimum, the City will re-inventory community GHG emissions for 2017 and 2020 in order to measure progress. If feasible at a reasonable cost/effort, annual GHG inventory monitoring may be conducted starting in 2014, but at this time funding and staff resources are not available, and the City cannot make such a commitment until funding mechanisms and resource availabilities are better understood.

The implementation coordinator will report annually to the City Council on CAP implementation progress. Where annual reporting, periodic inventories, or other information indicates that the GHG reduction measures are not as effective as originally anticipated, the CAP may need to be adjusted, amended, or supplemented. At a minimum, the City will conduct a 3-year review of CAP effectiveness as part of annual reporting in 2017, which will allow the potential to make mid-course adjustment in the CAP to effect change prior to 2020.

4.7 Managing the City's Greenhouse Gas Emissions after 2020 to reach 2030 Target

While GHG management in the State of California is currently focused on a 2020 target, EO S-03-05 articulates a GHG reduction target for California in 2050. EO S-03-05 states that by 2050 California shall reduce its GHG emissions to a level that is 80 percent below the level in 1990. It is reasonably foreseeable that as California approaches its first milestone in 2020, focus will shift to the 2050 target. A detailed plan for how the State will meet this target is expected. The City will monitor developments at the national and State levels.

Per the requirements of the City's General Plan, this CAP includes a preliminary GHG reduction target for 2030. This target will be preliminary given that California at present does not have legislation (like AB 32) defining the statutory targets for reductions after 2020.

Beginning in Phase 3 (2018), the City will commence planning for the post-2020 period. At this point, the City will have implemented the first two phases of the CAP and will have a better understanding of the effectiveness and efficiency of different reduction strategies and approaches. In addition, the State is likely to have a better understanding of its post-2020 commitments. The City will evaluate the status of federal, State, and local GHG reduction strategies and assess the need for future City GHG reduction planning. The new post-2020 reduction plan will include a revised target for 2030, as well as preliminary targets for 2040 and 2050. The targets will be consistent with broader State and federal reduction targets and with the scientific understanding of the reductions needed by 2050. The City will adopt the post-2020 reduction plan by January 1, 2020.

Appendix A
Greenhouse Gas Inventory and Forecast Methodology

Appendix A
Greenhouse Gas Inventory and Forecast Methodology

Introduction

This appendix summarizes the sectors analyzed, the methodology, and the data sources used to develop the City of Goleta's (City) baseline greenhouse gas (GHG) 2007 Inventory and the 2020 and 2030 forecasts. The eight (8) sectors are as follows.

- Building Energy
- On-Road Transportation and Land Use
- Off-Road Transportation and Equipment
- Solid Waste Generation
- Refrigerants
- Water Consumption
- Wastewater Treatment
- Agriculture

This appendix also describes stationary sources methodology and data sources, though it should be noted that this sector was not included in the City's 2007 Inventory or the 2020 or 2030 forecasts.

GHG emissions from "community activities" include those resulting from activities within the City's jurisdictional boundary and generally consist of emissions sources that the City's community can influence or control. Emissions generated by the City's municipal operations (e.g., City-owned facilities, vehicle fleets) are also subject to the CAP and have been included in the 2007 Inventory. The 2007 Inventory represents the baseline inventory, or existing emissions levels. The 2020 and 2030 forecasts are a prediction of how community emissions may change by 2020 and 2030 in the absence of State and local actions to reduce GHGs. The forecast estimates future GHG emissions based on trends in population, households, and employment.

The 2007 Inventory and 2020 and 2030 forecasts were developed using methodologies and procedures approved by state and local air quality management agencies. The primary protocols consulted for the analysis are listed below.

- The U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (ICLEI 2012).
- Local Governments Operations Protocol (LGOP) for the quantification and reporting of GHG emissions inventories (California Air Resources Board 2010a).
- 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change 2006).
- 2009 General Reporting Protocol (Version 3.1) for reporting entity-wide GHG emissions (California Climate Action Registry 2009).

As is the standard practice, the 2007 Inventory and the 2020 and 2030 forecasts are presented in metric tons (MT) of CO_2 equivalent (CO_2e), unless otherwise denoted. Presenting inventories in CO_2e allows one to characterize the complex mixture of GHGs as a single unit that takes into account the different global warming potential (GWP) of each gas.

The 2020 and 2030 forecasts take into account the recent closure of the San Onofre Nuclear Generation Station (SONGS). SONGS was a nuclear power plant that generated carbon-free electricity for Southern California Edison (SCE) in 2007 (the inventory year). The facility was temporarily shut down in January 2012 for maintenance and repair of certain facilities but was then permanently shut down in June 2013, requiring the reinstatement of several natural gas plants and dramatically altering SCE's power mix. SCE's power mix in 2011 was 19% qualified renewables; 8% coal; 7% large hydroelectric; 27% natural gas; 24% nuclear; and 15% unspecified sources. SCE's power mix in 2012 was 20% qualified renewables; 7% coal; 4% large hydroelectric; 21% natural gas; 7% nuclear; and 41% unspecified sources.

According to CARB, total GHG emissions from power plants in California increased by 35% in 2011 (from 30.7 million MT CO_2e to 41.6 million $MTCO_2e$), primarily due to increase in natural gas electricity generation. The majority of the additional natural gas electricity generation is due to a decrease in available hydroelectric generation and due to the early closure of SONGS. Electricity emissions had been declining from 2008 to 2011, but then went up in 2012. Electricity consumption is another factor as consumption increased by approximately 2% likely due to warmer weather, and a recovering economy. Annual electricity consumption had declined in 2009 and 2010 and had only 1% annual growth in 2011.

The California Public Utilities Commission (CPUC) approved a final decision (Rulemaking 12-03-014) regarding the long-term procurement for local capacity requirements due to the permanent retirement of SONGS in March 2014.[1] The decision outlines a strategy that will replace electricity generated by SONGS with a range of renewable, energy storage, natural gas, and other resources. The decision allows for procurement flexibility of renewable/energy storage that ranges between 40% and 60%. For the purposes of this analysis, a midpoint between the range of 50% renewable/energy storage and 50% natural gas (including "other resources") was used. Therefore, electricity-related emissions were forecasted to 2020 and 2030 assuming that SONGS will be replaced by 50% renewable and 50% natural gas resources.

The 2020 and 2030 forecasts were estimated using socioeconomic data (population, employment, households) estimates for 2020 and 2030 from the Santa Barbara County Association of Governments 2007 forecasts, adjusted using the 2010 U.S. Census. It is possible that the forecasts may be somewhat optimistic due to the economic downtown. If population, employment, and housing growth is less than that estimated at present, then the estimate of 2020 and 2030 GHG may

[1] See http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M088/K979/88979084.PDF.

overestimate actual emissions levels. Overly conservative projections of population, employment, and households would be detrimental to the CAP. The CAP should cover the actual expected growth in the City to 2020 and 2030. Thus, the socioeconomic data used for this analysis are considered representative of likely growth that could occur under the City's General Plan to 2020 and 2030.

Building Energy

Building energy emissions include both direct emissions from onsite natural gas consumption (heating and cooking) and indirect emissions from electricity consumption. This sector captures both residential and commercial/industrial buildings and facilities. Indirect emissions from electricity consumption result from combustion of fossil fuels at power plants, although the activity of using electricity occurs (e.g., lighting or air conditioning) within the City's boundaries.

Methodology

Electricity and natural gas usage data were collected from SCE and Sempra Utilities, the entities that provide electricity and natural gas service, respectively, to the City. GHG emissions due to electricity use in the City were calculated by multiplying electricity consumption by a CO_2 carbon intensity emission factor for SCE's electricity in 2007. This electricity emission factor is included in the Public Utility Protocol Reports (SCE publicly reports its emissions to the California Climate Action Registry). Electricity emission factors for CH_4 and N_2O were taken from the U.S. Environmental Protection Agency's (EPA's) Emissions & Generation Resource Integrated Database (eGRID), which represents values for California.

GHG emissions due to natural gas consumption were estimated by multiplying natural gas consumption (therms) by the natural gas emission factors for CO_2, CH_4, and N_2O from the Climate Registry General Reporting Protocol Version 3.1. Natural gas -related GHG emissions were projected to 2020 and 2030 using population growth (for residential energy consumption) and job growth (for commercial energy consumption). Electricity emissions were determined by multiplying 2020 and 2030 electricity consumption by the 2020 BAU electricity emission factor (no change made for 2030). The 2020/2030 BAU electricity factor was developed using the "50/50" scenario described in the Introduction. This factor assumes that, under a 2020 BAU scenario, SCE will have 27.5% qualified renewable energy (18% assuming same mix as 2010 and 9.5% as 50% replacement for SONGs), 6% large hydro-electric energy, and 9.5% natural gas as a replacement for SONGS. The remainder of the electricity (57%) was assumed to be a mix of fossil fuel sources.

Data Sources

- City socioeconomic data.
- Goleta's electricity consumption provided by SCE.
- Goleta's natural gas consumption provided by Sempra Utilities.

- CO_2, CH_4, and N_2O emission factors for natural gas combustion—California Climate Action Registry General Reporting Protocol version 3.1: http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html.
- Electricity emission factor for CO_2 from the California Climate Action Registry Public Utility Report for SoCal Edison for 2007: http://www.climateregistry.org/wp-content/plugins/carrot/carrot_reports/southern-california-edison-2007-ca.pdf.
- Electricity emission factors for CH_4 and N_2O from EPA's Emissions & Generation Resource Integrated Database (eGRID): http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html.
- CARB 2008 to 2012 Emissions for Mandatory Greenhouse Gas Emissions Reporting Summary: http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/2008-2012-ghg-emissions-summary.pdf.
- CEC Electricity Consumption Data: http://www.ecdms.energy.ca.gov/elecbycounty.aspx.

On-Road Transportation and Land Use

This sector includes emissions from on-road transportation and land use in the region. Emissions from this sector are due to the combustion of fossil fuels (such as diesel and gasoline) used to power all on-road vehicles (e.g., light and medium duty autos, medium and heavy duty trucks, buses, and motorcycles).

Methodology

Traffic modeling was conducted by Fehr and Peers for the City using the Santa Barbara County Association of Governments (SBCAG) Regional Travel Demand Model for the years 2000 and 2030. Vehicle-miles traveled (VMT) for these years were estimated using the SBCAG model. Intermediate years (2007 and 2020) were estimated using linear interpolations between years 2000 and 2030. Fehr and Peers used the following approach to calculate VMT for the City, which is consistent with the Regional Targets Advisory Committee document Recommendations of the Regional Targets Advisory Committee Pursuant to Senate Bill 375.[2]

CO_2 emissions from on-road vehicles were estimated using the VMT data from the SBCAG model. Emission factors (grams CO_2/mile) by speed were estimated using the EMFAC 2007 model. Vehicle distributions by speed were estimated using the CT-EMFAC model for 2007, 2020, and 2030.

CH_4 and N_2O emissions were calculated using the SBCAG model VMT data and emission factors (grams CH_4/mile or grams N_2O /mile) from EPA's GHG inventory report, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2005.

Data Sources

- SBCAG Regional Travel Demand Model.

[2]Located at: http://www.arb.ca.gov/cc/sb375/rtac/report/092909/finalreport.pdf.

- EMFAC 2007 Model.
- CT EMFAC model.
- U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2005, EPA 430-R-07-002, Annex 3.2, (April 2007).

Off-Road Transportation and Equipment

This sector includes emissions due to the burning of fuel by all types of off-road vehicles and equipment operating in the City, including residential (e.g., lawn and garden), commercial/industrial (e.g., transportation refrigeration units, construction), oil, gas and mining equipment, pleasure craft and recreational vehicles, and portable pumps and generators.

Methodology

Emissions from off-road vehicles in Santa Barbara County were estimated using the California Air Resources Board's (ARB's) OFFROAD 2007 model. The OFFROAD model provides the annual activity level (hours of operation per year or gallons of fuel consumed per year) and type of fuel consumed for a wide variety of off-road vehicle and equipment categories at the county level. The fuel consumed was summed for each equipment and vehicle category and multiplied by corresponding fuel emission factors from the California Climate Registry's General Reporting Protocol version 3.1. These emission factors relate the amount of CO_2, CH_4, and N_2O emitted per gallon of gasoline, diesel, or liquefied propane consumed.

Santa Barbara County-wide GHG emissions for each equipment type was apportioned to the City based on one of three metrics: population, housing, or jobs. For example, lawn and garden equipment emissions were apportioned to the City using the number of City households relative to County households. Off-road emissions in 2020 and 2030 were estimated by projecting the 2007 emissions for each category using the appropriate socioeconomic data. Continuing with the prior example, lawn and garden equipment emissions were projected to 2020 and 2030 using the rate of household growth in the City between 2007 and 2020 and 2030.

Data Sources

- California Climate Action Registry General Reporting Protocol version 3.1. January 2009: http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html.
- California Air Resources Board's OFFROAD 2007 model.
- City socioeconomic data.

Solid Waste Generation

This sector includes CH_4 methane emissions that will result from the decomposition of landfill waste that was generated by the City in 2007. These emissions are also known as the "future methane commitment" of the waste. CO_2 emissions due to waste generated in 2007 are not considered in this analysis because they are considered biogenic in origin.

Methodology

Emissions from waste generation were calculated using publicly available data from CalRecycle and emission factors based on EPA's Waste Reduction Model (WARM). CalRecycle waste data details the specific amounts of various waste materials that compose a jurisdiction's waste stream for both the commercial and residential sectors. CalRecycle data were available from the larger waste agency that encompasses the City's waste management reporting, the Santa Barbara County Regional Integrated Waste Management Reporting Regional Agency (SBCRIWMRRA). Waste disposal was estimated for Goleta using the waste disposal data from CalRecycle for SBCRIWMRRA using the ratio of Goleta's population to the SBCRIWMRRA population, also from CalRecycle.

ICF altered emission factors from WARM to discount emissions from waste collection vehicles and recycling related emissions, as these are life cycles and are not typically included in a community GHG inventory. For each material type (e.g., used oil, paint, lumber, etc.), the modified EPA WARM emission factors were multiplied by the amount of waste disposed for the corresponding waste material type (i.e., the lumber emission factor was multiplied by the amount of lumber that Goleta generated in 2007). That is, the amount of each material type was multiplied by the material's corresponding emission factor. The emissions from all material types were summed to estimate total emissions. Residential waste emissions were estimated for 2020 and 2030 using population growth, and commercial waste emissions were estimated for 2020 and 2030 using job growth.

Data Sources

- California Department of Resources Recycling and Recovery (CalRecycle).
- EPA's Waste Reduction Model (WARM).
- City socioeconomic data.

Refrigerants

Refrigerant emissions are produced by air conditioning use and other refrigerant applications in commercial/industrial and residential buildings.

Methodology

A top down, per capita approach was used to estimate refrigerant emissions for the City. ARB's 2010 state refrigerants emissions were utilized and divided by the State's 2010 population from the U.S. Census. This resulted in a per capita refrigerant emission rate for the state. This per capita rate was applied to Goleta by multiplying the rate (in emissions per person) by the city's population data for 2007, 2020 and 2030. This approach assumes that the per capita rate for the state in 2007 was the same as in 2010, and that the City of Goleta has a similar rate of refrigerant emissions per person as the rest of the state.

