



Climate Action Plan

for the City of Capitola

March 20, 2015

PlaceWorks

in collaboration with:

Green Lynx, LLC

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Prepared by:

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in collaboration with:

Green Lynx, LLC

Orange County • Northern California • Los Angeles / Downtown • Los Angeles / West • Inland Empire • San Diego

1625 Shattuck Avenue, Suite 300 | Berkeley, California 94709 | 510 848 3815 | 510 848 4315 (f)

www.placeworks.com

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1 INTRODUCTION

Capitola is a tight-knit coastal community with a family-friendly atmosphere, historic charm, regional appeal, and a high quality of life. During some of its earliest years, Capitola was established as a seaside resort, and the City continues to be seen as a laid-back getaway with a village atmosphere. Through thoughtful planning over the 65 years since incorporation in 1949, Capitola has managed to grow and evolve while maintaining respect for its beautiful natural setting and preserving its historic character and a distinct sense of place. Capitola is a conscientious community that wishes to preserve its intimate feeling and unique identity as it provides for future prosperity and greater sustainability. Residents and leaders of Capitola recognize that a healthy and prosperous community must consider economic, environmental, and social goals when planning for the future, and must evolve in a way that continues to promote the City's values.

Under the leadership of a General Plan Advisory Committee, the Planning Commission, and the City Council, and with input from the community, the City of Capitola prepared an updated General Plan that was adopted in 2014 and is focused on maintaining a strong local identity, fostering a high quality of life, improving the environment, and promoting sustainable development. ***Sustainability*** is commonly defined as "using resources in the present in a manner that does not compromise the choices and quality of life of future generations." The updated General Plan recognizes a variety of ways that sustainability goals can be met, such as increasing alternative modes of transportation, maintaining a healthy local economy, and preserving open space.

This Climate Action Plan (CAP) is a strategic tool to be implemented alongside the General Plan. It is a detailed, long-range strategy to reduce greenhouse gas (GHG) emissions and achieve greater conservation of resources with regards to transportation and land use, energy, water, solid waste, and open space. Collectively addressing community development and conservation through these lenses will help Capitola remain attractive, prosperous, and adaptive to social, political, and environmental changes.

This Climate Action Plan has been created for Capitola to be in compliance with State requirements that address the reduction of major sources of GHG emissions. It establishes a strategy that the City and community can implement to achieve the City's GHG emissions reduction target, as identified and required by State legislation.

Implementation of this Climate Action Plan will guide Capitola's actions through a series of communitywide and municipal GHG emissions reduction measures to decrease the city's contribution to GHG emissions. Communitywide GHG emission reduction measures are aimed to increase energy independence; reduce spending on gas, electricity, and water; and

improve air quality from non-City operations. Municipal GHG emission reduction measures apply exclusively to City operations. Both communitywide and municipal GHG emission reduction measures are discussed in Chapter 5 of this document.

This Climate Action Plan will support ambitious GHG emission reduction goals adopted by the State and will ensure that Capitola is eligible for transportation and land use grant funding. The federal, State, and regional requirements are discussed in detail under the heading *Regulatory Action on Greenhouse Gas Emissions* further along in this chapter.

***Communitywide** measures aim to reduce GHG emissions from activities that occur within Capitola.*

***Municipal** measures apply exclusively to City government operations.*

This CAP may also be utilized for tiering and streamlining future development within Capitola, pursuant to California Environmental Quality Act (CEQA) Guideline Sections 15152 and 15183.5. It serves as the CEQA threshold of significance within the city for GHG emissions, by which all applicable developments within the city will be reviewed.

KEY COMPONENTS OF THIS CLIMATE ACTION PLAN

Three primary components comprise the core of a typical Climate Action Plan: a baseline inventory, one or more reduction targets, and GHG reduction measures. Put most simply, the baseline inventories tell communities where they are with regard to GHG emissions, reduction targets tell communities where they need to go, and the GHG reduction measures are the means by which communities arrive at their targets for future GHG emissions.

2010 BASELINE INVENTORY

A baseline inventory serves as a snapshot of existing GHG emissions levels within a community and acts as the starting point for establishing future targets and the emissions reductions necessary to achieve those targets. The baseline inventory is calculated based on a broad array of information, including population and employment levels, energy use, waste disposal, water use, and transportation patterns. Calculations are performed using one or more modeling tools and/or emissions factors that extrapolate GHG emissions levels in $MTCO_2e$ using inputs such as Vehicle Miles Traveled (VMT), electricity use in kilowatt hours (kWh), or tons of solid waste disposal, among others. Using these data, the quantity of GHG emissions is calculated for different sectors. The calculated emissions levels for each of these sectors are then totaled to arrive at the communitywide GHG emissions inventory. For Capitola, these sectors evaluated are:

- Transportation and mobile sources
- Residential energy use
- Non-residential energy use
- Moving and treating water/wastewater
- Solid waste disposal

Capitola's 2010 Baseline Inventory

Sector	$MTCO_2e$
Transportation and mobile sources	57,123
Residential energy use	15,570
Non-residential energy use	13,255
Moving and treating water/wastewater	1,476
Solid waste disposal	667
Total:	**88,091**

Source: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Communitywide Greenhouse Gas Emissions Inventory.

Reduction Targets

Establishing reduction targets is at the heart of the Climate Action Planning process. State legislation, including AB 32 and Executive Order S-03-05, establishes statewide GHG emissions targets that are then applied locally to determine what amount of GHG emissions reductions are needed at the community level. The State has set a goal of returning to 1990 emissions levels by the year 2020, and decreasing emissions to 80 percent below 1990 levels by 2050. Communities have different options for approaches to evaluating their progress in meeting these goals. Communities may elect to determine their own 1990 emissions levels and use that as the basis of their goals for 2020 and 2050. Alternatively, a community may rely on statewide data, and this is the strategy being used by Capitola.

The California Air Resources Board (CARB) has examined California's current and historic GHG emissions levels to determine the statewide percent reductions in GHG emissions necessary to achieve the goals established based on 1990 emissions levels. Depending on the level of GHG emissions in any given year, the percent reduction necessary to return to 1990 levels will vary. CARB determined that given the level of emissions in 2010, a 4.9 percent reduction from that emissions level would be necessary to reach 1990 emissions levels. CARB also determined that to reach the goal of an 80 percent reduction from 1990 levels, an 81 percent reduction from 2010 emissions levels would be required.

Based on these numbers, Capitola's GHG reduction goal is to reduce its total communitywide emissions by 5 percent from 2010 levels by 2020 and by 81 percent from 2010 levels by 2050. These percentage reductions are applied to Capitola's 2010 Baseline Inventory to determine the absolute emissions levels that comprise the targets of the Climate Action Plan. Capitola's exact emissions targets and the calculations performed to establish those targets are discussed in greater detail in Chapter 5, Greenhouse Gas Emissions Reduction Target.

Capitola's 2010 Baseline Inventory, 2020 Goal, and 2050 Goal

Capitola's absolute goals for GHG reductions are determined using a combination of State-level percentage reduction estimates, applied to Capitola's absolute amount of local emissions, expressed in $MTCO_2e$. The following calculations show the steps for determining Capitola's needed reductions for GHG emissions.

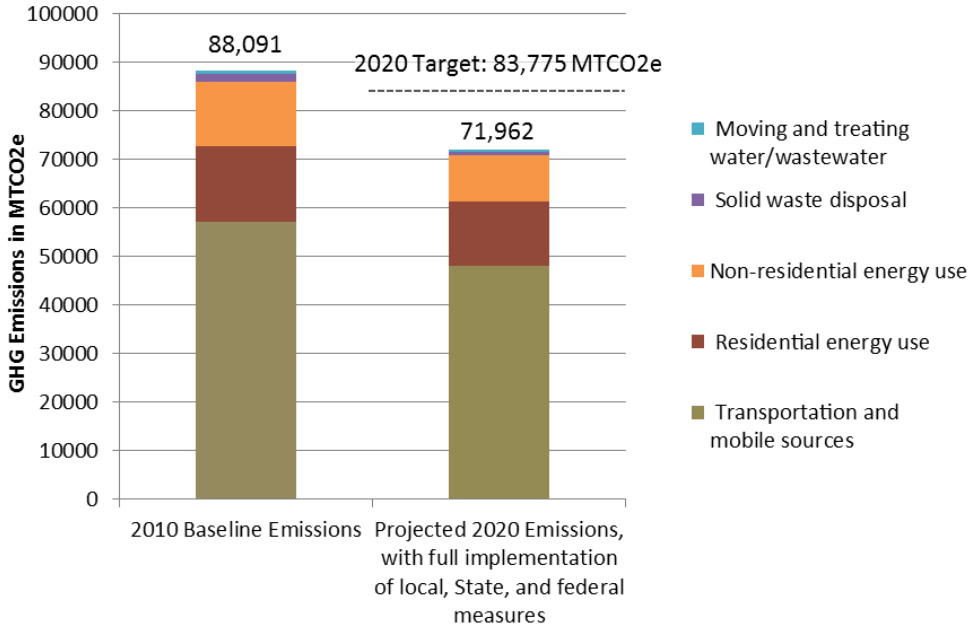
88,091 $MTCO_2e$
2010 Baseline
→ 4,316 $MTCO_2e$
4.9% Reduction
→ 83,775 $MTCO_2e$
2020 Goal

2020 Goal established by AB 32 must be achieved through combination of local GHG reduction measures, and federal/State measures and programs.

71,354 $MTCO_2e$
81% Reduction
→ 16,737 $MTCO_2e$
2050 Goal

2050 Goal established by S-03-05 is not considered feasible with current technology.

FIGURE 1-1 2010 BASELINE INVENTORY AND 2020 PROJECTED EMISSIONS BY SECTOR



GHG Reduction Measures

In order to reach the GHG emissions targets established for Capitola, the CAP outlines a comprehensive program of reduction measures that will serve to decrease citywide GHG emissions. The CAP incorporates both mandatory and voluntary measures covering a variety of different topics and GHG emissions sources. GHG reduction measures for Capitola address the following categories:

- VMT and Transportation
- Residential and Non-Residential Energy
- Water and Wastewater
- Solid Waste
- Parks, Open Space, and Agriculture
- Action and Implementation

Capitola's Projected 2020 GHG Reductions by Measure Category

Measure Category	$MTCO_2e$
VMT and Transportation	2,972
Residential and Non-Residential Energy	2,078
Water and Wastewater	67
Solid Waste	922
Parks, Open Space, and Agriculture	0
Action and Implementation	0
Total:	**6,039***

* Due to rounding errors and modeling limitations, the sum of sector-specific reductions from local reduction for 2020 varies slightly (<0.25 percent) from the total amount of projected GHG reductions in the overall sector-level data.

Expanding upon the modeling used to calculate Capitola's Baseline Inventory of GHG emissions, the CAP projects the potential GHG reductions that may be anticipated from particular measures or groups of measures. It is not possible to quantify the potential GHG reductions for all measures, and all projections of GHG reductions are estimates. Nevertheless, taken together, the projected GHG emissions reductions allow Capitola to evaluate the overall effectiveness of its GHG reduction measures in meeting the goals and targets established by State legislation and the Capitola CAP. Going forward, it will be necessary for the City to ensure and monitor implementation of the CAP measures, and to reevaluate in the future whether the implemented measures are enabling the City to meet the emissions goals of the CAP. Chapter 7, Greenhouse Gas Reduction Measures, Implementation, and Monitoring, presents the complete list of GHG reduction measures, including the full text of the measures, projected emissions reductions, estimated relative levels of effectiveness, and information on implementation and monitoring.

PUBLIC OUTREACH AND PARTICIPATION

Capitola's recently completed General Plan process addressed multiple aspects of climate change, and the policies and principles of the General Plan inform the Climate Action Plan. Starting with the earliest General Plan workshops, participants integrated sustainability into the guiding principles and policies of the General Plan. At the multiple subsequent community workshops that were part of the General Plan process, participants discussed and incorporated goals and policies related to land use, transportation, and overall sustainability—all of which relate to climate change and GHG emissions. The General Plan Advisory Committee (GPAC) also held a number of meetings on specific topics directly relating to climate change and GHG emissions, including transportation, community design, safety, and open space and conservation. Climate change adaptation was an important component of the GPAC's meeting on the Safety Element of the General Plan. Although the General Plan process touched on multiple aspects of climate change prevention and adaptation, the development of the Climate Action Plan, with its emphasis on quantified emissions and GHG reduction measures, stands as a separate but related process.

Based on the values expressed by residents and local leaders as part of the General Plan process, a preliminary list of GHG reduction measures was developed. The GPAC reviewed and offered feedback on this preliminary list of measures at its January 2013 meeting. The GPAC provided the following overarching suggestions for the GHG reduction measures:

- Focus on education
- Offer options and choice
- Avoid punitive measures
- Emphasize equity
- Prioritize incentives rather than disincentives
- Encourage community energy supply aggregation
- Seek to change overall "culture"
- Solicit additional feedback on the CAP from the Commission on the Environment (COE)

Key Meetings Held:

Community Workshops:
- March, 19, 2011
- July 20, 2011

GPAC Meeting on GHG Measures:
- January 16, 2013

Commission on the Environment:
- October 27, 2014

Per the suggestions of the GPAC, the list of preliminary GHG reduction measures was revised and brought before the Commission on the Environment on October 27, 2014. The Commission offered additional feedback on the development of the CAP and the proposed GHG reduction measures. This feedback included slight modifications to the proposed measures, as well as the addition of two minor measures.

SUMMARY OF THE CLIMATE ACTION PLAN

This Climate Action Plan is divided into the following eight chapters:

- **Chapter 1, Introduction:** This chapter explains and summarizes the purpose and content of this Climate Action Plan, and summarizes the public process to date.
- **Chapter 2, Background:** This chapter presents background information about greenhouse gases, climate change science, climate change regulation, and sustainability challenges facing Capitola.
- **Chapter 3, Baseline Inventory:** This chapter presents detailed information on the 2010 Baseline Inventory of GHG emissions, including sector-level data and explanations, as well as discussion of GHG sources not quantified, such as municipal GHG emissions.
- **Chapter 4, 2020 and 2035 Forecasts:** This chapter presents the "Business as Usual" and "Adjusted" GHG emissions projections that form the basis of Capitola's local GHG reduction target.
- **Chapter 5, Greenhouse Gas Emissions Reduction Targets:** This chapter discusses the selected approach for determining Capitola's community GHG reduction goals for 2020 and 2035, and calculates the GHG emissions reductions required to be achieved by local measures in order to meet overall emissions goals.
- **Chapter 6, Overview of Measures and Projected Effects:** This chapter categorizes and describes the effects of communitywide and municipal GHG reduction measures that will enable Capitola to meet its local reduction targets and achieve its overall GHG emissions goal. This chapter presents projected GHG emissions reductions for measures or groups of measures whose reductions could feasibly be quantified.
- **Chapter 7, Measures, Implementation, and Monitoring:** This chapter presents a detailed description of all measures and sub-measures. This chapter also presents reduction mechanisms, reduction assumptions, cost-effectiveness discussions, action and implementation items, and a general timeline for each measure.

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2 BACKGROUND

This chapter provides background information on the following topics:

- Greenhouse gases (GHGs) and the theory of global climate change.
- Federal, State, and regional regulatory action on GHG emissions.
- Sustainability and GHG reduction challenges facing Capitola

WHAT ARE GREENHOUSE GASES?

Greenhouse gases are vapors that trap heat in the Earth's atmosphere. Federal and California State law identifies the following six gases as GHGs: [1]

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)

Greenhouse gases emissions are measured in terms of their Global Warming Potential (GWP). The GWP is the ability of a GHG to trap heat in the Earth's atmosphere when compared to an equal amount of carbon dioxide, which assumes a GWP value of 1. The GWP is used to estimate the amount of warming potential a particular GHG will contribute to the Earth's atmosphere.

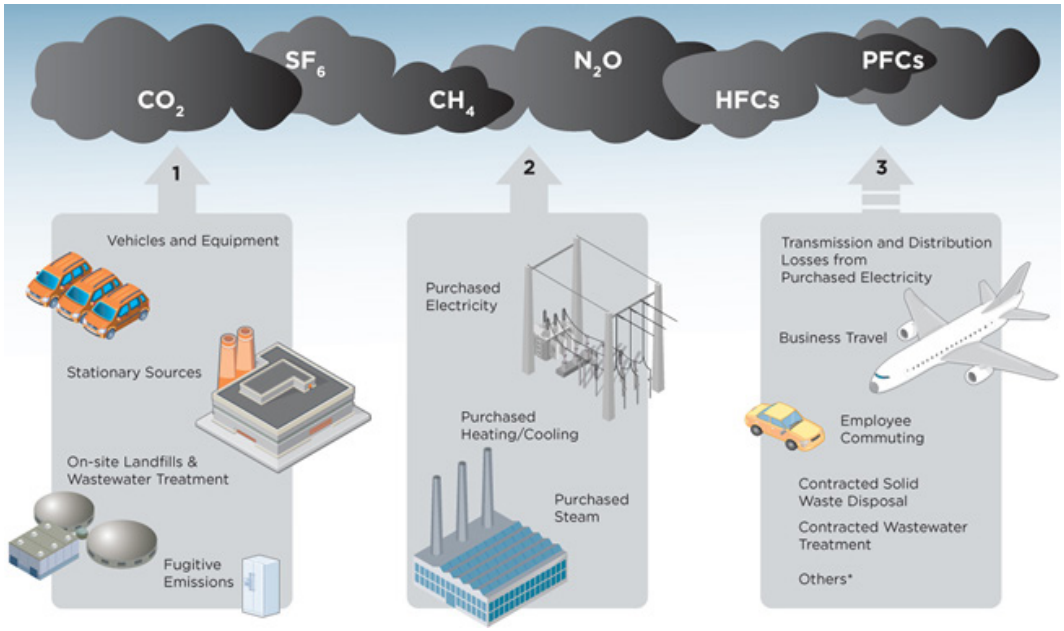
What is a metric ton of carbon dioxide?

- *About 1 metric ton of CO_2 is produced to meet the average monthly energy demand of the typical American household for heating, cooling, cooking, electricity use, and other energy needs. This results in 12 metric tons per house per year.*
- *About 1 metric ton of CO_2 is produced for approximately each 100 gallons of gasoline used. This means if you drive a car that gets 20 miles per gallon, 1 metric ton of CO_2 is released into the atmosphere for every 2,000 miles driven. This is about two months of driving for many US drivers.*

Source: EPA

Based on the GWP, all GHGs can be converted into a measure called carbon dioxide equivalents (CO_2e), which enables decision-makers to consider different GHGs in comparable terms. The conversion of GHGs is done by comparing the GWP of each GHG to carbon dioxide. The carbon dioxide equivalent is a quantity that describes the amount of carbon dioxide that would have the same GWP. For example, methane is approximately 21 times more powerful than carbon dioxide on a per weight basis in its ability to trap heat. Therefore, 1 metric ton of methane would be calculated as 21 metric tons of carbon dioxide equivalent ($MTCO_2e$).

[1] California Health and Safety Code, Section 38505(g).



COMMON SOURCES OF GREENHOUSE GAS EMISSIONS

Source: US EPA, EPA's Greenhouse Gas Emissions Reductions, http://www.epa.gov/oaintrnt/ghg/index.htm, accessed on December 15, 2014.

A brief description of each of the six GHGs is provided below.

CARBON DIOXIDE (CO_2)

The primary source of carbon dioxide from human activity is burning fossil fuels such as petroleum, coal, and natural gas in factories, electrical power plants, cars, trucks, and other similar sources. Energy use and driving are directly linked to global warming. While carbon dioxide is the most common GHG, it is the least powerful and has a GWP of 1.

METHANE (CH_4)

Methane is the primary component of natural gas, which is used for space and water heating, steam production, and power generation. As provided in the example above, the GWP of methane is 21, or 21 times that of carbon dioxide. Methane in the Earth's atmosphere occurs when organic material breaks down. Modern solid waste landfills, agricultural operations, coal mines, and oil and natural gas operations are the primary sources of human-generated methane emissions.

NITROUS OXIDE (N_2O)

The majority of nitrous oxide is produced from agricultural practices, including nitrogen fertilizers and animal waste, which promote nitrous oxide production from naturally occurring bacteria. Industrial processes and internal combustion engines also produce nitrous oxide. The GWP of nitrous oxide is 310, which means that nitrous oxide is 310 times more powerful than carbon dioxide and would be calculated as 310 metric tons of CO_2e.

HYDROFLUOROCARBONS (HFCS)

Hydrofluorocarbons are typically used as foam-blown insulation and as refrigerants for both stationary refrigeration and mobile air conditioning, and do not occur naturally. The use of hydrofluorocarbons for cooling and foam blowing is growing as the continued phase-out of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) increases. The GWP of hydrofluorocarbons ranges from 140 to 6,300.

PERFLUOROCARBONS (PFCS)

Perfluorocarbons are compounds consisting of carbon and fluorine, primarily created as byproducts of aluminum production and semiconductor (e.g. radios, computers, and telephones) manufacturing; they do not occur naturally. Perfluorocarbons are powerful GHGs that range in GWP from 5,700 to 11,900. Perfluorocarbons are a particular concern because they can remain in the Earth's atmosphere for up to 50,000 years after they are released.

SULFUR HEXAFLUORIDE (SF_6)

This gas is most commonly used as an electrical insulator in high voltage equipment that transmits and distributes electricity, and does not occur naturally. Like perfluorocarbons described above, sulfur hexafluoride is an extremely powerful GHG and has a GWP of 23,900. However, sulfur hexafluorides have a small occurrence and contribute very little to overall GHGs in the Earth's atmosphere.

OTHER COMPOUNDS

In addition to the six major GHGs discussed above, many other compounds have the potential to build up in the Earth's atmosphere. Some of these compounds have been identified as the cause of ozone damage and their gradual phase-out is currently in effect.

These compounds include ozone, 1,1,1-trichloroethane,[2] hydrochlorofluorocarbons, and chlorofluorocarbons.

GLOBAL CLIMATE CHANGE SCIENCE

Despite a strong scientific consensus, global climate change remains a controversial topic in the United States. Some people disagree that the climate is changing; others assert that changes in the Earth's climate are part of natural cycles and are not caused by human activity. Although there is extensive scientific research and documentation that supports theories of human-caused global climate change, a small minority of scientists believe that the evidence is inconclusive. This section presents the basic concepts underlying the science of global climate change in order to explain why those who are concerned about global climate change, such as California legislators, are seeking to reduce the impacts of specific human activities on the Earth's atmosphere.

The Earth's atmosphere is composed of naturally occurring and human-caused GHGs that trap heat in the atmosphere and regulate the Earth's temperature. This phenomenon, known as the greenhouse effect, is responsible for maintaining a climate suitable for human life. Greenhouse gases in the Earth's atmosphere play an important role in maintaining the Earth's temperature as they trap heat reflected from the Earth's surface that otherwise would escape to space, as shown in Figure 2-1.

Water vapor and carbon dioxide are the most abundant GHGs in the Earth's atmosphere. As discussed above, the six GHGs that are considered the main contributors to man-made global climate change are:

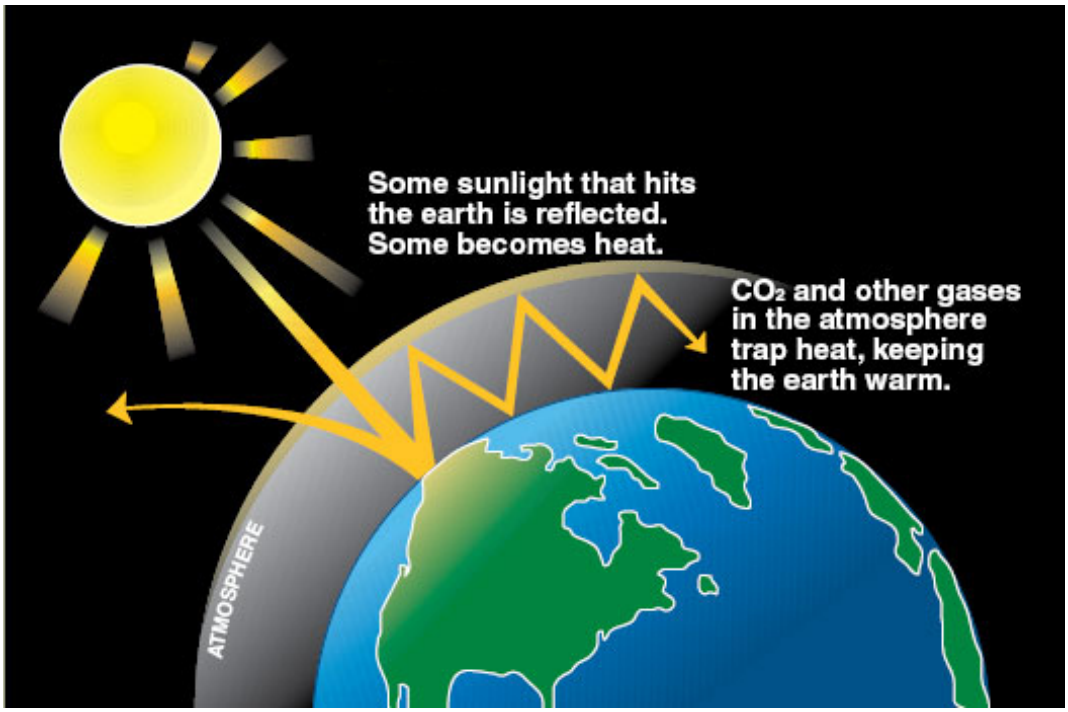
- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)

While human activity results in the release of some GHGs that occur naturally, such as carbon dioxide and methane, other gases, like hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, are completely human-made.

[2] 1,1,1-trichloroethane was used as an industrial solvent before being banned under the Montreal Protocol in 1996.

Human activities, including but not limited to burning fossil fuels and removing trees, result in the release of carbon in the form of carbon dioxide into the Earth's atmosphere. Without these human activities, carbon dioxide would be naturally stored underground in sediments

FIGURE 2-1 **THE GREENHOUSE EFFECT**



Source: State of Washington Department of Ecology, "What is Climate Change," http://www.ecy.wa.gov/climatechange/whatis.htm, accessed on October 11, 2012.

and compounds, such as petroleum, coal, and natural gas, or on the Earth's surface as plant life. As human activities that release stored carbon dioxide have increased from the time of the industrial revolution over 200 years ago, the amounts of GHGs in the atmosphere also increased, consequently enhancing the natural greenhouse effect.

A majority of scientists cite strong evidence that this enhanced greenhouse effect has contributed to global warming, which is defined as an increased rate of warming of the Earth's surface temperature. As more GHGs build up in the Earth's atmosphere, more heat is trapped in the Earth's atmosphere, thereby increasing evaporation rates and temperatures near the surface. The warming of the Earth induces large-scale changes in ocean circulation

patterns, precipitation patterns, global ice cover, biological distributions, as well as other major shifts in Earth's systems. These are collectively referred to as global climate change.

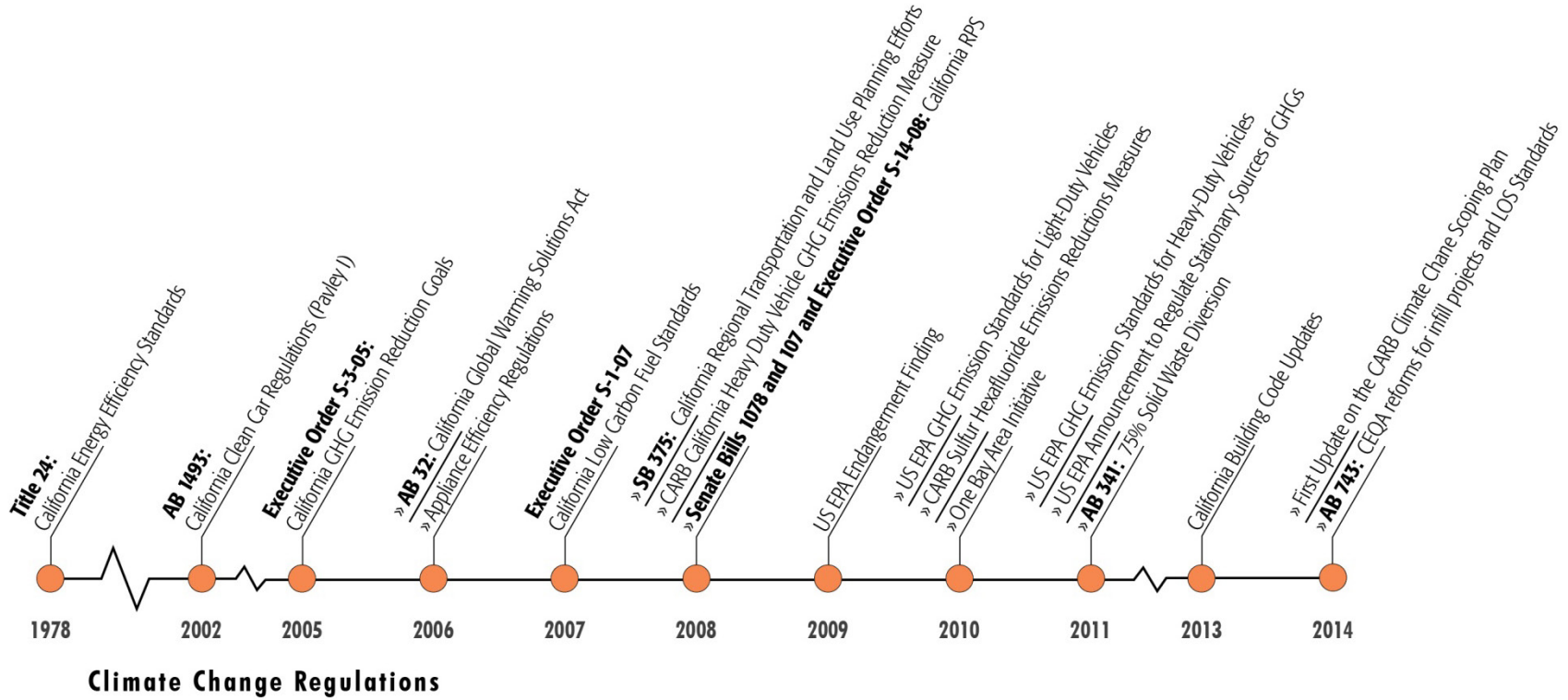
REGULATORY ACTION ON GREENHOUSE GAS EMISSIONS

Many federal, State, and regional government agencies and organizations are working to develop and implement solutions to control GHG emissions and slow their effects on natural ecosystems.

At the federal level, in December 2009, the US Environmental Protection Agency (EPA) found that elevated concentrations of the six key GHGs in the atmosphere, which are discussed earlier in this chapter, endanger the public health and welfare of current and future generations. In collaboration with the National Highway Traffic Safety Administration, the EPA established GHG emission standards for light-duty vehicles (e.g., cars) in 2010 and heavy-duty vehicles (e.g., trucks) in 2011. Additionally, on January 2, 2011, the EPA announced that it would regulate GHG emissions from major stationary sources of GHGs, including oil refineries and fossil fuel burning power plants, through modifications to the existing Clean Air Act permitting programs. At the State level, California's major laws and regulations include:

- **Energy Efficiency Standards (1978)** to reduce the State's energy consumption by providing regularly updated standards that incorporate new energy efficiency goals, methods, and technologies.
- **Clean Car Regulations (Assembly Bill [AB] 1493, 2002)** to decrease GHG emissions from new passenger vehicles and light duty trucks through California Air Resources Board (CARB) adopted regulations.
- **Executive Order S-3-05 (2005)** to reduce emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050 through a California Environmental Protection Agency (Cal/EPA) led multi-agency effort that identified GHG emission reduction strategies and measures.
- **Global Warming Solutions Act (AB 32, 2006)** to cap California's GHG emissions at 1990 levels by 2020 through CARB-identified discrete, early and easy-to-implement actions to reduce emissions and through a CARB-developed statewide scoping plan to identify how to meet the emissions reduction targets.

FIGURE 2-2 CLIMATE CHANGE REGULATIONS TIMELINE



- **Appliance Efficiency Regulations (2006)** to establish higher standards for federally-regulated and non-federally-regulated appliances. Now considered "business as usual," these standards exceed those imposed by all other US states and serve to reduce the demand for electricity.
- **Executive Order S-01-07 (2007)** to reduce the carbon content of passenger vehicle fuels by 10 percent by 2020 through establishing a low carbon fuel standard (LCFS) for transportation fuels sold in California.[3]
- **Regional Transportation and Land Use Planning Efforts (SB 375, 2008)** to support AB 32 by requiring California metropolitan planning organizations (MPOs) to prepare a sustainable communities strategy to reduce vehicle miles traveled (VMT) in their regions and demonstrate their ability to reach CARB targets for 2020 and 2035 and by providing incentives for governments and developers to implement compact and efficient growth patterns.
- **Heavy Duty Vehicle GHG Emissions Reduction Measure (2008)** to improve the fuel economy of heavy duty vehicles through requiring long-haul truckers to retrofit their trailers with fuel-efficient tires and aerodynamic devices.
- **Senate Bills 1078 and 107, and Executive Order S-14-08** to establish, refine, and strengthen California's Renewable Portfolio Standard (RPS) for electricity production. The most recent standards establish a goal of 33 percent renewable sources by 2020.
- **Sulfur Hexafluoride Emissions Reductions Measures (2010)** to reduce sulfur hexafluoride emissions from semiconductor (e.g., radios, computers, and telephones) and non-semiconductor applications through CARB-adopted regulations, including reporting and reduction requirements for semiconductor operations and new restrictions on the use and sale of sulfur hexafluoride.
- **Solid Waste Diversion (AB 341, Chesbro, 2011)** to reduce waste diversion by 75 percent by 2020 through requiring the Department of Resources, Recycling, and Recovery (CalRecycle) to provide strategies for achieving the reduction, certain businesses to arrange for recycling services, and local governments to implement a

[3] On December 29, 2011, the US District Court for the Eastern District of California issued several rulings in federal lawsuits challenging the LCFS. One of the court's rulings preliminarily prohibited CARB from enforcing the regulation during the time of the litigation. In January 2012, CARB appealed the decision and on April 23, 2012, the Ninth Circuit Court granted CARB's motion for a stay of the injunction while it considered CARB's appeal of the lower court's decision. In September 2013, the Ninth Circuit Court of Appeals upheld the LCFS, and in June 2014, the US Supreme Court declined to review the case, allowing California's LCFS to stand.

commercial recycling program, and through revising technical and procedural facets of solid waste facility regulatory laws.

- **California Building Code updates (Title 24, Part 6, California Code of Regulations, 2013)** to strengthen year 2008 energy efficiency requirements for new construction by 25 percent for residential and by 30 percent for commercial projects.
- **First Update to the Climate Change Scoping Plan (CARB, 2014)** to identify new strategies and recommendations to reduce and regulate GHG emissions. Establishes CARB's near- and medium-term priorities, evaluates efforts to meet short-term (2020) GHG reduction goals, and explores approaches to meeting longer-term (2050) GHG reduction goals established in Executive Orders S-3-05 and B-16-2012.
- **Modification to CEQA standards relating to traffic and transportation impacts (SB 743, 2014)** to strengthen the statewide commitment to recognize and respond to the nexus between transportation and land use, and to reduce vehicle miles traveled. Among other things, SB 743 offers opportunities for streamlined environmental review for certain types of projects near high-quality transit facilities, allows for new approaches to evaluating traffic/transportation impacts, and requires transportation agencies to ensure greater conformity between regional transportation, land use, and Congestion Management Plans (CMPs).

In addition to federal- and State-level regulations and policies, some regions in California have established regulations and policies relating directly to GHG emissions. However, the Monterey Bay Unified Air Pollution Control District (MBUAPCD), which has jurisdiction over Capitola, has not established such regulations, nor has it established thresholds of significance for evaluating the GHG emissions of projects under CEQA. The District is currently considering options for regulations and thresholds of significance, and anticipates adopting these sometime in 2015.[4] MBUAPCD currently recommends that air pollution emissions for individual projects be calculated using the CalEEMod modeling software.

Moving Forward 2035 Monterey Bay is a regional planning effort with the goal of coordinating land use and transportation to improve efficiency and decrease GHG emissions. Moving Forward 2035 Monterey Bay was developed by the Association of Association of Monterey Bay Area Governments (AMBAG), consistent with SB 375, and in coordination with MBUAPC, the Santa Cruz County Regional Transportation Commission

[4] Clymo, Amy, Supervising Air Quality Planner, Association of Monterey Bay Area Governments, Personal Communication with Eric Panzer, PlaceWorks. December 12, 2014.

(SCCRTC), and other regional agencies. The Moving Forward 2035 Monterey Bay plan serves as the region's 2035 Metropolitan Transportation Plan (MTP) and Sustainable Communities Strategy (SCS), which together link land use and transportation to GHG emission reduction goals. Capitola's plans, projects, and development must be consistent with Moving Forward 2035 Monterey Bay in order for the City to be eligible for transportation and land use grant funding.

SUSTAINABILITY CHALLENGES

Like other communities in California and around the world, the City of Capitola faces a number of sustainability challenges. This section describes sustainability challenges related to the GHG emission-generating sources covered in this Climate Action Plan.

TRANSPORTATION AND LAND USE

During the second half of the 20th century, transportation and driving patterns in the US shifted dramatically. Vehicle miles traveled (VMT) per person increased by around 140 percent between 1956 and 1998.[5] This growth in VMT is the result of increasing car trips and increasing average trip length. These increases have been driven by a variety of factors, including changes in demographics, land use, urban design, and public transportation systems. It means that the number of miles driven in America has increased much more dramatically than the increase in population.

As the proportion of two-income households grew, and as jobs shifted to areas further from the traditional town center, long car commutes became more common. This has been true of Capitola, as more residents work outside of Capitola and the Monterey Bay region, even commuting "over the hill" to job centers in Silicon Valley. In addition, changes in land use and in building and streetscape design also contributed to increased car trips. The separation of uses and driver convenience often came at the expense of pedestrians and other non-automotive users. As commercial areas became more disconnected from residential neighborhoods, it became less convenient to reach these destinations by means other than a car. Auto-oriented designs, which can be unpleasant, intimidating, or even dangerous for non-drivers, have made non-automotive transportation modes more difficult and less

[5] Puentes, Robert and Adie Tomer, 2008, *The Road…Less Traveled: An Analysis of Vehicle Miles Traveled Trends in the US,* Brookings Institution, Washington D.C.

appealing to use. Additionally, public transit systems have seen their coverage decreased and their services cut as funding declines, and in some cases they have been removed completely.

Because of the obstacles created by development and design, driving is often the only viable mode of transportation. Consequently, residents have fewer opportunities for physical activity, and those who cannot drive, including children, seniors, and disabled people, can have trouble accessing services.

ENERGY

Energy production is a major economic, security, and environmental challenge at the local, national, and global levels. Although Capitola receives its energy from Pacific Gas & Electric Company (PG&E), which provides an energy mix that is cleaner than what many other US utilities provide, it still relies on fossil fuels—coal, oil, and natural gas—for about half of its energy.[6]

According to the U.S. Energy Information Administration, the US imported approximately 40 percent of its petroleum from foreign countries in 2012.[7] This dependence potentially makes our economy and security vulnerable to political and resource instability in other parts of the world. Recent advances in energy extraction technology have allowed the United States to produce a greater quantity of petroleum and natural gas products domestically. Nevertheless, the U.S. continues to face a significant reliance on foreign fossil fuel sources and the new extraction technologies themselves result in environmental and safety impacts that have caused concern among scientists and everyday citizens.

The combustion of fossil fuels to produce heat or electricity, or to power internal combustion engines, is a main contributor to GHG emissions and other environmental problems. Because fossil fuels are found deep in the ground, they must be extracted and transported to provide energy. Surface and groundwater pollution can occur during extraction, storage, and transportation. Land subsidence can result when oil and gas are removed from below ground with nothing left to support the land above. New extraction technologies have also been demonstrated to result in increases in seismic activity. There is also the potential for storage tank leakage and oil spills during transportation, causing widespread pollution and requiring costly cleanup efforts.

[6] Pacific Gas and Electric website, Clean Energy Solutions, http://www.pge.com/en/about/environment/pge/cleanenergy/index.page, accessed on December 8, 2014.

[7] U.S. Energy Information Administration, EIA's Energy in Brief: How dependent are we on foreign oil? http://www.eia.gov/energy_in_brief/article/foreign_oil_dependence.cfm, accessed on December 11, 2014.

WATER

Water conservation is important both to protect water resources, which are expected to be negatively impacted by climate change as a result of GHG emissions, and to reduce GHG emissions that occur as a result of the energy needs for water treatment and transportation.

The years 2012 through 2014 brought severe drought conditions to California, with some studies suggesting that these years represented the worst acute drought in California in 1,200 years.[8] As of late summer in 2014, some of California largest reservoirs stood at approximately 30 percent of capacity, which was comparable to levels experienced during the 1977 drought.[9] The United States Department of Agriculture (USDA) predicted that the 2014 drought would likely have severe impacts on agricultural production and food prices.[10] Responding to these wide-ranging impacts, the Governor proclaimed a State of Emergency for the second time in five years in January 2014, calling for immediate state, regional, and local efforts to reduce water use by urban water users and implement efficient water management practices by agricultural users.[11] Such drought conditions also threaten aquatic ecosystems, increase the risk of wildfires, increase food prices, and harm livelihoods dependent on agriculture, natural resources, and tourism.

Although it is possible for drought conditions to be alleviated by one or more wet winters, increased variability in precipitation contributes to economic and agricultural hardship, and the impacts of a drought may continue to be felt long after rains return. Extreme periods of drought and flooding make agriculture and other human activities more difficult, and severe weather events can cause substantial property damage. It is anticipated that climate change could result not only in more severe long-term drought, but also in greater extremes in both wetness and dryness.

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[8] KQED Science website, Drought Watch 2014, http://blogs.kqed.org/science/series/california-drought-watch/, accessed on December 11, 2014.

[9] Los Angeles Times, August 21, 2014, California Drought continues to take heavy toll on reservoirs, http://www.latimes.com/local/lanow/la-me-ln-california-drought-reservoir-levels-20140821-story.html, accessed on December 11, 2014.

[10] USDA Economic Research Service, California Drought 2014 Farm and Food Impacts, http://ers.usda.gov/topics/in-the-news/california-drought-2014-farm-and-food-impacts.aspx, accessed on December 11, 2014.

[11] Office of the Governor, State of California, January 17, 2014, Press Release, *Governor Brown Declares Drought State of Emergency,* http://gov.ca.gov/news.php?id=18379, accessed on December 11, 2014.

SOLID WASTE

The production and transport of consumer products creates large amounts of GHGs. A large percentage of these products are disposed of after only one use, requiring more raw materials to be extracted to replace these products. Making new products or buildings from raw materials generally requires more energy, uses more water, and creates more air and water pollution than reusing materials or making the same product from recycled materials, thereby increasing GHG emissions.

Once in the landfill, solid waste continues to emit GHGs as it rots, most notably methane, which, as previously noted, is approximately 21 times more potent than carbon dioxide in terms of its global warming impacts. Landfills also release harmful contaminants such as vinyl chloride and benzene. In addition, as rainwater filters through the layers of solid waste in a landfill, it absorbs harmful chemicals, which are then carried into soil, surface water, and groundwater, resulting in contamination. Poor management of landfills can increase populations of disease-carrying pests and create nuisances related to odor, litter, and dust.

The GHG emissions and other environmental problems associated with solid waste can be reduced by diverting waste from landfills through reduced consumption of single-use or disposable products, reuse, and recycling.

OPEN SPACE AND CONSERVATION LANDS

Within its City Limit and Sphere of Influence, Capitola does not have any agricultural land, but does have open space areas. These open space areas can store carbon in trees and plants. Conversion of these open space lands to development can release GHGs into the Earth's atmosphere.

Depending on the types of conservation practices used, open space land uses with long-lived plants, such as forests, can serve to "sequester," or hold, varying amounts of carbon dioxide and other GHGs.[12] When trees and plants are removed as part of the process of converting open space land to other uses, the carbon that is stored in the plants and trees is released into the Earth's atmosphere. This process eliminates the possibility of using the land for plants that would store carbon in the future and disrupts the biological processes that allow land to hold GHGs. In addition, developing on forest land or open space land can result in the release of nitrous oxide emissions from the soil when it comes into contact with oxygen.

[12] International Panel on Climate Change (IPCC), 2006. *IPCC Guidelines for National Greenhouse Gas Inventories*; and IPCC, 2000, *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

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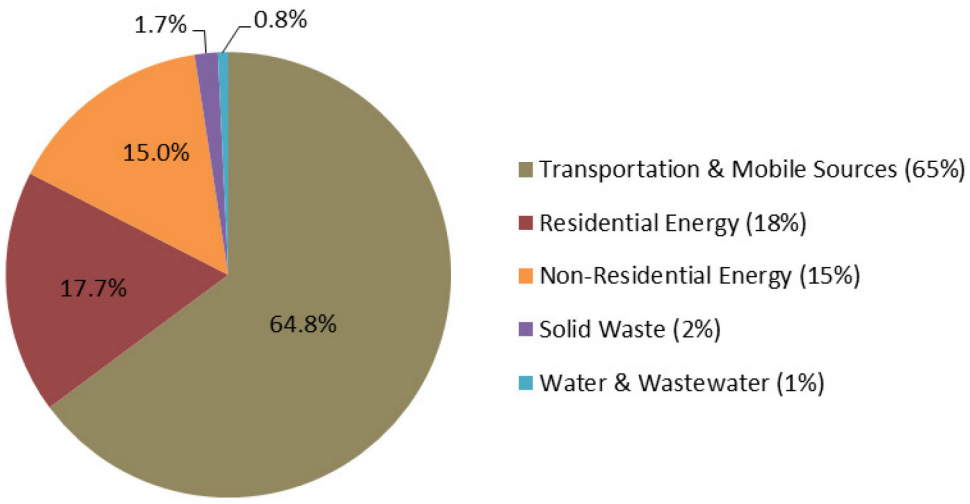
3 EXISTING GREENHOUSE GAS EMISSIONS INVENTORY

This chapter describes existing greenhouse gas (GHG) emissions in the city of Capitola resulting from the following GHG emission-generating sources:

- Transportation and mobile sources
- Residential energy use
- Non-Residential energy use
- Moving and treating water/wastewater
- Solid waste disposal

Capitola's current GHG inventory was compiled for the year 2010. Capitola's calculated annual community-wide GHG emissions in 2010 were 88,091 metric tons of carbon dioxide equivalent (MTCO2e). (See Chapter 1 for an explanation of carbon dioxide equivalent.) The sources of these emissions are shown in Figure 2-1.

FIGURE 3-1 **GREENHOUSE GAS INVENTORY**



Appendix C provides the technical documentation for this inventory. An explanation of these GHG emission-generating sources and how their emissions were calculated in Capitola is presented below.

TRANSPORTATION EMISSIONS

Cars and trucks release GHGs when they burn gasoline and diesel fuel. Capitola's emissions from cars and trucks, also called transportation emissions, were calculated based on the trips to and from homes, schools, shopping centers, office buildings, and other destinations inside and outside Capitola.[1] For the purposes of the Climate Action Plan, transportation emissions include 100 percent of trips that both begin and end within Capitola. For trips from Capitola to somewhere else and trips from somewhere else to Capitola (external-internal trips), only 50 percent of the trip length is included as part of the City's inventory. This is based on the presumption that only half the trip is the "responsibility" of the city, with the origin or destination outside of Capitola responsible for the other half. For trips that pass through Capitola, such as cars driving from Watsonville to Santa Cruz on Highway 1, no emissions are included as part of the city's inventory, since the city bears no responsibility for these trips. Capitola's total transportation emissions are shown in Table 3-1.

TABLE 3-1 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM TRANSPORTATION SOURCES**

	Total Annual VMT	GHG Emissions ($MTCO_2e$/Year)
On Road Vehicles (e.g., cars, trucks, buses)	110,422,720	54,744
	Off Road Energy Equivalent (MMBtu)	**GHG Emissions ($MTCO_2e$/Year)**
Off Road Vehicles and Equipment (e.g., construction equipment)	800,000	2,379
Total	--	57,123

Source: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Community-wide Greenhouse Gas Emissions Inventory.

[1] Vehicle miles traveled (VMT) generated by land uses within the city was compiled by RBF consulting for the City of Capitola for 2010. GHG emissions from those VMT were compiled by the Association of Monterey Bay Area Governments Energy Watch using the EMFAC 2007 vehicle types and emissions factors.

RESIDENTIAL EMISSIONS

"Residential land uses" are the single-family houses, apartments, mobile homes, townhouses and other residential units where people live. People's homes generate GHG emissions primarily from electricity and natural gas used for heating and cooking.[2] Pacific Gas and Electric Company (PG&E) provided residential purchased energy use and natural gas use for the year 2010. These data are shown in Table 3-2.

TABLE 3-2 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM RESIDENTIAL LAND USES**

Source	Energy Use	Energy Use in MMBtu	GHG Emissions ($MTCO_2e$/Year)
Residential Building Purchased Electricity	22,835,419 kWh	77,937	4,624
Residential Building Natural Gas	2,070,672 therms	207,167	10,946
Total			**15,570**

Notes: Based on 2010 electricity and natural gas use provided by PG&E. Based on PG&E's 2010 GHG emission factor. Emissions are rounded to the nearest whole number.
kWh = kilowatt hours. A kilowatt hour is a unit of energy equivalent to one kilowatt of power expended for one hour of time. As an example, a small electric heater with one heating element can use 1 kilowatt.
Therms = A unit of heat equivalent to 100,000 British thermal units (BTUs). A BTU is the amount of heat required to raise 1 pound of water (approximately 1 pint), 1 degree Fahrenheit at or close to its point of maximum density.
MTCO2e = metric tons of carbon dioxide equivalent.
Source: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Community-wide Greenhouse Gas Emissions Inventory

[2] GHG emissions are categorized by whether they are human-made (anthropogenic) or part of the natural atmospheric cycle (biogenic). Burning wood is considered a biogenic source of carbon dioxide (a GHG) because the carbon is associated with recently living organic material. Biogenic sources of GHG emissions are not included as part of the communitywide GHG inventory because the release of carbon dioxide simply restores the atmosphere to prior levels. This is consistent with the State GHG emissions inventory, which does not include biogenic sources of GHG emissions.

NON-RESIDENTIAL EMISSIONS

The non-residential category includes GHG emissions associated with commercial, office, and industrial land uses, such as hotels, office buildings, hospitals, gas stations, factories and warehouses. Like homes, non-residential land uses generate GHG emissions primarily from electricity and natural gas used for heating and cooking, as in restaurants. Because of privacy regulations related to the reporting of air pollutant emissions, industrial sources of GHG emissions in Capitola are included in non-residential emissions, rather than considered separately. PG&E provided data on non-residential purchased energy use and natural gas use for year 2010, as shown in Table 3-3.

TABLE 3-3 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM NON-RESIDENTIAL LAND USES**

Source	Energy Use	Energy Use MMBtu	GHG Emissions ($MTCO_2e$/Year)
Non-Residential Building Purchased Energy	36,291,610 kWh	132,104	8,152
Non-Residential Building Natural Gas	966,194 therms	96,619	5,103
Total			**13,255**

Notes: Based on 2010 electricity and natural gas use provided by PG&E. Based on PG&E's 2010 GHG emission factor. Emissions are rounded to the nearest whole number.
kWh = kilowatt hours. A kilowatt hour is a unit of energy equivalent to one kilowatt of power expended for one hour of time. As an example, a small electric heater with one heating element can use 1 kilowatt.
Therms = A unit of heat equivalent to 100,000 British thermal units (BTUs). A BTU is the amount of heat required to raise 1 pound of water (approximately 1 pint), 1 degree Fahrenheit at or close to its point of maximum density.
MMBtu = one million British thermal units. One BTU is equivalent to the energy required to heat one pound of water by one degree Fahrenheit.
MTCO2e = metric tons of carbon dioxide equivalent.
Source: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Community-wide Greenhouse Gas Emissions Inventory

WATER/WASTEWATER EMISSIONS

Using water and flushing the toilet results in GHG emissions for two reasons: first, from the electricity required to move and treat potable (drinking) water, and second, from methane and nitrous oxide from sewage that are not captured within the wastewater treatment system.[3] For the purposes of comparison to other emissions sources, these emissions are converted to $MTCO_2e$. Table 3-4 shows GHG emissions from the city's water use and wastewater (sewage) generation.

TABLE 3-4 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM WATER USE AND WASTEWATER TREATMENT**

	Water Use/ Wastewater Generation (MGD)[a]	Energy Use	GHG Emissions ($MTCO_2e$/Year)
Water Use	1.00	1,277,338 kWh[b]	**407**[c]
Wastewater Treatment	1.08	N/A[d]	**260**
Total			**667**

[a] MGD = Million gallons per day.
[b] Energy associated with water conveyance, treatment, and distribution.
[c] Based on PG&E's 2010 GHG emission factor.
[d] GHG emissions associated with wastewater generation and treatment were calculated based on total process and energy emissions from the Santa Cruz Wastewater Treatment Plan, which serves Capitola and other area cities. These data did not break down emissions by source, such as energy use or fugitive emissions.
Source: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Community-wide Greenhouse Gas Emissions Inventory

[3] Few if any Capitola households are on separate septic tank systems given the city's compact footprint and proximity to sensitive coastal waters. For the purpose of this GHG emissions inventory, all wastewater was modeled as treated wastewater.

SOLID WASTE DISPOSAL EMISSIONS

Trash, also referred to as "solid waste," produces significant amounts of methane; a powerful GHG. Most operating landfills in California have installed landfill gas recovery systems as a common way to reduce methane emissions from solid waste disposal. These systems capture the methane gas released from rotting garbage in landfills and convert it to useable energy. Although solid waste disposal sites produce carbon dioxide from bacteria or biological processes that occur in the landfill, known as biogenic carbon dioxide, these biogenic sources of GHG emissions are not included as part of a communitywide GHG inventory because they are part of a natural process and are not under the City's control. Solid waste collected in Capitola is transferred to the Monterey Peninsula Class III Landfill, operated by the Monterey Regional Waste Management District (MRWMD) and located in Marina. In cooperation with GreenWaste Recovery, MRWMD is currently looking to expand existing methane capture and reuse from this facility.[4]

The California Department of Resources Recycling and Recovery (CalRecycle) maintains a disposal reporting system (DRS) to document waste disposal by jurisdiction and facility; this system was used to access the data needed to identify GHG emissions from garbage generated in Capitola. The CalRecycle DRS tracks solid waste disposal and "alternative daily cover" (ADC), which is used as a temporary overlay to cover exposed garbage to reduce insects and vermin. Typical ADC materials include green materials, sludge, ash and kiln residue, compost, construction, and demolition debris, and special foams and fabric; these materials contribute to the total solid waste disposal documented for Capitola. Table 3-5 shows total GHG emissions from waste disposal for the city.

[4] Abraham, Kera. *Monterey County Weekly*. November 20, 2015. Waste district plans to convert landfill methane into carbon-negative hauling fuel.

TABLE 3-5 **BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FROM WASTE DISPOSAL**

Waste Generated (Wet Tons/Year)	GHG Emissions ($MTCO_2e$/Year)
8,083	1,476

Source: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Community-wide Greenhouse Gas Emissions Inventory.

CARBON STOCK/CARBON SEQUESTRATION

As described in Chapter 1, Capitola hosts open space and conservation areas. Development on open space and conservation lands can release carbon dioxide emissions from removal of plant materials that store carbon. The amount of biological material from living or recently living organisms (i.e., biomass) stored in open space and conservation areas within the city boundary is not a substantial portion of Capitola's GHG emissions. Therefore, carbon stock from open space biomass is not included in this GHG emissions inventory.

MUNICIPAL EMISSIONS

Emissions from City government operations, such as the electricity used in City office buildings, or gas burned by Capitola Police Department cars, are a very small percentage of the overall emissions within the city limits of Capitola. Therefore, the focus of this Climate Action Plan is on the community-wide GHG emissions, and on measures to reduce those community-wide emissions. While this Climate Action Plan includes measures that the City will implement in order to reduce the emissions from its municipal operations, those reductions will not significantly affect the overall amount of GHGs emitted in Capitola. Moreover, the GHG emissions reductions from changes to City government operations are too small to quantify accurately. Because the reductions from municipal measures were not quantified, the baseline municipal GHG emissions were not quantified as part of this inventory.

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4 2020 AND 2035 BUSINESS AS USUAL AND ADJUSTED BUSINESS AS USUAL GREENHOUSE GAS EMISSIONS INVENTORIES

This chapter forecasts the greenhouse gas (GHG) emissions in Capitola in the years 2020 and 2035. The year 2020 was selected to be consistent with the statewide target established by Assembly Bill (AB) 32, which, as explained in Chapter 1, is to limit California's GHG emissions to 1990 levels by the year 2020. The year 2035 was selected as a mid-way point to the more distant 2050 GHG reductions goal set by Executive Order S-3-05. The State of California has yet to set official targets relating to the goals of this executive order; therefore, the 2035 inventory and the 2035 goals discussed in the following chapter are preliminary.

As in the inventory of existing emissions in Chapter 3, this forecast looks at GHGs emissions from:

- Transportation and Mobile Sources
- Residential energy use
- Non-Residential energy use
- Moving and treating water/wastewater
- Solid waste disposal

This chapter discusses two scenarios for the years 2020 and 2035:

1. A "business as usual" (BAU) forecast, if no steps were taken to reduce emissions.
2. An "adjusted" BAU forecast, which takes into account State and federal regulations and standards to reduce emissions that will be in effect by 2020 and subsequent years.

BUSINESS AS USUAL FORECAST

The BAU forecast refers to a scenario in which neither California nor the US government adopts any measures to reduce GHG emissions.

For Capitola's BAU forecasts, the projected GHG emissions in 2020 and 2035 were based on the communitywide GHG emissions inventory for the year 2010, which is identified in Chapter 3 as 88,091 metric tons of carbon dioxide equivalent ($MTCO_2e$). 2020 and 2035 BAU GHG emission projections assume that for future growth in Capitola, the carbon intensities of vehicle use, residences, and other uses and activities will remain the same as what existed in Capitola in 2010. Table 4-1 shows Capitola's projected population, housing, non-residential building square footage, and employment in 2020 and 2035, based on the amount and type of development that is reasonably foreseen. These 2020 and 2035 projections were based on the differences between 2010 conditions and the proposed

Capitola General Plan 2035 land use map and policies. Table 4-1 totals the number of residents and number of employees working in Capitola to arrive at the "service population." Since both residents and workers in a community drive, use energy, flush toilets, and throw away trash, GHG emissions analyses frequently refer to a "service population" of both workers and residents, rather than the standard population, which refers only to residents.

Table 4-2 identifies the 2010 baseline communitywide GHG emissions inventory (from Chapter 2) and the 2020 BAU communitywide GHG emissions projection for Capitola. Technical documentation for the BAU and adjusted forecasts are provided in Appendix A.

ADJUSTED BAU FORECAST

The "adjusted" BAU forecast refers to a scenario that assumes federal- and State-mandated GHG emission reduction measures, but no local measures, would be implemented. As described in Chapter 1, federal and State regulations have already been adopted that will result in reductions in GHG emissions from a wide range of activities, including how energy is generated and how vehicle fuels are formulated and consumed. These federal- and State-mandated GHG emission reductions will occur regardless of any reduction measures that the City of Capitola does or does not implement in this Climate Action Plan (CAP).

The adjusted BAU forecast does not include GHG emission reductions from federal or State requirements that must be implemented at the local level. For example, California AB 341, which requires municipalities to achieve 75 percent solid waste diversion by 2020, will be implemented by the City and not by the State. Therefore, the GHG emission reductions from AB 341 are excluded from the adjusted BAU forecast, and instead included in the forecast of GHG emission reductions resulting from the City's actions under this CAP.