Data Sources

- City population data

- California Air Resources Board: California Facilities and Greenhouse Gas Emissions Inventory High-Global Warming Potential Stationary: http://www.arb.ca.gov/regact/2009/gwprmp09/refappb.pdf.
- 2010 U.S. Census: http://quickfacts.census.gov/qfd/states/06000.html.

Water Consumption

Emissions from water consumption were estimated based on the energy associated with the distribution of water to the City.

Methodology

Emissions from the conveyance of water (i.e., the transport of water supplies from outside the City's boundary to the boundary), pretreatment of water, and distribution of water were calculated using two kinds of data: (1) the amount of water that the City consumed in 2007, per the Goleta Water District Urban Water Management Plan (UWMP), and (2) the energy intensity factors for water conveyance, treatment, and distribution, provided by California Air Pollution Control Officers Association (CAPCOA). Water consumption in the City for residential, commercial, and industrial uses was estimated using a linear interpolation of the consumption values in 2005 and 2010 from UWMP.

Water-related electricity was calculated by multiplying the water consumption amounts for residential, commercial, and industrial uses by energy intensity factors from CAPCOA. These factors assist in estimating the energy required to treat, convey, and distribute water. After water-related energy was determined, the energy values were converted into GHG emissions using the carbon-intensity factors for electricity discussed in the building energy sector section, above. Water-related emissions in 2020 and 2030 were calculated using the same approach as with 2007 and used UWMP projections for water consumption in the City in 2020 and 2030.

Data Sources

- California Air Pollution Control Officers Association 2010: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- Goleta Water District 2005 Urban Water Management Plan: http://www.water.ca.gov/urbanwatermanagement/2005uwmps/GoletaWD/Final_UWMP_rev_12-20-05.pdf.

Wastewater Treatment

These emissions are associated with the treatment of industrial, residential, and commercial wastewater produced by the City. These emissions result from fugitive emissions of CH_4 and N_2O that occur during the chemical and biological breakdown of wastewater at the wastewater treatment plant.

Methodology

Fugitive and process emissions that result from the treatment of wastewater were estimated using ARB's Local Government Operations Protocol equations to determine emissions from wastewater treatment facilities. These equations calculate the fugitive methane and nitrous oxide emissions that result from the wastewater treatment processes at wastewater treatment plants.

Energy consumed at the wastewater treatment plants that serves Goleta was provided by Goleta Sanitary District. This energy consumption was calculated into GHG emissions using the natural gas and electricity carbon intensity factors that were used for the building energy sector.

Data Sources

- Wastewater Data Request sent to Goleta Sanitary District in 2011.
- City population data.
- California Air Resources Board's Local Government Operations Protocol For the quantification and reporting of greenhouse gas emissions inventories volume 1.1. : http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf.

Agriculture

This sector includes emissions from agricultural activities associated with the combustion of fossil fuels in agricultural equipment, fugitive emissions of nitrous oxide from fertilizer use, and fugitive emissions of carbon from lime application.

Methodology

Agricultural vehicles include tractors, pumps, small farm equipment, and other vehicles used for agricultural purposes. Emissions from agricultural vehicles were calculated using ARB's OFFROAD2007 model, as described above for the off-road transportation and equipment sector.

Emissions resulting from fertilizer use were calculated using the number of acres in the City, as specified in the City' General Plan. This information was used in ARB equations for estimating direct and indirect N_2O emissions from fertilizer and lime application. Agriculture emissions were projected to 2020 using information from the City's General Plan, which indicates that the agricultural land will substantially decrease by 2020 (by ~70%) and will decrease even further from 2020 to 2030.

Data Sources

- City of Goleta General Plan.
- California Air Resources Board methodology:
- http://www.arb.ca.gov/cc/inventory/doc/methods_v1/annex_3f_nitrous_oxide_from_agricultural_soil_management.pdf.

Stationary Sources

This sector includes emissions from stationary combustion of fossil fuels (except natural gas, which is included in the building energy sector) and industrial process emissions. It should be noted that stationary sources are regulated by local air districts and ARB. The City does not have regulatory control over stationary sources located within the City, so emissions from stationary sources are not counted towards the City's GHG 2007 Inventory or 2020 or 2030 forecasts and are only included as an informational item. The methodology used to calculate stationary source items is described below for informational purposes.

Methodology

Emissions resulting from the combustion of fuels at stationary sources were estimated using fuel consumption information for permitted sources provided by the Santa Barbara County Air Pollution Control District (SBCAPCD). The data from the SBCAPCD includes a list of fuel types and the amount consumed and captures those sources emitting greater than 25,000 MT CO_2e per year that are required to report under California's Mandatory Reporting Rule. Fuel consumption quantities were multiplied by corresponding carbon intensity fuel emission factors from the Climate Registry to obtain GHG emissions. Stationary source emissions in 2020 were estimated by projecting 2007 emissions to 2020 and 2030 using annual job growth in the City.

Data Sources

- California Climate Action Registry General Reporting Protocol version 3.1 (January 2009): http://www.climateregistry.org/tools/protocols/general-reporting-protocol.html.
- Stationary Source fuel consumption provided by SBCAPD.

Appendix B
Greenhouse Gas Reduction Measure Methodology

Appendix B
Greenhouse Gas Reduction Measure Methodology

Introduction

This Appendix provides a detailed overview of the calculations and assumptions used to quantify greenhouse gas (GHG) reductions and the monetary costs and savings for each of the City's GHG reduction measures. A qualitative discussion of benefits is also presented. The following information is provided for each measure.

Measure Description. Details the implementation requirement(s) and reduction goal.

Assumptions. Includes all assumptions used in calculating emissions reductions and costs.

Analysis Details. Presents a detailed discussion of calculations performed to quantify emissions reductions. A qualitative summary of benefits is also provided. Note that a reasonable amount of information is provided so that the reader can understand the basic methods and equations used to quantify emissions reductions and costs. However, this section does not include an exhaustive list of all calculations and steps performed; doing so would result in hundreds of pages of documentation. For additional information, please refer to the citations provided for each measure.

Overview of GHG Methods

The quantification of GHG reductions was based primarily on guidance provided by the California Air Pollution Control Officers Association (CAPCOA), other reference sources (such as the U.S. Environmental Protection Agency), and consultant experience with developing climate action plans (CAP) for other jurisdictions in California. The majority of calculations were performed using standard factors and references, rather than performing a specific analysis of individual technologies. The following sections provide an overview of general calculation methods by emissions sector.

To avoid double counting emissions savings achieved by State programs, emissions reductions attributed to the local reduction measures first subtract reductions achieved through the relevant State measures. Likewise, emissions reductions attributed to State measures subtract reductions achieved by overlapping local measures. For example, local measures that reduce electricity consumption must take into account the Renewable Portfolio Standards (RPS) (State Measure-4), which will reduce the carbon intensity of the City's electricity in 2020. If double counting were not avoided in this example, the local building energy measure reductions would be assuming greater GHG reductions than would actually occur. By removing overlapping reductions, one can combine GHG reduction strategies to determine the cumulative effect of several measures without double counting measure effectiveness.

Overview of Cost-Benefit Analysis Methods

The cost analysis estimated the following metrics for each measure.

Upfront Costs/Capital Investments. These costs represent the costs of purchasing new equipment, retrofitting equipment, planting trees—the "one-time" costs associated with implementing a measure. In many cases, these one-time costs are assumed to occur at the same time; however, there are a few cases where these one-time costs are actually spread over several years as the measure is fully implemented.

Annual Net Costs/Savings. Annual costs generally represent maintenance costs. Annual savings often represent avoided energy costs or avoided maintenance costs. Net annual costs/savings can vary by year, so this document presents the annual net costs anticipated in 2020.

Net Present Value. The Net Present Value was calculated by considering the stream of all costs and savings over the lifetime of the equipment and applying a discount rate for future costs or savings. In some cases, there is no associated lifetime of equipment, and total costs/savings were calculated up to the 2020 time period. A discount rate of 5% was used.

Annualized discounted net costs (or savings) per ton of CO2e reduction in 2020 ($/ton). The total costs/savings were divided by an annuity factor to estimate the annualized costs/savings. This value is from the perspective of annual costs and savings, taking into account the time value of money. Because costs and savings are incurred over a period of several years, it is necessary to calculate the annualized amount so that it can be evaluated against the GHG reductions that occur in a single year (2020). This value provides an estimate of the cost per ton of implementing the measure.

Simple payback period. The simple payback period is calculated by dividing the one-time costs by the annual savings, or (when annual costs vary) by calculating the break-even point. In some cases, the payback period will exceed the lifetime of the equipment, and this never will actually be "repaid." These instances are noted as "NA" (for Not Applicable) in the summary tables. Note that the savings and costs are sometimes borne by different entities, so the payback period does not necessarily indicate that a given entity will actually be paid back on its investment.

There are some important caveats to note regarding the cost analysis. First, the numbers presented in this document are meant to provide order-of-magnitude estimates and assist in evaluating the relative costs/savings of each measure. There are numerous factors that will affect the actual costs incurred if the measures are implemented. In some cases, assumptions had to be made about the specific actions taken to implement a given measure, although the actual approach to implementing the measure could vary. Second, it is important to understand that in many cases, costs and savings are borne by different entities. For example, a local government may incur costs associated with planting and maintaining urban trees, but the savings from reduced electricity bills accrue to local businesses and residents. Where appropriate, this analysis distinguishes among the key players incurring the costs and savings.

Overview of Additional Measure Benefits

Many of the GHG reduction measures will result in financial, environmental, and public benefits for the City and community that are additional to the expected GHG emission reductions. These benefits include cost savings over conventional activities, reductions in criteria pollutants[1], job growth, economic growth, and public health improvements. Studies have shown that some climate actions in California can produce net gains for the statewide economy, increasing growth and creating jobs, while others will result in net costs. Climate policies can produce positive economic growth through monetary savings from improvements in energy efficiency and reduced energy bills, as well as investing in technologies for innovation, which can provide new stimulus for employment (Roland-Holst 2008). Another study demonstrated that addressing and mitigating GHG emissions on a national level can yield a large savings potential, benefit the global economy, and can be mostly achieved through implementation of existing technology (Vattenfall 2007). Based on literature reviews, a qualitative discussion of anticipated benefits is provided for each of the City's GHG reduction measures. Benefits are identified using the following icons.

Benefits of the City's GHG Reduction Measures

	*Reduced Energy Use*: A decrease in the amount of energy consumed resulting from increased consumer awareness and/or higher-efficiency appliances.		*Reduced Energy Price Volatility*: A reduction in the volatility of energy prices will make the City less sensitive to large swings in energy prices, reducing the impacts on energy consumers.
	*Waste Reduction:* A decrease in waste as a secondary benefit from non-waste measures. This includes reducing waste associated with electricity production.		*Economic Growth:* Growth in the economy resulting from increased jobs in the renewable energy sector, and potentially from increased consumer activity.
	*Resource Conservation:* Conservation of the Earth's natural resources, such as water, trees, land, and natural gas.		*Public Health Improvements*: A decrease in the risk and/or occurrences of asthma and other respiratory illnesses resulting from air pollution.

[1] The ARB defines a *criteria pollutant* as an air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM10 and PM2.5 (California Air Resources Board n.d.)

Benefits of the City's GHG Reduction Measures

	*Energy Diversification and/or Security*: A diverse profile of energy sources that the City utilizes benefits the City by reducing dependence on energy sources that may be politically volatile.		*Increased Quality of Life:* The general increase in quality of life in the community resulting from reduced commuting times, less time spent in the car, and more vibrant neighborhoods.
	*Reduced Air Pollution*: Decreased emissions of non-GHG pollutants, such as NOX and particulate matter.		*Reduced Urban Heat Island Effect:* Fewer localized heat events in downtown and urban areas. This benefit also contributes to reduced energy use and better quality of life.
	*Increased Property Values*: The measureable rise in property values as neighborhoods transition to walkable communities and become more attractive to potential buyers.		*People-Oriented Communities:* Development of dense and walkable communities that make car travel less necessary for all trips.

State-1: AB 1493 (Pavley I) and Advanced Clean Cars

Measure Description

Pavley I will reduce GHG emissions from automobiles and light duty trucks by 30% from 2002 levels by the year 2016. The regulations affect 2009 models and newer. The Advanced Clean Cars Initiative introduces new standards for model years 2017–2025, and will increase fuel economy up to 62 miles per gallon by 2025.

Assumptions

Pavley I will reduce statewide emissions from passenger vehicles by 27.7 million metric tons (MT) carbon dioxide equivalent (CO2e) (California Air Resources Board 2011).

Advanced Clean Cars will reduce statewide emissions from passenger vehicles by 3.8 million MT CO2e in 2020 (California Air Resources Board 2011).

Analysis Details

GHG Analysis

Engine efficiency improvements will reduce fuel consumption, thereby reducing GHG emissions from fossil fuel combustion.

Emissions Reductions

The California Air Resources Board (ARB) estimates that implementation of Pavley I will reduce statewide emissions from passenger vehicles by 27.7 million MT CO2e, or by approximately 17% (California Air Resources Board 2011). GHG reductions achieved by Pavley I within the City were therefore quantified by multiplying emissions from light duty vehicles by 0.17. Similarly, ARB estimates that implementation of the Advanced Clean Cars initiative will reduce statewide emissions from passenger vehicles by 3.8 million MT CO2e[2], or by approximately 2.5% in 2020 (California Air Resources Board 2011). GHG reductions achieved by the Advanced Clean Cars initiative within the City were therefore quantified by multiplying emissions from light duty vehicles by 0.025.

Cost Analysis

Costs not estimated.

Co-Benefit Analysis

The following benefits are expected from implementation of Pavley I and Advanced Clean Car Standards.


Reduced Energy Use: Pavley I will increase the fuel efficiency of passenger vehicles, which will reduce the amount of fossil fuels consumed per mile travelled.


Reduced Air Pollution: Efficient vehicles burn less fuel per mile travelled than less-efficient vehicles. Air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide[3], and ozone precursors[4], will therefore be reduced.

[2] Reductions calculated based on the existing standard, which applies to model years 2017 to 2020 and will improve fuel economy to 43 miles per gallon.

[3] Sulfur dioxide contributes to acid rain.

[4] Ozone precursors (reactive organic compounds and nitrogen oxides) contribute to smog formation.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Improvements in vehicle efficiency will reduce the amount of fuel combusted, resulting in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Energy Diversification and/or Security: In 2012, 40% of petroleum consumed by the U.S. was imported from overseas, the lowest amount since 1991 (U.S. Energy Information Administration 2013). Reducing fuel consumption by passenger vehicles will lessen the demand for petroleum and ultimately the demand for imported oil.

State-2: Low Carbon Fuel Standard
Measure Description
Requires a reduction in the carbon intensity of California's transportation fuels by 2020.
Assumptions
The Low Carbon Fuel Standard (LCFS) will reduce statewide emissions from transportation-based fuels by 8.9%.
Analysis Details

GHG Analysis

The LCFS is a policy-based strategy that targets carbon emissions generated through the lifecycle of transportation fuels (i.e., from extraction to production to consumption). The standard assigns a maximum level of GHG emissions per unit of fuel produced for several refiners and importers. Companies that exceed the LCFS through development of biofuels and other clean technologies are able to sell their excess credits, creating a flexible and dynamic market for low-carbon transportation fuels. (Sperling and Yeh 2009).