Additionally, not all State and federal regulations and programs would result in quantifiable GHG reductions. To the extent feasible, GHG emissions reductions from federal and State programs are accounted for in the adjusted BAU forecast, consistent with guidance provided by State agencies. Federal or State programs that have the potential to reduce GHG emissions, but which cannot be modeled, are neither accounted for in the adjusted BAU forecast, nor does the City take credit for any of their potential GHG emissions reductions. To a certain extent, the GHG reductions in the adjusted BAU forecast may therefore be considered conservative.

TABLE 4-1 EXISTING, 2020, AND 2035 POPULATION, EMPLOYMENT, AND HOUSING PROJECTIONS

	2010 Baseline[a]	2020 Forecast[b]	Percent Change from Existing	2035 Forecast[c]	Percent Change from Existing
Population	9,918	10,108	1.4%	10,198	2.8%
Housing	5,534	5,589	0.7%	5,613	1.4%
Employment	6,170	6,624	9.7%	7,368	19.4%
Service Population[d]	16,088	16,732	4.6%	17,566	9.2%

[a] Derived from AMBAG regional growth forecasts.
[b] Interpolated from 2010 Baseline and 2035 forecast.
[c] As presented in the July 26, 2013 General Plan Buildout Projections Memorandum. Estimated by PlaceWorks based on the land use map in the General Plan Update.
[d] Population plus employment.
Source: Capitola General Plan 2025 Buildout.

TABLE 4-2 BASELINE YEAR 2010 AND FORECAST YEARS 2020 AND 2035 BUSINESS AS USUAL COMMUNITYWIDE GHG EMISSIONS SUMMARY

	GHG Emissions ($MTCO_2e$/Year)				
	2010 Baseline[a]	2020 BAU [b]	Increase from Baseline	2035 BAU [b]	Increase from Baseline
Transportation & Mobile Sources	57,123	57,685	562	57,945	822
Residential Energy Use	15,570	15,723	153	15,794	224
Commercial Energy Use	13,255	14,213	958	15,780	2,525
Solid Waste	1,476	1,509	33	1,532	56
Water & Wastewater	667	682	15	692	25
Total	**88,091**	**89,812**	**1,721**	**91,743**	**3,652**

[a] Based on 2010 GHG inventory using natural gas and purchased energy data from PG&E and VMT from RBF.
[b] Based on 2010 GHG inventory, and projected population and employment growth.
Source: Green Lynx, LLC, using ICLEI/SEEC ClearPath California Forecasting Module.

By considering the adjusted BAU forecast, the City can more precisely determine what additional GHG emissions reductions it needs to reach its local GHG emissions reduction target (discussed further in Chapter 5).

Table 4-3 compares the inventory of existing emissions to the adjusted forecast for year 2020 and 2035 GHG emissions based on federal and State GHG regulations and programs currently in place. This adjusted BAU forecast considers potential for GHG emission reductions from the specific federal and State regulations described below.

PAVLEY I AND II – CLEAN CAR STANDARDS

The "Pavley" standards, or AB 1493, are named for their author, Assemblywoman Fran Pavley. These standards, originally passed in 2002, require automakers to limit carbon dioxide and pollutants from new cars and light trucks, starting with the 2009 model year. In 2009, the California Air Resources Board (CARB) adopted amendments to the "Pavley" standards that require manufacturers to achieve higher fuel efficiency standards. The Pavley regulation is anticipated to reduce GHG emissions from new passenger vehicles by 31.4 percent from 2008 levels for the 2016 model year.[1]

FEDERAL CORPORATE AVERAGE FUEL ECONOMY STANDARDS

In 2010, the US Environmental Protection Agency (EPA) adopted federal Corporate Average Fuel Economy (CAFE) standards for model years 2012 through 2016. In 2011, the EPA, the US Department of Transportation, and the State of California announced a single time frame for proposing the fuel economy and

[1] Based on a California fleet mix of 70 percent passenger cars and light duty trucks (LDT1) and 30 percent light duty trucks (LDT2) as stated in CARB's *2008 Comparison of Greenhouse Gas Reductions under CAFE Standards and CARB Regulations Adopted Pursuant to AB 1493*.

TABLE 4-3 **BASELINE 2010 AND ADJUSTED BAU FORECAST YEARS 2020 AND 2035 BUSINESS AS USUAL COMMUNITYWIDE GHG EMISSIONS SUMMARY**

	GHG Emissions ($MTCO_2e$/Year)				
	2010 Baseline[a]	2020 Adj. BAU[b]	Change from Baseline	2035 Adj. BAU[b]	Change from Baseline
Transportation & Mobile Sources	57,123	50,946	-6,177	40,847	-16,276
Residential Energy Use	15,570	13,919	-1,651	13,982	-1,588
Commercial Energy Use	13,255	10,836	-2,419	12,031	-1,224
Solid Waste	1,476	1,509	33	1,532	56
Water & Wastewater	667	579	-88	588	-79
Total	**88,091**	**77,789**	**-10,302**	**68,980**	**-19,111**

[a] Based on 2010 GHG inventory using natural gas and purchased energy data from PG&E and VMT from RBF.
[b] Based on 2010 GHG inventory, and projected population and employment growth.
Source: Green Lynx, LLC, using ICLEI/SEEC ClearPath California Forecasting Module.

GHG standards for model years 2017 to 2025 passenger vehicles. In August of 2012, new CAFE standards were released, calling for an average fuel efficiency of 54.5 miles per gallon for all new cars and trucks by 2025. The adjusted BAU forecast accounts for these additional reductions through reductions associated with the Pavley requirements, which served as the model for the federal standard.

LOW CARBON FUEL STANDARD

CARB identified the Low Carbon Fuel Standard (LCFS) as an early action item in its Climate Change Scoping Plan, and adopted the LCFS regulation in 2009. It became law in 2010. The LCFS requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. However, because this standard can potentially be through "upstream" reductions in carbon intensity rather than from tailpipe emissions, this standard is not factored into the adjusted BAU projections.

RENEWABLE PORTFOLIO STANDARD

A major component of California's Renewable Energy Program is the renewable portfolio standard (RPS) under Senate Bill (SB) 1078. Under the RPS, certain retail sellers of electricity, like PG&E, are required to increase renewable energy by at least 1 percent each year in order to reach at least 20 percent by December 30, 2010. According to the California Public Utilities Commission (CPUC), PG&E served 20.6 percent of their electricity sales with renewable power during the first compliance period from 2011 to 2013.[2]

CARB has now approved an even higher goal of 33 percent by 2020. Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. Increasing renewable sources of electricity will decrease indirect GHG emissions from buildings that use energy because electricity production from renewable sources is generally considered carbon neutral, and this reduction is accounted for in the adjusted BAU forecast.

SMART GRID

The CPUC requires California investor-owned electric utilities (IOUs) to develop a smarter or more efficient electric grid in the State. In July 2011, California utilities, including PG&E, filed ten-year "Smart Grid deployment plans" with the CPUC, in order to show how they would become more efficient. In 2013, all of the submitted plans were approved and the CPUC has reported that California IOUs are making progress in implementing the plans and delivering benefits to rate-payers.[3] The adjusted BAU forecast does not account for emissions reductions from this program because the GHG reductions from Smart Grid technology overlap significantly with reductions from other energy efficiency measures, and the State has not offered official guidance on calculating these reductions.

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[2] California Public Utilities Commission, 2015, Renewables Portfolio Standard Quarterly Report, 3rd Quarter 2014. http://www.cpuc.ca.gov/NR/rdonlyres/CA15A2A8-234D-4FB4-BE41-05409E8F6316/0/2014Q3RPSReportFinal.pdf, Accessed on February 2, 2015.

[3] California Public Utilities Commission, 2015, Annual Report to the Governor and the Legislature California Smart Grid. http://www.cpuc.ca.gov/NR/rdonlyres/BCDBFE10-E89E-4933-8457-EA6B6E3D5D52/0/SmartGridAnnualReport2014Final011215.pdf, Accessed on February 2, 2015.

CALIFORNIA BUILDING AND ENERGY EFFICIENCY STANDARDS (TITLE 24)

Title 24, Part 6 of the California Code of Regulations (CCR) requires that the design of building shells and building components conserve energy. The standards are updated periodically to consider and incorporate new energy efficiency technologies and methods. The 2013 Building and Energy Efficiency standards, which went into effect on January 1, 2014, are approximately 24 percent more energy efficient for residential buildings and 30 percent more energy efficient for non-residential buildings compared to the previous 2008 Building and Energy Efficiency Standards. The adjusted BAU forecast does not account for emissions reductions from this program because Capitola has relatively low amounts of new construction to which the regulation would apply, because the GHG reductions from improved energy efficiency in existing buildings may overlap significantly with reductions from other energy efficiency measures, and because the State has not offered official guidance on calculating these reductions.

CALIFORNIA GREEN BUILDING STANDARDS CODE (TITLE 24)

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (Title 24, CCR), known as CALGreen. The 2010 edition of the code established voluntary standards on planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air quality. The mandatory provisions of the code became effective January 1, 2011. CALGreen refers to the mandatory Building and Energy Efficiency Standards described above, and also includes voluntary Tier 1 and Tier 2 programs for cities and counties that wish to adopt more stringent energy efficiency requirements that are 15 percent and 30 percent more energy efficient than the current Title 24 standards, respectively. In addition, CALGreen includes mandatory increases in indoor and outdoor water efficiency for new building construction. In 2014, the 2013 California Green Building Standards went into effect alongside the Building and Energy Efficiency Standards update. The adjusted BAU forecast does not account for emissions reductions from this program because Capitola has relatively low amounts of new construction to which the regulation would apply, because the

GHG reductions from improved energy efficiency in existing buildings would overlap significantly with reductions from other measures, and because the State has not offered official guidance on calculating these reductions.

California Appliance Efficiency Regulations

The 2006 Appliance Efficiency Regulations (Title 20, CCR Sections 1601 through 1608) were adopted by the California Energy Commission on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. In 2014 the California Energy Commission adopted an update of these regulations. The regulations include standards for both federally regulated appliances and non-federally regulated appliances across 23 different appliance categories. The adjusted BAU forecast does not account for emissions reductions from this program because Capitola has relatively low amounts of new construction that would include new appliances to which the regulation applies, because the regulation does not mandate the replacement of old appliances, and because the State has not offered official guidance on calculating these reductions.

GHG EMISSIONS BY SOURCE

This section describes the 2020 and 2035 BAU and adjusted BAU emissions and calculations for the five GHG emission source categories previously listed. For all sources, 2020 and 2035 emissions are based on the respective population and employment in Capitola shown in Table 4-1. As Table 4-1 shows, this forecast anticipates a 1.4 percent increase in residents and a 9.7 percent increase in jobs in Capitola by 2020, which is equivalent to a total service population increase of 4.6 percent. For 2035, the forecast anticipates a 2.8 percent increase in residents and a 19.4 percent increase in jobs in Capitola, which is equivalent to a total service population increase of 9.2 percent. These numbers are based on the amount and type of development that is reasonably foreseen, and the differences between 2010 conditions and the proposed Capitola General Plan 2035 land use map and policies.

TRANSPORTATION AND LAND USE EMISSIONS

GHG emissions from transportation needs generated by land uses within the city were compiled for Capitola's 2010 GHG Inventory, and are shown in Table 4-4. The slight increases in transportation-related GHG emissions from 2010 to 2020 and 2035 for the BAU scenario reflect the small anticipated increases in VMT and off-road emissions. The large decreases between the BAU and adjusted BAU forecasts for 2020 and 2035 reflect expected improvements in fuel efficiency as a result of State and federal measures.

TABLE 4-4 **2020 GHG EMISSIONS FROM TRANSPORTATION AND VMT**

Model Year	On-Road VMT	Off-Road Energy Equivalent (MMBTU)	GHG Emissions ($MTCO_2e$/Year)
2010 Baseline	110,422,720	800,000	57,123

Model Year	On Road VMT	Off-Road Energy Equivalent (MMBTU)	BAU Emissions (MTCO2e/Year)	Adj. BAU Emissions (MTCO2e/Year)
2020 Forecast	111,442,393	807,387	57,685	50,946
2035 Forecast	111,777,188	809,813	57,945	40,847

Sources: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Communitywide Greenhouse Gas Emissions Inventory. Projected population and employment growth based on buildout of land uses in Capitola General Plan 2035. GHG emissions modeled by Green Lynx, LLC using ICLEI/SEEC ClearPath California Forecasting Module.

RESIDENTIAL AND NON-RESIDENTIAL EMISSIONS

Energy use and natural gas use from residential and non-residential uses will grow in proportion to the number of people who live and work in Capitola. Table 4-5 shows anticipated BAU and adjusted BAU GHG emissions for residential and non-residential uses in 2020 and 2035. The moderate increases in total residential/non-residential GHG emissions from 2010 to 2020 and 2035 reflect the moderate anticipated increases in Capitola's total service population. The large decrease between the BAU and adjusted BAU forecasts for 2020 and 2035 reflect anticipated increases in the proportion of energy derived from renewable and alternative sources as a result of statewide measures.

TABLE 4-5 **2020 AND 2035 GHG EMISSIONS FROM RESIDENTIAL AND NON-RESIDENTIAL LAND USES**

	GHG Emissions ($MTCO_2e$/Year)				
Source	**2010 Baseline**	**2020 BAU**	**2020 Adj. BAU**	**2035 BAU**	**2035 Adj. BAU**
Residential Energy	15,570	15,723	13,919	15,794	13,982
Non-Residential Energy	13,255	14,213	10,836	15,780	12,031
Total	28,825	29,936	24,755	31,574	26,013

Sources: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Communitywide Greenhouse Gas Emissions Inventory. Projected population and employment growth based on build out of land use designations in Capitola General Plan 2035. GHG emissions modeled by Chris Sentieri using ICLEI/SEEC ClearPath tool.

WATER/WASTEWATER EMISSIONS

The increase in water demand and wastewater generation within the City is based on current demand and generation rates applied to expected development in 2020. Table 4-6 shows anticipated BAU and adjusted BAU water demand and wastewater generation and associated GHG emissions in 2020 and 2035. The moderate increases in total water/wastewater GHG emissions from 2010 to 2020 and 2035 for the BAU scenario reflect the moderate anticipated increases in Capitola's total service population. The large decrease between the BAU and adjusted BAU forecasts for 2020 and 2035 reflect anticipated increases in the proportion of energy derived from renewable and alternative sources.

TABLE 4-6 **2020 AND 2035 GHG EMISSIONS FROM WATER USE AND WASTEWATER GENERATION**

	GHG Emissions ($MTCO_2e$/Year)				
Source	**2010 Baseline**	**2020 BAU**	**2020 Adj. BAU**	**2035 BAU**	**2035 Adj. BAU**
Water Use	260	266	163	270	166
Wastewater Generation[a]	407	416	416	422	422
Total	**667**	**682**	**579**	**692**	**588**

Notes: Water and wastewater GHG emissions are generated from the energy associated with water conveyance, treatment, and distribution, and wastewater treatment.

[a] Wastewater from Capitola is treated at the Santa Cruz Wastewater Treatment Plan, which also treats wastewater from Aptos, Live Oak, Santa Cruz, and Soquel. Emissions for Capitola are based on its proportional contribution of wastewater, estimated trends in employment and population, and changes in the carbon intensity of energy sources used by the facility.

Sources: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Communitywide Greenhouse Gas Emissions Inventory. Projected population and employment growth based on build out of land use designations in Capitola General Plan 2035. GHG emissions modeled by Green Lynx, LLC using ICLEI/SEEC ClearPath California Forecasting Module.

SOLID WASTE DISPOSAL EMISSIONS

The amount of trash thrown away in Capitola will increase in proportion to the number of people that live and work there. Table 4-7 shows anticipated GHG emissions in 2020 and 2035. The very small increases in total solid waste GHG emissions from 2010 to 2020 and 2035 for the BAU scenario reflect the anticipated increases in Capitola's total service population, coupled with anticipated decreases in solid waste generation related to statewide initiatives that are not strictly related to climate change and are already in place. There are no differences in emissions levels between the BAU and adjusted BAU forecasts for either 2020 or 2035 because statewide programs to decrease solid waste are already in place, are not strictly related to climate change, and are not currently anticipated to be supplemented by additional statewide or federal measures pertaining to GHG emissions from solid waste disposal.

TABLE 4-7 **2020 AND 2035 GHG EMISSIONS FROM SOLID WASTE DISPOSAL**

	GHG Emissions ($MTCO_2e$/Year)				
Source	2010 Baseline	2020 BAU	2020 Adj. BAU	2035 BAU	2035 Adj. BAU
Solid Waste Disposal	1,476	1,509	1,509	1,532	1,532

Sources: The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Communitywide Greenhouse Gas Emissions Inventory. Projected population and employment growth based on build out of land use designations in Capitola General Plan 2035. GHG emissions modeled by Green Lynx, LLC using ICLEI/SEEC ClearPath California Forecasting Module.

5 GREENHOUSE GAS EMISSIONS REDUCTION TARGETS

This chapter establishes the local targets of GHG emissions reductions that Capitola will strive to reach through implementation of this Climate Action Plan (CAP). The beginning of this chapter details the background and approach to setting the 2020 GHG reduction target, which is the official target that must be met under AB 32. The latter portion of the chapter briefly discusses the more distant 2035 target, which serves as mid-term target for the 2050 GHG goal set by Executive Order S-03-05. Since the State has not officially adopted a 2050 or 2035 target, this 2035 target discussed in this chapter serves as a preliminary benchmark for gauging progress toward long-term GHG emissions targets.

2020 GHG REDUCTION TARGET

This Climate Action Plan's 2020 GHG Reduction Target is to reduce GHG emissions by 4.9 percent below Capitola's 2010 Baseline GHG Emissions.

The AB 32 target is to reduce GHG emissions to 1990 levels by the year 2020. In order to identify the appropriate level of GHG emissions reductions needed statewide over the 10 years from 2010 to 2020, this CAP relies on the 2014 updated Statewide GHG emissions inventory for the years 2000 to 2012, which was published by CARB in 2014, as part of the ongoing process of meeting the 1990 statewide GHG emissions target required by AB 32. [1,2] This update provides actual GHG emissions data for this time period, whereas the previous statewide inventory relied on projections for years after 2004. This updated and comprehensive annual statewide emissions inventory offers the clearest understanding to date of historical GHG emission trends, which, in turn, helps track progress towards meeting the State's GHG emissions reduction target. The 2000–2012 statewide GHG emissions inventory shows that GHG emissions in California are increasing at a slower rate than anticipated in the 2008 Scoping Plan, likely due to the downturn in the economy, as well as implementation of efficiency measures and renewable energy sources.

Since the GHG inventory for Capitola was for the year 2010, this CAP estimates the necessary reduction from baseline to achieve the 2020 target requires by using the CARB 2014 Inventory data for 2010. Based on the 2000–2012 inventory, CARB estimates that

[1] The California Environmental Protection Agency, California Air Resources Board website, http://www.arb.ca.gov/cc/inventory/inventory.htm, accessed on February 6, 2014.

[2] The 1990 through 1999 GHG emission estimates are included in the 1990-2004 GHG inventory that was published in November 2007.

statewide GHG emissions in 2010 were 453.1 million $MTCO_2e$. The CARB 2014 Inventory update also estimated that 1990 emissions were approximate 431 million $MTCO_2e$. Therefore, to achieve the AB 32 target of reaching 1990 emissions levels by 2020, the State would need to reduce emissions by 22.1 million $MTCO_2e$ compared to 2010 conditions, a reduction of 4.9 percent. Table 5-1 illustrates the GHG emissions inventories and reductions identified by the State and shows the relationship to local emissions inventories. Figure 5-1 illustrates statwide GHG emissions over time and their relationship to the 2020 target.

Based on the updated statewide GHG emissions inventory and forecast data discussed above, this Climate Action Plan therefore uses a local target that applies the same statewide ratio of needed reductions to Capitola's local emissions, which is a reduction in emissions of 4.9 percent below Capitola's 2010 Baseline. Appendix B discusses alternative approaches to setting 2020 GHG emissions targets, and why those alternatives were rejected.

Capitola's 2010 Baseline emissions were estimated at 88,091 $MTCO_2e$. Therefore, to achieve the local target of a 4.9-percent reduction below baseline, forecasted 2020 GHG emissions in Capitola must be reduced to 83,775 $MTCO_2e$ or less, a decrease of 4,316 $MTCO_2e$.[3] Capitola's 2020 BAU emissions are projected to be 89,812 $MTCO_2e$, and its adjusted BAU emissions are projected to be 77,789 $MTCO_2e$. Therefore, even before additional GHG reduction measures are implemented, Capitola is anticipated to meet its 2020 GHG target through the combination of State and federal programs detailed in Chapter 4.

Nevertheless, the City has identified additional measures to implement at the local level in order to further reduce GHG emissions in Capitola. Because the GHG emissions reductions from the federal and State measures rely on modeling estimates, it's possible that the actual reductions will be less effective than expected, and the City would not meet the target without additional local actions. Although this is unlikely given the expected degree of reductions from State and Federal measures, it is also important for Capitola to begin implementing community-level GHG reduction measures in anticipation of meeting future targets. Given that the 2035 and 2050 emissions goals associated with Executive Order S-3-05 are likely infeasible with current technology, implementation of reasonable local measures better positions Capitola to meet long-term emissions goals. Additionally, the City has identified additional local measures in order to demonstrate the City's responsiveness to community concerns about this issue and the City's commitment to supporting State and national efforts to reduce GHG emissions.

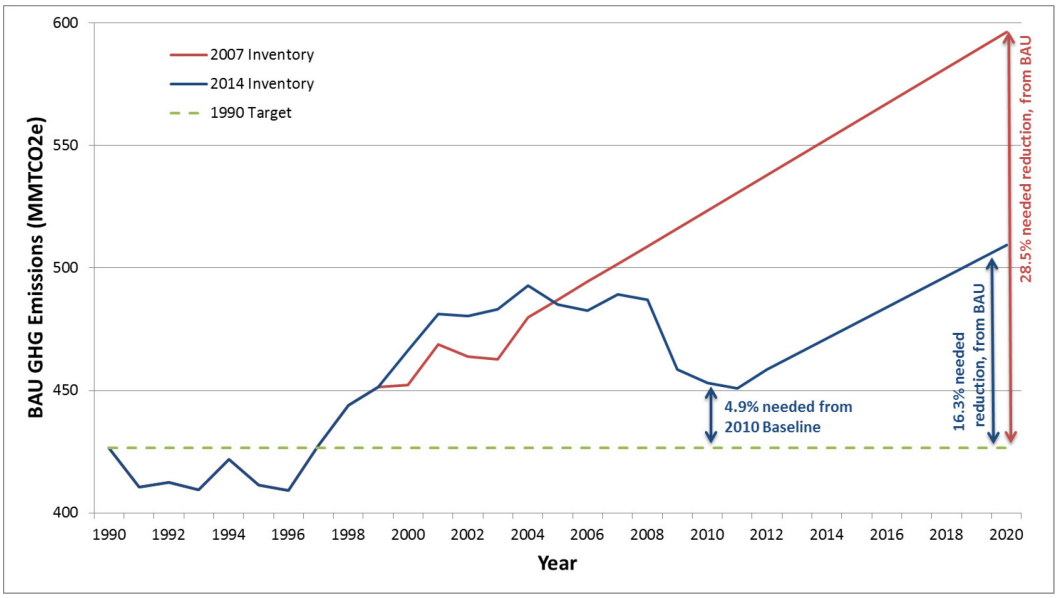
[3] 88,091 $MTCO_2e$ times 0.049, subtracted from 88,091 $MTCO_2e$ equals 83,774.5 $MTCO_2e$.

TABLE 5-1 STATEWIDE AND LOCAL GHG EMISSIONS INVENTORY HISTORY

	GHG Emissions Million $MTCO_2e$			
Inventory Years	Estimated 1990	Estimated 2010	Reduction to Meet 1990 Levels	Percentage
2000 to 2010 (2014 Updated Inventory)	431	453.1	22.1	4.9

Sources: CARB, 2014,2000-2012 Inventory by Scoping Plan category, http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-12_2014-03-24.pdf; Association of Environmental Professionals, 2012, *Forecasting Community-Wide Greenhouse Gas Emissions and Setting Reduction Targets (Draft)*, available at: http://www.califaep.org/docs/AEP_Next_Steps_White_Paper.pdf.

FIGURE 5-1 STATEWIDE GHG EMISSIONS OVER TIME AND 2020 TARGET



2035 TARGET

This Climate Action Plan's 2035 GHG Reduction Target is to reduce GHG emissions by 42.9 percent below Capitola's 2010 Baseline GHG Emissions.

Executive Order S-3-05 has set a goal of reducing statewide GHG emissions to 80 percent below 1990 levels by 2050. CARB and climate change experts have previously indicated that the 2050 goal set by Executive Order S-3-05 is likely not feasible with current technology. Nevertheless, it is potentially instructive to consider mid-term targets based on this goal.

In 2014, CARB completed the First Update to the Climate Change Scoping Plan, which lays the groundwork to reach the post-2020 goal set forth in Executive Order S-3-05, including a recommendation for the State to adopt mid-term emissions targets. Because the State has not yet adopted a mid-term target, the 2035 target included in this CAP is preliminary and unofficial. Nevertheless, by including this target, Capitola can evaluate its potential progress toward long-term emissions goals and consider additional steps to achieve them.

Consistent with this recommendation, this Climate Action Plan sets and evaluates Capitola's projected progress toward an interim 2035 GHG reduction target. The year 2035 was chosen because it is the buildout year for the 2035 Capitola General Plan, and because it is the mid-point between 2020 and 2050, which are the target years for AB32 and Executive Order S-3-05, respectively. Given that 2035 is half way between 2020 and 2050, the GHG target for this year was set at the numerical midpoint between the reductions required by AB32 and envisioned by Executive Order S-3-05. Tables 5-2 and 5-3 illustrate the relationship between 1990 emissions, the 2010 baseline, and 2020, 2035, and 2050 targets.

Although the State has not officially adopted 2050 or 2035 targets, and additional technological and policy changes are likely before 2035, the 2035 target serves as a preliminary basis for considering Capitola's potential to meet long term GHG reduction goals with the GHG reduction measures described in this CAP.

TABLE 5-2 **STATEWIDE EMISSIONS AND 2050 TARGETS**

	GHG Emissions Million $MTCO_2e$			
	2010 Emissions	2050 Goal 80% Below 1990 Levels	Reduction to Meet 80% Below 1990 Levels	Percentage
Statewide Inventory	453.1	86.2	366.9	81%

Sources: CARB, 2014, 2000-2012 Inventory by Scoping Plan category, http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-12_2014-03-24.pdf.

TABLE 5-3 **LOCAL EMISSIONS AND 2020, 2035, AND 2050 TARGETS**

2010 Capitola Emissions[a]	2020 Goal Percentage Reduction[b]	2020 Goal[a]	2035 Goal Percentage Reduction[c]	2035 Goal[a,c]	2050 Goal Percentage Reduction[d]	2050 Goal[a,e]
88,091	4.9%	83,775	42.9%	50,256	81%	16,737

Notes: Based on 80 percent reduction from 1990 levels, as called for in Executive Order S-3-05
[a] Value shown in $MTCO_2e$.
[b] Based on statewide percentage reductions necessary to achieve 1990 emissions levels, as illustrated in Table 5-1.
[c] Shown as percentage reduction from 2010 Baseline. Based on statewide percentage reductions from 2010 emissions necessary to achieve goal of 80 percent below 1990 emissions levels in 2050, interpolated with 2020 goal.
[d] Calculated percentage reduction from 2010 statewide emissions levels to achieve 80 percent below statewide 1990 levels in 2050, as shown in Table 5-2.
[e] Represents 81 percent reduction from 2010 Baseline local emissions.
Sources: CARB, 2014, 2000-2012 Inventory by Scoping Plan category; http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-12_2014-03-24.pdf. The Association of Monterey Bay Area Governments | Energy Watch, 2010, City of Capitola 2010 Baseline Community-wide Greenhouse Gas Emissions Inventory.

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6 OVERVIEW OF MEASURES AND PROJECTED EFFECTS

Chapter 6 presents the reduction measures that the City of Capitola will implement in order to decrease greenhouse gas (GHG) emissions; increase energy independence; reduce spending on gas, electricity, and water; and improve air quality. Initial measures were developed with community involvement during the General Plan process and through multiple meetings of the General Plan Advisory Committee and the Commission on the Environment. This preliminary list of measures was used, in conjunction with the ClearPath California Planning Module developed by International Council for Local Environmental Initiatives Local Governments for Sustainability (ICLEI) for California's Statewide Energy Efficiency Collaborative (SEEC), to create streamlined measures that each incorporate one or more of the original measures, but which have been tailored to yield quantifiable emissions reductions. Each measure is based on careful consideration of existing priorities, programs, and resources, as well as the potential costs and benefits of various possible approaches. A complete table showing the relationship between the initial measures and the final measures is provided as part of the technical documentation in Appendix A.

Some of the GHG reduction measures are programs that are already underway. If such a program began or expanded its implementation after 2010 (the baseline inventory year), then the program is included in this chapter so that the City can "take credit" for it in calculating emissions reductions.

MEASURE CATEGORIZATION

The measures are divided into the following six categories, which correspond to the six sections of this chapter:

1. VMT Reduction Measures
2. Residential and Non-Residential Energy Measures
3. Water and Wastewater Measures
4. Solid Waste Reduction Measures
5. Parks, Open Space, and Agriculture
6. Action and Implementation

Quantified measures for each category are discussed in detail in the first part of each section; and any non-quantifiable measures are listed in the latter part of each section. The last two categories are composed entirely of non-quantifiable measures. Sections of the chapter for these categories therefore do not present detailed GHG reduction information; however, the Parks, Open Space, and Agriculture section explains how its measures would potentially contribute to GHG reductions, and provides action items and qualitative cost-effectiveness

analysis. Since they are purely supportive of the other measures, Action and Implementation measures are not accompanied by cost-effectiveness or implementation information.