Emissions Reductions

ARB estimates that implementation of the LCFS will reduce statewide emissions from transportation-based fuels5 by 15 million MT CO2e, or by approximately 8.9% (California Air Resources Board 2011). GHG reductions achieved by the LCFS within the City were therefore quantified by multiplying on-road transportation and off-road transportation emissions by 0.089.

Cost Analysis

Costs not estimated.

Co-Benefit Analysis

The following benefits are expected from implementation of LCFS.

Reduced Air Pollution: The LCFS will reduce the carbon content of transportation fuels by 10%. The combustion of hydrocarbons generates a number of air pollutants, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors. Reducing the carbon content of transportation fuels will therefore reduce local and regional air pollution.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Improvements in vehicle efficiency will reduce the amount of fuel combusted, resulting in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Energy Diversification and/or Security: In 2012, 40% of petroleum consumed by the U.S. was imported from overseas, the lowest amount since 1991 (U.S. Energy Information Administration 2013). Reducing the carbon-content of transportation fuels will reduce the consumption and demand for imported petroleum.

[5] Excludes aviation fuel, residual fuel oil, and lubricants.


Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, fuel prices will likely be subject to fluctuations and frequent price spikes. Biofuels and other renewable technologies will contribute to the diversification of the energy supply mix, thereby buffering local economies from the volatile global energy market.


Economic Development: The development of biofuels and other clean technologies will create new jobs, taxes, and revenue for local and regional economies.

State-3: Other Vehicle Efficiency Measures

Measure Description

The AB 32 Scoping Plan includes vehicle efficiency measures (in addition to Pavley and LCFS) that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Low Friction Oils Program will increase vehicle efficiency by mandating the use of engine oils that meet the low friction specifications established for the American Petroleum Institute's "energy conserving designation" (California Air Resources Board 2006). The Heavy-Duty Vehicle GHG Emission Reduction Program will increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB approved technology to reduce aerodynamic drag and rolling resistance.

Assumptions

- Tire Pressure Program will reduce statewide emissions from passenger vehicles by 0.6 million MT CO2e (California Air Resources Board 2011).
- Low Friction Oils Program will reduce statewide emissions from passenger vehicles by 2.8 million MT CO2e (California Air Resources Board 2011).
- Heavy-Duty Vehicle GHG Emission Reduction Program will reduce statewide emissions from heavy-duty vehicles by 0.9 million MT CO2e (California Air Resources Board 2011).

Analysis Details

GHG Analysis

Improvements in engine efficiency and vehicle technology will reduce fuel consumption, thereby reducing GHG emissions from fossil fuel combustion.

Emissions Reductions

Tire Pressure

ARB estimates that implementation of the Tire Pressure Program will reduce statewide emissions from passenger vehicles by 0.6 million MT CO2e, or by approximately 0.39% (California Air Resources Board 2011). GHG reductions achieved by the Tire Pressure Program within the City were therefore quantified by multiplying emissions from light duty vehicles by 0.0039.

Low Friction Oils

ARB estimates that implementation of the Low Friction Oils Program will reduce statewide emissions from passenger vehicles by 2.8 million MT CO2e, or by approximately 1.8% (California Air Resources Board 2011). GHG reductions achieved by the Low Friction Oils Program within the City were therefore quantified by multiplying emissions from light duty vehicles by 0.018.

Heavy-Duty Vehicle GHG Emissions Reductions

ARB estimates that implementation of the Heavy-Duty Vehicle GHG Emission Reduction Program will reduce statewide emissions from heavy-duty vehicles by 0.9 million MT CO2e, or by approximately 2.2% (California Air Resources Board 2011). GHG reductions achieved by the Heavy-Duty Vehicle GHG Emission Reduction Program within the City were therefore quantified by multiplying emissions from heavy-duty vehicles by 0.022.

Cost Analysis

Costs not estimated.

Co-Benefit Analysis

The following benefits are expected from implementation of AB 32 Transportation Reduction Strategies.

 Reduced Energy Use: The AB 32 Transportation Reduction Strategies will increase the efficiency of passenger vehicles and heavy-duty trucks, which will reduce the amount of fossil fuels consumed per mile travelled.

 Reduced Air Pollution: Efficient vehicles burn less fuel per mile travelled than less-efficient vehicles. Air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will therefore be reduced.

 Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Improvements in vehicle efficiency will reduce the amount of fuel combusted, resulting in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

 Energy Diversification and/or Security: In 2012, 40% of petroleum consumed by the U.S. was imported from overseas, the lowest amount since 1991 (U.S. Energy Information Administration 2013). Reducing fuel consumption by passenger vehicles will lessen the demand for petroleum and ultimately the demand for imported oil.

State-4: Renewable Portfolio Standard

Measure Description

The Renewable Portfolio Standard (RPS) obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure 33% of retail sales from eligible renewable sources by 2020. The California Energy Commission deems a renewable resource eligible for RPS through designated eligibility requirements but commonly includes solar, wind, small-scale hydroelectric and several other sources. Eligible renewable sources do not include large-scale hydroelectric or nuclear power. A full list of eligible renewable resources is available from the California Energy Commission.[6]

Assumptions

The 2020 BAU scenario was constructed by using the 2010 SCE power mix (18% qualified renewable, 19% nuclear from SONGS, 6% large hydro, and 57% from a mix of fossil fuel sources) and then adjusting for the replacement of SONGS. For the 2020 BAU scenario, it was assumed that SCE will replace the energy previously provided by SONGS with 50% qualified renewable energy and 50% natural gas (per the CPUC 2014 plan for replacement). Accordingly SCE is assumed to have a pre-RPS energy mix of 27.5% qualified renewables, 9.5% natural gas, 6% hydro energy, with the remainder (57%) obtained from the same mix of fossil fuel sources as in 2010.

- For the RPS scenario, it was assumed that SCE will have an RPS-compliant energy mix of 33% qualified renewables, 9.5% natural gas, and 6% hydro energy, with the remainder (51.5%) obtained from same mix of fossil fuel sources as in 2010.
- The emission factor for the mixture of fossil fuel sources was assumed to be 1,070 lbs CO2e per MWh based on the 2010 SCE emissions factor.
- The emission factor for natural gas was assumed to be 865 lbs CO2e per MWh based on the 2010 e-Grid subregional factor for natural gas in California.
- The emission factor for renewable energy sources was assumed to be zero.

Analysis Details

GHG Analysis

Implementation of the Renewable Portfolio Standard (RPS) will increase the proportion of renewable energy within SCE's energy supply mix. Renewable resources, such as wind and solar power, produce the same amount of energy as coal and other traditional sources, but do not emit any GHGs. By generating a greater amount of energy through renewable resources, electricity provided to the City by SCE will be cleaner and less GHG intensive.

Emissions Reductions

Emissions reductions achieved through RPS were calculated by multiplying the City's total net electricity consumption with CAP implementation (that is, the electricity savings from all other CAP measures were subtracted from the City's 2020 BAU expected electricity consumption), and multiplied by the percentage of each electricity source and the corresponding emission factor. For example, as discussed above, it was assumed that the City's electricity will be from 27.5% qualified renewables and 6% large hydro in the BAU scenario. To calculate BAU emissions, the City's net electricity was multiplied by 33.5% and then 0 lbs per MWH, because renewables do not generate GHGs. This was done for the other electricity sources in the 2020 BAU scenario (natural gas, 9.5%; other fossil fuel mix, 57%) to obtain the GHGs that will be emitted in the BAU scenario. The same process was followed for the RPS scenario. The percentages listed in the assumptions above were

[6] The list of eligible renewable resources is found at the following link (page 7):
http://www.energy.ca.gov/2013publications/CEC-300-2013-005/CEC-300-2013-005-ED7-CMF.pdf

multiplied by the corresponding emission factors and the City's total net electricity to obtain the GHG emissions generated for the RPS scenario. These GHG emissions were subtracted from the BAU GHG emissions to determine the GHG reductions that will result from the RPS.

Cost Analysis
Costs not estimated.

Co-Benefit Analysis
The RPS provides California with a flexible, market-based strategy to increase renewable energy generation and distribution. As discussed above, renewable energy provides the same amount of power as tradition sources (e.g., coal), but does not emit any GHGs or other criteria pollutants. Renewable energy therefore represents a clean source of power for the state and the City. The following benefits are expected from implementation of the RPS (International Energy Agency 2007; U.S. Environmental Protection Agency 2009).


Reduced Air Pollution: SCE generates power through a combination of sources, but the majority of electricity is provided by fossil fuels (e.g., coal, natural gas). The extraction and processing of fossil fuels generates localized pollutant emissions at the place of mining and at the source of power generation. These pollutants may be dispersed into the atmosphere, where they can be transported over long distances and result in regional air pollution. Reducing the amount of fossil fuels processed at power stations through increased generation of renewable energy will contribute to cumulative reductions in criteria pollutants throughout the state.


Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste, including fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production will reduce waste created by fossil fuel-supplied power.


Energy Diversification and/or Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, substations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.


Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices will likely be subject to fluctuations and frequent price spikes. Renewables will contribute to the diversification of the energy supply mix, thereby buffering local economies from the volatile global energy market.


Economic Development: Development of renewable energy infrastructure (e.g., solar farms, wind turbines) will create new jobs, taxes, and revenue for local and regional economies.


Public Health Improvements: Reduced regional air pollution and waste generation will contribute to overall improvements in public health.

State-5: Title 24 Standards for Non-Residential and Residential Buildings

Measure Description

Requires that building shells and building components be designed to conserve energy and water.

Assumptions

- Stringency of the residential Title 24 standards was increased by 25% (single-family homes) and 14% (multi-family homes) over 2008 standards in 2013 (California Energy Commission 2012).
- Stringency of the commercial Title 24 standards was increased by 30% over 2008 standards in 2013 (California Energy Commission 2012).
- Stringency of the residential Title 24 standards will be increased by 17% in 2017 and 2020.
- Stringency of the non-residential Title 24 standards will be increased by 7% in 2017 and 2020, based on ICF's estimate of potential future Title 24 updates.

Analysis Details

GHG Analysis

Energy efficiency upgrades as a result of the Title 24 standards will reduce electricity and natural gas consumption, thereby resulting in GHG emissions savings.

Emissions Reductions

Based on the assumed stringency increases in the residential and non-residential Title 24 standards, respectively, 2020 residential energy use will be reduced to 51.7% (single-family) and 59.2% (multi-family) of the 2008 baseline code. Non-residential energy use will be reduced to 60.5% of the 2008 baseline code. The stringency increases in Title 24 relative to the 2008 standards assumed for this measure, are shown in the table below.

Title-24 Updates Relative to 2008 Standards, Development Built Between 2007 and 2020			
Year	Single-Family Res.	Multi-Family Res.	Non-Residential
2008	-	-	-
2014	25% below 2008 standards	14% below 2008 standards	30% below 2008 standards
2017	38% below 2008 standards	29% below 2008 standards	35% below 2008 standards

Because the Title 24 code is revised on a triennial basis, only a fraction of total energy use is subject to each code revision. Thus, the stringencies of each triennial period must be weighted to come up with total average reduction values for the CAP timeframe (2007-2020) for single family residences, for multi-family residences, and for non-residential buildings. For example, the 2017 non-residential code is applicable for 3 years of the 13 year period of interest (2007–2020); thus, the stringency of the 2017 non-residential code was weighted by 23% (3 divided by 13) to arrive at the actual, weighted-stringency value. This was done for each year's code to come up with the weighted average reduction value. The average residential energy use in 2020, relative to BAU, as a result of the Title 24 Standards was therefore estimated to be 86.5% for single-family homes and 90.7% for multi-family homes, and the average non-residential reductions were estimated to be 86.2%. Consequently, the estimated reduction in building energy use relative to BAU due to the Title 24 Standards will be 13.5%, 9.3%, and 13.8% respectively.

These energy reduction values were then calculated into GHG emissions reductions by multiplying the total energy reductions by the appropriate utility emission factors[7]. The GHG reduction values represent the amount of GHGs that will be reduced in development built between 2007 and 2020 as a result of increase in the stringency of Title 24 and the resulting energy consumption savings in new buildings. Development built before 2007 is not affected by this measure.

Cost Analysis

The City will not incur any direct costs for implementation of this measure. Upgrades of existing private or public buildings will need to comply with new Title 24 standards, as applicable, resulting in both costs and energy savings. New development will need to comply with updates to Title 24 over time, which will increase upfront housing costs while resulting in energy savings over the life of the home.

Co-Benefit Analysis

The following benefits are expected from implementation of the Title 24 standards.


Reduced Energy Use: Energy retrofits and standards will improve the efficiency of residential and non-residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity will be lowered.


Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).


Resource Conservation: Increased building efficiency will reduce water consumption, which will help conserve fresh water.


Increased Property Values: Energy-efficient buildings have higher property values and resale prices than less-efficient buildings.


Public Health Improvements: Reduced regional and local air pollution will contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health ailments. For example, properly sealed ducts help prevent mold and dust mites that can cause asthma.


Increased Quality of Life: The reduction of health ailments (see above) contributes to increased quality of life. Additionally, energy-efficient structures improve general comfort by equalizing room temperatures and reducing indoor humidity.

[7] Utility emission factors account for decreased carbon intensities as a result of the State's RPS.

State-6: High Global Warming-Potential Greenhouse Gases

Measure Description

High-GWP gases are typically emitted at lower rates than the three primary GHGs (CO2, CH4, and N2O), but contribute more to climate change due to their greater ability to trap infrared radiation in the atmosphere. As a result, the ARB has set restrictions on the use of sulfur hexafluoride (SF6) and refrigerant canisters for automobiles. The ARB will also likely implement additional measures in the future to address high-GWP gases in vehicles. These actions at the state level will result in refrigerant emissions reductions at the City level.

Assumptions

ARB and state-level action will reduce high-GWP GHG emissions from vehicle air conditioning systems and other mobile sources, as well as SF6 emissions, by 16.62%

Analysis Details

Emissions Reductions

Reductions from this measure were determined by multiplying the estimated statewide reduction in refrigerants in vehicle air conditioning systems and other mobile sources, and stationary source refrigerant sources (16.62%) by the City's refrigerant emissions in 2020.

Analysis Details

Costs not estimated.

Co-Benefit Analysis

The following benefits are expected from implementation of State-7:

Public Health Improvements: While refrigerants do not pose a risk frequently in everyday consumer activity, a reduction in refrigerant use and other high-GWP gases will reduce the risk that does exist from human exposure to these gases.

BEE-1: Continue Implementation of Residential and Commercial Building Code that Exceeds Title 24 Standards by 15 percent effective through Code Expiration (July 2014)

Measure Description

Under this measure, the City receives credit for the reach code that it adopted in 2007, which calls for a building code that exceeds Title 24 standards by 15% until2014. This measure results in GHG savings through increased energy efficiency of new buildings.

Assumptions

- Single-family homes that exceed the Title 24 standards between 2008 and 2014 by 15% will achieve a 1.35% reduction in electricity use and a 13.20% reduction in natural gas use in 2020 (CAPCOA 2010:Table BE-1.2).
- Multifamily homes that exceed the Title 24 standards between 2008 and 2014 by 15% will achieve a 0.60% reduction in electricity use and a 13.65% reduction in natural gas use in 2020 (CAPCOA 2010:Table BE-1.2).
- Commercial facilities that exceed the Title 24 standards between 2008 and 2014 by 15% will achieve a 4.65% reduction in electricity use and a 10.95% reduction in natural gas use in 2020 (CAPCOA 2010:Table BE-1.1).