QUANTIFICATION OF EFFECTIVENESS

For the quantifiable measures in the first four categories, the GHG reductions for each measure were projected using the ICLEI/SEEC ClearPath California Planning Module, in association with AMBAG's Energy Watch tool and PG&E's savings browser. The assumptions and calculations from the modeling processes are documented in Appendix A. To ensure a conservative estimate of likely emissions reductions, the model does not assume that every project will comply with every measure, particularly for voluntary programs where it is difficult to project future participation rates.

For each quantified measure, this chapter presents the environmental benefits, as well as implementation information, including action items, responsible parties, cost effectiveness, and an approximate schedule for implementation. The amount of GHG emissions reduction that each measure results in may serve as the standard that the City can use to evaluate whether the reduction target is being met.

The cost effectiveness evaluations present primarily qualitative assessments rather than measured or quantified assessments. Each qualitative assessment takes into account both the cost to implement the measure and its benefits. Due to data constraints for many measures, it is not possible to estimate specific dollar costs, and attempting to do so would likely be inaccurate or misleading. Where feasible, the cost effectiveness evaluations present quantitative values. In the absence of rigorous quantitative data, this chapter offers a qualitative assessment of the likely cost to implement the measure as compared to the likely benefits of the measure. Highly cost-effective measures may have only moderate benefits, but low or negligible implementation costs. Similarly, highly cost-effective measures may be expensive to implement, but result in very high benefits.

The implementation and peak GHG reductions of the measures will occur during different time periods. For each measure, the start and end years used for the purposes of modeling are indicated. Some measures are expected to be implemented on a later timeline due to obstacles of available data, technology, or finances. Overall maintenance of most measures will extend beyond the initial implementation phase.

As discussed in Chapters 3 and 4, the reductions from federal and State requirements that must be implemented by the City, such as complying with State requirements to reduce the amount of solid waste sent to landfills, are included with the measures identified in this chapter because they will be done by the City and not by the federal or State governments.

PROJECTED EMISSIONS REDUCTIONS

A summary of the reductions by sector is provided in Table 6-1. The technical documentation for the measure modeling is provided in Appendix A. Figure 6-1 illustrates the relationship between Capitola's 2010 Baseline emissions; the BAU and Adjusted BAU forecasts for 2020 and 2035; the 2020 and 2035 GHG targets; and the 2020 and 2035 emissions forecast after implementation of local GHG reduction measures.

In total, implementation of the measures described in this chapter, plus local compliance with State and federal requirements, will decrease Capitola's GHG emissions by 17,850 metric tons of carbon dioxide equivalent ($MTCO_2e$) by 2020 and 39,265 $MTCO_2e$ by 2035.

As discussed in Chapter 5, the GHG emissions reductions from federal and State actions would alone enable Capitola to exceed its 2020 GHG reduction target by 5,986 $MTCO_2e$, even without any local actions. The measures discussed in this chapter would further reduce GHG emissions in 2020 by an additional 5,827 $MTCO_2e$, and in combination with the federal and State actions, would achieve the 2020 reduction target and surpass it by 11,813 $MTCO_2e$. By achieving greater reductions than the minimum necessary to meet its 2020 target, the City has some flexibility to allow for differences in the actual GHG emission reductions compared to the modeled reductions, while still meeting the target. Given that the 2035 and 2050 emissions goals associated with Executive Order S-3-05 are likely infeasible with current technology, implementation of reasonable local measures better positions Capitola to meet long-term emissions goals. In addition, adopting measures that exceed Capitola's GHG emission reduction target demonstrates the City's commitment and responsiveness to the need to mitigate GHG emissions.

For the year 2035, the measures detailed in the following chapter would reduce adjusted GHG emissions by 16,502 $MTCO_2e$. With total projected GHG emissions in 2035 of 52,478 $MTCO_2e$, Capitola is projected to be approximately 4.4 percent over its 2035 target. Since it is likely that additional regulations and technologies to reduce emissions will be in place by 2035, the City considers this to be acceptable at the present time.

FIGURE 6-1 CAPITOLA EXISTING AND PROJECTED GHG EMISSIONS LEVELS AND TARGETS

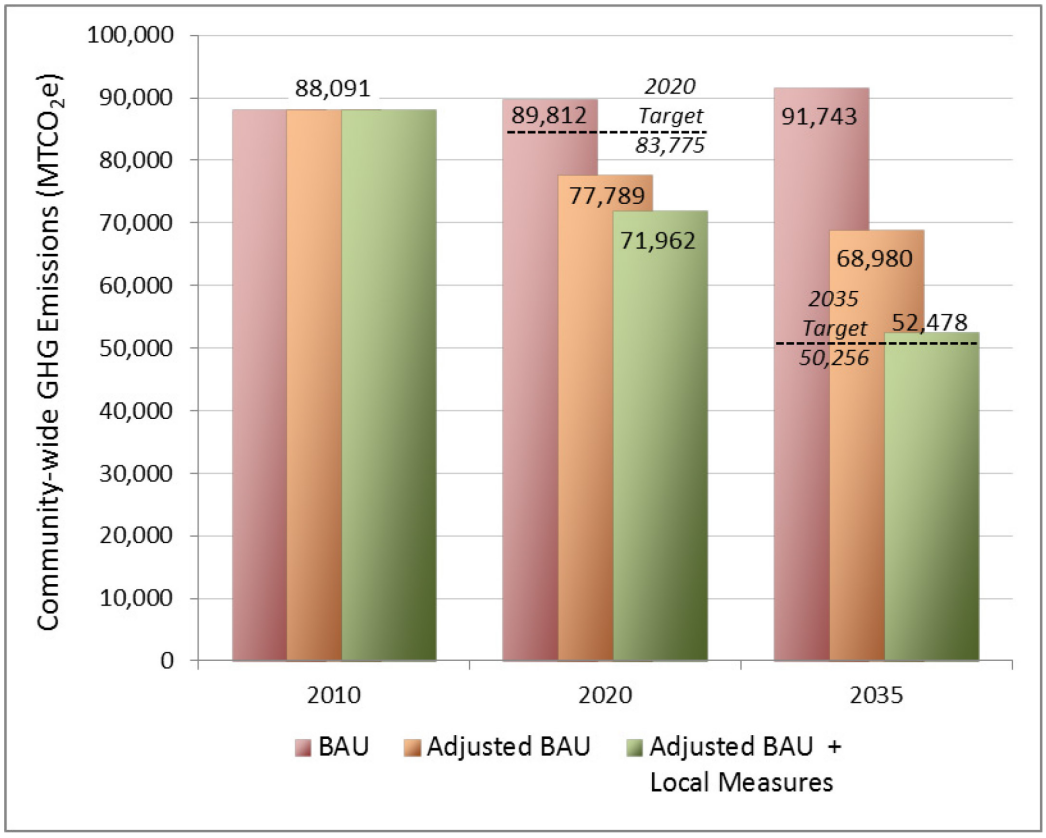


TABLE 6-1 **GHG EMISSION AND VMT REDUCTIONS**

Sector/Measure	Total GHG Reduction in 2020 ($MTCO_2e$)	Percent of Local Reduction[a]	Total GHG Reduction in 2035 ($MTCO_2e$)	Percent of Local Reduction[a]
VMT and Transportation				
VMT-1 Ridesharing and Car Sharing	162	5.5%	136	1.7%
VMT-2 Increase Bus Ridership	286	9.6%	95	1.2%
VMT-3 Increase Bicycle Ridership	118	4.0%	208	2.6%
VMT-4 Educate and Engage the Public About Alternative Modes	138	4.6%	32	0.4%
VMT-5 Support Local Uptake of Electric Vehicles	196	6.6%	2,011	25.2%
VMT-6 Support Rail as a Commute Option	1,005	33.8%	1,772	22.2%
VMT-7 Support Implementation of the RTP/SCS	1,067	35.9%	3,742	46.8%
Subtotal	*2,972*[b]	*49.2%*	*7,996*[b]	*45.8%*
Residential and Non-Residential Energy				
ENRG-1 Solar Energy	50	2.4%	164	1.9%
ENRG-2 Energy Upgrade California and Residential Energy Efficiency	418	20.1%	954	11.2%
ENRG-3 Residential Weatherization	0	0.0%	170	2.0%
ENRG-4 Renewable Energy Sources and Community Choice Aggregation	367	17.7%	6,365	74.6%
ENRG-5 Non-Residential Energy Efficiency	748	36.0%	514	6.0%
ENRG-6 Right Lights Energy Efficiency Program	201	9.7%	138	1.6%
ENRG-7 Green Business Certification Program	294	14.1%	227	2.7%
ENRG-8 Municipal Energy Use	–	–	–	–
Subtotal	*2,078*[b]	*34.4%*	*8,532*[b]	*48.9%*

TABLE 6-1 **GHG EMISSION AND VMT REDUCTIONS**

Sector/Measure	Total GHG Reduction in 2020 ($MTCO_2e$)	Percent of Local Reduction[a]	Total GHG Reduction in 2035 ($MTCO_2e$)	Percent of Local Reduction[a]
Water and Wastewater				
WW-1 Water Conservation	67	100.0%	1	100.0%
Subtotal	*67*[b]	*1.1%*	*1*[b]	*0.0%*
Solid Waste				
SW-1 Communitywide Solid Waste Diversion and Recycling	612	66.4%	612	66.4%
SW-2 Communitywide Food Waste Diversion	310	33.6%	310	33.6%
Subtotal	*922*[b]	*15.3%*	*922*[b]	*5.3%*
Parks, Open Space, and Agriculture	*No measurable reductions*			
Action and Implementation	*No measurable reductions*			
All Sectors Total	**6,039**[b]		**17,451**[b]	

[a] For each measure, the percent of the total GHG emissions reductions for that sector is provided. For each sector, the percent of the total local GHG emissions reductions for the entire Climate Action Plan is provided.
[b] Due to limitations of the current version of the SEEC ClearPath tools, these estimates were created outside of the SEEC ClearPath tools using an Excel spreadsheet tool developed by ICLEI, and thus are not meant for direct comparison to the more accurate sector-based Forecasts output directly by the SEEC ClearPath tool, and included in Appendix A.
Source: Green Lynx, LLC, using ICLEI/SEEC ClearPath California Planning Module.

7 MEASURES, IMPLEMENTATION, AND MONITORING

The measures discussed in this chapter are the backbone of this Climate Action Plan (CAP). The greenhouse gas (GHG) emission reductions achieved by these measures will help to mitigate the GHG emissions generated by activities allowed by the City's General Plan, enabling the City to comply with State law and responding to community members who support energy, climate change, and conservation planning. Adopting these measures could position the City to be eligible for State and regional grants. Future development that is consistent with this CAP may benefit from a streamlined CEQA process because it may not be necessary to do a costly and time-consuming, project-specific GHG emissions analysis.

VMT AND TRANSPORTATION EMISSIONS REDUCTION MEASURES

As shown in Table 6-1 in Chapter 6, the vehicle miles travelled (VMT) and Transportation Emissions Reduction measures would decrease GHG emissions in Capitola by a total of 2,972 $MTCO_2e$ in 2020 and 7,996 $MTCO_2e$ in 2035.[1] VMT reduction measures are interrelated and support one another. Therefore future changes in land use patterns, transportation, or fuel efficiency could affect the GHG reductions from all of these measures.

HOW VMT AND TRANSPORTATION EMISSIONS REDUCTION MEASURES REDUCE GHGS

Current liquid fuels (gasoline and diesel) and other energy sources (grid electricity) for transportation tend to be based on carbon-intense fossil fuels. Therefore, until all energy for transportation is derived from renewable or carbon-neutral sources, limiting VMT will remain a key approach to limiting GHG emissions.

OTHER BENEFITS OF VMT AND TRANSPORTATION EMISSIONS REDUCTION MEASURES

Beyond reducing GHG emissions and VMT, the transportation measures in the CAP would yield other sustainability benefits. Offering people options besides riding alone in their cars will help reduce traffic congestion; improve mobility for seniors, who will be an increasing

[1] As noted for Table 6-1, due to limitations of the current version of the SEEC ClearPath tools, measure-based estimates of GHG reductions were created outside of the SEEC ClearPath tools using an Excel spreadsheet tool developed by ICLEI, and thus are not meant for direct comparison to the more accurate sector-based forecasts output directly by the SEEC ClearPath tool, and included in Appendix A. Due to the limitations of this approach and rounding errors, measure-based GHG reduction projections may differ from sector-based GHG reduction projections by up to 1.8 percent.

part of the population in the coming decades; improve air quality, which negatively affects children; enhance public health as more residents walk or bike; and reduce wear and tear on city streets. Additionally, by promoting infill development, these measures could limit the loss of natural and farmland areas beyond Capitola, preserving the hillside views, wildlife habitat, and local agriculture that form an important part of character and heritage of the region to which Capitola belongs.

In addition, the transportation measures support the General Plan policies and actions that help the City to comply with the California Complete Streets Act (AB 1358), which directs the City plan for a balanced and multimodal transportation network that meets the needs of all transportation users, including bicyclists, children, persons with disabilities, motorists, pedestrians, users of public transportation, and seniors.

VMT-1 RIDE SHARING AND CAR SHARING

Encourage the use of ridesharing and car sharing as an alternative to single occupancy driving through business and commuter incentives, such as participation in the Rideshare Week Program administered by SCCRTC and AMBAG, and parking disincentives.

REDUCES VMT BY:

- Discouraging non-essential automobile trips.
- Encouraging use of alternatives to driving.
- Decreasing number of single-occupancy vehicles.

VMT REDUCTION ASSUMPTIONS:

- Joining a car-share program leads to a 30 percent reduction in annual VMT.

COST EFFECTIVENESS: HIGH

Costs include staff time needed to draft and implement business and commuter incentives, and potential costs from funding of incentives. Some incentives could be included in green business certification programs and potential costs for incentives could potentially be covered through grants or other statewide programs. Residents will save money through a decreasing need for vehicle ownership, thereby saving on fuel and other vehicle-related costs. The City could benefit from indirect long-term cost savings by reducing traffic congestion and air pollution.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff, SCCRTC, and AMBAG.

- Develop and implement potential local incentives for car sharing.
- Continue to support the *Rideshare Week Program.*

IMPLEMENTATION SCHEDULE: Ongoing

VMT-2 INCREASE BUS RIDERSHIP

Encourage the use of bus services for local and regional trips, including commute, shopping and other trips. Employ the following strategies to increase bus ridership:

- Develop a Transportation Demand Management Plan (TDM) for City and local employees. A TDM Program would offer incentives to encourage the use of alternative modes of transportation by City and local employees (e.g. in the Village, Bay Avenue, and 41st Avenue areas). Free bus passes, reimbursement for not using a parking space, emergency cab services, etc. will help reduce parking demand and reduce greenhouse gas emissions through reduced commuter traffic.
- Work with METRO to explore additional opportunities for discount bus ticket programs.
- Work with regional agencies to establish baseline values for vehicle trip makeup (origin/destination) for residents, businesses, and municipalities, and create baseline transportation numbers for in-town trips.
- Continue to work with county and regional transportation leaders to explore options for additional funding sources on regional level to support multi-modal transportation infrastructure.

REDUCES VMT BY:

- Discouraging non-essential automobile trips.
- Encouraging use of alternatives to driving.
- Decreasing number of single-occupancy vehicles.

VMT REDUCTION ASSUMPTIONS:

- Average passenger vehicle fuel economy is 32 miles per gallon.
- Average trip length for Capitola is 5 miles.
- VMT reduction is 1,825 miles per year per additional daily rider
- Phase I model assumes 50 new daily riders annually for duration of measure implementation.

COST EFFECTIVENESS: HIGH

Costs include staff time needed to craft and implement TDM programs or other incentives for bus ridership. Similar to ride sharing and car sharing programs, some incentives could be included in green business certification programs and costs for incentives could potentially be covered through grants or other statewide programs. Residents will save money through a decreasing need for vehicle ownership, thereby saving on fuel and other vehicle-related costs. The City could benefit from indirect long-term cost savings by reducing traffic congestion and air pollution.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff, SCCRTC, and AMBAG.

- Develop and implement potential local incentives for car sharing.
- Continue to support the *Rideshare Week Program.*

IMPLEMENTATION SCHEDULE: Ongoing

VMT-3 INCREASE BICYCLE RIDERSHIP

Increase bike ridership in Capitola through the following measures:

- Provide periodic status reports on 2011 Bicycle Transportation Plan implementation to the City Council.
- Complete a Quality Index assessment for Bicycle routes throughout the City and set targets to upgrade sections of key corridors to meet "Reasonable" or "Ideal" condition levels by 2020.
- Continue to implement the proposed projects defined in the 2011 Bicycle Transportation Plan to close gaps in the bicycle networks and connect major destinations and activity centers by 2020.
- Work with the County to design safe bike infrastructure across jurisdictional boundaries.
- Install bike route signs, including directions and mileage indicators to common destinations.
- Install high-quality bicycle parking facilities in the Village in centralized, safe, and secure areas.
- Require bicycle parking facilities and on-site showers in major non-residential development and redevelopment projects. Major development projects include buildings that would accommodate more than 50 employees, whether in a single business or multiple tenants; major redevelopment project include projects that change 50 percent or more of the square footage or wall space.
- Encourage businesses to provide bikes, electric bikes, and scooters for employees for lunch time and work time errands.
- Encourage and support non-profit or volunteer organizations in creating a bicycle-sharing program.

REDUCES VMT BY:

- Encouraging use of bicycling as an alternative to driving.

VMT REDUCTION ASSUMPTIONS:

- Higher levels of bicycle mode share with increased residential density.
- 10-year implementation schedule.
- 3.3 daily trips per person and average bicycle trip length of 2 miles.
- Bicycle facility improvements called for in the Regional Transportation Plan (RTP) will result in a 2.22 percent decrease in VMT/GHG emissions.

COST EFFECTIVENESS: MODERATE TO HIGH

Staff time would be needed to administer implementation of bicycle improvements, as well as any consultant costs to prepare designs. The City and/or developers would incur costs associated with construction and maintenance expenses to implement the bicycle infrastructure. Costs related to additional infrastructure such as bike signals, crossings, loop detectors, etc. would depend on the number and type of facilities installed. Costs could range from as high as $550,000 per mile for separated Class I bicycle trails, to $2,500 per mile for shared-lane Class III bike routes. Because bicycle routes are important to reducing commute and school-related trips, and would result in other benefits to the community, such as improved health and air quality, and reduced congestion, it is considered moderately-to-highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Develop and implement bicycle infrastructure improvements.

IMPLEMENTATION SCHEDULE: Ongoing. Phase I: 2015–2024; Phase II: 2025–2035

VMT-4 EDUCATE AND ENGAGE THE PUBLIC ABOUT ALTERNATIVE MODES

Support and engage in sustainable transportation education and outreach programs, including the following potential approaches:

- Work with community groups to encourage pedestrian and bike events.
- Allow car-free weekends or special events within the Village if it reduces single occupancy vehicle driving and is financially feasible.
- Continue to investigate and modify parking requirements and parking fees for new development.
- Consider implementing a "Park Once" campaign for Capitola Village which includes education, outreach, and signage, as appropriate.

REDUCES VMT BY:

- Encouraging use of alternatives to driving.

VMT REDUCTION ASSUMPTIONS:

- Average Annual VMT of 8,081 per person.
- Annual VMT reduction of 5 percent for each program participant.
- 100 participants engage in program each year.

COST EFFECTIVENESS: MODERATE

Staff time would be needed to create and conduct outreach campaign, including materials and programming. Costs for program would vary depending on level and types of engagement and outreach. Car-free weekends could potentially result in commercial benefits for the city, but would carry higher costs for organization and logistics. Costs of participating in regional working groups would vary and primarily result from staff time for preparation and attendance. By encouraging use of alternative modes of transportation, education/outreach campaign could result in other benefits to the community, such as improved health and air quality, and reduced congestion. Although education and outreach represent an important approach to encouraging mode shift, program costs and overall levels of benefit are uncertain; therefore, it is considered moderately cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Develop and deploy outreach programs and materials.
- Plan and hold public workshops, car-free weekends, or other outreach events.
- Research, draft, and implement potential changes to parking requirements.
- Coordinate and collaborate with AMBAG and SCCRTC for implementation of outreach.

IMPLEMENTATION SCHEDULE: Initial effort 2018–2020; potentially ongoing.

VMT-5 Support Local Uptake of Electric Vehicles

Make it easier and more appealing for residents to own and use electric vehicles (EV):

- Provide incentives, such as giving priority in plan review, processing, and field inspection services, for new and existing commercial and residential projects that provide parking spaces reserved for electric vehicles and have a charging connection.
- Continue to work with the Monterey Bay Electrical Vehicle Alliance and others to assess needs, identify and eliminate barriers to local EV uptake, and develop future municipal and private charging infrastructure to increase public access to EV charging stations.

Reduces Transportation Emissions By:

- Encouraging use electric vehicles, which are more efficient overall and can be powered by electricity, which is increasingly generated from renewable sources.

VMT Reduction Assumptions:

- Average fuel economy of conventional vehicles is 23 MPG.
- Average electric vehicle fuel economy (gasoline equivalent) is 105 MPG.
- For conventional vehicles being replaced by electric vehicles, average annual VMT is 10,000.
- 50 additional electric vehicles will be owned by Capitola residents by 2020.

Cost Effectiveness: Low to Moderate

Staff time would be needed to develop, implement, and administer incentives, and additional costs could arise from actual provision of infrastructure for electric vehicles, including public charging stations, and priority parking. Costs of infrastructure upgrades could be high relative to initial level of electric vehicle ownership and use. As use of electric vehicles increases and electric vehicle technology advances, overall costs and/or costs per electric vehicle in use could decrease. Requirements for electric vehicle charging stations or parking facilities that are "electric-vehicle ready" in private developments could be administered at a lower cost to the City. Costs for coordination with Monterey Bay Electrical Vehicle Alliance would depend on the amount of attendant effort by City staff. Although electric vehicle charging stations are an important component of encouraging electric vehicle update, this measure is deemed to currently have a low to moderate cost effectiveness due to the uncertainties in costs to the City and levels of use.

Action Items and Responsible Parties:

City Staff:

- Develop, implement, and administer incentives for providing electric vehicle parking and charging stations.
- Continue to work with the Monterey Bay Electrical Vehicle Alliance to increase public access to EV charging stations.

Implementation Schedule: 2020–2034; potentially ongoing.

VMT-6 Support Rail as a Commute Option

Work with local partners and regional transportation planning groups to support the use of the Santa Cruz Branch Line corridor as a supplemental regional commute option.

Reduces VMT By:

- Encouraging use a of a regional rail corridor as an alternative to driving.

VMT Reduction Assumptions:

- Rail service begins in 2020.
- 600 Capitola residents use rail on a daily basis.
- Phase II expansion of rail will result in an annual increase of 50 riders.

Cost Effectiveness: Uncertain

The Santa Cruz County Regional Transportation Commission (SCCRTC) is currently studying the feasibility of rail service along the Santa Cruz Branch Line. Since cost and ridership projections are currently not available, it is not possible to estimate what portion of these costs would be borne by Capitola or determine what the cost effectiveness would be with respect to this CAP.

Action Items and Responsible Parties:

City Staff:

- Continue to work with regional partners including the SCCRTC, AMBAG, the City of Santa Cruz, and others to study and potentially establish commuter rail service along the Santa Cruz Branch line.

Implementation Schedule: 2020–2034, subject to change; potentially ongoing.

VMT-7 Support Implementation of the Regional Transportation Plan and Sustainable Communities Strategy

Work with AMBAG to implement the Metropolitan Transportation Plan/Sustainable Community Strategy (MTP/SCS) to reduce GHG emissions generated from transportation in the region. Actively participate in County and regional transportation planning working groups to reduce regional trips and congestion, and advocate for transit that supports sustainable growth within the county. Work with local and regional transportation partners to develop, fund, and implement transit options to create a convenient, integrated, and accessible transit system for within town, cross-county, and Monterey Bay Area commutes. In combination with the previous VMT measures, consider and potentially undertake the following supportive local and regional sub-measures to reduce within-town car trips by 10 percent by 2020:

- Continue to implement intelligent transportation systems, roundabouts, signal timing and synchronization, and other efficiency methods that decrease idling time and congestion.
- Encourage the Metro Center to become a multi-modal facility with amenities and integration with a possible future shuttle system in Capitola.
- Support local and regional ride sharing programs.
- Encourage local employers to develop tools and methods to decrease emissions from work commutes, including work at home, ride-sharing, and vanpools.
- Continue to work with school districts and solicit input from elementary, middle, and high school parents to identify opportunities to decrease emissions from school commutes:
  - Support school busing, carpooling, biking, and walking options as alternatives to individual parent pick-up and drop-off.
  - Support development of more "safe routes to school" for students to walk and ride to school and home, and continue to explore additional funding for projects that enhance bike and walk to school opportunities.
- Evaluate opportunities for new residential subdivisions and major commercial redevelopment projects to include a pedestrian or bicycle through-connection in any new cul-de-sacs.
- Promote the ability of all residents to safely walk and bicycle to public parks. Identify improvements needed to address any deficiencies and incorporate these improvements into the City's CIP.
- Maintain an environment within the Village and Capitola Mall that prioritizes the safety and convenience of pedestrians and bicyclists.

- Consider adopting a Transportation Impact Fee (TIF) Program to mitigate for transportation impacts resulting from development projects. Allocate portions of the TIF budget to bicycle and pedestrian facility projects.
- Investigate and consider implementing additional parking strategies, including: developing a parking structure within walking distance of the Village, expansion of the in-lieu parking fee program, implementation of a parking management program, formation of a parking assessment district, and using "smart pricing" for metered parking spaces.
- Require new major non-residential development to include designated or preferred parking for vanpools, carpools, and electric vehicles.
- Implement Land Use policies that support walking, bicycling, and transit use:
    - Encourage land use intensity with connectivity near retail, employment, and transit centers.
    - Support well-designed infill development on vacant and underutilized sites that enhances Capitola's quality of life.
    - Encourage development of affordable housing, retail services, and employment in areas of Capitola best served by current or expanded alternative transportation options.
    - Encourage appropriate mixed-use development in the Mixed-Use and Commercial zoning districts.
    - Amend the Zoning Ordinance to encourage new development or significant redevelopment in the Village Mixed-Use zoning district to be vertical mixed-use (i.e., residential or office above ground-floor retail).
    - Amend the Zoning Ordinance and other City regulations as needed to encourage and/or remove barriers to establishing "co-working" collaborative work spaces in Capitola.
    - Evaluate secondary dwelling unit standards in the Zoning Ordinance and revise as appropriate to encourage additional secondary dwelling units development.
    - Amend the Zoning Ordinance to encourage new major developments to provide for safe and convenient pedestrian and bicycle connections between residential and commercial areas, provided it does not result in spillover parking in adjacent residential neighborhoods.
    - Revise development standards to promote a pedestrian-oriented environment in non-residential areas through reduced setbacks, principal entries that face a public street, and window and storefront requirements along the ground floor.

- Consider a telecommuting program for City employees.

- Implement Economic Development policies that help support local shopping and jobs, and reduce "over the hill" trips:
  - Evaluate local sales leakage and work with Santa Cruz County and other jurisdictions to provide necessary services within the county to reduce "over the hill" shopping.
  - Support efforts to attract resident-serving commercial uses in the area south of Capitola Road.
  - Identify locations in the City's commercial districts where ground-floor commercial uses are necessary to maintain a concentrated and functional business district, and amend the Zoning Ordinance to require ground-floor commercial uses in these locations.
  - Support regional efforts to recruit and retain businesses that provide high-wage jobs.
  - Support regional efforts to retain and create jobs within Santa Cruz County to reduce the number of "over the hill" commute trips.
  - Actively participate in and be aware of the activities of regional workforce development organizations, such as the Comprehensive Economic Development Strategy Committee, Workforce Investment Board, and the Santa Cruz County Business Council, and publicize these efforts locally through the City's website and brochures.
  - Build on existing outreach and regular events to inform business owners and entrepreneurs of available workforce development resources.
  - Support regional small business assistance programs, particularly for those with an environmental focus, and publicize the availability of this assistance via local partners, the City's website, and other economic development outlets. Coordinate and promote green building programs and pursue grant funding applications.
  - Pursue and support collaborations with local business initiatives/attractions to draw customers and visitors.
  - In collaboration with the Capitola-Soquel Chamber of Commerce and the Capitola Village Business Improvement Area, conduct regular surveys of merchants to assess the needs and issues of locally-owned and independent businesses.

REDUCES VMT BY:

- Encouraging walking, bicycling[2], and transit use as alternatives to driving for local and regional trips.

VMT REDUCTION ASSUMPTIONS:

- Net reduction of 10 percent VMT by 2035.[3]
- Implementation of the RTP and MTP/SCS will take place over a 20-year period.

COST EFFECTIVENESS: UNCERTAIN

Implementation of the MTP, RTP, and SCS, along with the supportive local and regional measures outlined above will involve a variety of different projects and programs with diverse timelines and costs. Different individual policies and actions under each of these programs may have different degrees of cost effectiveness, and overall cost effectiveness will depend on the specific measures chosen and the timing of implementation. Additionally, these programs and local measures are highly interdependent, making it difficult to compare costs and GHG reductions specific to each individual measure.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Continue to work with regional partners including the SCCRTC and AMBAG, to implement and potentially update/expand the RTP, MTP, and SCS.
- Develop and adopt local programs and ordinances to implement the RTP, MTP, and SCS.
- Revise local requirements relating to provision of parking and designations of reserved parking for electric and rideshare vehicles.
- Conduct outreach and provide informational materials to existing and future employers.
- Collaborate with local and regional transit agencies to monitor transit demands, funding, and State farebox recovery, and expand the transit network as appropriate and where demand warrants and funding allows.
- Amend the Zoning Ordinance as necessary to be consistent with the provisions of this measure.
- Review architectural plans and environmental documents for consistency with this measure.
- Amend Zoning Ordinance to be consistent with this measure incorporating appropriate land use and urban design provisions
- Work with local businesses organizations to implement economic development strategies.
- Pursue projects and land uses that promote high-quality jobs and locally serving retail in Capitola.