Analysis Details

GHG Analysis

Energy consumption is not only dependent on the type and size of building, but also the climate zone in which the building is located. According to CAPCOA, Goleta is located within the CEC Forecast Climate Zone 8 (CAPCOA 2010). For single-family homes, multifamily homes, and commercial establishments, the CEC has published anticipated percent deductions in energy use resulting from a 1% exceedance of the 2008 Title 24 energy efficiency standards. Values for Climate Zone 8 were utilized for this analysis and obtained from Tables BE-1.1 and BE-1.2 in CAPCOA (2010).

Emissions Reductions

Energy deductions for exceeding the 2008 Title 24 standards by 1% were obtained from CAPCOA (2010). Separate values were provided for single-family homes, multifamily homes, and commercial developments. Because BEE-1 assumes the standard will be exceeded by 15%, the reductions for a 1% improvement over the 2008 Title 24 standard were multiplied by 15. These values were then multiplied by new energy consumption for each building type from 2007 to 2014 to obtain total energy reductions associated with the measure. For example, new commercial electricity usage between 2007 and 2014 is estimated to be 19,658 MWh. The anticipated energy reduction for exceeding the 2008 Title 24 standard by 15% is 4.65% for commercial uses. Accordingly, mitigated electricity usage for new commercial units was determined by multiplying 19,658 MWh by 0.0465. GHG emissions reductions achieved by this measure were quantified by multiplying the energy reductions for each building type by the appropriate utility emission factors.

Cost Analysis

No direct costs from implementation of this measure will be incurred as a result of the CAP, because the reach code was planned independent of the CAP. As a result, no cost analysis is presented for this measure.

Co-Benefit Analysis

The following benefits are expected from implementation of BEE-1.

 Reduced Energy Use: Energy retrofits and standards will improve the efficiency of residential and non-residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity will be lowered.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

 Resource Conservation: Increased building efficiency will reduce water consumption, which will help conserve fresh water.

 Increased Property Values: Energy-efficient buildings have higher property values and resale prices than less-efficient buildings.

 Public Health Improvements: Reduced regional and local air pollution will contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health ailments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

 Increased Quality of Life: The reduction of health ailments (see above) contributes to increased quality of life. Additionally, energy-efficient structures improve general comfort by equalizing room temperatures and reducing indoor humidity.

BEE-2: Aide Public Participation in Energy Efficiency Retrofit Programs for Low-Income Housing Through Outreach Program

Measure Description

Incentivize or otherwise support voluntary energy-efficiency retrofits of existing low-income residential buildings to achieve reductions in natural gas and electricity usage. Adopt standards and/or promote voluntary programs that retrofit indoor lights; replace electric clothes dryers; install Energy-Star rated appliances; install programmable thermostats; add duct sealing, air sealing, and attic insulation.

Assumptions

- It was assumed that 9.1% of City residents are below the poverty line.
- It was assumed that 15% of residential units below the poverty line will participate in this measure, about 170 houses.
- Home size was assumed to be 1,200 square feet.
- Homeowners will perform the following retrofits
- Replace high-use incandescent lamps with compact fluorescent lamps.
- Replace electric clothes dryers with natural gas dryers.
- Install a programmable thermostat.
- Replace clothes washers with an ENERGY STAR-labeled model.
- Replace gas furnace with an ENERGY STAR-labeled model.
- Seal ducts and air leaks.
- Insulate the attic.
- Anticipated energy reductions associated with the above retrofits are 1,954 kWh and 198 therms per single-family home (U.S. Department of Energy 2011).

Analysis Details

GHG Analysis

Residential electricity and natural gas consumption are indirect sources of GHG emissions. Power plants emit GHGs in the production and delivery of energy to residences. Retrofitting existing residences will increase home energy efficiency, which will decrease energy consumption and GHG emissions.

Emissions Reductions

Energy savings associated with retrofitting were estimated using the Home Energy SaverTM (HES), which is based on models and data developed at the U.S. Department of Energy's (DOE's) Lawrence Berkley National Laboratory (U.S. Department of Energy 2011). HES estimates energy savings, emission reductions, and costs associated with various energy-efficiency measures. For this analysis, energy-efficient upgrades were assumed to be conducted on an average single-family home in the City, built in 1972.[8] Upgrades assumed to be performed are those listed in the Assumptions section above.

The HES calculated the annual electricity and natural gas savings. To determine the total energy reduction from this measure, the energy savings per home was multiplied by the number of homes in the City, and the penetration rate chosen by the City (15% of existing homes below the poverty line will make the recommended retrofits). The total energy reductions were multiplied by utility emission factors to determine the total GHG emissions reductions.

[8] For other assumptions, the model defaults were employed.

Cost Analysis

Total initial costs to homeowners are estimated at $508,241 and $1,078,744 for lower- and higher-cost scenarios, respectively. These retrofits are expected to result in energy cost savings of about $123,059 per year, delivering a payback period of 4 to 9 years. Net savings per ton is estimated to range from $275/MT CO2e to $103/MT CO2e for both the lower and higher initial upfront cost scenarios, respectively.

Initial costs associated with conducting home energy audits were estimated based on the total number of participating low-income homes (as calculated by the GHG Analysis), and the cost per square foot for home audits. The cost per square foot for home energy audits depends on building size and the complexity of home energy systems.

Initial capital costs associated with energy-efficient retrofitting were estimated for the advanced upgrade options described above. The retrofit cost per home was estimated to range from about $2,994 to $6,356 for advanced retrofits.

Annual energy cost savings were calculated by multiplying the mitigated electricity and natural gas usage for each retrofit level—as calculated by HES—by the average residential SCE and SoCal Gas utility rates. A lifetime of 18 years was assumed for this measure, based on the lifetimes of individual energy-efficient upgrades reported in California Public Utilities Commission 2009.

Co-Benefit Analysis

The following benefits are expected from implementation of BEE-2.

 Reduced Energy Use: Energy retrofits will improve the efficiency of residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity will be lowered.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

 Increased Property Values: Energy-efficient homes have higher property values and resale prices than less-efficient homes.

 Public Health Improvements: Reduced regional and local air pollution will contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health ailments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

 Increased Quality of Life: The reduction of health ailments (see above) contributes to increased quality of life. Additionally, energy-efficient homes improve general comfort by equalizing room temperatures and reducing indoor humidity.

BEE-3: Aide Public Participation in Funding, Incentive, or Rebate Programs that Provide Financing for Residential Energy Efficiency Retrofits Through Outreach Program

Measure Description

Incentivize or otherwise support voluntary energy-efficiency retrofits of existing residential buildings to achieve reductions in natural gas and electricity usage. Promote voluntary programs that retrofit indoor lights; replace electric clothes dryers; install Energy-Star appliances; install programmable thermostats; add duct sealing, air sealing, and attic insulation.

Assumptions

- It was assumed that 5% of existing homes will participate in this measure. This equates to about 542 housing units.
- Home size was assumed to be 1,800 square feet.
- Homeowners will perform the following retrofits.
- Replace high use incandescent lamps with compact fluorescent lamps.
- Replace electric clothes dryers with natural gas dryers.
- Install a programmable thermostat.
- Replace clothes washers with an ENERGY STAR-labeled model.
- Replace gas furnace with an ENERGY STAR-labeled model.
- Seal ducts and air leaks.
- Insulate the attic.
- Anticipated energy reductions associated with the above retrofits are 2,049 kWh and 295 therms per single-family home (U.S. Department of Energy 2011).

Analysis Details

GHG Analysis

Residential electricity and natural gas consumption are indirect sources of GHG emissions. Power plants emit GHGs in the production and delivery of energy to residences. Retrofitting existing residences will increase home energy efficiency, which will decrease energy consumption and GHG emissions.

Emissions Reductions

Energy savings associated with retrofitting were estimated using the Home Energy SaverTM (HES), which is based on models and data developed at DOE's Lawrence Berkley National Laboratory (U.S. Department of Energy 2011). HES estimates energy savings, emission reductions, and costs associated with various energy-efficiency measures. For this analysis, energy-efficient upgrades were assumed to be conducted on an average single-family home in the City, built in 1972.9 Upgrades assumed to be performed are those listed in the Assumptions section above.

The HES calculated the annual electricity and natural gas savings. To determine the total energy reduction from this measure, the energy savings per home were multiplied by the number of homes in the City, and the penetration rate chosen by the City (5% of existing homes will make the recommended retrofits). Energy reductions from overlapping measures were subtracted from the baseline electricity and natural gas usage to avoid double counting. The total energy reductions were multiplied by utility emission factors to determine the total GHG emissions reductions.

[9] For other assumptions, the model defaults were employed.

Cost Analysis

Total initial costs to homeowners are estimated at $1.9 to $3.9 million for lower- and higher-cost scenarios, respectively. These retrofits are expected to result in energy cost savings of about $504,491 per year, delivering a payback period of 4 to 8 years. Net savings per ton is estimated to range from $275/MT CO2e to $133/MT CO2e, for both the lower and higher initial upfront cost scenarios, respectively.

Initial costs associated with conducting home energy audits were estimated based on the total number of participating homes (as calculated by the GHG Analysis), and the cost per square foot for home audits. The cost per square foot for home energy audits depends on building size and the complexity of home energy systems.

Initial capital costs associated with energy-efficiency retrofitting were estimated for the advanced upgrade options described above. The retrofit cost per home was estimated to range from about $3,584 to $7,256 for advanced retrofits.

Annual energy cost savings were calculated by multiplying the mitigated electricity and natural gas usage for each retrofit level—as calculated by HES—by the average residential SCE and SoCal Gas utility rates. A lifetime of 18 years was assumed for this measure, based on the lifetimes of individual energy-efficient upgrades reported in California Public Utilities Commission 2009.

Co-Benefit Analysis

The following benefits are expected from implementation of BEE-3.

 Reduced Energy Use: Energy retrofits will improve the efficiency of residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity will be lowered.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

 Increased Property Values: Energy-efficient homes have higher property values and resale prices than less-efficient homes.

 Public Health Improvements: Reduced regional and local air pollution will contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health ailments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

 Increased Quality of Life: The reduction of health ailments (see above) contributes to increased quality of life. Additionally, energy-efficient homes improve general comfort by equalizing room temperatures and reducing indoor humidity.

BEE-4: Aide Public Participation in Funding Programs that Provide Financing for Commercial Energy Efficiency Retrofits Through Outreach Program

Measure Description

Under this measure, the City will promote voluntary programs for existing commercial facilities to improve building-wide energy efficiency. In addition, the City will adopt a program that encourages existing commercial facilities to improve building-wide energy efficiency by 20% by 2020 (compared to 2007). Increased energy efficiency in commercial facilities will result in decreased energy consumption.

Assumptions

- It was assumed that 5% of existing commercial units will participate in this measure.
- Commercial units were assumed to reach an energy efficiency increase of 20% by 2020.
- Electricity and natural gas usage by existing commercial development remains constant between 2005 and 2020

Analysis Details

GHG Analysis

Existing buildings generate a considerable amount of GHG emissions. Older developments are typically less energy efficient and therefore consume greater amounts of electricity and natural gas, relative to newly constructed facilities.

Emissions Reductions

The magnitude of GHG emissions achieved by this measure is dependent on the degree of implementation. It was assumed that 5% of existing commercial units will perform an energy audit, and of those, 100% will actual perform energy retrofits and reach a 20% increase in efficiency. Energy reductions from overlapping measures were subtracted from the baseline electricity and natural gas usage to avoid double counting. Energy reductions from a 20% reduction in building energy consumption were quantified by multiplying baseline electricity and natural gas usage by the percentage of participating commercial facilities (5%) and then by the target reduction in energy consumption (20%). GHG savings were then quantified by multiplying the energy reductions by the appropriate utility emission factors.

Cost Analysis

Total initial costs to retrofit existing non-residential buildings are estimated at a low of $4.6 million to a high of $7.6 million. These retrofits are expected to result in an energy cost savings of $484,075 per year, with a payback period of 9 to 16 years. Net cost/savings per ton is estimated to range from a net savings of $86/MT CO2e to a net cost of $156/MT CO2e.

Initial costs of conducting building energy audits were estimated based on the total square footage of participating commercial buildings, using an assumed value of 16 kWh per square foot for commercial building energy consumption. Costs were calculated by using assumptions on the cost per square foot for lighting ($5.08) and HVAC ($8.49).

Annual energy cost savings were calculated by multiplying the mitigated electricity and natural gas usage—as calculated by the GHG Analysis—by the average commercial SCE and SoCal Gas utility rates. A lifetime of 18 years was assumed for this measure, based on the lifetimes of individual energy-efficient upgrades reported in California Public Utilities Commission 2009.

Co-Benefit Analysis

The following benefits are expected from implementation of BEE-4.

 Reduced Energy Use: Energy retrofits and standards will improve the efficiency of commercial buildings. Improved efficiency will lower the amount of energy (e.g., electricity, natural gas) consumed per unit of activity.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

 Increased Property Values: Energy-efficient buildings have higher property values and resale prices than less-efficient buildings.

 Public Health Improvements: Reduced regional and local air pollution will contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health ailments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

 Increased Quality of Life: The reduction of health ailments (see above) contributes to increased quality of life. Additionally, energy-efficient structures improve general comfort by equalizing room temperatures and reducing indoor humidity. Employee satisfaction may therefore be increased.

BEE-5: Support Planting of New Trees in the City through Urban Forest Management Plan

Measure Description

Trees sequester atmospheric CO2 during respiration. The amount of CO2 sequestered depends on the type, size, and age of the trees. Planting trees in commercial areas will increase shade and help reduce urban heat island effect. In 2013, the City developed a draft of the 2012–2013 Urban Forest Management Plan (UFMP). The draft 2012–2013 UFMP sets an annual target of 100 new public trees per year.

Assumptions

- It was assumed that tree planting began in 2011 and will continue through 2020 at a rate of 100 trees per year
- Urban heat island energy-saving factor for planting trees: 7 kWh/tree
- Trees (as opposed to seedlings) will be planted.
- CAPCOA default sequestration rate for all trees: 0.035 MT CO2e per year

Analysis Details

GHG Analysis

Trees will both reduce the urban heat island effect and sequester carbon. Lessening the urban heat island effect with trees in cities can reduce summer cooling energy consumption. Trees also provide the benefit of carbon sequestration. The GHG benefits achieved from sequestration will vary based on the type of tree planted. Mature trees will function to sequester more carbon dioxide from the atmosphere than young trees.

Emissions Reductions

The Climate and Air Pollution Planning Assistant (CAPPA) tool created by ICLEI - Local Governments for Sustainability (ICLEI 2010), has derived an estimate for the amount of electricity saved by planting one tree in an area affected by the urban heat island effect. This value, 7 kWh per tree planted, was multiplied by the number of trees to be planted by 2020 to determine the total energy saved from the decreased need for cooling buildings. The total energy saved, 6,300 kWh (in 2020), was multiplied by utility emission factors to obtain total GHG emissions reductions.