Developers/Property Owners:

- Design and construct pedestrian and bicycle connections to retail and employment centers, transit routes, and recreation areas for new residential and mixed-use development.

[2] VMT reductions associated with increased bicycling are accounted for under other measures; however, implementation of the RTP and MTP/SCS would serve to encourage bicycling.

[3] The model assumes a 10 percent reduction. This reduction is based on the AMBAG/SCCRTC reports and excludes reductions related to increased bicycling, which are accounted for under other measures.

- Design projects to include bike and pedestrian connections through cul-de-sacs.

Employers:

- Develop and offer trip reduction programs.
- Encourage and provide technical support for telecommuting, as feasible.

IMPLEMENTATION SCHEDULE: 2016–2035; potentially ongoing.

RESIDENTIAL AND NON-RESIDENTIAL ENERGY MEASURES

As shown in Table 6-1, the Residential and Non-Residential Energy measures would decrease GHG emissions in Capitola by a total of 2,078 $MTCO_2e$ in 2020 and 8,532 $MTCO_2e$ in 2035.[4]

Energy conservation, green building, and renewable energy and low carbon fuels all contribute to the reductions in GHG emissions associated with residential and non-residential energy use in Capitola. This section discusses the ways in which the residential and non-residential energy measures, detailed in the following section, decrease GHG emissions.

How Energy Measures Reduce GHGs

Current energy sources tend to be carbon-intense fossil fuels. Therefore, until all energy is derived from renewable or carbon-neutral sources, limiting energy use through conservation and efficiency will remain a key approach to limiting GHG emissions.

Green building measures would reduce GHG emissions because they would decrease the energy and water used in buildings, resulting in lower demand for both electricity and natural gas. Similarly, storing, treating, and conveying the water used in buildings requires energy for both construction and operation of water-system infrastructure. (For additional discussion of water-related energy use, see the introduction to the section on water and wastewater.) Because much of our energy—whether for construction, electricity, heating, water, or cars and trucks—currently comes from GHG-producing fossil fuels, direct and indirect decreases in energy use lead to reduced GHG emissions.

Renewable energy and low carbon fuels measures are intended to limit and eventually eliminate the use of fossil fuels as energy sources. Carbon in fossil fuels largely remains bonded to other substances and isolated deep within the earth's crust. Burning fossil fuels to produce energy releases the carbon stored within the fossil fuel, mainly as carbon dioxide, the most common greenhouse gas. Low-carbon fuels are those which incorporate or are entirely composed of fuels whose production is carbon-neutral. Carbon-neutral fuels are created by processes which absorb as much carbon as will be released when the fuels are later burned. Fossil fuels, on the other hand, are carbon-intense because the process of

[4] As noted for Table 6-1, due to limitations of the current version of the SEEC ClearPath tools, measure-based estimates of GHG reductions were created outside of the SEEC ClearPath tools using an Excel spreadsheet tool developed by ICLEI, and thus are not meant for direct comparison to the more accurate sector-based forecasts output directly by the SEEC ClearPath tool, and included in Appendix A. Due to the limitations of this approach and rounding errors, measure-based GHG reduction projections may differ from sector-based GHG reduction projections by up to 1.8 percent.

extracting these fuels does not absorb any of the carbon that will be released when those fuels are burned. Increasing the use of renewable and carbon-neutral energy sources, such as solar, wind, and biomass (trees and plants), would reduce GHG emissions.

The GHG reduction mechanisms of measures and sub-measures relating to purchasing are similar to, and in some ways an extension of, those of both energy and solid waste measures. Careful purchasing decisions can help ensure that the acquired products use less energy themselves; are less likely to become and/or generate waste; and were produced using fewer resources, more efficient processes, and thus less energy. As discussed above, actions which limit energy use, most notably energy use from fossil fuels, serve to reduce GHG emissions.

GHG emission reductions that stem directly from measures and sub-measures relating to purchasing cannot be readily quantified because such reductions are either incorporated into energy efficiency reductions, or relate to what are known as lifecycle emissions, which are the emissions generated by the activities and processes associated with materials extraction and manufacturing for consumer products. Such emissions are extremely difficult to quantify due to the complexity of the systems which produce these goods. The production of consumer goods has far-reaching impacts in regard to energy, resources, and the natural environment. In this way, the purchasing measure touches on all of these issues. By promoting reduced or more conscientious purchasing of consumer products, it is able to broadly increase sustainability.

OTHER BENEFITS OF ENERGY MEASURES

In addition to reducing GHGs, energy conservation measures offer many of the same sustainability benefits as those for renewable energy and low-carbon fuels. Reduced energy use reduces other pollutants alongside GHGs, while also saving on energy costs and lowering overall energy demand. The extraction of conventional fossil fuels such as oil, coal, and natural gas also has impacts on the environment, including pollution and habitat disruption. By cutting demand for fossil fuels, energy conservation helps reduce these impacts. Additionally, doing more with less energy improves overall efficiency, and can serve to strengthen local economies.

Green building includes a diverse range of practices that offer different ways to achieve the same goal of energy conservation. The reduced energy and water use associated with green building practices reduces other environmental impacts from using up these important resources and improves the long-term reliability of water and energy sources. Additionally, some green building practices alleviate both urban heat-island effects and stormwater runoff, making communities more livable and resilient in the face of both typical and extreme weather. Green building practices can also contribute directly to human health and well-being by reducing indoor air pollution and increasing access to natural light. Certain green

building practices, such as green roofs, bioswales, and living walls, can even provide habitat and foraging opportunities for urban wildlife. Finally, through this array of benefits, green building provides an opportunity to create connections between the natural and built environments and residents.

Reduced energy use and alternative fuels serve to reduce other pollutants alongside GHGs. The extraction of conventional fossil fuels such as oil, coal, and natural gas also has impacts on the environment, including pollution and habitat disruption, which can be lessened through the increased use of renewable energy. Additionally, and perhaps most importantly, fossil fuels are a finite resource, subject to long-term shortages and short-term price volatility. Renewable energy, while not unlimited, will be continually replenished very long into the future; using renewable energy can thus insulate communities from volatile energy costs. Finally, by creating jobs and allowing energy needs to be met on a more local level, renewable energy and low carbon fuels add to the resilience and economic vitality of communities.

ENRG-1 SOLAR ENERGY

Encourage, incentivize, and, in some cases, require the installation of solar energy systems for electricity and/or water heating through the following measures:

- Require residential projects of six units or more to participate in the California Energy Commission's New Solar Homes Partnership, which provides rebates to developers of six units or more who offer solar power in 50 percent of new units and is a component of the California Solar Initiative, or a similar program with solar power requirements equal to or greater than those of the California Energy Commission's New Solar Homes Partnership.
- Amend the Zoning Ordinance to promote solar and wind access in new and existing development.
- Amend the Tree Protection Ordinance to allow removal of non-heritage trees necessary to provide solar access in new and existing development.
- Amend the Zoning Ordinance to remove regulatory barriers to the establishment of on-site energy generation.
- Amend the Green Building Ordinance to require all new buildings be constructed to allow for easy, cost-effective installation of future solar energy systems, where feasible. "Solar ready" features should include: proper solar orientation (i.e. south-facing roof area sloped at 20 degrees to 55 degrees from the horizontal); clear access on the south sloped roof (i.e. no chimneys, heating vents, or plumbing vents); electrical conduit installed for solar electric system wiring; plumbing installed for solar hot water systems; and space provided for a solar hot water storage tank.
- Amend the Zoning Ordinance to require new or major rehabilitations of commercial, office, or industrial development to incorporate solar or other renewable energy generation to provide 15 percent or more of the project's energy needs.
- Complete a renewable energy feasibility study of City buildings and facilities.
- Incorporate the use of solar panels and solar hot water heaters in future City facilities.

REDUCES GHG EMISSIONS BY:

- Reducing residential and non-residential use of both natural gas and electricity generated from non-renewable sources.

GHG REDUCTION ASSUMPTIONS:

For Residential Uses:

- Assumes 1,643 kWh per year for each 1 kW of installed capacity.
- Assumes additional 10kW of local solar generation per year between 2015 and 2019.
- Assumes additional 60kW of local solar generation per year between 2020 and 2024.
- Assumes average of 2,889 kWh of electricity savings and 137 therms of natural gas savings per solar-thermal water system installed.
- Assumes 20 percent of homes use electric water heating.
- Assumes 10 additional solar-thermal systems installed per year between 2020 and 2024.

For Non-Residential Uses:

- Assumes 1,643 kWh per year for each 1 kW of installed capacity.
- Assumes additional 15kW of local solar generation per year between 2015 and 2019.

COST EFFECTIVENESS: HIGH

Costs include staff time needed to draft and adopt the enabling ordinance for New Solar Homes Partnership Participation. Developers and potentially homeowners would incur costs to install solar panels, and PG&E to provide rebates for solar installations. These costs would be partially or entirely offset by savings on energy costs for homeowners. Additional City costs would stem from staff time needed to draft and adopt implementing language for solar access and tree removal ordinances. Cost savings would result from increasing solar power generation. Any costs to developers or residents from the latter measures would be voluntary and minimal. Given that solar energy is at or near the break-even cost point for much of California, as well as ongoing improvements in solar efficiency, this measure is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Amend the Zoning Ordinance to require participation in the New Solar Homes Partnership, consistent with this measure.
- Amend the Zoning Ordinance to encourage appropriate street and house orientation for south-facing roof exposure in new residential buildings and subdivisions as part of project design review.
- Amend the tree protection ordinance to allow removal of trees or branches for solar access in certain situations.
- Review development plans and environmental documents for consistency with these measures.

Developers/Property Owners:

- Design and construct projects to maximize the south-facing exposure of rooftops.
- Design and construct residential projects to have solar power in 50 percent of new units.

IMPLEMENTATION SCHEDULE: 2015–2034, subject to change; potentially ongoing.

ENRG-2 ENERGY UPGRADE CALIFORNIA AND RESIDENTIAL ENERGY EFFICIENCY

Partner with Energy Upgrade California to increase participation by Capitola residents in energy efficiency home improvement projects. Support participation in this and similar programs, educate residents about approaches to energy efficiency, encourage self-directed energy efficiency upgrades, and require critical energy efficiency upgrades through the following measures:

- Encourage PG&E to develop and distribute energy use report cards for their residential customers in Capitola.
- Provide incentives, such as rebates offered by the "Bright Lights" program, for multi-family housing buildings to retrofit inefficient lighting fixture with new, more efficient fixtures.
- Encourage passive solar design, in which window placement and building materials help to collect and maintain solar heat in the winter and reflect solar heat in the summer.
- Require large homes over 3,000 square feet to provide greater efficiency than required of smaller homes to compensate for the increased energy requirements of larger homes.
- Partner with knowledgeable organizations to publicize the availability of grants, loans, and tax incentive options for various resource efficiency upgrades via the State or federal government, utility providers, and other sources. Work with Santa Cruz County and other regional government entities to ensure that Capitola is included in energy efficiency programs.
- Provide outreach support for existing programs that provide energy efficiency retro-commissioning, audits, and retrofits for housing, including rental housing, businesses, non-profit organizations, and government, special district, and school district customers (e.g. PG&E, AMBAG, Central Coast Energy Services, Ecology Action, Energy Upgrade California)
- Expand City and partner programs that enhance education regarding energy efficiency, resource conservation, and climate change programs and policies.

REDUCES GHG EMISSIONS BY:

- Reducing residential use of both natural gas and electricity generated from non-renewable sources.

GHG REDUCTION ASSUMPTIONS:

For PG&E Energy Upgrade Programs:

- Assumes 750 kWh in electricity savings per year per participating residence.

- Assumes 445 therms in natural gas savings per year per participating residence.
- Assumes 20 residences will participate in program per year from 2015 to 2019.
- Assumes 50 residences will participate in program per year from 2020 to 2029.

For Resident Energy Efficiency Education Programs:

- Assumes 619 kWh in electricity savings per year per participating residence.
- Assumes 56 therms in natural gas savings per year per participating residence.
- Assumes 150 residences will participate in program per year from 2020 to 2024.
- Assumes 250 residences will participate in program per year from 2030 to 2032.

COST EFFECTIVENESS: HIGH

Costs would include staff time and materials to conduct public outreach to publicize and encourage participation in programs, as well as educate the public on energy efficiency strategies. Additional costs would arise from staff time to work with partnering organizations. Homeowners would incur costs from time and money spent to implement home energy upgrades; however, these programs provide rebates of up to $6,500 in costs for upgrades. Therefore, significant portions of direct costs would be borne by PG&E. Because home energy efficiency upgrades can significantly reduce energy usage, many homeowners could potentially realize long term costs savings from upgrades. Given that this measure would likely result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Coordinate internally, as well as with PG&E and other regional partners to promote various existing programs that conserve energy, as well as to develop and publicize new PG&E programs.
- Engage in resident outreach and education efforts to inform the public about approaches to improving home energy efficiency.

IMPLEMENTATION SCHEDULE: 2015–2034; potentially ongoing.

ENRG-3 RESIDENTIAL WEATHERIZATION

Participate in Weatherization Assistance Programs to improve the insulation and energy efficiency of the homes of low-income households.

REDUCES GHG EMISSIONS BY:

- Reducing residential use of both natural gas and electricity generated from non-renewable sources.

GHG REDUCTION ASSUMPTIONS:

For Weatherization Assistance Programs:

- Assumes 261 kWh in electricity savings per year per participating residence.
- Assumes 125 therms in natural gas savings per year per participating residence.
- Assumes 50 residences will participate in program per year from 2021 to 2025.

COST EFFECTIVENESS: HIGH

Costs would include staff time and materials to conduct public outreach to publicize and encourage participation in weatherization programs. If Capitola implements local assistance programs, additional costs could be incurred through administration of those programs and assistance given directly to low-income households. Homeowners and renters could incur costs from time and money spent to implement home energy upgrades; however, these programs are designed to provide direct assistance to cover these costs. Therefore significant portions of direct costs would be borne by PG&E and the federal government. Because home energy efficiency upgrades can significantly reduce energy usage, many homeowners could potentially realize long term costs savings from upgrades. Given that this measure would likely result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Seek funding for potential implementation of local low-income weatherization assistance programs.
- Publicize and facilitate use of low-income weatherization assistance programs such as the official federal Weatherization Assistance Program, as well as programs offered through PG&E, such as the Energy Savings Assistance Program.

IMPLEMENTATION SCHEDULE: 2015–2025; potentially ongoing.

ENRG-4 RENEWABLE ENERGY SOURCES AND COMMUNITY CHOICE AGGREGATION

Undertake efforts to significantly increase the proportion of locally used energy derived from regional renewable sources, including by continuing to support the County's investigation into implementation of Community Choice Aggregation, a program in which the local government purchases power from selected local, renewable sources, and the local utility provider handles transmission and billing. Implement the following measures in support of these efforts:

- In partnership with PG&E and local alternative energy companies, develop an Alternative Energy Development Plan that includes citywide measurable goals and identifies the allowable and appropriate alternative energy facility types within the City, such as solar photovoltaics (PV) on urban residential and commercial roofs and low-scale wind power facilities. As part of this plan:
  - Propose phasing and timing of alternative energy facility and infrastructure development.
  - Conduct a review of City policies and ordinances and establish a streamlined development review process for new alternative energy projects that ensures noise, aesthetic, and other potential land use compatibility conflicts are avoided.
  - Develop a renewable energy expansion plan for the City.
  - Consider reducing permit fees or other incentives for alternative energy development.
  - Provide incentives for electric car charging stations which use solar and other renewable energy generation.

REDUCES GHG EMISSIONS BY:

- Decreasing the carbon intensity of electrical energy used by residential and non-residential land uses.

GHG REDUCTION ASSUMPTIONS:

- Assumes that all participating utility customers in Capitola are enrolled in the Community Choice Aggregation program in 2020.
- Assumes renewable and carbon-free content of electrical energy supply is increased by 5 percent annually from 2020 to 2024.
- Assumes renewable and carbon-free content of electrical energy supply is increased by 10 percent annually from 2025 to 2029.
- Assumes renewable and carbon-free content of electrical energy supply is increased by 20 percent annually from 2030 to 2034.

COST EFFECTIVENESS: UNKNOWN

Costs include staff time needed to coordinate with PG&E to draft and adopt the Alternative Energy Development Plan consistent with measure RES-3. With adoption of incentives, City and developers could incur reduced fees associated with the approval of alternative energy installations. Costs for renewable/alternative energy installations cannot be feasibly predicted, and different sources of renewable energy may have different levels of cost effectiveness. Because use of alternative energy can have other positive effects, such as reduced air and water pollution, there may be cost savings due to reduced externalities from energy production. Nevertheless, given the level of uncertainty, the overall cost effectiveness of the measure cannot be reliably determined.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Work with PG&E to develop the Alternative Energy Development Plan. As part of this process, the City will identify which types of alternative energy facilities are appropriate in Capitola and where, identify means to address potential land use compatibility conflicts, and establish a development review process for new alternative energy projects.
- Review and update existing City policies and ordinances to address alternative energy production and the findings of the Alternative Energy Development Plan.
- Coordinate, as applicable, with other agencies for regional alternative energy initiatives.

IMPLEMENTATION SCHEDULE: 2020–2034; potentially ongoing.

ENRG-5 NON-RESIDENTIAL ENERGY EFFICIENCY

Continue to participate in and potentially expand implementation of AMBAG and PG&E energy efficiency programs for non-residential uses such as retail, hospitality, and other businesses. Implement the following measures in support of these efforts:

- Partner with PG&E to promote individualized energy management planning and related services for large energy users.
- Join regional partners in advocating for the continuation and expansion of utility provider incentive programs to improve energy efficiency, and advocating for sustainable practices by the providers themselves.
- Implement the following measures with respect to Capitola's Green Building Ordinance, Zoning Ordinance, and permitting procedures:
  - Require new development and major renovations to use energy-efficient appliances that meet ENERGY STAR standards and energy-efficient lighting techniques that exceed Title 24 standards by 30 percent.
  - Require the installation of programmable thermostats in new buildings and as part of additions or renovations to existing buildings.
  - Require outdoor lighting fixtures in new development to be energy efficient. Require parking lot light fixtures and light fixtures on buildings to be on full cut-off fixtures, except emergency exit or safety lighting, and all permanently installed exterior lighting shall be controlled by either a photocell or an astronomical time switch. Prohibit continuous all night outdoor lighting in construction sites unless required for security reasons.
  - Periodically review, and if needed, amend Capitola's Green Building Ordinance to ensure effectiveness of the regulations relative to Title 24 standards.
  - Provide an expedited entitlement process and/or waiver of select permit fees for exemplary projects that greatly exceed requirements and that are "LEED©-Ready."
  - Incorporate green building techniques into the City's commercial and residential design guidelines.
  - Train all plan review and building inspection staff on green building materials, techniques, and practices.

- Identify and remove regulatory or procedural barriers to implementing green building practices in the City by updating codes, guidelines, and zoning.
- Periodically review, and as needed, update City development codes and regulations to promote innovative energy-efficient technologies.
- Provide incentives, such as streamlined permitting and inspection processes or reduced permitting fees, for retail and hospitality establishments that utilize energy-efficient equipment.
- Promote LEED-certified or similar projects by providing maps and/or coordinated tours of such facilities.

REDUCES GHG EMISSIONS BY:

- Reducing non-residential use of both natural gas and electricity generated from non-renewable sources.

GHG REDUCTION ASSUMPTIONS:

- Assumes participation rates during future years for energy efficiency programs will remain generally equivalent to past participation levels from 2006-Q2 to 2012.
- Assumes annualized future energy savings will be equivalent to average of past program years.

For AMBAG Energy Watch Program:

- Assumes total annual reduction in electricity use of 41,899 kWh.
- Assumes program will reach saturation in 2023.

For PG&E Energy Efficiency Programs:

- Assumes total annual reduction in electricity use of 347,481 kWh.
- Assumes total annual reduction in natural gas use of 2,186.6 therms.
- Assumes program will reach saturation in 2023.

For Hospitality Uses Energy Efficiency Campaign:

- Assumes 10 participating firms annually 2015 through 2019.
- Assumes total annual reduction in electricity use of 155,420 kWh.
- Assumes total annual reduction in natural gas use of 1,400 therms.

For Retail Uses Energy Efficiency Campaign:

- Assumes 10 participating firms annually 2020 through 2024.
- Assumes total annual reduction in electricity use of 342,790 kWh.
- Assumes total annual reduction in natural gas use of 1,620 therms.

COST EFFECTIVENESS: HIGH

Costs would include staff time and materials to conduct outreach to businesses to publicize and encourage participation in AMBAG and PG&E programs. Additional costs would arise from time needed for staff to draft, adopt, and implement changes to the Green Building standards, zoning

ordinance, and other sections of the municipal code, to ensure consistency with this measure. Business and property owners would incur costs from time and money spent to implement energy and efficiency upgrades. Because energy efficiency upgrades can significantly reduce energy usage, many business owners could potentially realize long term costs savings from upgrades. Additionally, property owners could realize benefits from improved ability to retract and retain tenants. Given that this measure would likely result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:
City Staff:

- Coordinate internally, as well as with AMBAG, PG&E, and other regional partners to promote existing programs that promote energy efficiency.
- Engage in outreach and education efforts to inform local businesses and employers about approaches to improving energy efficiency.
- Amend the Zoning Ordinance to incorporate requirements consistent with this measure.

Business and Property Owners:

- Implement energy efficiency upgrades and practices consistent with this measure, as feasible and/or required by the Municipal Code.
- Participate in energy efficiency programs offered by AMBAG and PG&E.

IMPLEMENTATION SCHEDULE: 2015–2034; potentially ongoing.

ENRG-6 RIGHT LIGHTS ENERGY EFFICIENCY PROGRAM

Publicize and encourage participation in the Right Lights Energy Efficiency Program, which offers no-obligation lighting audits and helps facilitate replacement of existing lighting with high-efficiency fixtures.

REDUCES GHG EMISSIONS BY:

- Reducing use of electricity generated from non-renewable sources.

GHG REDUCTION ASSUMPTIONS:

- Assumes participation rates during future years for energy efficiency programs will remain generally equivalent to past participation levels from 2006-Q2 to 2012.
- Assumes annualized future energy savings will be equivalent to average of past program years.
- Assumes total annual reduction in electricity use of 169,271 kWh.

COST EFFECTIVENESS: HIGH

Costs would include staff time and materials to conduct public outreach to publicize and encourage participation in the Right Lights Energy Efficiency program. Business owners would incur costs from time and money spent to implement lighting upgrades; however, PG&E sometimes provides rebates for such upgrades. Therefore significant portions of direct costs could in some cases be borne by PG&E. Because efficient lighting upgrades can significantly reduce energy usage, many business owners could potentially realize long term costs savings from upgrades. Given that this measure would likely result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Coordinate internally, as well as with PG&E to promote Right Lights Energy Efficiency Program.
- Engage in outreach and education efforts to inform business owners about the Right Lights program and how to best take advantage of it.

IMPLEMENTATION SCHEDULE: 2015–2023; potentially ongoing.

ENRG-7 GREEN BUSINESS CERTIFICATION PROGRAM

Promote the Monterey Bay Area Green Business Program and publicize businesses in Capitola which have been certified. Over time, consider whether it will be advantageous to develop a program specific to Capitola. Consider whether to support the program via contributions to technical assistance and marketing, and consider implementation of the following supportive measures:

- Prioritize green business practices and local businesses in City purchases.
- Promote the use of reusable, returnable, recyclable, and repairable goods.
- Encourage the use of locally grown and prepared foods at City events.
- Establish a Green Village campaign to encourage participation of Village businesses and property owners in resource efficiency programs. Recognize these businesses on the City's website and other outlets.
- Support the Buy Local campaign as a GHG reduction tool.
- Expand City and partner programs that enhance education regarding energy efficiency, resource conservation, and climate change programs and policies.

REDUCES GHG EMISSIONS BY:

- Reducing non-residential use of natural gas and electricity generated from non-renewable sources, as well as reducing use of carbon-intense and/or disposable products.

GHG REDUCTION ASSUMPTIONS:

- Assumes participation rates will increase over past participation levels.
- Assumes 27 currently certified Green Businesses will remain certified through 2023.
- Assumes total electricity savings for currently certified businesses of 793,174 kWh per year.
- Assumes total water savings for currently certified businesses of 3,127,180 gallons per year.
- Assumes total solid waste savings for currently certified businesses of 12,323 pounds per year.
- Assumes 10 additional certified Green Businesses each year between 2017 and 2021.
- Assumes total electricity savings for currently certified businesses of 29,377 kWh per year.
- Assumes total water savings for currently certified businesses of 115,821 gallons per year.
- Assumes total solid waste savings for currently certified businesses of 456 pounds per year.

COST EFFECTIVENESS: UNKNOWN

Costs would include staff time and materials to conduct public outreach to publicize and encourage participation in the Green Business Certification program. Business owners would incur costs from time and money spent to implement changes to structures or business practices to comply with certification requirements. In some cases, reduced energy and water use may allow business owners to potentially realize long term costs savings from reduced electricity and water use. Although this measure could result in returns through energy and water cost savings, the costs and savings associated with the measure would be highly variable between businesses; therefore, it is not feasible to make a general cost-effectiveness determination.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Coordinate internally, as well as with Monterey Bay Area Green Business Program to promote Green Business certification.
- Revise internal City policies for consistency with the items included in this measure.

IMPLEMENTATION SCHEDULE: 2015–2021; potentially ongoing.

NON-QUANTIFIED ENERGY USE MEASURES

The following measure ENRG-8 would not result in a measurable reduction in GHG emissions in Capitola beyond the other measures modeled for this sector. GHG reductions from the measure could not be quantified because they were not easily separable from the reductions from other measures, and because municipal operations constitute such a small portion of GHG emissions for Capitola. However, this measure is consistent with the other quantified measures discussed in this category, and is important in having the City of Capitola act as a leader in reducing energy use and subsequent GHG emissions.

ENRG-8 MUNICIPAL ENERGY USE

Reduce the energy use of municipal buildings and facilities through the following sub-measures:

- Continue to make energy improvements to City facilities to maintain Capitola's certification from the Monterey Bay Green Business Program.
- Ensure that all City development projects serve as models of energy-efficient building design.
- Conduct periodic energy audits of City facilities and include any feasible energy cost reduction measures in the annual budget.
- Prioritize the purchase of ENERGY STAR-rated appliances and computer equipment as new purchases become necessary.

REDUCES GHG EMISSIONS BY:

- Reducing City use of both natural gas and electricity generated from non-renewable sources.

COST EFFECTIVENESS: HIGH

The City would incur costs from time and money spent to conduct energy audits and implement energy efficiency upgrades; however, because energy efficiency upgrades can significantly reduce energy usage, many individual energy efficiency improvements could potentially realize long-term costs savings. Given that this measure has strong potential to result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Coordinate internally, as well as with PG&E and other regional partners to conduct energy audits for City facilities, and identify priority projects and programs to reduce municipal energy use.
- Collaborate to implement and involve all staff in energy efficiency programs and facility upgrades.

IMPLEMENTATION SCHEDULE: 2015–2034; potentially ongoing.

WATER AND WASTEWATER

As shown in Table 6-1, reductions in water use and subsequent wastewater generation from the following measures would decrease GHG emissions in Capitola by a total of 67 $MTCO_2e$ in 2020 and 1 $MTCO_2e$ in 2035.

How Water and Wastewater Measures Reduce GHGs

Water and wastewater measures serve to decrease GHG emissions primarily through reduced energy needs for water storage, pumping, and treatment, as well as through reduced fugitive GHG emissions from wastewater and sewage. The provision of water through a municipal supply requires elaborate and extensive infrastructure. Beyond the energy needed for the everyday operations of this infrastructure, its construction and ongoing maintenance also generates energy demand. Thus, by reducing water usage, these measures serve to decrease both these routine demands for energy and the long-term demand for energy related to the upkeep, replacement, and expansion of water-system infrastructure. As discussed above, much of this energy is currently derived from carbon-intense fossil fuel sources. Therefore, lessening the water use, which currently relies on carbon-intense energy sources, is the main mechanism by which these measures would serve to reduce GHG emissions. Additionally, decreased water use means subsequent decreases in quantities of wastewater. Since wastewater requires additional energy to treat and can itself release GHGs through natural degradation processes, decreased generation of wastewater also serves to reduce GHG emissions.

Other Benefits of Water and Wastewater Measures

Beyond the energy savings discussed above, these measures yield other sustainability benefits as well. Though fresh water is a renewable resource, the amount available at a particular time and place is finite. Wiser use of water makes communities more resilient in the face of drought or other water shortages, and can reduce or delay the need for infrastructure improvements or expansions. Reduced urban water use also allows more water to be left in natural waterways, offering benefits for wildlife, agriculture, and recreation. Finally, some of the measures which help to reduce water use and wastewater generation, such as xeriscaping, also serve to provide habitat to urban wildlife.