CAPCOA (2010) has quantified anticipated annual CO2 accumulation rates associated with various tree species. For this analysis, a default sequestration rate of 0.035 MT CO2 per tree was assumed. This CO2 accumulation rate was multiplied by the number of planted trees per year (100) and by the number of planting years (2011–2020 = 9 years) to obtain total CO2 sequestered in 2020.

Cost Analysis

Initial costs for planting, staking, and mulching were estimated at between $75 and $215 per public tree. Annual maintenance costs were estimated at $33.89 per tree, depending on the maturity of the trees; irrigation costs are higher in the first 5 years, whereas infrastructure repair and litigation/liability costs apply after the trees reach a certain size (McPherson et al. 1999). The higher end of maintenance costs included full pruning, pest and disease control, irrigation, infrastructure repair, litter removal, storm cleanup, litigation liability, and administration costs, while the lower cost estimate focused more on basic maintenance such as pruning and irrigation. Operation and maintenance costs were estimated at $45,004 in 2020.

Trees have important impacts on their local surroundings but this study focused on direct cost savings to the community through electricity savings achieved by reduced energy use. Each tree was assumed to reduce electricity demand by 7 kWh on average, mostly from reductions in the urban heat island effect and shading.

The energy saved results in $1,024 in total annual savings for private residents and businesses by the year 2020.

The total discounted net costs for this measure will be approximately $529,035. The total discounted net cost per ton of GHG reduced will be approximately $941 per ton. Actual net costs for the City may vary from those estimated. A lifetime of 40 years was assumed for this measure.

Co-Benefit Analysis

The following benefits are expected from implementation of BEE-5.

 Reduced Energy Use: Trees planted adjacent to buildings provide shade, which cools buildings and reduces the need for summertime air conditioning use. As a result, less electricity is consumed.

 Reduced Air Pollution: Reduced electricity use will contribute to reductions in regional air pollution. Trees planted adjacent to congested roadways may also help filter particulate matter and other local pollutants.

 Reduced Urban Heat Island Effect: Urban heat island effect occurs when the ambient temperature in urban areas increases as a result of high energy consumption (e.g., air conditioning use during the summertime). Trees provide shade, which helps mitigate the urban heat island effect, making urban areas more comfortable for pedestrians and those who live or work in the area

 Increased Quality of Life: Trees improve the aesthetic quality of buildings, as well as reduce storm water runoff during periods of heavy rain.

RE-1: Continue Implementation of Ordinance Requiring Construction of Solar-Ready Buildings

Measure Description

Under this measure, the City will ensure that large projects that require legislative action by the City Council will be constructed as solar-ready buildings. Solar-ready buildings are constructed so that the future installation of a solar energy system will be readily feasible.

Assumptions

- Electricity consumption per square foot estimates in commercial buildings were taken from the Energy Information Administration (U.S. Energy Information Administration 2008).
- Electricity consumption estimates per residential unit were taken from the Energy Information Administration (U.S. Energy Information Administration 2009).
- Square footage per commercial project and the number of residential units were obtained from the City's list of expected large projects that will require legislative action, to be built before 2020
- It was assumed that the commercial and residential projects will obtain 50% of energy needs from solar installations, based on the City consultant's previous experience preparing CAPs.

Analysis Details

GHG Analysis

Utilizing electricity generated by renewable resources displaces electricity demand that would ordinarily be provided by SCE. Although SCE purchases energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon-neutral sources, such as solar, do not emit GHGs (CAPCOA 2010).

Emissions Reductions

To determine the energy consumption of the future legislative-action projects, the square footage (for commercial projects) and number of units (for residential projects) were used. These values were then multiplied by energy consumption metrics from the Energy Information Administration (EIA). For commercial projects, square footage for each project was multiplied by energy consumption per square foot estimates for a variety of projects (e.g., office, health care, etc.). For residential projects, the number of units to be constructed for each project was multiplied by the EIA's estimates for electricity consumption per residential unit. It was then assumed that all projects will obtain 50% of their energy consumption from solar energy. Thus, the electricity consumption for each project was multiplied by 0.50 to obtain the estimated electricity that will be supplied by solar. GHG emissions were then determined by multiplying by the appropriate utility emission factors.

Cost Analysis

Total First Costs

For this measure, two financing scenarios were estimated: one scenario where the building owner purchases and installs the solar panels and one scenario where the building owner enters into a power purchase agreement (PPA) with a local company that owns and maintains the solar panels. In general, the financials are more attractive to the building owner by entering into a PPA. Costs were calculated on a per-commercial project and per-residential project basis, and then multiplied by the number of commercial and residential projects. A 25-year lifetime is assumed for these projects.

For the owner-financed scenario, total initial costs to homeowners/building developers to install solar panels on residential and non-residential properties are estimated to be $6.2–$9.2 million, as calculated by the proprietary financial modeling software used by Optony Inc. Initial costs include the direct capital costs (e.g., the

cost of the system equipment) as well as the indirect costs (e.g., the cost of labor to install it). These costs are driven by project size (assumed to be 7 kilowatts [kW] per residential project and 40 kW per commercial project). These costs amount to $15,324 per residential project and $73,151 per commercial project. The total number of projects undertaken is assumed to be 84 new commercial projects and three new residential projects, based on projections of projects requiring legislative actions. For the PPA scenario, the total initial cost to building owners was assumed to be zero.

Net Annual Costs

For the owner-financed scenario, the value of electricity is drawn from the Optony Inc. proprietary financial modeling software. For the PPA scenario (where there are no initial costs), annual operating costs are incorporated into the discounted electricity rate. Savings were determined using Optony Inc. financial modeling software. As noted previously, though, terms of PPAs can vary, as can the associated savings. However, most often, customers enter into PPAs because they experience net savings.

Total Costs

Under both financing scenarios, the net cash flow is positive after the initial year for both residential and commercial projects. A 25-year analysis period was used.

With the owner-financed scenario, annual net savings are estimated to be $773,085 and $814,605 for the lower and higher upfront cost scenarios, respectively.

Under the PPA scenario, because there is no initial outlay of capital, there are only net savings to the building owner. Total annual net savings are estimated as ranging from $122,248 to $209,537.

Co-Benefit Analysis

The following benefits are expected from implementation of RE-1.

Reduced Air Pollution: Generating community electricity through renewable sources will displace a significant portion of electricity generated by fossil fuels. As such, combustion at regional power stations will be reduced, contributing to cumulative reductions in criteria pollutants.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste, including fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production will reduce waste created by fossil fuel-supplied power.

Energy Diversification and/or Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.

Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices will likely be subject to fluctuations and frequent price spikes. Renewables will contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.

 Economic Development: Development of renewable energy infrastructure (solar installations) will create new jobs in the local economy as the demand for solar contractors increases.

 Public Health Improvements: Reduced regional air pollution and waste generation will contribute to overall improvements in public health.

 Increased Property Values: If renewable infrastructure is added to buildings as a result of this measure, property and resale values of those structures may rise.

RE-2: Aide Public Participation in Funding Programs for Residential Solar Installations through Outreach Program

Measure Description

Under this measure, the City will encourage residents to install rooftop solar on existing buildings using the existing funding mechanisms that are available for solar installation. This measure will reduce reliance on sources of energy that emit GHGs, thereby reducing GHG emissions.

Assumptions

- It was assumed that 350 existing homes will participate in this measure
- The average photovoltaic system size will be 7 kW and each system has the potential to generate 12,505 kWh of electricity per year.
- Solar electricity generation will be 4,376,750 kWh in 2020 based on the assumptions above.

Analysis Details

GHG Analysis

Utilizing electricity generated by renewable resources displaces electricity demand that will ordinarily be provided by SCE. Although SCE purchases energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon-neutral sources, such as solar, do not emit GHGs (CAPCOA 2010).

Emissions Reductions

It was assumed that 350 homeowners will install a 7 kW photovoltaic system by 2020. This will result in 4,376,750 kWh of electricity that will not need to be generated by SCE. The resulting GHG emissions reductions were determined by multiplying the electricity reductions by the appropriate utility emission factors.

Cost Analysis

Total First Costs

For this measure, two financing scenarios were estimated: one scenario where the building owner purchases and installs the solar panels, and one scenario where the building owner enters into a power PPA with a local company that owns and maintains the solar panels. In general, the financials are more attractive to the building owner by entering into a PPA. Costs were calculated on a per-project basis, and then multiplied by the number of projects. A 25-year lifetime is assumed for these projects.

For the owner-financed scenario, total initial costs to homeowners to install solar panels on residential properties are estimated to be $5.4 and $7.1 million for lower and higher initial upfront cost estimates, respectively, as calculated by the proprietary financial modeling software used by Optony Inc. Initial costs include the direct capital costs (e.g., the cost of the system equipment) as well as the indirect costs (e.g., the cost of labor to install it). These costs are driven by project size (assumed to be 7 kW per residential project) and amount to $15,324 per residential project. The total number of projects undertaken, assumed to be 350 houses, is based on current patterns of solar installation permits within the City. For the PPA scenario, the total initial cost to homeowners was assumed to be zero.

Net Annual Costs

For the owner-financed scenario, the value of electricity is drawn from the cost analysis engineering firm's proprietary financial modeling software. For the PPA scenario (where there are no initial costs), annual operating costs are incorporated into the discounted electricity rate. Savings were determined using the

financial modeling software. As noted previously, though, terms of PPAs can vary, as can the associated savings. However, most often, customers enter into PPAs because they experience net savings.

Total Costs

Under both financing scenarios, the net cash flow is positive after the initial year for the projects. A 25-year analysis period was used. With the owner-financed scenario, total net savings are estimated as $2.7 and $4.4 million for the higher and lower upfront estimated costs, respectively. Payback times are 8 and 11 years for the lower and higher upfront estimated costs, respectively.

Under the PPA scenario, because there is no initial outlay of capital, there are only net savings to the building owner. Total net savings are estimated as $1.3 to $2.6 million.

Co-Benefit Analysis

The following benefits are expected from implementation of RE-2.


Reduced Air Pollution: Generating community electricity through renewable sources will displace a significant portion of electricity generated by fossil fuels. As such, combustion at regional power stations will be reduced, contributing to cumulative reductions in criteria pollutants.


Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste, including fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production will reduce waste created by fossil fuel-supplied power.


Energy Diversification and/or Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.


Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices will likely be subject to fluctuations and frequent price spikes. Renewables will contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.


Economic Development: Development of renewable energy infrastructure (residential solar installations) will create new jobs in the local economy as the demand for solar contractors increases.


Public Health Improvements: Reduced regional air pollution and waste generation will contribute to overall improvements in public health.


Increased Property Values: If renewable infrastructure is added to buildings as a result of this measure, property and resale values of those structures may rise.

RE-3: Aide Public Participation in Funding Programs for Commercial Solar Installations through Outreach Program

Measure Description

Under this measure, the City will encourage businesses to install solar on existing buildings using the existing funding mechanisms that are available for solar installations. This measure will reduce reliance on sources of energy that emit GHGs, thereby reducing GHG emissions.

Assumptions

- It was assumed that 12 existing businesses will participate in this measure
- The average photovoltaic system size will be 40 kW and each system has the potential to generate 71,459 kWh of electricity per year.
- Solar electricity generation will be 857,508 kWh in 2020 based on the assumptions above.

Analysis Details

GHG Analysis

Utilizing electricity generated by renewable resources displaces electricity demand that will ordinarily be provided by SCE. Although SCE purchases energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon-neutral sources, such as solar, do not emit GHGs (CAPCOA 2010).

Emissions Reductions

It was assumed that 12 existing businesses will install a 40 kW photovoltaic system by 2020. This will result in 857,508 kWh of electricity that will not need to be generated by SCE. The resulting GHG emissions reductions were determined by multiplying the electricity reductions by the appropriate utility emission factors.

Cost Analysis

Total First Costs

For this measure, two financing scenarios were estimated: one scenario where the building owner purchases and installs the solar panels, and one scenario where the building owner enters into a PPA with a local company that owns and maintains the solar panels. In general, the financials are more attractive to the building owner by entering into a PPA. Costs were calculated on a per-project basis, and then multiplied by the number of projects. A 25-year lifetime is assumed for these projects.[10]

For the owner-financed scenario, total initial costs to building developers to install solar panels on non-residential properties are estimated to be $877,813 and $1,294,626 for lower and higher upfront cost estimates, respectively, as calculated by proprietary financial modeling software used by Optony Inc. Initial costs include the direct capital costs (e.g., the cost of the system equipment) as well as the indirect costs (e.g., the cost of labor to install it). These costs are driven by project size (assumed to be 40 kW per project) and amount to $73,151 per commercial project. The total number of projects undertaken, assumed to be 12 installations, is based on patterns of solar installations in the City. Commercial projects are eligible for a California Performance Based Incentive of $0.032 per kWh through the California Solar Initiative. The California Solar Initiative applies lower incentives in 10 steps over time, so actual incentives received depend on when the projects are initiated. SCE is currently paying out at the second-to-last step (step 9), which corresponds to the $0.032 per kWh

[10] National Renewable Energy Laboratory. Solar Advisor Model (May 2012). https://sam.nrel.gov/.

incentive for commercial projects. The initial costs are also eligible for a federal investment tax credit of 30% of the initial costs.11 However, this credit is taken at the end of the initial year to align with a lag time in receiving tax credits for project expenditures. For the PPA scenario, the total initial cost to commercial entities was assumed to be zero.

Net Annual Costs

For the owner financed scenario, the value of electricity is drawn from Optony Inc. financial modeling software. For the PPA scenario (where there are no initial costs), annual operating costs are incorporated into the discounted electricity rate. Savings were determined using the financial modeling software. As noted previously, though, terms of PPAs can vary, as can the associated savings. However, most often, customers enter into PPAs because they experience net savings.

Total Costs

Under both financing scenarios, the net cash flow is positive after the initial year for the projects. A 25-year analysis period was used.

With the owner-financed scenario, total net savings are estimated as ranging from $701,496 to $384,096 for lower and higher initial upfront cost estimates, respectively.

Under the PPA scenario, because there is no initial outlay of capital, there are only net savings to the building owner. Total net savings are estimated as ranging from $261,534 to $445,744.

Co-Benefit Analysis

The following benefits are expected from implementation of RE-3.

Reduced Air Pollution: Generating community electricity through renewable sources will displace a significant portion of electricity generated by fossil fuels. As such, combustion at regional power stations will be reduced, contributing to cumulative reductions in criteria pollutants.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste, including fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production will reduce waste created by fossil fuel-supplied power.

Energy Diversification and/or Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.

Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices will likely be subject to fluctuations and frequent price spikes. Renewables will contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.

[11] DSIRE Energy Investment Tax Credit (ITC) http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F&re=1&ee=1.

 Economic Development: Development of renewable energy infrastructure (commercial solar installations) will create new jobs in the local economy as the demand for solar contractors increases.

 Public Health Improvements: Reduced regional air pollution and waste generation will contribute to overall improvements in public health.

 Increased Property Values: If renewable infrastructure is added to buildings as a result of this measure, property and resale values of those structures may rise.

RE-4: Encourage Solar Installation in New Residential

Measure Description

Under this measure, the City will encourage developers to utilize existing incentives, rebates, and tax credits to install solar on new residential developments. This measure will reduce reliance on sources of energy that emit GHGs, thereby reducing GHG emissions. This measure covers the new residential developments that are not covered in RE-1; that is, the projects that do not require legislative action by the City Council. Finally, this measure will be consistent with Implementation Program 9B in the Housing Element of the General Plan: Promote Solar Design.

Assumptions

- It was assumed that, of the approximately 362 new single-family homes expected to be built before 2020 (based on interpolation of socioeconomic forecast data and interpolating for new units from 32014 and 2040), 25% of those homes (90) will be built with solar installations. This estimate assumes that 62% of the houses in the City are single-family homes, and that that percentage will stay constant to 2020. The proportion of single family homes was determined using housing data from the City's General Plan.
- The average photovoltaic system size will be 7 kW and each system has the potential to generate 12,505 kWh of electricity per year. These estimates are based on the City consultant's previous experience preparing CAPs.
- Solar electricity generation from the installations will be 1,130,634 kWh in 2020 based on the assumptions above.

Analysis Details

GHG Analysis

Utilizing electricity generated by renewable resources displaces electricity demand that would ordinarily be provided by SCE. Although SCE purchases energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon-neutral sources, such as solar, do not emit GHGs (CAPCOA 2010).

Emissions Reductions

It was assumed that 90 single-family homes (25% of new single family homes) will install a 7 kW photovoltaic system by 2020. This will result in 1,130,634 kWh of electricity that will not need to be generated by SCE. The resulting GHG emissions reductions were determined by multiplying the electricity reductions by the appropriate utility emission factors.

Cost Analysis

Total First Costs

For this measure, two financing scenarios were estimated: one scenario where the building owner purchases and installs the solar panels and one scenario where the building owner enters into a PPA with a local company that owns and maintains the solar panels. In general, the financials are more attractive to the building owner by entering into a PPA. Costs were calculated on a per-project basis, and then multiplied by the number of expected new residential projects. A 25-year lifetime is assumed for these projects.

For the owner-financed scenario, total initial costs to building developers to install solar panels on residential properties are estimated to be $1.4–$1.8 million, as calculated by the financial modeling software. Initial costs include the direct capital costs (e.g., the cost of the system equipment) as well as the indirect costs (e.g., the cost of labor to install it). These costs are driven by project size (assumed to be 7 kW per project) and amount to

$15,324 per project. The total number of projects undertaken is assumed to be 90 new residential projects.
For the PPA scenario, the total initial cost to building owners was assumed to be zero.

Net Annual Costs

For the owner-financed scenario, the value of electricity is drawn from the cost analysis engineering firm's proprietary financial modeling software.
For the PPA scenario (where there are no initial costs), annual operating costs are incorporated into the discounted electricity rate. Savings were determined using financial modeling software. As noted previously, though, terms of PPAs can vary, as can the associated savings. However, most often, customers enter into PPAs because they experience net savings.

Total Costs

Under both financing scenarios, the cash flow is positive after the initial year for the projects. A 25-year analysis period was used.
With the owner-financed scenario, total net savings are estimated to range from $692,581 to $1.1 million.
Under the PPA scenario, because there is no initial outlay of capital, there are only net savings to the building owner. Total net savings are estimated as ranging from $339,909 to $662,278.

Co-Benefit Analysis

The following benefits are expected from implementation of RE-4.


Reduced Air Pollution: Generating community electricity through renewable sources will displace a significant portion of electricity generated by fossil fuels. As such, combustion at regional power stations will be reduced, contributing to cumulative reductions in criteria pollutants.


Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste, including fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production will reduce waste created by fossil fuel supplied power.


Energy Diversification and/or Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.


Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices will likely be subject to fluctuations and frequent price spikes. Renewables will contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.


Economic Development: Development of renewable energy infrastructure (residential solar installations) will create new jobs in the local economy as the demand for solar contractors increases.

Public Health Improvements: Reduced regional air pollution and waste generation will contribute to overall improvements in public health.

Increased Property Values: If renewable infrastructure is added to buildings as a result of this measure, property and resale values of those structures may be increased.

CCA-1: Pursue a Community Choice Aggregation Program

Measure Description

Community Choice Aggregation (CCA) allows individual citizens or businesses in the City to purchase their electricity, collectively, from alternative energy suppliers.

Assumptions

- For the 2020 with-CCA scenario, it was assumed that 80% of Goleta residents will purchase their electricity from the CCA with 75% purchasing a 50% renewable option and 5% purchasing a 100% renewable option. The other 20% are assumed to purchase electricity from SCE.
- With this mix, the Cities electricity will consist of 42.5% from renewables from the CCA (75% X 50% + 5% X 100%), 37.5% from conventional sources from the CCA, and 20% from SCE's mix under the RPS scenario).
- The emissions factor for SCE under the RPS scenario is as described above under State-4.
- The emission factor for non-renewable CCA electricity was assumed to be 944 lbs CO2e per MWh based on the CARB non-specified electricity generating source emissions factor.
- The emission factor for renewable energy sources was assumed to be zero.

Analysis Details

GHG Analysis

Utilizing electricity generated by renewable resources displaces electricity demand that would ordinarily be provided by SCE. For this measure, subscribers will purchase renewable electricity from a CCA instead of conventional electricity through SCE.

Emissions Reductions

Similar to State-4 RPS, this measure was analyzed by quantifying the City's GHG emissions from net electricity consumption under pre-CCA and post-CCA scenarios. Under the without-CCA scenario, it was assumed that the conditions of the RPS will apply; that is, 33% of the SCE's electricity will be from qualified renewables with the remainder being from hydro energy sources, natural gas, and other fossil fuels (see State-4). GHG emissions from the CCA scenario were quantified by multiplying the City's net electricity consumption by the participation rates assumed for the CCA (80%) and SCE (20%). These percentages and the net electricity were multiplied by the corresponding emission factors, listed in the assumptions above. The difference in GHG emissions between the RPS scenario and the CCA scenario is the amount of GHG reduction resulting from this measure.

Cost Analysis

Costs were not quantified for this measure because of the many uncertainties associated with CCA programs. As part of implementation of this measure, a feasibility study will provide more information on the costs of this CCA measure by assessing community interest and the potential of various renewable resources for the City.

Co-Benefit Analysis

The following benefits are expected from implementation of CCA-5.

Reduced Air Pollution: Generating community electricity through renewable sources will displace a significant portion of electricity generated by fossil fuels. As such, combustion at regional power stations will be reduced, contributing to cumulative reductions in criteria pollutants.


Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste, including fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production will reduce waste created by fossil fuel supplied power.


Energy Diversification and/or Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.


Reduced Energy Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices will likely be subject to fluctuations and frequent price spikes. Renewables will contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.


Economic Development: Development of any local renewable energy projects requiring significant infrastructure (e.g., solar farms, wind turbines) will create new jobs, taxes, and revenue for the local economy, and provide a framework for a future widespread renewable energy network and the associated economic benefits.


Public Health Improvements: Reduced regional air pollution and waste generation will contribute to overall improvements in public health.

T-1 Develop Design Guidelines for Increased Density for New Developments

Measure Description

The City will develop guidelines to allow increased development densities. Providing increased density (measured in terms of persons, jobs, or dwellings per unit area) reduces travel distances and provides opportunities to use alternative modes of transportation. The City will prepare policies and incentives to encourage higher-density development. Denser developments might include taller buildings, more units per building, smaller units, and less open space.

Assumptions

According to the CAPCOA document, the observed VMT reduction associated with a change in density ranges from 1% to 30%. It is estimated that the likely VMT reduction associated with implementation of this strategy will be at the low end of the range, 2%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by on-road GHG emissions resulting from new development between 2014 and 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-1:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People-Oriented Communities: This measure will result in more compact, walkable communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

Increased Property Values: Communities that are walkable, located near transit options, and have an abundance of key amenities are typically desirable places to live. Developing communities that fit this profile will increase property values over suburban communities where car travel is a necessity.

T-2: Develop Design Guidelines for Increased Destination Accessibility for New Developments

Measure Description

The City will develop guidelines, policies, and incentives to encourage locating new development in more centralized areas, such as downtown or adjacent to major commercial, residential, and employment areas within the City. As part of this strategy, the City will formally and informally direct development to more centralized areas of the City.

Assumptions

The CAPCOA document estimates that this strategy could reduce the VMT of a specific project by up to 20%. However, this highest level of reduction will only apply to new development and only to those projects in the most central locations. An analysis of the Citywide VMT indicates that growth in VMT from new development is only 30% compared to existing VMT. Additionally, it is unlikely that the City will be able to direct all development to more centralized locations. As such, it is estimated that the VMT reduction will be 2%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by on-road GHG emissions resulting from new development between 2014 and 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-2:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People-Oriented Communities: This measure will result in more compact, walkable communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-3: Create an Incentive Program for Increased Diversity for New Developments (Mixed Use)

Measure Description

The City will create an incentive program to encourage increased levels of mixed use within existing and new developments. Providing residential units near retail and employment areas, as well as providing more employment options closer to predominately residential land uses, increases the diversity of the developments and encourages non-vehicle trips. Potential incentives could include parking variances, reductions in building and permit fees, and other related tactics.

Assumptions

The CAPCOA document estimates that this strategy can produce a reduction in VMT of up to 30% for a project with the most optimized level of mixed-use. However, the likely level of effectiveness in Goleta will be much less. First, this strategy will only apply to new development, which represents a fraction of the total VMT in 2035. Additionally, this strategy could probably be incorporated in only some future development projects, as it is likely that not all future developments will have optimal levels of mixed-use. It is estimated that this strategy will have a likely reduction of no more than 2%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by on-road GHG emissions resulting from new development between 2014 and 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-3:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People-Oriented Communities: This measure will result in more compact, walkable communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-4: Develop Design Guidelines for Improved Design for New Developments

Measure Description

The City will require new projects to include improved design elements to enhance walkability and connectivity. Pedestrian-friendly design may be evaluated in terms of building setbacks, reduced street widths, small block size, proportions of four-way intersections, sidewalk coverage, number of pedestrian crossings, presence of street trees, and other physical variables that enhance pedestrian-oriented environments. Barriers to pedestrian access and interconnectivity will be eliminated. These barriers may include walls, landscaping, slopes, and other elements that reduce pedestrian circulation.

Assumptions

The CAPCOA document estimates the reductions associated with these strategies typically range from 3 to 20%, depending on the number of intersections per square mile. It is anticipated that the level of reduction will be moderate, given the amount of new development anticipated and other factors in the City. Thus, it was determined that the reduction in the City is 2%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by on-road GHG emissions resulting from new development between 2014 and 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-4:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People-Oriented Communities: This measure will result in more compact, walkable communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-5: Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development

Measure Description

Locating new developments with high density near transit options, as recommended for this measure, will facilitate the use of transit by people traveling to and from work. This will result in a shift from cars to transit, which reduces VMT. A project with a residential/commercial center designed around a rail or bus station is called a transit-oriented development (TOD). The City will support more TODs as part of this measure.

Assumptions

The CAPCOA document notes that this strategy has a potential reduction of up to 25%. For the City of Goleta, a smaller reduction is anticipated based on the following factors:

- Applies to new development only
- Likely to occur most intensively in selected corridors
- Thus, it is estimated that the VMT reduction associated with this strategy will be a maximum of 2%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by on-road GHG emissions resulting from new development between 2014 and 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-5:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People Oriented Communities: This measure will result in more compact, walkable communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

Increased Property Values: Communities that are walkable, located near transit options, and have an abundance of key amenities are typically desirable places to live. Developing communities that fit this profile will increase property values over suburban communities where car travel is a necessity.

T-6: Create an Incentive Program for Integrating Below-Market Rate Housing

Measure Description

The City will require residential projects to provide a certain percentage of below-market rate (BMR) housing or contribute to an Affordable Housing Fund. The City will also require nonresidential projects to pay a housing impact fee to be deposited in the Affordable Housing Fund. BMR housing provides opportunities for lower income families to live closer to job centers and transit. Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. Level of auto ownership tends to be lower with lower-income families. This may allow buildings to design for less parking, increasing the economic viability of new development.

Assumptions

The VMT estimated to occur with this reduction will be limited, according to the CAPCOA document. It is estimated that the reduction will be no more than 1%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by on-road GHG emissions resulting from new development between 2014 and 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-6:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People-Oriented Communities: This measure will result in more compact, walkable communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-7: Implement General Plan Policy TE 11: Bikeways Plan
Measure Description
The City will implement bicycle improvements consistent with the City's General Plan. The bike paths will be created to provide connections to major destinations and transit terminals. The network will be complemented with bicycle markings and signage to encourage bicycling and provide awareness for vehicle drivers. A comprehensive bicycle network encourages bicycle commuting and may reduce peak-hour vehicle trips. Improved bicycle facilities also increase accessibility to transit stations, thus encouraging transit commuting.
Assumptions
This strategy is estimated to have a moderate reduction in VMT with a likely reduction of no more than 2% Citywide.
Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Total first costs for T-7 are expected to be $6.6 million. First costs include costs associated with installing 2.5 miles of Class I bike lanes, 5 miles of Class II bike lanes, and 1 mile of Class III bike lanes. These mileages were multiplied by the cost-per-mile estimates for Class I, II and III bike lanes specified in the Draft Bicycle Master Plan for Santa Barbara County and the Urban Land Institute's Moving Cooler Technical Appendix (Santa Barbara County 2009; Urban Land Institute 2009). Annual costs for the City are estimated as $660,248, while annual savings for users of the network are calculated as $3.6 million (due to avoided fuel costs).

Co-Benefit Analysis

The following benefits are expected from implementation of T-7:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity. Finally, increased bicycling activity will improve public health by increasing the fitness level of employees who would normally commute to work by car.

People-Oriented Communities: This measure will result in more compact, bicycle-friendly communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-8: Encourage Bicycle Parking through Development of Design Guidelines and Policies
Measure Description
This measure will require nonresidential projects to provide short-term and long-term bicycle parking facilities to meet peak season maximum demand. It will also require residential, multi-family projects to provide long-term bicycle parking facilities for all residents. This measure will also include bicycle parking at public facilities such as the Amtrak Station and bus stations around the City.
Assumptions
This strategy is estimated to have a moderate reduction in VMT, with a likely reduction of no more than 2% Citywide.
Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Total first costs for T-8 are expected to be $10,000 to $50,000 and were assumed to be the costs associated with constructing bicycle facilities. Costs associated with each bicycle facility range from $1,000 to $5,000. For this analysis, it was assumed that 10 bicycle facilities will be constructed at existing private and public developments.

Annual costs for building owners are assumed to be minimal, while annual savings for users of the network are calculated as $3.6 million (due to avoided fuel costs).

Co-Benefit Analysis

The following benefits are expected from implementation of T-8:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity. Finally, increased bicycling activity will improve public health by increasing the fitness level of employees who would normally commute to work by car.

People-Oriented Communities: This measure will result in more compact, bike-friendly communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-9: Encourage SBMTD to Expand and Improve Transit Network

Measure Description

Consistent with the City's General Plan, the City will encourage the Santa Barbara Metropolitan Transit District (SBMTD) to expand existing transit service beyond the limited number of routes that currently operate within the City. As an example, SBMTD provides service along Hollister Avenue as Route 6. Service on this route is currently provided at 30 minute intervals at non-peak times and 20 minute intervals at peak times. Expanding service could include adding vehicles along existing routes to increase bus frequency, and/or providing service on new routes that are not currently served by the district.