WW-1 WATER CONSERVATION

Support interior and exterior water efficiency and conservation in new and existing buildings and uses through the following sub-measures:

- Amend the Green Building Ordinance to require all water use and efficiency measures identified as voluntary in the California Green Building Standards Code for new development
- Amend the Green Building Ordinance to promote water conservation through standards for water-efficient fixtures and offsetting demand so that there is no net increase in imported water use. Include clear parameters for integrating water conservations infrastructure and technologies, including low-flush toilets and low-flow showerheads. As appropriate, partner with local water conservation companies on the development and implementation of this measure.
- Develop a water efficiency retrofit ordinance to require water efficiency upgrades as a condition of issuing permits for renovations or additions. Work with local water purveyors to achieve consistent standards and review and approval procedures for implementation.
- Continue to require water efficiency retrofits at point of sale for residential, commercial, and industrial properties.
- Collaborate with the Soquel Creek Water District and Santa Cruz Water Department to enact conservation programs for commercial, industrial, and institutional (CII) accounts.
- Partner with Central Coast Energy Services to integrate low-flow toilet and showerhead replacement services into their low-income housing retrofit services, and promote these services to homeowners.
- In collaboration with the Soquel Creek Water District and Santa Cruz Water Department, promote water audit programs that offer free water audits to residential and commercial customers.
- Conduct marketing and outreach to promote water conservation rebates provided by the Soquel Creek Water District and Santa Cruz Water Department.
- Amend the Green Building Ordinance to promote water conservation through standards for watering timing and water-efficient irrigation equipment. As appropriate, partner with local water conservation companies on the development and implementation of this measure.

- Review and update the City's Water-Efficient Landscaping Ordinance with improved conservation programs and incentives for non-residential customers that are consistent with the Tier 1 water conservation standards of Title 24.
- Implement incentives for the use of drought-tolerant landscaping and recycled water for landscape irrigation

REDUCES GHG EMISSIONS BY:

- Decreasing overall energy demand related to water storage and transport.
- Reducing energy demand from fossil fuels related to water heating.

GHG REDUCTION ASSUMPTIONS:

- Assumes full participation and compliance with the Soquel Creek Water District 2010 Urban Water Management Plan Water Conservation Strategies.
- Assumes a Water Savings of 19,225,234 Gallons in 2035 (as compared to 2010 Baseline Usage).

COST EFFECTIVENESS: HIGH

Costs would include staff time and materials to conduct public outreach to publicize and encourage water-saving practices and installation of water-efficient fixtures and landscaping. Homeowners and renters, and property and business owners could incur costs from time and money spent to install water-efficient fixtures and landscaping, and/or undertake other improvements to save or reuse water. However, because water efficient fixtures and landscaping can significantly reduce water use, their installation can result in significant returns from water cost savings. Assuming a cost of $150 and a water rate of $0.0025 per gallon–which is lower than current water rates for much of Capitola and therefore conservative–using the water savings listed above, simple payback periods for water-efficient toilets is estimated at 15.4 years. For inexpensive low-flow faucet and shower heads–which are available for between $5 and $10–the simple payback periods would be significantly shorter, approximately two to five years. Similarly, because water-efficient landscaping can significantly reduce water use and maintenance needs, its installation can result in significant returns from water cost savings. Given that even the conservative simple payback periods for interior fixtures are relatively short, and given potential returns from water-efficient landscaping, this measure is deemed to be highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Amend the Green Building Ordinance as necessary to require incorporation of water-saving practices and fixtures consistent with this measure.
- Develop a water efficiency retrofit ordinance consistent with this measure.
- Collaborate with the Soquel Creek Water District, the Santa Cruz Water Department, and Central Coast Energy Services to implement various provisions of this measure.
- Conduct marketing and outreach to promote water conservation and available rebates.
- Review development plans and environmental documents for consistency with this measure.
- Review and update the City's Water-Efficient Landscaping Ordinance (WELO).

- Develop and implement incentives for the use of drought-tolerant landscaping.
- Conduct marketing and outreach to promote water-efficient landscaping practices.
- Review development plans and environmental documents for consistency with the WELO.

Developers/Property Owners:

- Design and construct projects with water-saving features consistent with this measure.
- Design and construct projects with water-efficient landscaping consistent with the WELO.
- Replace existing lawns and other conventional landscaping with xeriscaping.

IMPLEMENTATION SCHEDULE: 2015–2035; potentially ongoing.

NON-QUANTIFIED WATER AND WASTEWATER MEASURES

The following measures WW-2 and WW-3 would not result in a measureable reduction in GHG emissions in Capitola beyond the other measures modeled for this sector. Emissions reductions from Measure WW-2 could not be quantified because details regarding implementation of recycled water systems remain too uncertain at this time. Emissions reductions from Measure WW-3 could not be quantified because municipal reductions in water use are not easily separable from the reductions and constitute a very small portion of GHG emissions for Capitola. However, this measure is consistent with the other quantified measures discussed in this category. Water reuse and recycling is an important future approach for conserving and supplementing water supplies; and municipal conservation is important to having the City of Capitola act as a leader in reducing water use and subsequent GHG emissions.

WW-2 WATER RECYCLING AND RAINWATER CATCHMENT

Encourage grey water use and rainwater catchment systems where their use could accomplish water conservation objectives through the following measures:

- Investigate the feasibility of adding new California grey water building/plumbing codes into the Green Building Ordinance.
- Adopt a residential rainwater collection policy and update the Zoning Ordinance as needed to support permitting and regulation of residential rainwater systems.
- Investigate emerging technologies that reuse water within residential and commercial buildings and make that information available to the public via the City's website and/or brochures.
- Pursue funding sources to provide rebates and reduce permit fees for cisterns.
- Provide outreach support for water-efficient landscaping programs, classes, and businesses.

REDUCES GHG EMISSIONS BY:

- Decreasing energy demand related to water storage and transport.
- Decreased fugitive emissions from waste water and from energy used to treat wastewater.

COST EFFECTIVENESS: UNKNOWN

The City would incur costs from time and money spent to implement water efficiency upgrades; however, because water efficiency upgrades can significantly reduce usage, many individual water efficiency improvements could potentially realize long term costs savings. Given that this measure has strong potential to result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Coordinate internally, as well as with Soquel Creek Water District and Santa Cruz Water Department to investigate opportunities and develop plans for more extensive implementation and funding of greywater capture and reuse, and rainwater catchment.
- Evaluate potential for inclusion of greywater standards in the Green Building Ordinance.
- Draft and potentially adopt a residential rainwater collection policy and update the Zoning Ordinance for consistency with this measure.
- Engage in resident outreach and education efforts to inform public about strategies for greywater recycling and rainwater catchment.

IMPLEMENTATION SCHEDULE: 2015–2034; potentially ongoing.

WW-3 MUNICIPAL WATER USE

Reduce the water use of municipal buildings and facilities through the following sub-measures:

- Establish an ultra-low water use policy for City buildings and operations, and provide mechanisms to achieve policy goals.
- Work with water service providers to develop and implement a reclaimed (recycled) water distribution system (purple pipe) for landscaping and other non-potable water uses for domestic, commercial, and industrial consumers.

REDUCES GHG EMISSIONS BY:

- Decreasing energy demand related to water storage and transport for municipal use.
- Reducing energy demand from fossil fuels related to water heating for municipal use.

COST EFFECTIVENESS: HIGH

The City would incur costs from time and money spent to implement water efficiency upgrades; however, because water efficiency upgrades can significantly reduce usage, many individual water efficiency improvements could potentially realize long term costs savings. Given that this measure has strong potential to result in significant returns through energy cost savings, it is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Coordinate internally, as well as with Soquel Creek Water District and Santa Cruz Water Department to identify and implement projects and programs to reduce municipal water use.
- Collaborate to implement and involve all staff in water efficiency programs and facility upgrades.

IMPLEMENTATION SCHEDULE: 2015–2034; potentially ongoing.

SOLID WASTE

As shown in Table 6-1, the Solid Waste measures would decrease GHG emissions in Capitola by a total of 922 $MTCO_2e$ in 2020 and also 922 $MTCO_2e$ in 2035.

For many of the solid waste measures, the cost effectiveness cannot be reasonably determined. However, the content of these individual measures may be viewed as a potentially necessary individual component of a broader strategy to reduce the waste stream.

HOW SOLID WASTE MEASURES REDUCE GHGS

Solid waste measures serve to reduce GHG emissions primarily by lessening the need for energy-using processes surrounding the fabrication and disposal of consumer products, as well as by serving to limit or recapture the GHGs given off when such materials degrade in landfills. The production of consumer goods involves resource extraction, refinement, manufacturing, transportation, and other processes, all of which consume energy. As discussed above, current methods of energy generation tend to produce GHG emissions. By seeking to promote more limited purchasing and greater reuse and recycling of materials and goods, the solid waste measures serve to decrease the need for energy-consuming production and disposal processes, and thus reduce GHG emissions. Additionally, the breakdown of certain materials in landfill can release even more powerful GHG emissions, such as methane. By seeking to limit or recapture such gases, the solid waste measures serve to further reduce GHG emissions.

OTHER BENEFITS OF SOLID WASTE MEASURES

Similar to the variety of ways in which measures to reduce solid waste serve to reduce GHG emissions, these measures offer other broad sustainability benefits as well. Perhaps most importantly, by encouraging recycling, solid waste measures serve to decrease demand for virgin materials and other inputs to production. This decreases resource extraction and related environmental impacts, such as pollution and habitat disruption. Similarly, composting—an essential approach to waste reduction—recycles nutrients within the waste stream, thus further conserving resources and supporting local agriculture. Other key sustainability benefits come from reductions in demand for the processing and storage of solid waste. Some solid waste may contain toxic or harmful compounds, and nearly all waste requires certain handling techniques to ensure its safe disposal; encouraging greater reuse and more conscientious disposal techniques reduces risks to people and the environment from hazardous materials. Finally, decreasing solid waste reduces the space needed for landfills, conserving land and prolonging the lifetime of existing facilities.

SW-1 COMMUNITYWIDE SOLID WASTE DIVERSION AND RECYCLING

Work with Green Waste Recovery to reduce community per capita solid waste disposal by 75 percent by 2020. Implement the following sub-measures in support of this goal:

- Conduct a study to consider providing financial incentives to households and businesses to reduce the volume of solid waste sent to the landfill. Based on the results of this study, undertake such incentives, as appropriate.
- Partner with PG&E to establish an end-of-life requirement for appliance disposal. Establish a protocol per US EPA's Responsible Appliance Disposal Program.
- Revise the Recycling Ordinance to require at least 50 percent diversion of non-hazardous construction waste from disposal, as required by the California Green Building Code.
- Amend the Green Building Ordinance to encourage building designs that minimize waste and consumption in construction projects.
- Retain Zoning Ordinance requirements for all new and significant redevelopments/remodels of existing multi-family developments, including those with fewer than five units, to provide recycling areas for their residents.
- Work with Green Waste Recovery to improve recycling collection services in the Village and in commercial areas.
- Amend the Municipal Code to require recycling at all public events that require a City permit.
- Encourage the use of recycled asphalt pavement (RAP) for commercial and community parking lots.
- Encourage the use of reusable, returnable, recyclable, and repairable goods through incentives, educational displays, and activities.
- Encourage the reduction of waste and consumption from household and business activities in Capitola through public outreach and education activities.
- Support recycling and compost efforts at City schools by providing information and educational materials.

REDUCES GHG EMISSIONS BY:

- Supporting alternatives to solid waste disposal in landfills, such as reuse and recycling.
- Supporting greater reuse and alternative solid waste disposal.
- Supporting reduced solid waste in landfills.
- Supporting energy conservation and reduced energy use related to solid waste disposal.

GHG REDUCTION ASSUMPTIONS:

- Assumes total solid waste landfill disposal for Capitola in 2010 was 8,083 tons.
- Assumes a 30 percent increase in waste diversion related to recycling by 2017.
- Assumes a 60 percent additional increase in waste diversion related to recycling through by 2020.

COST EFFECTIVENESS: UNKNOWN

Costs include staff time needed to draft, adopt, and implement enabling ordinances for requirements of Measure SW-1 and sub-measures. Additional costs include staff time needed to create promotional materials and conduct public outreach regarding waste diversion. Other costs to the City include payment for waste collection services from public receptacles, as well as from the provision and ongoing maintenance of those receptacles; however, potential cost savings could be realized as the need for landfills decreases over time.

Potential costs to property owners/developers include the need for increased space, management, or number of receptacles to accommodate recycling. Potential savings to developers could accrue through salvage and recycling various construction materials. Given that this measure could result in highly variable costs and cost savings, it is not feasible to make an overall cost-effectiveness determination.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Continue the City's educational and outreach programs about waste reduction; develop informational materials and outreach to encourage the use of salvaged and recycled materials.
- Amend the Green Building/Zoning Ordinance to require the sourcing of construction materials locally, as feasible, consistent with this measure.
- Amend the Green Building/Zoning Ordinance to require provision of recycling and composting areas and receptacles, as feasible, consistent with this measure.
- Review proposed development applications, construction and demolition permits, and environmental documents for consistency with this measure.
- Review proposed development applications and environmental documents for consistency with this measure.
- Work with GreenWaste to install and maintain recycling receptacles in the Village and parks, as needed and deemed appropriate.

Developers/Property Owners:

- Design and construct redeveloping, remodeling, and existing multi-family developments projects to provide recycling areas for their residents.
- Design and construct new and remodeling projects to use salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping, and use local construction materials, as feasible.

IMPLEMENTATION SCHEDULE: 2015–2020; potentially ongoing.

SW-2 COMMUNITYWIDE FOOD WASTE DIVERSION

Continue the City's Food Waste Reduction Program and policies related to green waste diversion to keep food and green waste out of the landfill.

REDUCES GHG EMISSIONS BY:

- Supporting composting as an alternative to food waste disposal in landfills.
- Supporting energy conservation and reduced energy use related to food waste disposal.

GHG REDUCTION ASSUMPTIONS:

- Assumes food waste comprises 29.3 percent of total solid waste disposal for Capitola.
- Assumes a 30 percent increase in food waste diversion by 2017.
- Assumes a 60 percent additional increase in food waste diversion by 2020.

COST EFFECTIVENESS: HIGH

Costs include staff time needed to create promotional materials and conduct public outreach regarding food waste diversion and composting. Other costs to the City include payment for food waste collection services from public receptacles, as well as from the provision and ongoing maintenance of those receptacles. Composting carries lower overall costs than landfill disposal for food waste. Because composted food waste does not need to be permanently stored, costs associated with land use or long-term waste management are significantly decreased. Additionally, compost in itself is a valuable commodity, and the sale of compost helps to support food waste collection and the composting operation itself. Given that food waste collection and composting programs tend to result in lower long-term, and even sometimes short-term costs, this measure is deemed highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Continue the City's educational and outreach programs about food waste reduction.
- Amend the Green Building/Zoning Ordinance to require provision of composting areas and receptacles, as feasible, consistent with this measure and Measure SW-1.
- Review proposed development applications and environmental documents for consistency with this measure.
- Work with GreenWaste to install and maintain food waste receptacles in the Village and parks, as needed and deemed appropriate.

Developers/Property Owners:

- Design and construct redeveloping, remodeling, and existing multi-family developments projects to provide composting areas for their residents.

IMPLEMENTATION SCHEDULE: 2015–2020; potentially ongoing.

PARKS, OPEN SPACE, AND AGRICULTURE

The parks, open space, and agriculture measures would not result in measureable reductions in GHG emissions in Capitola. Therefore, Table 6-1 does not show a quantified absolute amount or percentage of total GHG reductions for these non-quantified measures. However, they are important in helping to reach the City's overall goal of reducing GHG emissions in Capitola. Since projected GHG emissions reductions from individual parks, open space, and agriculture measures are not available, it is not practical to provide estimates of cost-effectiveness for those measures.

How Parks, Open Space, and Agriculture Measures Reduce GHGs

The primary mechanism through which parks, open space, and agriculture measures serve to reduce GHGs is through the sequestration (long-term storage) of carbon in biomass such as trees and soil. For parks, open space, and agriculture measures, GHG emissions reductions are largely incidental to the other sustainability benefits they offer and would be relatively minor.

Other Benefits of Parks, Open Space, and Agriculture Measures

In addition to providing opportunities for recreation and improved public health, regional and urban parks and open spaces create wildlife habitat and help mitigate urban heat-island effects. Community gardens similarly make multiple contributions to overall sustainability by helping to improve public health, increasing local food production and thus reducing the distance food must travel, and providing additional habitat and foraging opportunities for wildlife.

OS-1 Community Gardens and Locally-Sourced Food

Increase the number of community gardens through the following sub-measures:

- Identify and inventory potential community garden and urban farm sites on parks, public easements, PG&E easements, and rights-of-way, and develop a program to establish community gardens in appropriate locations.
- Encourage significant new residential developments over 50 units to include space that can be used to grow food.
- Establish a process through which a neighborhood can propose and adopt a site as a community garden.
- Work with schools to develop opportunities for creating additional community gardens on their campuses.
- As part of the Zoning Ordinance Update, identify and address barriers to urban farming and produce sales directly from farmers to consumers.
- Promote food grown locally in Capitola through marketing, outreach, and by providing locally grown and prepared food at City events, helping to reduce the transportation needs for food distribution while boosting the local economy.
- Encourage neighborhood grocery stores, farmers markets, and food assistance programs to increase their use of locally-grown and prepared goods.
- Encourage institutions, such as schools, government agencies, and businesses to serve foods produced locally and in the region.

Reduces GHG By:

- Increasing locations for carbon-storing biomass (trees and plants).
- Supporting the provision of areas that naturally reduce the urban heat-island effects, thus conserving energy and reducing energy demand.
- Supporting opportunities for convenient pesticide-free food.
- Supporting reduced farm equipment use required for mechanized farming methods.
- Supporting reduced automobile and long-haul truck use for the transport of food, and associated fossil–fuel consumption.

Cost Effectiveness: Unknown

Costs include staff time needed to continue identifying and inventorying potential sites and to draft and adopt a process for the establishment of new community garden sites, consistent with this measure. Additional City costs would result from staff time to develop informational materials and conduct outreach to promote community gardens, urban agriculture, locally-produced food, and farmers markets. Costs to local institutions and events could include potentially increased costs for procurement of locally-produced foods. Residents who voluntarily choose to take advantage of

program to create new community garden sites could potentially incur time and materials costs for establishing gardens. Participating residents could also enjoy savings through offset food costs.

ACTION ITEMS AND RESPONSIBLE PARTIES:

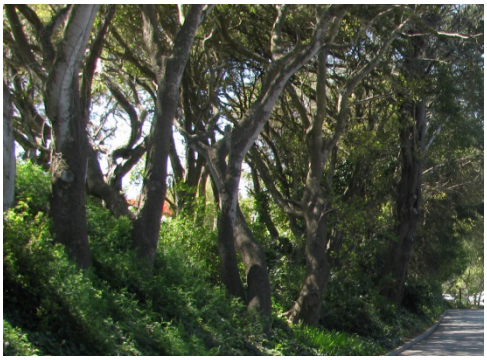
City Staff:

- Continue to inventory potential community garden sites and develop the associated community garden programs consistent with this measure.
- Develop a process for the establishment of new community garden sites consistent with this measure.
- Develop informational materials and conduct outreach during the project review process to encourage development applicants to include garden areas in large residential projects.
- Develop informational materials and conduct outreach to promote farmers markets and locally produced food to residents, businesses, and event organizers.
- Amend Zoning Ordinance, as necessary, to remove barriers to community gardens and urban agriculture.

IMPLEMENTATION SCHEDULE: 2015–2020; potentially ongoing

OS-2 URBAN FORESTS

Increase and enhance open space and urban forests and support community tree plantings.



REDUCES GHG BY:

- Increasing locations for carbon-storing biomass (trees and plants).
- Supporting the provision of areas that naturally reduce the urban heat-island effects, thus conserving energy and reducing energy demand.

COST EFFECTIVENESS: UNKNOWN

Potential costs to the city include staff time to develop specific policies or programs to encourage tree planting and urban forests. Since it does not establish specific requirements or programs, this measure would cause minimal direct imposition of costs. Studies have found that every dollar invested in urban trees can result in returns of $1.37 to $3.09 (2005 dollars).[5] However, due to the voluntary nature and geographical variation in tree-planting and associated costs and benefits, it is not possible to precisely quantify potential costs or savings.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Develop informational materials and conduct outreach to encourage tree planting and urban forestry.
- Amend Zoning or municipal code, as necessary, to remove barriers to planting new trees along streets or on private property.

IMPLEMENTATION SCHEDULE: 2015–2020; potentially ongoing

[5] McPherson, Greg, et al., 2005, *Municipal Forest Benefits and Costs in Five US Cities,* Journal of Forestry.

ACTION AND IMPLEMENATION

The action and implementation measures would not in themselves result in measureable reductions in GHG emissions in Capitola. Therefore, Table 6-1 does not show a quantified absolute amount or percentage of total GHG reductions for these non-quantified measures. However, they are important in helping to reach the City's overall goal of reducing GHG emissions in Capitola. It is not practical to provide estimates of cost-effectiveness for these measures since these measures support the other measures in this CAP and do not themselves result in direct GHG emissions reductions.

HOW ACTION AND IMPLEMENTATION MEASURES REDUCE GHGS

The infeasibility of quantifying the emissions reductions from action and implementation measures stems directly from the broad ways in which they contribute to sustainability. While action and implementation measures in and of themselves do not directly contribute to decreased GHGs or improved sustainability, these measures would serve to facilitate the other measures in this Climate Action Plan by informing the public about actions they can take to improve sustainability, by encouraging residents and businesses to take those actions, and by guiding the City on how to use the CAP going forward.

IMP-1 COMPREHENSIVE CLIMATE CHANGE EFFORTS

Participate fully in local, regional, State, and federal efforts to reduce GHG emissions and mitigate the impacts resulting from climate change, including through the following sub-measures:

- Support ongoing public efforts to increase climate change awareness, action, and advocacy.
- Support the coordination and promotion of films, events, speakers, and forums related to climate change.
- Advocate for effective State and federal policies and lead by example through reporting of local reduction success.
- Explore opportunities to engage high school students in reducing their personal GHG emissions as well as becoming leaders in communitywide GHG reductions.
- Partner with regional municipalities to establish funding to support GHG reduction efforts.

REDUCES GHG BY:

- Reinforcing broader external measures and efforts to prevent climate change.
- Potentially improving the effectiveness of other measures through increased awareness of climate change and climate change prevention strategies.

COST EFFECTIVENESS: UNKNOWN

Staff time would be needed to engage in broader efforts to create and conduct outreach campaign, including materials and programming. Costs for programs would vary depending on level and types of these efforts. Since the GHG reductions or other possible benefits of this measure are not quantifiable and the costs have a high level of uncertainty, it is not possible to determine the cost effectiveness for this measure.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Develop and deploy outreach programming and materials.
- Plan and hold public workshops or other outreach events.
- Research, draft, and enact resolutions or other legislation in support of broader climate change prevention efforts.
- Engage with other jurisdictions and agencies in climate action planning.

IMPLEMENTATION SCHEDULE: 2015–2035; potentially ongoing

IMP-2 CLIMATE ACTION PLAN IMPLEMENTATION AND MAINTENANCE

Coordinate implementation and ongoing implementation of the Climate Action Plan through 2035, including through the following sub-measures:

- Conduct periodic reviews and revisions of the Climate Action Plan.
- Conduct GHG emissions inventories at least every five years, in partnership with regional municipalities, AMBAG, and PG&E.
- Establish a process for reporting on GHG emissions within appropriate Council reports to evaluate and analyze how actions support or are consistent with the City's GHG reduction goals.
- Integrate City departments' operational implementation of the Climate Action Plan through coordination with staff of all relevant City programs and by assigning a staff person to serve as the City's Climate Action Coordinator.
- Quantify and report on the effectiveness of the implementation of the Climate Action Plan and make the information available to City Council, all City departments, partners, and the public.
- Create suggestion e-box for City staff energy efficiency and resource conservation ideas.

REDUCES GHG BY:

- Establishing continued support for and evaluation of the Climate Action Plan.
- Providing quantitative metrics that inform implementation and potential revision of the GHG reduction measures to maintain and/or increase GHG reductions.

COST EFFECTIVENESS: UNKNOWN

Staff time would be needed to conduct subsequent GHG emissions inventories and establish quantifications procedures for those inventories. Costs for program would vary depending on level and types of these efforts. Since the GHG reductions or other possible benefits of this measure are not quantifiable and the costs have a high level of uncertainty, it is not possible to determine the cost effectiveness for this measure.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Staff:

- Revisit the Climate Action Plan at least once every five years.
- Develop future procedures for evaluating the effectiveness of GHG reduction measures.
- Conduct future GHG emissions inventories and quantify reductions from individual measures, as feasible.

IMPLEMENTATION SCHEDULE: 2020–2035; potentially ongoing

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Appendices

Climate Action Plan

for the City of Capitola

March 20, 2015

PlaceWorks

in collaboration with:

Green Lynx, LLC

APPENDIX A

GHG FORECASTS AND REDUCTION MEASURE MODELING

This appendix outlines the assumptions, data, sources, coefficients, models and modeling outputs, and supporting calculations behind a) the Business As Usual (BAU) and Adjusted Future Year Greenhouse Gas (GHG) Emission Forecasts presented within this document, and b) estimates of projected greenhouse gas emission reductions associated with planned or existing state and local actions outlined in this document.

These projections were facilitated using resources made available (at no cost) to California jurisdictions (and those working on their behalf) by The Statewide Energy Efficiency Collaborative (SEEC), an organization devoted to helping California cities and counties reduce greenhouse gas emissions and energy consumption. SEEC is a collaboration between three statewide nonprofit organizations and California's four investor-owned utilities: ICLEI Local Governments for Sustainability USA, The Institute for Local Government (ILG), The Local Government Commission (LGC), Pacific Gas & Electric Company (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and the Southern California Gas Company (SCGC).

The primary resource used to facilitate this analysis was SEEC-ClearPath California. SEEC-ClearPath California, is a cloud-based suite of climate and energy management tools developed by ICLEI for the California SEEC Program. These tools were created to assist local governments in developing customized plans for mitigating local contributions too climate change, as well as tracking and reporting on the performance of those plans over time. SEEC-ClearPath California provides information and quantification tools to: conduct or update GHG Inventories, create and update Future Year GHG Forecasts, calculate projected GHG reductions for a breadth of emission reduction strategies, and more.

City-specific data was entered into the SEEC-ClearPath California software and combined with emission coefficients, local growth rates (I.e.- Population, Housing, Employment), carbon intensity modifiers (i.e. California's Renewable Energy Portfolio regulations), reduction targets, and measure implementation metrics (ie- scope, duration, useful life) to create actionable projections of future GHG emissions, as well as anticipated reductions in emissions from state and local action.

The Business as Usual Future Year GHG Forecasts were developed using a) the 2010 Baseline Capitola Greenhouse Gas Inventory provided by the Association of Monterey Bay Area Governments (AMBAG), b) growth projections for Population, Housing, and Employment growth for the City of Capitola provided by DC&E/Placeworks, c) carbon-intensity modifiers for state-level actions (including: the Renewable Portfolio Standard, and Pavley I and II), and d) the Forecast module of SEEC ClearPath California.

The projected GHG reductions for each of the included local reduction measures were calculated using models developed by ICLEI- Local Governments for Sustainability and included in the a) SEEC- ClearPath California platform, b) the SEEC- Climate and Energy Management Suite (CEMS), and c) the Climate and Air Pollution Planning Assistant (CAPPA) version 1.5. The calculators utilized are indicated for each measure.

The Adjusted Future Year GHG Forecast accounting for all reductions associated with the included local reduction measures was calculated using the SEEC- ClearPath California Planning Module.

It is important to note here that developing a climate action plan is a forward looking exercise and as such, the calculations made are inherently speculative and require a number of assumptions about external drivers technology development, state and local government action, and human behavior. Calculations made in the Forecasting and Planning modules of SEEC- ClearPath CA are no different. This analysis is meant to help illustrate the scope of effort that would be required to meet chosen reduction targets, to help determine which reduction strategies are most likely to be most effective within the City of Capitola's unique circumstances, and to help design a manageable and logical implementation plan.

This analysis also served to develop reasonable performance metrics for the included reduction measures, which will help City staff manage the successful implementation of the Climate Action Plan. The SEEC-ClearPath California platform includes a user-friendly Monitoring and Implementation Module, which will assist City staff in tracking and reporting the progress of individual measures, as well as the comprehensive plan overall.

The calculations, estimates, assumptions and qualitative and/or contextual information provided in this appendix include (but are not limited to): the source consumption data (kWh, therms, vehicle miles, tons of waste, gallons of water, etc), projected growth rates, models and calculators utilized, memos and correspondence, historic and current market trend data, any default values used and their sources, emission factors, and conversion metrics that form the basis of the projected performance modeled for each included reduction measure, as well as the resulting Business As Usual and Adjusted Future Year GHG Forecasts.