Assumptions

The CAPCOA document identifies a maximum reduction of 8% associated with this strategy. However, it is estimated that the actual reduction for the City will be less than this optimal amount for the following reasons:

- Transit ridership is the highest in areas with higher densities and heterogeneous land uses. Much of the City is currently lower density with limited instances of mixed use. While there will be opportunities to provide transit-supportive densities and mixed-use in selected areas of the City, much of the City will retain its existing forms of land use.
- Any increase in service is likely to be limited given the demands for service in other areas of Santa Barbara County. Additionally, transit agencies throughout California have been cutting service because of financial constraints.
- Accordingly, it is estimated that the VMT reduction associated with this strategy will be no more than 1%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-9:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

People-Oriented Communities: This measure will result in more compact, walkable, and transit-friendly communities. Consequently, car travel is not a necessity due to the proximity of important amenities near residential communities that can be reached by transit.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-10: Develop Incentives to Encourage Employee-Based Commute Trip Reduction Programs

Measure Description

One way to reduce VMT is through the use of travel demand management (TDM) strategies, which encourage employees to use methods of travel other than single-occupant vehicles. TDM strategies are typically developed to be either mandatory programs in which all employers must participate, or voluntary programs for which participation is encouraged but not required. It was assumed that these programs will be voluntary, as there are limited opportunities to compel employers within the existing regulatory framework. Potential strategies that could be implemented by employers include transit passes, parking cash out, bicycling subsidies, and privately operated shuttles.

Assumptions

The VMT reduction associated with this measure could be substantial, with a potential reduction of up to 6%, according to the CAPCOA document. However, it is anticipated that the actual level of reduction will be much less within the City since the anticipated TDM program will be voluntary instead of mandatory. Additionally, the TDM program benefits will only apply to commute trips made by employees working in the City. Therefore, it is estimated that the VMT reduction will be 1%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-10:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity. Finally, increased bicycling activity will improve public health by increasing the fitness level of employees who would normally commute to work by car.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means, such as carpooling. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-11: Encourage End-of-Trip Facilities

Measure Description

End of trip facilities are bike lockers, showers, and changing rooms. These facilities often are used by cyclists and can encourage cycling use, particularly for commuting to work.

To implement this measure, the City will amend its Municipal Code to require the placement of end-of-trip facilities in new buildings that accommodate offices and larger retail uses. It is likely that this amendment will have certain qualifiers, such as excluding buildings below a certain size (buildings below 25,000 square feet, for example) or limiting its application to new construction only.

Assumptions

The VMT reduction associated with this strategy will be limited, as these strategies tend to have limited effectiveness on their own unless paired with the implementation of transit service, bicycle facilities, and TDM strategies. Accordingly, it is estimated that the reduction will be 0.5%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-11:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity. Finally, increased bicycling activity will improve public health by increasing the fitness level of employees who would normally commute to work by car.

T-12: Develop Incentives for Employers to Provide Employer-Sponsored Shuttles

Measure Description

The City will work with local employers to establish or expand worker shuttle programs. Scheduling and ridership charges will be established by the employers.

Assumptions

It is estimated that the reduction for this measure will be 0.5%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-12:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means, such as an employee shuttle. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

T-13: Coordinate with School Administrative Staffs to Adopt Programs Reducing Vehicular Travel to School

Measure Description

Consistent with the City General Plan, the City will encourage public and private schools to adopt TDM plans and to implement trip reduction programs for commuting students and parents. Potential measures include funding for safe routes to schools, encouraging transit providers to offer free or reduced-cost bus passes for students and employees, and increased funding of school buses.

Assumptions

The VMT reduction associated with this strategy is anticipated to be limited, with a likely reduction of 0.5%.

Analysis Details

GHG Analysis

The VMT reduction percentage was multiplied by total on-road GHG emissions in 2020.

Cost Analysis

Costs could not be assessed for this measure because of data and/or methodology uncertainties.

Co-Benefit Analysis

The following benefits are expected from implementation of T-13:

Reduced Air Pollution: Because less petroleum will be consumed by vehicles within the City, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, will be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Increased Quality of Life: This measure will reduce car travel by making transportation feasible through other means, such as a school bus or school pool. This will increase the quality of life by reducing stress associated with traffic, car maintenance and costs, and the hazards of car travel.

WR-1: Continue Compliance with SB X7-7: Reduce Per Capita Urban Water Use

Measure Description

Under this measure, the City will encourage residents and businesses to implement water retrofits and utilize water-efficient landscaping. The City's goal is to reduce per capita water consumption by 5% by 2020 (compared to the 5-year average of 2005–2009), pursuant to the requirements of State regulation (SBX 7-7). Decreased urban water use will reduce the amount of energy needed to transport and deliver this water, thereby reducing GHG emissions.

Assumptions

- Water energy intensities were assumed to be 3,294 kWh per million gallons for the Cachuma Project and 6,444 kWh per million gallons for other surface water.
- It was assumed that 33% of indoor water use in residential buildings and 22% of indoor water use in commercial buildings is hot water.
- It was assumed that 10.7% of homes have electric water heaters, and 85.1% have natural gas water heaters.
- It was assumed that 39.9% of businesses have electric water heaters, and 55.2% have natural gas water heaters.
- Water heating intensities were assumed to be 0.19 kWh/gallon for electric heaters and 0.0098 therms/gallon for natural gas heaters.

Analysis Details

GHG Analysis

California homes and businesses consume a significant amount of water through indoor plumbing needs and outdoor irrigation. A large portion of water use can be attributed to inefficient fixtures (e.g., showerheads, toilets). Recognizing that water uses a great deal of electricity to pump, treat, and transport, the state adopted SB X7-7, which requires an overall 20% reduction in urban per capita use by December 31, 2020. This goal varies based on water providers and hydrologic regions in the state. As discussed in Chapter 3, Goleta Water District's goal is a 5% reduction. Achieving this goal will not only reduce electricity consumption, but also avoid GHG emissions and conserve water.

Emissions Reductions

The City's water consumption reduction was calculated by multiplying water usage by 5%. The reduction in water was then multiplied by the portion of water from each source from which the City receives water to get the reduction breakdown by source. The energy intensity of each source was then multiplied by the reduction in water from each source to obtain the energy reductions associated with decreased water consumption.

Reductions in building energy consumption were calculated by multiplying the water reductions by the percent of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types. The resulting electricity reductions from water processing and building energy reductions were multiplied by the appropriate utility emission factors to obtain GHG reductions.

Cost Analysis

Initial costs for this measure were not quantified, because the cost difference between high-efficiency and low-efficiency water fixtures is small. Thus, the incremental cost was assumed to be zero. Total savings were not calculated for this measure. Annual cost savings per home were determined to be approximately $200 for fixture upgrades and $50–$200 in costs for smart irrigation systems.

Co-Benefit Analysis

The following benefits are expected from implementation of WR-1.

 Resource Conservation: Reduced water consumption will help conserve freshwater resources.

 Reduced Energy Use: Water consumption requires electricity to pump, treat, and transport the water. Consequently, reductions in water use will reduce electricity consumption.

 Reduced Air Pollution: Reduced electricity use will contribute to reductions in regional air pollution.

 Increased Property Values: Energy-efficient buildings have higher property values and resale prices than less-efficient buildings.

OR-1: Require Alternatively Fueled Construction and Landscape Equipment

Measure Description

Under this measure, the City will offer incentives, such as preference points when bidding on City contracts, to construction contractors that utilize electric equipment in the construction and landscape fleets that are active in the City. The City will also draft an ordinance requiring electric landscape equipment and develop conditions of approval relating to alternatively fueled landscape equipment.

Assumptions

Electrification of construction and landscaping equipment will result in the following percent GHG reductions by horsepower.

- Less than 25 hp: 49.5%
- 25–50 hp: 72.3%
- 50–120 hp: 72.0%
- 120–175 hp: 71.2%
- More than 175: 70.4%

Analysis Details

GHG Analysis

Utilizing electric power will offset direct GHG emissions from fuel combustion. Indirect emissions from electricity are significantly lower than direct emissions from fuel combustion. Electrifying construction vehicles and landscape equipment therefore results in a reduction in GHG emissions.

Emissions Reductions

The OFFROAD2007 model calculates vehicle operating emissions by fuel type (e.g., diesel, gasoline) and average horsepower. Model outputs by vehicle class were multiplied by CAPCOA's anticipated percent reduction in GHG emissions from switching to electric power. It was assumed that the City will implement electric equipment in 10% of the fleet.

Cost Analysis

Total initial costs for this measure were not calculated because the upfront costs associated with equipment are too variable. The cost of the equipment varies significantly based on other features besides fuel type (electric, gas, diesel, etc.). Annual cost savings vary greatly depending on equipment type and use. An electric leaf blower used at a residence will save about $57 per year over a gas-powered leaf blower, for example. The same electric leaf blower will save over $600 if used for commercial purposes in high-use situations. Values for typical wattage and gas usage were used to develop these savings values (Thompson and Sorvig 2007). Total cost savings were developed using the annual savings and a lifetime of 9 years. Each electric leaf blower or chainsaw used for commercial purposes could save approximately $4,000 over the lifetime of the unit.

Co-Benefit Analysis

The following benefits are expected from implementation of OR-1.

 Reduced Air Pollution: Utilizing electricity in place of diesel will reduce local air pollution.

Public Health Improvements: Diesel combustion releases several toxic air contaminants known to cause adverse human health effects in construction workers. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Increased Quality of Life: Electric equipment is quieter and typically easier to maneuver than diesel-powered equipment.

WS-1: Require Waste Diversion Increase

Measure Description

Under this measure, the City will increase the amount of waste diverted from landfills from 31% to 46%. The increase will be achieved through the City waste contractor. The City will pursue tools to expand recycling and compositing services for residents and businesses. These supporting measures are discussed further in Chapter 4 of the CAP.

Assumptions

- Based on discussion with the City, it was assumed that the City had a franchise diversion rate of 31% for municipal solid waste in 2007 and will achieve a 45% diversion rate in 2020.
- It was assumed that the diversion rate will increase linearly between 2007 and 2020
- Based on inventory data, it was assumed that the City's waste emission factor is 0.143 MT CO2e per short ton of waste landfilled.

Analysis Details

GHG Analysis

Diversion programs reduce the amount of waste deposited in regional landfills. Because waste generates methane emissions during decomposition, reducing the volume of waste sent to landfills directly reduces GHG emissions. In general, waste diversion rates have risen dramatically since the early 1980s.

Emissions Reductions

WS-1 assumes that the City will increase the franchise diversion rate from 31% to 46%. This increase in diversion was assumed to be linear between 2007 and 2020. To determine the GHG reductions due to the increase, waste emissions in 2020 (3,825 MT CO2e) were divided by waste tons in 2020 (26,835 tons) to get a GHG metric ton per waste ton ratio (0.143). Then, the additional waste that will be diverted due to the increased diversion rate was multiplied by this ratio to determine the GHGs that will be avoided.

Cost Analysis

The net costs considered in this analysis are approximations of the costs and revenues borne by the waste management company servicing the City, as a result of the increased diversion rate assumed in this measure. Costs of collecting and processing recyclables vary widely, and it is difficult to apply generalized estimates to specific companies. While broad estimates of costs are provided, the extent to which these costs are representative of local conditions is uncertain. Initial costs to increase diversion are assumed to be minimal. Net costs were calculated on a per-ton basis using data from a City Council Report from the City of Santa Monica12 as a proxy for the City of Goleta's potential waste collection program. The cost-per-ton value includes components such as food scraps collection, marketing, and residuals processing. The total weighted cost per ton assumed for this analysis is $11.25 (low estimate) to $45.18 (high estimate). Total annual costs for the increased diversion measure are $63,602 to $255,367.

[12] Available: http://www.smgov.net/departments/council/agendas/2013/20130319/s2013031904-A.htm

Co-Benefit Analysis

The following benefits are expected from implementation of WS-1.

 Reduced Air Pollution: The decomposition of landfilled waste emits methane, which can react with other gases in the atmosphere to form local smog. By sending less waste to regional landfills, methane emissions will be reduced.

 Resource Conservation: Waste that is diverted to recycling centers can be converted into reusable products, thereby reducing the need for raw materials.

M-1: Develop a Water Conservation Plan for City Operations

Measure Description

For this measure, the City will implement a plan to increase water conservation in City-owned and –utilized facilities, through upgrades and the promotion of water conservation.

Analysis Details

GHG Analysis

Emissions Reductions and Cost Savings

For this measure, it was assumed that the City will reduce water consumption in City-owned and -utilized buildings by 15%. This reduction will be achieved primarily through water fixture upgrades. The City's total water consumption in City buildings in 2020 (73 million gallons) was multiplied by 15% to determine the reduction goal. The water reduction was then multiplied by the water energy intensity factors discussed for WR-1, and the associated electricity was then multiplied by the utility emission factors to determine GHG reductions.

Cost Analysis

Costs were not quantified for this measure, as the level of implementation will be restricted to City-owned and –utilized buildings and could not be accurately assessed without a detailed study of City facilities

Co-Benefit Analysis

The following benefits are expected from implementation of M-1.

 Reduced Energy Use: The amount of energy (e.g., electricity, natural gas) consumed to transport and heat water will be lowered.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

M-2: Conduct an Employee Commute Study

Measure Description

Under this measure, the City will continue to encourage municipal employees to carpool, telecommute, or use other alternative modes of transportation, as a result of the City's employee commute study.

Analysis Details

GHG Analysis

Emissions Reductions and Cost Savings

Reductions associated with this measure will result from reduced VMT by City employees. This measure is discussed in more detail in the City's Energy Efficiency Action Plan (EEAP) (City of Goleta 2012).

Cost Analysis

Costs were not quantified for this measure, as it has already been implemented by the City.

Co-Benefit Analysis

The following benefits are expected from implementation of M-2.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional and local air pollution (from reduced vehicle exhaust).

 Public Health Improvements: Fossil fuel combustion releases several toxic air contaminants known to cause adverse human health effects. Reductions in the amount of fuel combusted will result in corresponding reductions in toxic air contaminants. Additionally, reductions in ozone precursors will reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity. Finally, increased bicycling activity will improve public health by increasing the fitness level of employees who would normally commute to work by car.

 Increased Quality of Life: Less car travel (and reduced VMT) by City employees as a result of the employee commute study will reduce stress and generally improve quality of life.

M-3: Implement the Energy Efficiency Action Plan

Measure Description

Under this measure, the City will continue to implement the EEAP, which was adopted in 2012. The EEAP includes energy efficiency measures aimed at increasing energy efficiency in City-owned buildings, which will reduce the City's municipal GHG emissions expected in 2020.

Analysis Details

GHG Analysis

Emissions Reductions and Cost Savings

Reductions associated with this measure will result from implementation of the City's EEAP. For more information, refer to the EEAP (City of Goleta 2012).

Cost Analysis

Costs were not quantified for this measure, as funding for the EEAP has already been identified through SCE, and the EEAP is currently being implemented by the City.

Co-Benefit Analysis

The following benefits are expected from implementation of M-3.

 Reduced Energy Use: The EEAP will improve the efficiency of City-owned buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed will be lowered.

 Reduced Air Pollution: Reduced energy use will contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

 Increased Property Values: Energy-efficient buildings have higher property values and resale prices than less-efficient buildings.