Reference #	Reduction Measure Name	Corresponding Reference #'s from Initial Draft List (from DC&E/Placeworks)	Start year	End year
	Energy Measures			
ENRG-1.1a	Increased Residential Solar Photovoltaic Phase I	RE-1, RE-2, RE-3, RE-4, RE-5, RE-6, RE-7, RE-10, RE-11	2015	2019
ENRG-1.1b	Increased Residential Solar Photovoltaic Phase II	RE-1, RE-2, RE-3, RE-4, RE-5, RE-6, RE-7, RE-10, RE-11	2020	2024
ENRG-1.2	Increased Residential Solar Thermal	RE-1, RE-2, RE-3, RE-4, RE-5, RE-6, RE-7, RE-10, RE-11	2020	2024
ENRG-1.3a	Increased Non-Residential Solar Photovoltaic- Phase I	RE-1, RE-2, RE-3, RE-4, RE-5, RE-6, RE-7, RE-10, RE-11	2018	2022
ENRG-1.3b	Increased Non-Residential Solar Photovoltaic- Phase II	RE-1, RE-2, RE-3, RE-4, RE-5, RE-6, RE-7, RE-10, RE-11	2020	2024
ENRG-2.1a	EUC Whole Home Retrofit- Electricity Savings Phase I	GB-12, GB-15, GB-17, GB-19	2015	2019
ENRG-2.1b	EUC Whole Home Retrofit- Electricity Savings Phase II	GB-12, GB-15, GB-17, GB-19	2020	2029
ENRG-2.2a	EUC Whole Home Retrofit- Nat Gas Savings Phase I	GB-12, GB-15, GB-17, GB-19	2015	2019
ENRG-2.2b	EUC Whole Home Retrofit- Nat Gas Savings Phase II	GB-12, GB-15, GB-17, GB-19	2020	2029
ENRG-2.3a	Residential Energy Efficiency Education- Phase I	GB-12, GB-15, GB-19, WW-9, WW-10, CA-7	2020	2024
ENRG-2.3b	Residential Energy Efficiency Education- Phase II	GB-12, GB-15, GB-19, WW-9, WW-10, CA-7	2030	2032
ENRG-3	Residential Weatherization Programs	GB-15, GB-18, GB-19	2021	2025
ENRG-4.1a	Community Choice Aggregation- Residential Phase I	RE-7, RE-7.2, RE-7.1 through RE-7.4, RE-8, RE-9, RE-10	2020	2024
ENRG-4.1b	Community Choice Aggregation- Residential Phase II	RE-7, RE-7.2, RE-7.1 through RE-7.4, RE-8, RE-9, RE-10	2025	2029
ENRG-4.1c	Community Choice Aggregation- Residential Phase III	RE-7, RE-7.2, RE-7.1 through RE-7.4, RE-8, RE-9, RE-10	2030	2034
ENRG-4.2a	Community Choice Aggregation- Non-Residential Phase I	RE-7, RE-7.2, RE-7.1 through RE-7.4, RE-8, RE-9, RE-10	2020	2024
ENRG-4.2b	Community Choice Aggregation- Non-Residential Phase II	RE-7, RE-7.2, RE-7.1 through RE-7.4, RE-8, RE-9, RE-10	2025	2029
ENRG-4.2c	Community Choice Aggregation- Non-Residential Phase III	RE-7, RE-7.2, RE-7.1 through RE-7.4, RE-8, RE-9, RE-10	2030	2034
ENRG-5.1	AMBAG Energy Watch Energy Efficiency- Electricity Savings	GB-7.4, GB-11, GB-12, GB-13, GB-15, GB-19, GB-22, GB-24, CA-7	2013	2023
ENRG-5.2	PG&E Energy Efficiency Programs- Electricity Savings	GB-1 through GB-5, GB-7.4, GB-7.5, GB-7.6, GB-7.7, GB-11, GB-12, GB-13, GB-16, GB-19	2013	2023
ENRG-5.3	PG&E Energy Efficiency Programs- Natural Gas Savings	GB-1 through GB-5, GB-7.4, GB-7.5, GB-7.6, GB-7.7, GB-11, GB-12, GB-13, GB-16, GB-19	2013	2023
ENRG-5.4	Hospitality EE Campaign- Electricity Savings	GB-5, GB-13.1, GB-16	2015	2019
ENRG-5.5	Hospitality EE Campaign- Natural Gas Savings	GB-5, GB-13.1, GB-16	2015	2019
ENRG-5.6	Retail EE Campaign- Electricity Savings	GB-5, GB-13.2, GB-16	2020	2024
ENRG-5.7	Retail EE Campaign- Natural Gas Savings	GB-5, GB-13.2, GB-16	2020	2024
ENRG-6	Right Lights Energy Efficiency Program- Electricity Savings	GB-7.4, GB-7.7, GB-19	2013	2023
ENRG-7.1a	Green Business Certification- Certified To-date: Electricity	P-1.1, P-1.2, P-1.4, CA-2, CA-3, CA-4, CA-7	2014	2023
ENRG-7.1b	Green Business Certification- Expansion: Electricity	P-1.1, P-1.2, P-1.4, CA-2, CA-3, CA-4, CA-7	2017	2021
ENRG-7.2	Green Business Certification- Certified To-date: Water Savings	P-1.1, P-1.2, P-1.4, CA-2, CA-3, CA-4, CA-7	2014	2023

Solid Waste Reduction Measures				
SW-1a	**Increased Community-wide Recycling- Phase I**	**SW-1, SW-2, SW-8, SW-9, SW-10, SW-14**	**2016**	**2017**
SW-1b	**Increased Community-wide Recycling- Phase II**	**SW-1, SW-2, SW-8, SW-9, SW-10, SW-14**	**2019**	**2020**
SW-2a	**Increased Community-wide Food Waste Diversion- Phase I**	**SW-6, SW-7, SW-14**	**2016**	**2017**
SW-2b	**Increased Community-wide Food Waste Diversion- Phase II**	**SW-6, SW-7, SW-14**	**2019**	**2020**
VMT Reduction Measures				
VMT-1a	**Careshare Program- VMT Reductions Phase I**	**TR-12.3, TR-12.6**	**2015**	**2019**
VMT-1b	**Careshare Program- VMT Reductions Phase II**	**TR-12.3, TR-12.6**	**2020**	**2024**
VMT-2a	**Increased Bus Ridership- Phase I**	**TR-7, TR-11, TR-11.1, TR-12.1, TR-14**	**2015**	**2019**
VMT-2b	**Increased Bus Ridership- Phase II**	**TR-7, TR-11, TR-11.1, TR-12.1, TR-14**	**2020**	**2024**
VMT-3a	**Improved Bike Infrastructure- Phase I**	**TR-12.5, TR-16, TR-16.1 through TR-16.9, TR-17, TR-18, TR-19, TR-20**	**2015**	**2024**
VMT-3b	**Improved Bike Infrastructure- Phase II**	**TR-12.5, TR-16, TR-16.1 through TR-16.9, TR-17, TR-18, TR-19, TR-20**	**2025**	**2034**
VMT-4	**Low-carbon Transportation Education**	**TR-4, TR-12.4, TR-12.2, TR-12.4, TR-12.5, TR-12.7, TR-2**	**2018**	**2020**
VMT-5.1a	**Support Local Uptake of Electric Vehicles- Phase I**	**TR-21, TR-22, TR-12.6**	**2020**	**2034**
VMT-5.1b	**Support Local Uptake of Electric Vehicles- Phase II**	**TR-21, TR-22, TR-12.6**	**2025**	**2039**
VMT-5.2a	**Electricity Consumed by New Electric Vehicles- Phase I**	**TR-21, TR-22, TR-12.6**	**2020**	**2034**
VMT-5.2b	**Electricity Consumed by New Electric Vehicles- Phase II**	**TR-21, TR-22, TR-12.6**	**2025**	**2039**
VMT-6a	**Light Passenger Rail- VMT Reduction Phase I**	**TR-13.1, TR-8, TR-13**	**2020**	**2050**
VMT-6b	**Light Passenger Rail- VMT Reduction Phase II**	**TR-13.1, TR-8, TR-13**	**2025**	**2035**
VMT-7	**Regional Transportation Plan/Sustainable Communities Strategy- VMT Reductions**	**LU-1 through LU-10, ED-1 through ED-10, TR-1, TR-2, TR-3, TR-5, TR-6, TR-9, TR-10, TR-11, TR-12, TR-13, TR-13.2, TR-13.3, TR-15, TR-15.1, TR-15.2, TR-17, TR-18, TR-19, TR-20**	**2016**	**2035**
Water Conservation Measures				
WW-1	**Water Efficiency Programs**	**WW-1 Thru WW-10**	**2035**	**2050**

Reference #	Reduction Measure Name	Start year	End year	Electricity Reduction (MWBtu / Year)	Electricity Reduction (MWBtu / Year) Effective Useful Life	Change in Grid Energy Carbon Intensity (% / Year)	Change in Grid Energy Carbon Intensity (% / Year) Effective Useful Life	Natural Gas Reduction (MMBtu / Year)	Natural Gas Reduction (MMBtu / Year) Effective Useful Life	Change in Water Supply Energy Use	Change in Water Supply Energy Use Effective Useful Life	Total Change in VMT After Changes Complete	Annual Gasoline VMT Reduced	Annual Gasoline VMT Reduced Effective Useful Life	Annual Diesel VMT Reduced	Annual Diesel VMT Reduced Effective Useful Life	Annual Electricity Production (kWh / Year)	Grid Electricity Energy Reduced (MMBtu / Year)	Grid Electricity Energy Reduced (MMBtu / Year) Effective Useful Life	Electricity Savings (kWh / Year)	Electric Energy Savings (MMBtu / Year)	Electric Energy Savings (MMBtu / Year) Effective Useful Life	Gas Savings (Therms / Year)	Gas Savings (MMBtu / Year)	Gas Savings (MMBtu / Year) Effective Useful Life	Gasoline VMT Reduction (Miles / Year)	Gasoline VMT Reduction (Miles / Year) Effective Useful Life	Quantity of Diverted Compostable Paper (tons / Year)	Quantity of Diverted Food Waste (tons / Year)	Quantity of Diverted Grass (tons / Year)	Quantity of Diverted Leaves (tons / Year)	Quantity of Diverted Branches / Stumps / Trimmings (tons / Year)	Change in Landfill Bound Waste (wet tons)	Change in Landfill Bound Waste (wet tons) Effective Useful Life	Baseline Emissions Rate (MT CO2e / ton MSW)	Diverted Waste Emissions Rate (MT CO2e / ton MSW)	Emissions Reduced (MT CO2e)	Natural Gas Savings (Therms / Year)	Natural Gas Energy Savings (MMBtu / Year)	Natural Gas Energy Savings (MMBtu / Year) Effective Useful Life	One Year Emissions Savings (MTCO2e)
Energy Measures																																										
ENRG-1.1a	Increased Residential Solar Photovoltaic Phase I	2015	2019														16,430	-56	20																							
ENRG-1.1b	Increased Residential Solar Photovoltaic Phase II	2020	2024														98,580	-336	20																							
ENRG-1.2	Increased Residential Solar Thermal	2020	2024																	-578	-2	30	-110	-11	20																
ENRG-1.3a	Increased Non-Residential Solar Photovoltaic- Phase I	2018	2022														24,645	-84	20																							
ENRG-1.3b	Increased Non-Residential Solar Photovoltaic- Phase II	2020	2024														123,225	-420	20																							
ENRG-2.1a	EUC Whole Home Retrofit- Electricity Savings Phase I	2015	2019	-51	10																																				
ENRG-2.1b	EUC Whole Home Retrofit- Electricity Savings Phase II	2020	2029	-128	10																																				
ENRG-2.2a	EUC Whole Home Retrofit- Nat Gas Savings Phase I	2015	2019		10			-890	10																																
ENRG-2.2b	EUC Whole Home Retrofit- Nat Gas Savings Phase II	2020	2029		10			-2,225	10																																
ENRG-2.3a	Residential Energy Efficiency Education- Phase I	2020	2024																	-92,850	-317	15																	-8,400	-540	15	-65
ENRG-2.3b	Residential Energy Efficiency Education- Phase II	2030	2032																	-154,750	-528	15																	-14,000	-1,400	15	-109
ENRG-3	Residential Weatherization Programs	2021	2025																	-13,050	-45	15																	-6,250	-625	15	-36
ENRG-4.1a	Community Choice Aggregation- Residential Phase I	2020	2024			-5	35																																		
ENRG-4.1b	Community Choice Aggregation- Residential Phase II	2025	2029			-10	35																																		
ENRG-4.1c	Community Choice Aggregation- Residential Phase III	2030	2034			-20	35																																		
ENRG-4.2a	Community Choice Aggregation- Non-Residential Phase I	2020	2024			-5	35																																		
ENRG-4.2b	Community Choice Aggregation- Non-Residential Phase II	2025	2029			-10	35																																		
ENRG-4.2c	Community Choice Aggregation- Non-Residential Phase III	2030	2034			-20	35																																		
ENRG-5.1	AMBAG Energy Watch Energy Efficiency- Electricity Savings	2013	2023	-143	10																																				
ENRG-5.2	PG&E Energy Efficiency Programs - Electricity Savings	2013	2023	-1,186	10																																				
ENRG-5.3	PG&E Energy Efficiency Programs - Natural Gas Savings	2013	2023					-219	10																																
ENRG-5.4	Hospitality EE Campaign- Electricity Savings	2015	2019	-530	10																																				
ENRG-5.5	Hospitality EE Campaign- Natural Gas Savings	2015	2019					-140	10																																
ENRG-5.6	Retail EE Campaign- Electricity Savings	2020	2024	-1,170	10																																				
ENRG-5.7	Retail EE Campaign- Natural Gas Savings	2020	2024					-162	10																																
ENRG-6	Right Lights Energy Efficiency Program- Electricity Savings	2013	2023	-578	10																																				
ENRG-7.1a	Green Business Certification- Certified To-date: Electricity	2014	2023	-2,707	10																																				
ENRG-7.1b	Green Business Certification- Expansion: Electricity	2017	2021	-1,003	10																																				
ENRG-7.2	Green Business Certification- Certified To-date: Water Savings	2014	2023							-37	10																														
Solid Waste Reduction Measures																																										
SW-1a	Increased Community-wide Recycling- Phase I	2016	2017																									-420	-710	-24	-24	-24	-1,203	50	0	0	-372				
SW-1b	Increased Community-wide Recycling- Phase II	2019	2020																									-752	-1,273	-43	-43	-43	-2,155	50	0	0	-666				
SW-2a	Increased Community-wide Food Waste Diversion- Phase I	2016	2017																										-710				-710	50	0	0	-262				
SW-2b	Increased Community-wide Food Waste Diversion- Phase II	2019	2020																										-995				-995	50	0	0	-367				
VMT Reduction Measures																																										
VMT-1a	Careshare Program- VMT Reductions Phase I	2015	2019																							-60,600	15															
VMT-1b	Careshare Program- VMT Reductions Phase II	2020	2024																							-60,600	15															
VMT-2a	Increased Bus Ridership- Phase I	2015	2019																							-91,250	10															
VMT-2b	Increased Bus Ridership- Phase II	2020	2024																							-182,500	10															
VMT-3a	Improved Bike Infrastructure- Phase I	2015	2024									-552,109	-44,169	50	-11,042	50																										
VMT-3b	Improved Bike Infrastructure- Phase II	2025	2034									-107,461	-5,731	50	-1,433	50																										
VMT-4	Low-carbon Transportation Education	2018	2020																							-104,200	15															
VMT-5.1a	Support Local Uptake of Electric Vehicles- Phase I	2020	2034																							-499,997	15															
VMT-5.1b	Support Local Uptake of Electric Vehicles- Phase II	2025	2039																							-4,999,993	15															
VMT-5.2a	Electricity Consumed by New Electric Vehicles- Phase I	2020	2034	595	15																																				
VMT-5.2b	Electricity Consumed by New Electric Vehicles- Phase II	2025	2039	5,952	15																																				
VMT-6a	Light Passenger Rail - VMT Reduction Phase I	2020	2050																							-2,310,000	35															
VMT-6b	Light Passenger Rail - VMT Reduction Phase II	2025	2035																							-192,500	35															
VMT-7	Regional Transportation Plan/Sustainable Communities Strategy - VMT Reductions	2016	2035																							-473,243	35															
Water Conservation Measures																																										
WW-1	Water Efficiency Programs	2035	2050							-229	15																															

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		Incremental Annual CO2e Reduction															
Ref #	**Name**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
ENRG-1.1a	Increased Residential Solar Photovoltaic Phase I	0	0	0	0	-2	-2	-2	-2	-2	0	0	0	0	0	0	0
ENRG-1.1b	Increased Residential Solar Photovoltaic Phase II	0	0	0	0	0	0	0	0	0	-11	-11	-10	-9	-9	0	0
ENRG-1.2	Increased Residential Solar Thermal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-1.3a	Increased Non-Residential Solar Photovoltaic- Phase I	0	0	0	0	0	0	0	-3	-3	-3	-2	-2	0	0	0	0
ENRG-1.3b	Increased Non-Residential Solar Photovoltaic- Phase II	0	0	0	0	0	0	0	0	0	-15	-14	-13	-12	-12	0	0
ENRG-2.1a	Energy Upgrade California Whole Home Retrofit Program- Electricity Savings Phase I	0	0	0	0	-2	-2	-2	-1	-1	0	0	0	0	0	1	1
ENRG-2.1b	Energy Upgrade California Whole Home Retrofit Program- Electricity Savings Phase II	0	0	0	0	0	0	0	0	0	-4	-4	-3	-3	-3	-3	-2
ENRG-2.2a	Energy Upgrade California Whole Home Retrofit Program- Natural Gas Savings Phase I	0	0	0	0	-47	-47	-47	-47	-47	0	0	0	0	0	47	47
ENRG-2.2b	Energy Upgrade California Whole Home Retrofit Program- Natural Gas Savings Phase II	0	0	0	0	0	0	0	0	0	-117	-117	-117	-117	-117	-117	-117
ENRG-2.3a	Residential Energy Efficiency Education- Phase I	0	0	0	0	0	0	0	0	0	-54	-54	-53	-53	-52	0	0
ENRG-2.3b	Residential Energy Efficiency Education- Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-3	Residential Weatherization Programs	0	0	0	0	0	0	0	0	0	0	-34	-34	-34	-34	-34	0
ENRG-4.1a	Community Choice Aggregation- Residential Phase I	0	0	0	0	0	0	0	0	0	-142	-133	-125	-117	-110	0	0
ENRG-4.1b	Community Choice Aggregation- Residential Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-208	-187
ENRG-4.1c	Community Choice Aggregation- Residential Phase III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.2a	Community Choice Aggregation- Non-Residential Phase I	0	0	0	0	0	0	0	0	0	-225	-208	-191	-177	-167	0	0
ENRG-4.2b	Community Choice Aggregation- Non-Residential Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-321	-313
ENRG-4.2c	Community Choice Aggregation- Non-Residential Phase III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.1	AMBAG Energy Watch Energy Efficiency Programs- Electricity Savings	0	0	-7	-7	-6	-6	-6	-5	-5	-5	-4	-4	0	4	3	3
ENRG-5.2	PG&E Energy Efficiency Programs- Electricity Savings	0	0	-63	-60	-57	-53	-50	-47	-44	-42	-40	-38	0	34	31	28
ENRG-5.3	PG&E Energy Efficiency Programs- Natural Gas Savings	0	0	-11	-11	-11	-11	-11	-11	-11	-11	-11	-11	0	11	11	11
ENRG-5.4	Hospitality EE Campaign- Electricity Savings	0	0	0	0	-25	-24	-22	-21	-20	0	0	0	0	0	13	12
ENRG-5.5	Hospitality EE Campaign- Natural Gas Savings	0	0	0	0	-7	-7	-7	-7	-7	0	0	0	0	0	7	7
ENRG-5.6	Retail EE Campaign- Electricity Savings	0	0	0	0	0	0	0	0	0	-42	-39	-37	-36	-34	0	0
ENRG-5.7	Retail EE Campaign- Natural Gas Savings	0	0	0	0	0	0	0	0	0	-8	-8	-8	-8	-8	0	0
ENRG-6	Right Lights Energy Efficiency Program- Electricity Savings	0	0	-31	-29	-27	-26	-24	-23	-21	-20	-19	-18	0	16	15	13
ENRG-7.1a	Green Business Certification Program- Certified To-date: Electricity	0	0	0	-138	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-7.1b	Green Business Certification Program- Expansion: Electricity	0	0	0	0	0	0	-42	-40	-37	-36	-34	0	0	0	0	0
ENRG-7.2	Green Business Program- Certified To-date: Water Savings	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
SW-1a	Increased Community-wide Recycling- Phase I	0	0	0	0	0	-219	0	0	0	0	0	0	0	0	0	0
SW-1b	Increased Community-wide Recycling- Phase II	0	0	0	0	0	0	0	0	0	-393	0	0	0	0	0	0
SW-2a	Increased Community-wide Food Waste Diversion- Phase I	0	0	0	0	0	-129	0	0	0	0	0	0	0	0	0	0
SW-2b	Increased Community-wide Food Waste Diversion- Phase II	0	0	0	0	0	0	0	0	0	-181	0	0	0	0	0	0
VMT-1a	Careshare Program- VMT Reductions Phase I	0	0	0	0	-28	-28	-27	-27	-26	0	0	0	0	0	0	0
VMT-1b	Careshare Program- VMT Reductions Phase II	0	0	0	0	0	0	0	0	0	-26	-25	-25	-24	-24	0	0
VMT-2a	Increased Bus Ridership- Phase I	0	0	0	0	-43	-42	-41	-41	-40	0	0	0	0	0	35	35
VMT-2b	Increased Bus Ridership- Phase II	0	0	0	0	0	0	0	0	0	-79	-77	-76	-74	-73	0	0
VMT-3a	Improved Bike Infrastructure- Phase I	0	0	0	0	-21	-20	-20	-19	-19	-19	-18	-18	-18	-17	0	0
VMT-3b	Improved Bike Infrastructure- Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2
VMT-4	Low-carbon Transportation- Community Engagement & Education	0	0	0	0	0	0	0	-47	-46	-45	0	0	0	0	0	0
VMT-5.1a	Support Local Uptake of Electric Vehicles- Phase I	0	0	0	0	0	0	0	0	0	-217	0	0	0	0	0	0
VMT-5.1b	Support Local Uptake of Electric Vehicles- Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1971	0
VMT-5.2a	Electricity Consumed by New Electric Vehicles- Phase I	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0
VMT-5.2b	Electricity Consumed by New Electric Vehicles- Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	156	0
VMT-6a	Light Passenger Rail- VMT Reduction Phase I	0	0	0	0	0	0	0	0	0	-1005	0	0	0	0	0	0
VMT-6b	Light Passenger Rail- VMT Reduction Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-75	-74
VMT-7	Regional Transportation Plan/Sustainable Communities Strategy- VMT Reductions	0	0	0	0	0	-221	-217	-213	-210	-206	-201	-197	-193	-190	-186	-183
WW-1	Water Efficiency Programs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Incremental Annual MTCO2e Reduction by Year																								
Ref #	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
ENRG-1.1a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-1.1b	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
ENRG-1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-1.3a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-1.3b	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	0	0	0	0
ENRG-2.1a	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-2.1b	-2	-2	-2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-2.2a	47	47	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-2.2b	-117	-117	-117	117	117	117	117	117	117	117	117	117	117	0	0	0	0	0	0	0	0	0	0	0
ENRG-2.3a	0	0	0	0	0	0	0	0	45	45	45	45	45	0	0	0	0	0	0	0	0	0	0	0
ENRG-2.3b	0	0	0	-80	-78	-77	0	0	0	0	0	0	0	0	0	0	0	0	75	75	75	0	0	0
ENRG-3	0	0	0	0	0	0	0	0	0	33	33	33	33	33	0	0	0	0	0	0	0	0	0	0
ENRG-4.1a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.1b	-168	-151	-136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.1c	0	0	0	-244	-195	-155	-123	-98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.2a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.2b	-289	-270	-251	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.2c	0	0	0	-467	-388	-321	-264	-221	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.1	3	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.2	25	22	20	16	13	10	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.3	11	11	11	11	11	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.4	11	10	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.5	7	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.6	0	0	0	16	12	10	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.7	0	0	0	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-6	12	11	10	8	6	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-7.1a	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-7.1b	21	19	17	13	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-7.2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW-1a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW-1b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW-2a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SW-2b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-1a	0	0	0	21	21	21	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-1b	0	0	0	0	0	0	0	0	20	20	20	20	20	0	0	0	0	0	0	0	0	0	0	0
VMT-2a	34	34	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-2b	0	0	0	66	65	64	63	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-3a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-3b	-2	-2	-2	-2	-2	-2	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-4	0	0	0	0	0	0	36	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-5.1a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	164	0
VMT-5.1b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-5.2a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3	0
VMT-5.2b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-6a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-6b	-73	-71	-70	-69	-68	-68	-67	-66	-66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VMT-7	-179	-176	-173	-171	-169	-167	-165	-163	-162	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WW-1	0	0	0	0	0	0	0	0	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

			Cumulative Net Annual MTCO2e Reduction by Year																
Ref #	**Name**	**Peak Annual MTCO2e Reduction**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
ENRG-1.1a	Increased Residential Solar Photovoltaic Phase I	-10	0	0	0	0	-2	-4	-6	-8	-10	-10	-10	-10	-10	-10	-10	-10	-10
ENRG-1.1b	Increased Residential Solar Photovoltaic Phase II	-50	0	0	0	0	0	0	0	0	0	-11	-22	-32	-41	-50	-50	-50	-50
ENRG-1.2	Increased Residential Solar Thermal	-25	0	0	0	0	0	0	0	0	0	-5	-10	-15	-20	-25	-25	-25	-25
ENRG-1.3a	Increased Non-Residential Solar Photovoltaic- Phase I	-13	0	0	0	0	0	0	0	-3	-6	-9	-11	-13	-13	-13	-13	-13	-13
ENRG-1.3b	Increased Non-Residential Solar Photovoltaic- Phase II	-66	0	0	0	0	0	0	0	0	0	-15	-29	-42	-54	-66	-66	-66	-66
ENRG-2.1a	Energy Upgrade California Whole Home Retrofit Program- Electricity Savings Phase I	-8	0	0	0	0	-2	-4	-6	-7	-8	-8	-8	-8	-8	-8	-7	-6	-5
ENRG-2.1b	Energy Upgrade California Whole Home Retrofit Program- Electricity Savings Phase II	-28	0	0	0	0	0	0	0	0	0	-4	-8	-11	-14	-17	-20	-22	-24
ENRG-2.2a	Energy Upgrade California Whole Home Retrofit Program- Natural Gas Savings Phase I	-235	0	0	0	0	-47	-94	-141	-188	-235	-235	-235	-235	-235	-235	-188	-141	-94
ENRG-2.2b	Energy Upgrade California Whole Home Retrofit Program- Natural Gas Savings Phase II	-1170	0	0	0	0	0	0	0	0	0	-117	-234	-351	-468	-585	-702	-819	-936
ENRG-2.3a	Residential Energy Efficiency Education- Phase I	-266	0	0	0	0	0	0	0	0	0	-54	-108	-161	-214	-266	-266	-266	-266
ENRG-2.3b	Residential Energy Efficiency Education- Phase II	-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-3	Residential Weatherization Programs	-170	0	0	0	0	0	0	0	0	0	0	-34	-68	-102	-136	-170	-170	-170
ENRG-4.1a	Community Choice Aggregation- Residential Phase I	-627	0	0	0	0	0	0	0	0	0	-142	-275	-400	-517	-627	-627	-627	-627
ENRG-4.1b	Community Choice Aggregation- Residential Phase II	-850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-208	-395	-563
ENRG-4.1c	Community Choice Aggregation- Residential Phase III	-815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-4.2a	Community Choice Aggregation- Non-Residential Phase I	-968	0	0	0	0	0	0	0	0	0	-225	-433	-624	-801	-968	-968	-968	-968
ENRG-4.2b	Community Choice Aggregation- Non-Residential Phase II	-1444	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-321	-634	-923
ENRG-4.2c	Community Choice Aggregation- Non-Residential Phase III	-1661	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENRG-5.1	AMBAG Energy Watch Energy Efficiency Programs- Electricity Savings	-55	0	0	-7	-14	-20	-26	-32	-37	-42	-47	-51	-55	-55	-51	-48	-45	-42
ENRG-5.2	PG&E Energy Efficiency Programs- Electricity Savings	-494	0	0	-63	-123	-180	-233	-283	-330	-374	-416	-456	-494	-494	-460	-429	-401	-376
ENRG-5.3	PG&E Energy Efficiency Programs- Natural Gas Savings	-110	0	0	-11	-22	-33	-44	-55	-66	-77	-88	-99	-110	-110	-99	-88	-77	-66
ENRG-5.4	Hospitality EE Campaign- Electricity Savings	-112	0	0	0	0	-25	-49	-71	-92	-112	-112	-112	-112	-112	-112	-99	-87	-76
ENRG-5.5	Hospitality EE Campaign- Natural Gas Savings	-35	0	0	0	0	-7	-14	-21	-28	-35	-35	-35	-35	-35	-35	-28	-21	-14
ENRG-5.6	Retail EE Campaign- Electricity Savings	-188	0	0	0	0	0	0	0	0	0	-42	-81	-118	-154	-188	-188	-188	-188
ENRG-5.7	Retail EE Campaign- Natural Gas Savings	-40	0	0	0	0	0	0	0	0	0	-8	-16	-24	-32	-40	-40	-40	-40
ENRG-6	Right Lights Energy Efficiency Program- Electricity Savings	-238	0	0	-31	-60	-87	-113	-137	-160	-181	-201	-220	-238	-238	-222	-207	-194	-182
ENRG-7.1a	Green Business Certification Program- Certified To-date: Electricity	-138	0	0	0	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138
ENRG-7.1b	Green Business Certification Program- Expansion: Electricity	-189	0	0	0	0	0	0	-42	-82	-119	-155	-189	-189	-189	-189	-189	-189	-168
ENRG-7.2	Green Business Program- Certified To-date: Water Savings	-1	0	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
SW-1a	Increased Community-wide Recycling- Phase I	-219	0	0	0	0	0	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219
SW-1b	Increased Community-wide Recycling- Phase II	-393	0	0	0	0	0	0	0	0	0	-393	-393	-393	-393	-393	-393	-393	-393
SW-2a	Increased Community-wide Food Waste Diversion- Phase I	-129	0	0	0	0	0	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129
SW-2b	Increased Community-wide Food Waste Diversion- Phase II	-181	0	0	0	0	0	0	0	0	0	-181	-181	-181	-181	-181	-181	-181	-181
VMT-1a	Careshare Program- VMT Reductions Phase I	-136	0	0	0	0	-28	-56	-83	-110	-136	-136	-136	-136	-136	-136	-136	-136	-136
VMT-1b	Careshare Program- VMT Reductions Phase II	-124	0	0	0	0	0	0	0	0	0	-26	-51	-76	-100	-124	-124	-124	-124
VMT-2a	Increased Bus Ridership- Phase I	-207	0	0	0	0	-43	-85	-126	-167	-207	-207	-207	-207	-207	-207	-172	-137	-103
VMT-2b	Increased Bus Ridership- Phase II	-379	0	0	0	0	0	0	0	0	0	-79	-156	-232	-306	-379	-379	-379	-379
VMT-3a	Improved Bike Infrastructure- Phase I	-189	0	0	0	0	-21	-41	-61	-80	-99	-118	-136	-154	-172	-189	-189	-189	-189
VMT-3b	Improved Bike Infrastructure- Phase II	-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-4	-6
VMT-4	Low-carbon Transportation- Community Engagement & Education	-138	0	0	0	0	0	0	0	-47	-93	-138	-138	-138	-138	-138	-138	-138	-138
VMT-5.1a	Support Local Uptake of Electric Vehicles- Phase I	-217	0	0	0	0	0	0	0	0	0	-217	-217	-217	-217	-217	-217	-217	-217
VMT-5.1b	Support Local Uptake of Electric Vehicles- Phase II	-1971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1971	-1971	-1971
VMT-5.2a	Electricity Consumed by New Electric Vehicles- Phase I	0	0	0	0	0	0	0	0	0	0	21	21	21	21	21	21	21	21
VMT-5.2b	Electricity Consumed by New Electric Vehicles- Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	156	156	156
VMT-6a	Light Passenger Rail- VMT Reduction Phase I	-1005	0	0	0	0	0	0	0	0	0	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005
VMT-6b	Light Passenger Rail- VMT Reduction Phase II	-767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-75	-149	-222
VMT-7	Regional Transportation Plan/Sustainable Communities Strategy- VMT Reductions	-3742	0	0	0	0	0	-221	-438	-651	-861	-1067	-1268	-1465	-1658	-1848	-2034	-2217	-2396
WW-1	Water Efficiency Programs	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Cumulative Net Annual MTCO2e Reduction by Year																							
Ref #	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**Total MTCO2e Reduced Over Life of Measure**
ENRG-1.1a	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	**-340**
ENRG-1.1b	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-49	-48	-47	-46	-45	-45	-45	-45	-45	-45	-45	**-1,411**
ENRG-1.2	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-20	-15	-10	-5	0	0	0	0	0	0	0	**-500**
ENRG-1.3a	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	-13	**-406**
ENRG-1.3b	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66	-64	-62	-60	-58	-56	-56	-56	-56	-56	-56	-56	**-1,832**
ENRG-2.1a	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	**-200**
ENRG-2.1b	-26	-28	-27	-26	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	**-702**
ENRG-2.2a	-47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-2,350**
ENRG-2.2b	-1053	-1170	-1053	-936	-819	-702	-585	-468	-351	-234	-117	0	0	0	0	0	0	0	0	0	0	0	0	**-11,700**
ENRG-2.3a	-266	-266	-266	-266	-266	-266	-266	-221	-176	-131	-86	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	-41	**-4,569**
ENRG-2.3b	0	0	-80	-158	-235	-235	-235	-235	-235	-235	-235	-235	-235	-235	-235	-235	-235	-160	-85	-10	-10	-10	-10	**-3,578**
ENRG-3	-170	-170	-170	-170	-170	-170	-170	-170	-137	-104	-71	-38	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	**-2,615**
ENRG-4.1a	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	-627	**-18,263**
ENRG-4.1b	-714	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	-850	**-20,580**
ENRG-4.1c	0	0	-244	-439	-594	-717	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	-815	**-15,849**
ENRG-4.2a	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	-968	**-28,219**
ENRG-4.2b	-1193	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	-1444	**-34,839**
ENRG-4.2c	0	0	-467	-855	-1176	-1440	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	-1661	**-32,175**
ENRG-5.1	-40	-38	-37	-36	-35	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	**-1,370**
ENRG-5.2	-354	-334	-318	-305	-295	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	-287	**-11,884**
ENRG-5.3	-55	-44	-33	-22	-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-1,210**
ENRG-5.4	-66	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	-57	**-2,491**
ENRG-5.5	-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-350**
ENRG-5.6	-188	-188	-172	-160	-150	-142	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	-136	**-4,459**
ENRG-5.7	-40	-40	-32	-24	-16	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-400**
ENRG-6	-171	-161	-153	-147	-142	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	-138	**-5,729**
ENRG-7.1a	-138	-138	-138	-138	-138	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	**-4,764**
ENRG-7.1b	-149	-132	-119	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	-108	**-4,260**
ENRG-7.2	-1	-1	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-19**
SW-1a	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	-219	**-7,665**
SW-1b	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	-393	**-12,183**
SW-2a	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	-129	**-4,515**
SW-2b	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	-181	**-5,611**
VMT-1a	-136	-136	-115	-94	-73	-52	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	**-2,651**
VMT-1b	-124	-124	-124	-124	-124	-124	-124	-104	-84	-64	-44	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	**-2,201**
VMT-2a	-69	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	**-2,936**
VMT-2b	-379	-379	-313	-248	-184	-121	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	-59	**-4,916**
VMT-3a	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	-189	**-5,985**
VMT-3b	-8	-10	-12	-14	-16	-18	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	**-413**
VMT-4	-138	-138	-138	-138	-138	-102	-67	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	**-2,615**
VMT-5.1a	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-217	-53	-53	**-6,399**
VMT-5.1b	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	-1971	**-51,246**
VMT-5.2a	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	18	18	**645**
VMT-5.2b	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	**4,056**
VMT-6a	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	-1005	**-31,155**
VMT-6b	-293	-363	-432	-500	-568	-635	-701	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	-767	**-16,210**
VMT-7	-2572	-2745	-2916	-3085	-3252	-3417	-3580	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	-3742	**-97,563**
WW-1	0	0	0	0	0	0	0	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	**-128**