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Appendix C
Preliminary 2030 GHG Reduction Target

Appendix C
Preliminary 2030 GHG Reduction Target

2030 GHG Reduction Target

In order to assess whether implementing the CAP achieves the state's long-term climate goals, one must look beyond 2020 to see whether the emissions reduction measures included for the 2020 milestone set the City on the trajectory toward future greater reductions in the post-2020 period. To date, there is no state or federal mandate requiring reduction of GHG emissions after 2020. AB 32 contains no post-2020 reduction target nor provides CARB with the authority to mandate compliance with a post-2020 target. SB 375, while it contains requirements for transportation planning for the MPO (SBCAG for Goleta) to promote reductions in the passenger and light duty vehicle sector, does not contain mandatory requirements for local jurisdictions to reduce their GHG emissions overall.

Governor Schwarzenegger's Executive Order S-3-05 calls for an 80% reduction below 1990 greenhouse gas emission levels by 2050. However, an executive order is only binding on state agencies, and does not represent a legal mandate for local governments or the private sector. Nevertheless, S-03-05 contains a reduction target that is based on a rough agreement on the basis of scientific understanding of the level of reduction needed in developed countries of the world in order to avoid the more catastrophic effects of climate change that could result from unabated rise in anthropogenic GHG emission. The 2050 target in S-03-05 is equivalent to a 2050 statewide target of about 85 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) (total emissions), as compared to the 1990 level of 427 $MMTCO_2e$.

As of spring 2014, there is no state or federal plan as to how to achieve such ambitious reductions for 2050. The CARB 2008 AB 32 Scoping Plan did discuss a general scenario of potential reductions that would be needed by 2050 to meet these targets. The 2014 AB 32 Scoping Plan Update discusses potential strategies for the post-2020 period but the current draft does not contain specific measures to achieve a 2030 or a 2050 target. The AB 32 Scoping Plan Update does discuss potential 2030 targets as possibly 35 to 40 percent below 1990 levels for the state; it does not specifically propose any 2030 target to date.

Assuming that emissions of 11 percent below 2007 levels (equal to 290,374 $MTCO_2e$, excluding stationary sources) is roughly equivalent to 1990 levels, a 2050 City target to match the S-3-05 targets would be to achieve a level of emissions of approximately 58,000 $MTCO_2e$ in 2050, excluding stationary sources. Full implementation and expansion of the CARB's Scoping Plan to increase efforts beyond 2020 and expansion of the reduction strategies studied in the CAP could put the City on a path toward achieving these required long-term reductions.

Figure C-1 depicts what an emissions trajectory might look like for the City assuming the City follows a linear path from the 2020 reduction target to a 2050 target matching that in S-03-05. The

resultant 2030 preliminary target would be approximately 213,000 $MTCO_2e$. Options for expressing this target could include any of the following:

- Mass emissions (213,000 $MTCO_2e$);
- 26 percent below the 2020 CAP target;
- 35 percent below the 2007 levels; or
- 26 percent below 1990 levels (assumed equivalent to the 2020 target in the CAP)

The City will no doubt need to revisit the preliminary target during subsequent planning for the actual post-2020 CAP update. By later in this decade, CARB and possibly the California legislature may have identified a state 2030 target, which should be considered in any actual planning for the post-2020 period.

2030 Scenario Analysis

While the specific strategies needed to meet the 2050 target are too far in the future to define in detail, one can examine the level of achievement that would be needed to keep the region on track through 2030.

To reach the 2050 target, the City's greenhouse gas emissions need to be reduced by approximately 230,000 $MTCO_2e$ more than the 2020 target between 2020 and 2050. This translates to an average reduction of 2 to 3 percent per year between 2020 and 2030, or an additional 77,000 $MTCO_2e$ in reductions during the period 2020 to 2030. An additional challenge comes from the fact that the population in the City will continue to grow between 2020 and 2030 (a growth from approximately 32,528 in 2020 to 35,168 in 2030). Taking into account population growth, per-capita emissions would need to decrease at an average rate of approximately 0.3 $MTCO_2e$ per person per year during the 2020 to 2030 period. These reductions are possible.

The strategies needed are logical expansions of the programs recommended in the CARB Scoping Plan at the state level and the measures included in the CAP at the local level. By building on planned state efforts during this period and ramped up local efforts in the building energy and transportation (and other) sectors, the City can be on track to reach a 2050 target in 2020 (with the CAP) and in 2030 (with the next revision to the CAP by 2020).

The state can help the City keep on track through 2030 by extending state action in the following ways, as described in the Scoping Plan (California Air Resources Board 2008).

- Expand vehicle efficiency regulations beyond the current 2017 – 2025 standards.
- Increase California's use of renewable energy in electricity generation beyond the 33 percent planned for 2020.
- Reduce the carbon intensity of transportation fuels further than the 10 percent level set for 2020.

- Increase energy efficiency and green building efforts.
- Using a regional or national cap-and-trade system to further limit emissions.[1]

Potential ways that the City can do its part to be on track through 2030 to meet a 2050 target include, but are not limited to the following actions:

- Increase energy efficiency and green building efforts (for city municipal buildings as well as private buildings in the City).
- Increase replacement of fossil-fuel based electricity with electricity generated using renewable energy.
- Continue to implement land use and transportation strategies to lower VMT and shift travel modes[2].
- Continue to expand utilization of electric off-road construction and landscaping equipment.
- Continue to stress the importance of waste reduction in residences, business, and municipal buildings.
- Continue to work with Goleta Water District to improve local water efficiency and conservation.

The conceptual effects of potential strategies are presented in Table C-1. In total, these potential strategies described below would produce reductions to bring the City's GHG emissions to meet or exceed the preliminary 2030 reduction target. Table C-2 presents the City's emissions in 2020 with implementation of the CAP, and the City's emissions in 2030 with implementation of the potential State and local reduction strategies shown in Table C-1.

While the potential mix of future GHG reduction strategies presented in this Appendix is only an example, it serves to demonstrate that the current measures in the CARB Scoping Plan and the Reduction Plan can not only move the City to its 2020 target, but can also provide an expandable framework for much greater long-term greenhouse gas emissions reductions.

Planning for After 2020

It is reasonably foreseeable that as California approaches its first greenhouse gas milestone in 2020, focus will shift to a 2030 and possibly the 2050 target. A detailed plan for how the state would meet these targets is expected prior to 2020 accordingly. The City will monitor developments at the national and state levels.

[1] The CAP has not assumed any benefit from a cap-and-trade system by 2020, but when implemented, such a system will result in reductions beyond those currently anticipated in the CAP for 2020, and in additional reductions for 2030. The California Cap and Trade system will particularly affect large stationary sources, which are excluded from local measures in the CAP to avoid duplication of state and federal regulatory efforts. In addition, the Cap and Trade system will also affect electricity generation and transportation fuels, which may change energy prices, which may in turn change energy use and transportation behavior beyond that assumed for the reduction measures included in the CAP.

[2] http://www.sbcag.org/planning/2040RTP/images_docs/Final2040RTP&SCS-Chapters.pdf

Beginning in 2018, the City will commence planning for the post-2020 period. At this point, the City would have implemented the first phases of the CAP and would have a better understanding of the effectiveness and efficiency of different reduction strategies and approaches. The new post-2020 reduction plan should revisit the preliminary target for GHG reductions in 2030 and if supported by long-term planning at the state level, should also include preliminary planning for 2040 and 2050. The targets should be consistent with broader state and federal reduction targets and with the scientific understanding of the reductions needed by 2050. The City would adopt the post-2020 reduction plan by January 1, 2020, which would require the City to start a new inventory/assessment process by early 2018 at the latest.

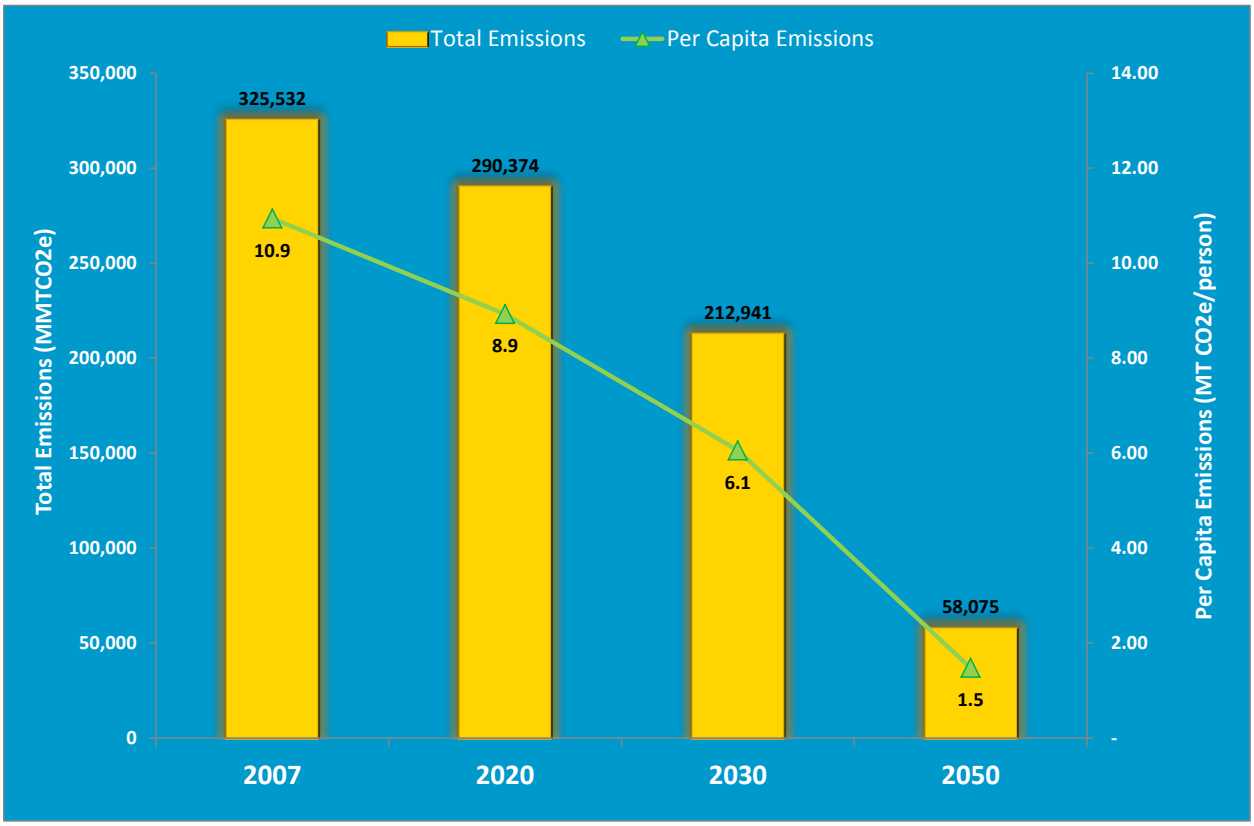

Figure C-1. Required GHG Reductions to Meet 2050 Target of 80 Percent below 1990 Levels

Table C-1. Potential State and City Reduction Strategies to Reach 2030 Target

Sector	Reductions by 2020 (2020 CAP with state/local measures)				Scenario for Additional State/Local Reductions by 2030		
	State	Local	TOTAL	Percent below 2007	Reductions beyond 2020 reductions	Relative to 2020 reductions	Notes
	$MTCO_2e$	$MTCO_2e$	$MTCO_2e$	%	$MTCO_2e$	%	
Building Energy (Residential, Commercial, Industrial)	13,678	29,846	43,523	30%	59,999	138%	CARB Scoping Plan calls for doubling of energy efficiency reductions between 2020 and 2030 compared to before 2020. The 2030 scenario assumes the City would achieve reductions from 2020 to 2030 that are equivalent to 20% of 2007 sectoral emissions. Additional GHG reductions during this period will come from a continued de-carbonization of electricity at the public utility level, more aggressive retrofitting of existing buildings and increased use of small scale renewables.
On-Road Transportation	33,700	10,918	44,619	34%	58,945	132%	CARB Scoping Plan calls for a doubling of GHG reductions from vehicle fleet by 2030 compared to 2020 and more than doubling reduction of carbon intensity of transportation fuels compared to before 2020. The 2030 scenario assumes the City will implement land use and transportation strategies that would result in lower VMT and shift travel modes resulting in reductions equivalent to 25% of 2007 sectoral emissions. A VMT reduction of 25% compared to the 2030 unmitigated condition was interpolated from the SBCAG 2040 preferred scenario estimate in the 2040 Regional Transportation Plan

Sector	Reductions by 2020 (2020 CAP with state/local measures)				Scenario for Additional State/Local Reductions by 2030		
	State	Local	TOTAL	Percent below 2007	Reductions beyond 2020 reductions	Relative to 2020 reductions	Notes
	$MTCO_2e$	$MTCO_2e$	$MTCO_2e$	%	$MTCO_2e$	%	
Off-Road Transportation and Equipment	2,461	1,363	3,824	15%	5,454	143%	CARB Scoping Plan calls for more than double the reduction of carbon intensity of transportation fuels compared to before 2020. The 2030 scenario assumes the City would continue to expand utilization of electric off-road construction and landscaping equipment resulting in reductions from 2020 to 2030 equivalent to 15 percent of 2007 sectoral emissions.
Solid Waste Management	0	806	806	23%	527	65%	Continue to stress the importance of waste reduction in residences, business, and municipal buildings. The 2030 scenario assumes the City's efforts would result in reductions from 2020 to 2030 equivalent to 15 percent of 2007 sectoral emissions.
Agriculture	0	0	0	0%	0	0%	No assumed change. This sector will be very small by 2020 within the City and thus is not likely to be a focus of reduction planning.
Wastewater Treatment	0	0	0	0%	0	0%	No assumed change. Additional measures may be identified in future reduction planning efforts.
Water Conveyance	0	96	96	7%	283	294%	Continue to work with Goleta Water District to improve local water efficiency and conservation. The 2030 scenario assumes the City's efforts would result in reductions from 2020 to 2030 equivalent to 20 percent of 2007 sectoral emissions.
Refrigerants	3,672	0	3,672	18%	0	0%	No assumed change. Additional measures may be identified in future reduction planning efforts.

Sector	Reductions by 2020 (2020 CAP with state/local measures)				Scenario for Additional State/Local Reductions by 2030		
	State	Local	TOTAL	Percent below 2007	Reductions beyond 2020 reductions	Relative to 2020 reductions	Notes
	$MTCO_2e$	$MTCO_2e$	$MTCO_2e$	%	$MTCO_2e$	%	
Municipal	0	119	119	NA	0	NA	Energy, water, and waste savings from the actions described above would likely affect municipal buildings. No further municipal actions have been identified as stand-alone strategies at this time but are likely to be identified in future reduction planning efforts.
TOTAL	53,511	43,147	96,659		125,207		

Table C-2. 2020 and 2030 Reduction Summary with Inclusion of Potential State and City Reduction Strategies

	2020 with CAP	2030 with CAP and 2030 Scenario Assumptions (see Table C-1)
Target	290,374	213,000a
Emissions with Reduction Measures	290,076	207,429
Target Exceedance	298	5,571[a]

[a] This target represents an approximately 26% reduction below the 2020 CAP Target

Appendix D
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