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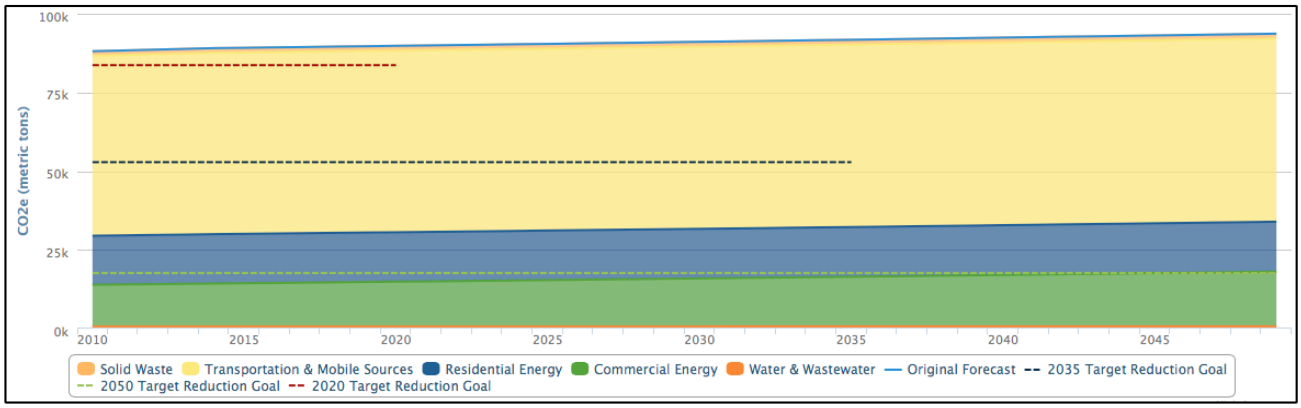
Complete Unadjusted 2050 Business As Usual GHG Forecast

Note- this Forecast has not been adjusted for the Renewable Portfolio Standard (RPS) or Pavley I & II



Category	2010	2011	2012	2013	2014
Residential Energy	15,570	15,601	15,632	15,664	15,695
Non-Residential Energy	13,255	13,348	13,441	13,535	13,630
Transportation & Mobile Sources	57,123	57,237	57,352	57,466	57,581
Solid Waste	1,476	1,482	1,488	1,494	1,500
Water & Wastewater	667	670	672	675	678
Annual Total MTCO2e	88,091	88,338	88,585	88,834	89,084
Reduction Targets					

Category	2015	2016	2017	2018	2019
Residential Energy	15,700	15,704	15,709	15,714	15,718
Non-Residential Energy	13,725	13,822	13,918	14,016	14,114
Transportation & Mobile Sources	57,599	57,616	57,633	57,650	57,668
Solid Waste	1,501	1,503	1,504	1,506	1,507
Water & Wastewater	678	679	680	680	681
Annual Total MTCO2e	89,203	89,324	89,444	89,566	89,688
Reduction Targets					

Category	2020	2021	2022	2023	2024
Residential Energy	15,723	15,728	15,733	15,737	15,742
Non-Residential Energy	14,213	14,312	14,412	14,513	14,615
Transportation & Mobile Sources	57,685	57,702	57,720	57,737	57,754
Solid Waste	1,509	1,510	1,512	1,513	1,515
Water & Wastewater	682	682	683	684	685
Annual Total MTCO2e	89,812	89,934	90,060	90,184	90,311
Reduction Targets	83,775				

Category	2025	2026	2027	2028	2029
Residential Energy	15,747	15,752	15,756	15,761	15,766
Non-Residential Energy	14,717	14,820	14,924	15,028	15,134
Transportation & Mobile Sources	57,772	57,789	57,806	57,824	57,841
Solid Waste	1,516	1,518	1,519	1,521	1,522
Water & Wastewater	685	686	687	687	688
Annual Total MTCO2e	90,437	90,565	90,692	90,821	90,951
Reduction Targets					

Category	2030	2031	2032	2033	2034
Residential Energy	15,770	15,775	15,780	15,785	15,789
Non-Residential Energy	15,239	15,346	15,454	15,562	15,671
Transportation & Mobile Sources	57,858	57,876	57,893	57,910	57,928
Solid Waste	1,524	1,525	1,527	1,529	1,530
Water & Wastewater	689	689	690	691	691
Annual Total MTCO2e	91,080	91,211	91,344	91,477	91,609
Reduction Targets					

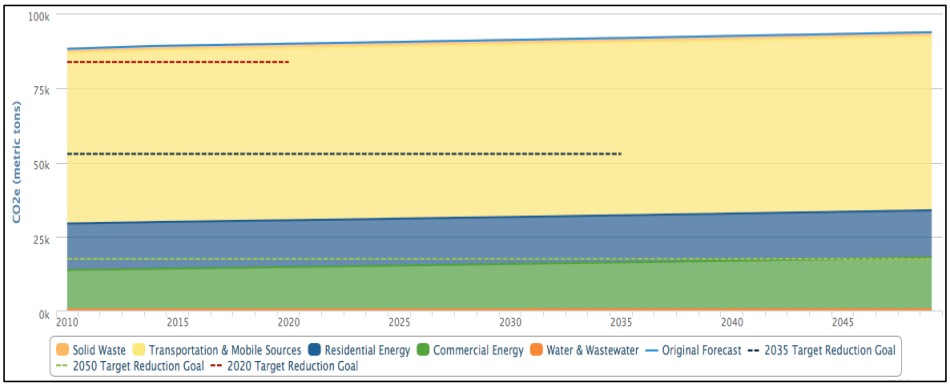
Category	2035	2036	2037	2038	2039
Residential Energy	15,794	15,799	15,804	15,808	15,813
Non-Residential Energy	15,780	15,891	16,002	16,114	16,227
Transportation & Mobile Sources	57,945	57,963	57,980	57,997	58,015
Solid Waste	1,532	1,533	1,535	1,536	1,538
Water & Wastewater	692	693	693	694	695
Annual Total MTCO2e	91,743	91,879	92,014	92,149	92,288
Reduction Targets	54,528				

Category	2040	2041	2042	2043	2044
Residential Energy	15,818	15,823	15,827	15,832	15,837
Non-Residential Energy	16,340	16,455	16,570	16,686	16,803
Transportation & Mobile Sources	58,032	58,050	58,067	58,084	58,102
Solid Waste	1,539	1,541	1,542	1,544	1,545
Water & Wastewater	696	696	697	698	698
Annual Total MTCO2e	92,425	92,565	92,703	92,844	92,985
Reduction Targets					

Category	2045	2046	2047	2048	2049
Residential Energy	15,840	15,843	15,846	15,849	15,853
Non-Residential Energy	16,920	17,039	17,158	17,278	17,399
Transportation & Mobile Sources	58,113	58,125	58,137	58,148	58,160
Solid Waste	1,547	1,549	1,550	1,552	1,553
Water & Wastewater	699	700	700	701	702
Annual Total MTCO2e	93,119	93,256	93,391	93,528	93,667
Reduction Targets					16,737

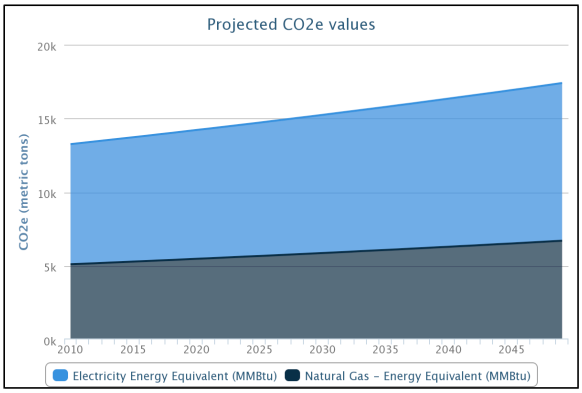
Complete Unadjusted 2050 Business As Usual GHG Forecast- Sector Detail

Note- this Forecast has not been adjusted for the Renewable Portfolio Standard (RPS) or Pavley I & II



Non-Residential Energy- Growth Indicator: Employment			
Year	**Usage**	**MTCO2e**	**Output Name**
2010	132,104	8,152	Electricity Energy Equivalent (MMBtu)
2011	133,029	8,209	Electricity Energy Equivalent (MMBtu)
2012	133,960	8,267	Electricity Energy Equivalent (MMBtu)
2013	134,898	8,324	Electricity Energy Equivalent (MMBtu)
2014	135,842	8,383	Electricity Energy Equivalent (MMBtu)
2015	136,793	8,441	Electricity Energy Equivalent (MMBtu)
2016	137,750	8,500	Electricity Energy Equivalent (MMBtu)
2017	138,715	8,560	Electricity Energy Equivalent (MMBtu)
2018	139,686	8,620	Electricity Energy Equivalent (MMBtu)
2019	140,663	8,680	Electricity Energy Equivalent (MMBtu)
2020	141,648	8,741	Electricity Energy Equivalent (MMBtu)
2021	142,640	8,802	Electricity Energy Equivalent (MMBtu)
2022	143,638	8,864	Electricity Energy Equivalent (MMBtu)
2023	144,644	8,926	Electricity Energy Equivalent (MMBtu)
2024	145,656	8,988	Electricity Energy Equivalent (MMBtu)
2025	146,676	9,051	Electricity Energy Equivalent (MMBtu)
2026	147,702	9,115	Electricity Energy Equivalent (MMBtu)
2027	148,736	9,178	Electricity Energy Equivalent (MMBtu)
2028	149,777	9,243	Electricity Energy Equivalent (MMBtu)
2029	150,826	9,307	Electricity Energy Equivalent (MMBtu)
2030	151,882	9,372	Electricity Energy Equivalent (MMBtu)
2031	152,945	9,438	Electricity Energy Equivalent (MMBtu)
2032	154,015	9,504	Electricity Energy Equivalent (MMBtu)
2033	155,094	9,571	Electricity Energy Equivalent (MMBtu)
2034	156,179	9,638	Electricity Energy Equivalent (MMBtu)
2035	157,272	9,705	Electricity Energy Equivalent (MMBtu)
2036	158,373	9,773	Electricity Energy Equivalent (MMBtu)
2037	159,482	9,841	Electricity Energy Equivalent (MMBtu)
2038	160,598	9,910	Electricity Energy Equivalent (MMBtu)
2039	161,723	9,980	Electricity Energy Equivalent (MMBtu)
2040	162,855	10,050	Electricity Energy Equivalent (MMBtu)
2041	163,995	10,120	Electricity Energy Equivalent (MMBtu)
2042	165,143	10,191	Electricity Energy Equivalent (MMBtu)
2043	166,299	10,262	Electricity Energy Equivalent (MMBtu)
2044	167,463	10,334	Electricity Energy Equivalent (MMBtu)
2045	168,635	10,406	Electricity Energy Equivalent (MMBtu)
2046	169,815	10,479	Electricity Energy Equivalent (MMBtu)
2047	171,004	10,552	Electricity Energy Equivalent (MMBtu)
2048	172,201	10,626	Electricity Energy Equivalent (MMBtu)
2049	173,406	10,701	Electricity Energy Equivalent (MMBtu)

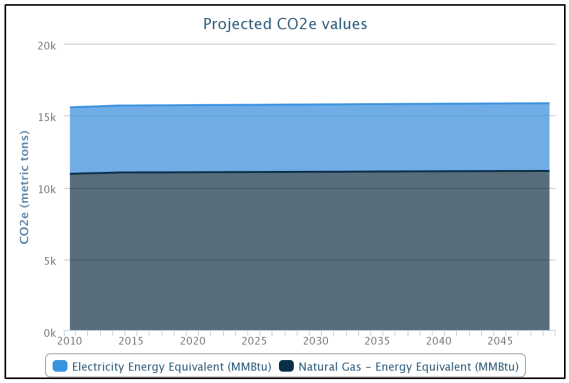
Non-Residential Energy:



2010	96,619	5,103	Natural Gas - Energy Equivalent (MMBtu)
2011	97,295	5,139	Natural Gas - Energy Equivalent (MMBtu)
2012	97,976	5,175	Natural Gas - Energy Equivalent (MMBtu)
2013	98,662	5,211	Natural Gas - Energy Equivalent (MMBtu)
2014	99,353	5,247	Natural Gas - Energy Equivalent (MMBtu)
2015	100,048	5,284	Natural Gas - Energy Equivalent (MMBtu)
2016	100,749	5,321	Natural Gas - Energy Equivalent (MMBtu)
2017	101,454	5,358	Natural Gas - Energy Equivalent (MMBtu)
2018	102,164	5,396	Natural Gas - Energy Equivalent (MMBtu)
2019	102,879	5,434	Natural Gas - Energy Equivalent (MMBtu)
2020	103,599	5,472	Natural Gas - Energy Equivalent (MMBtu)
2021	104,325	5,510	Natural Gas - Energy Equivalent (MMBtu)
2022	105,055	5,549	Natural Gas - Energy Equivalent (MMBtu)
2023	105,790	5,587	Natural Gas - Energy Equivalent (MMBtu)
2024	106,531	5,626	Natural Gas - Energy Equivalent (MMBtu)
2025	107,277	5,666	Natural Gas - Energy Equivalent (MMBtu)
2026	108,027	5,706	Natural Gas - Energy Equivalent (MMBtu)
2027	108,784	5,745	Natural Gas - Energy Equivalent (MMBtu)
2028	109,545	5,786	Natural Gas - Energy Equivalent (MMBtu)
2029	110,312	5,826	Natural Gas - Energy Equivalent (MMBtu)
2030	111,084	5,867	Natural Gas - Energy Equivalent (MMBtu)
2031	111,862	5,908	Natural Gas - Energy Equivalent (MMBtu)
2032	112,645	5,949	Natural Gas - Energy Equivalent (MMBtu)
2033	113,433	5,991	Natural Gas - Energy Equivalent (MMBtu)
2034	114,227	6,033	Natural Gas - Energy Equivalent (MMBtu)
2035	115,027	6,075	Natural Gas - Energy Equivalent (MMBtu)
2036	115,832	6,118	Natural Gas - Energy Equivalent (MMBtu)
2037	116,643	6,161	Natural Gas - Energy Equivalent (MMBtu)
2038	117,459	6,204	Natural Gas - Energy Equivalent (MMBtu)
2039	118,282	6,247	Natural Gas - Energy Equivalent (MMBtu)
2040	119,110	6,291	Natural Gas - Energy Equivalent (MMBtu)
2041	119,943	6,335	Natural Gas - Energy Equivalent (MMBtu)
2042	120,783	6,379	Natural Gas - Energy Equivalent (MMBtu)
2043	121,628	6,424	Natural Gas - Energy Equivalent (MMBtu)
2044	122,480	6,469	Natural Gas - Energy Equivalent (MMBtu)
2045	123,337	6,514	Natural Gas - Energy Equivalent (MMBtu)
2046	124,201	6,560	Natural Gas - Energy Equivalent (MMBtu)
2047	125,070	6,606	Natural Gas - Energy Equivalent (MMBtu)
2048	125,945	6,652	Natural Gas - Energy Equivalent (MMBtu)
2049	126,827	6,698	Natural Gas - Energy Equivalent (MMBtu)

Residential Energy- Growth Indicator Reference: Households			
Year	Usage	CO2e	Output Name
2010	77,937	4,624	Electricity Energy Equivalent (MMBtu)
2011	78,093	4,633	Electricity Energy Equivalent (MMBtu)
2012	78,249	4,643	Electricity Energy Equivalent (MMBtu)
2013	78,406	4,652	Electricity Energy Equivalent (MMBtu)
2014	78,562	4,661	Electricity Energy Equivalent (MMBtu)
2015	78,586	4,663	Electricity Energy Equivalent (MMBtu)
2016	78,610	4,664	Electricity Energy Equivalent (MMBtu)
2017	78,633	4,665	Electricity Energy Equivalent (MMBtu)
2018	78,657	4,667	Electricity Energy Equivalent (MMBtu)
2019	78,680	4,668	Electricity Energy Equivalent (MMBtu)
2020	78,704	4,669	Electricity Energy Equivalent (MMBtu)
2021	78,727	4,671	Electricity Energy Equivalent (MMBtu)
2022	78,751	4,672	Electricity Energy Equivalent (MMBtu)
2023	78,775	4,674	Electricity Energy Equivalent (MMBtu)
2024	78,798	4,675	Electricity Energy Equivalent (MMBtu)
2025	78,822	4,677	Electricity Energy Equivalent (MMBtu)
2026	78,846	4,678	Electricity Energy Equivalent (MMBtu)
2027	78,869	4,679	Electricity Energy Equivalent (MMBtu)
2028	78,893	4,681	Electricity Energy Equivalent (MMBtu)
2029	78,917	4,682	Electricity Energy Equivalent (MMBtu)
2030	78,940	4,684	Electricity Energy Equivalent (MMBtu)
2031	78,964	4,685	Electricity Energy Equivalent (MMBtu)
2032	78,988	4,686	Electricity Energy Equivalent (MMBtu)
2033	79,011	4,688	Electricity Energy Equivalent (MMBtu)
2034	79,035	4,689	Electricity Energy Equivalent (MMBtu)
2035	79,059	4,691	Electricity Energy Equivalent (MMBtu)
2036	79,083	4,692	Electricity Energy Equivalent (MMBtu)
2037	79,106	4,693	Electricity Energy Equivalent (MMBtu)
2038	79,130	4,695	Electricity Energy Equivalent (MMBtu)
2039	79,154	4,696	Electricity Energy Equivalent (MMBtu)
2040	79,177	4,698	Electricity Energy Equivalent (MMBtu)
2041	79,201	4,699	Electricity Energy Equivalent (MMBtu)
2042	79,225	4,700	Electricity Energy Equivalent (MMBtu)
2043	79,249	4,702	Electricity Energy Equivalent (MMBtu)
2044	79,273	4,703	Electricity Energy Equivalent (MMBtu)
2045	79,288	4,704	Electricity Energy Equivalent (MMBtu)
2046	79,304	4,705	Electricity Energy Equivalent (MMBtu)
2047	79,320	4,706	Electricity Energy Equivalent (MMBtu)
2048	79,336	4,707	Electricity Energy Equivalent (MMBtu)
2049	79,352	4,708	Electricity Energy Equivalent (MMBtu)

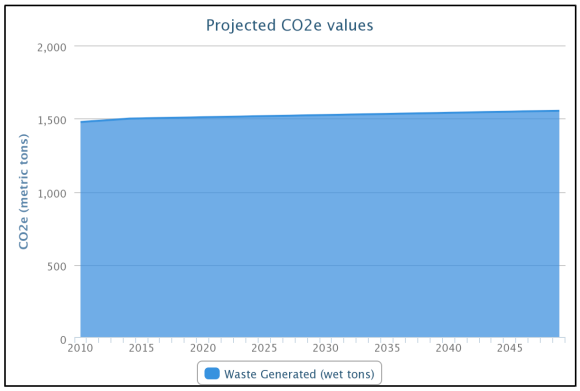
Residential Energy:



2010	207,167	10,946	Natural Gas - Energy Equivalent (MMBtu)
2011	207,581	10,968	Natural Gas - Energy Equivalent (MMBtu)
2012	207,996	10,990	Natural Gas - Energy Equivalent (MMBtu)
2013	208,412	11,012	Natural Gas - Energy Equivalent (MMBtu)
2014	208,829	11,034	Natural Gas - Energy Equivalent (MMBtu)
2015	208,892	11,037	Natural Gas - Energy Equivalent (MMBtu)
2016	208,955	11,040	Natural Gas - Energy Equivalent (MMBtu)
2017	209,017	11,044	Natural Gas - Energy Equivalent (MMBtu)
2018	209,080	11,047	Natural Gas - Energy Equivalent (MMBtu)
2019	209,143	11,050	Natural Gas - Energy Equivalent (MMBtu)
2020	209,205	11,054	Natural Gas - Energy Equivalent (MMBtu)
2021	209,268	11,057	Natural Gas - Energy Equivalent (MMBtu)
2022	209,331	11,060	Natural Gas - Energy Equivalent (MMBtu)
2023	209,394	11,064	Natural Gas - Energy Equivalent (MMBtu)
2024	209,457	11,067	Natural Gas - Energy Equivalent (MMBtu)
2025	209,519	11,070	Natural Gas - Energy Equivalent (MMBtu)
2026	209,582	11,074	Natural Gas - Energy Equivalent (MMBtu)
2027	209,645	11,077	Natural Gas - Energy Equivalent (MMBtu)
2028	209,708	11,080	Natural Gas - Energy Equivalent (MMBtu)
2029	209,771	11,084	Natural Gas - Energy Equivalent (MMBtu)
2030	209,834	11,087	Natural Gas - Energy Equivalent (MMBtu)
2031	209,897	11,090	Natural Gas - Energy Equivalent (MMBtu)
2032	209,960	11,094	Natural Gas - Energy Equivalent (MMBtu)
2033	210,023	11,097	Natural Gas - Energy Equivalent (MMBtu)
2034	210,086	11,100	Natural Gas - Energy Equivalent (MMBtu)
2035	210,149	11,104	Natural Gas - Energy Equivalent (MMBtu)
2036	210,212	11,107	Natural Gas - Energy Equivalent (MMBtu)
2037	210,275	11,110	Natural Gas - Energy Equivalent (MMBtu)
2038	210,338	11,114	Natural Gas - Energy Equivalent (MMBtu)
2039	210,401	11,117	Natural Gas - Energy Equivalent (MMBtu)
2040	210,464	11,120	Natural Gas - Energy Equivalent (MMBtu)
2041	210,527	11,124	Natural Gas - Energy Equivalent (MMBtu)
2042	210,591	11,127	Natural Gas - Energy Equivalent (MMBtu)
2043	210,654	11,130	Natural Gas - Energy Equivalent (MMBtu)
2044	210,717	11,134	Natural Gas - Energy Equivalent (MMBtu)
2045	210,759	11,136	Natural Gas - Energy Equivalent (MMBtu)
2046	210,801	11,138	Natural Gas - Energy Equivalent (MMBtu)
2047	210,843	11,140	Natural Gas - Energy Equivalent (MMBtu)
2048	210,886	11,142	Natural Gas - Energy Equivalent (MMBtu)
2049	210,928	11,145	Natural Gas - Energy Equivalent (MMBtu)

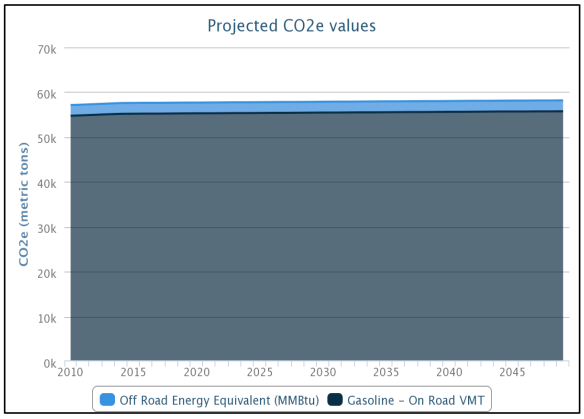
Solid Waste- Growth Indicator Reference: Population			
Year	Usage	CO2e	Output Name
2010	8,083	1,476	Waste Generated (wet tons)
2011	8,115	1,482	Waste Generated (wet tons)
2012	8,148	1,488	Waste Generated (wet tons)
2013	8,180	1,494	Waste Generated (wet tons)
2014	8,213	1,500	Waste Generated (wet tons)
2015	8,221	1,501	Waste Generated (wet tons)
2016	8,230	1,503	Waste Generated (wet tons)
2017	8,238	1,504	Waste Generated (wet tons)
2018	8,246	1,506	Waste Generated (wet tons)
2019	8,254	1,507	Waste Generated (wet tons)
2020	8,263	1,509	Waste Generated (wet tons)
2021	8,271	1,510	Waste Generated (wet tons)
2022	8,279	1,512	Waste Generated (wet tons)
2023	8,287	1,513	Waste Generated (wet tons)
2024	8,296	1,515	Waste Generated (wet tons)
2025	8,304	1,516	Waste Generated (wet tons)
2026	8,312	1,518	Waste Generated (wet tons)
2027	8,321	1,519	Waste Generated (wet tons)
2028	8,329	1,521	Waste Generated (wet tons)
2029	8,337	1,522	Waste Generated (wet tons)
2030	8,346	1,524	Waste Generated (wet tons)
2031	8,354	1,525	Waste Generated (wet tons)
2032	8,362	1,527	Waste Generated (wet tons)
2033	8,371	1,529	Waste Generated (wet tons)
2034	8,379	1,530	Waste Generated (wet tons)
2035	8,387	1,532	Waste Generated (wet tons)
2036	8,396	1,533	Waste Generated (wet tons)
2037	8,404	1,535	Waste Generated (wet tons)
2038	8,413	1,536	Waste Generated (wet tons)
2039	8,421	1,538	Waste Generated (wet tons)
2040	8,429	1,539	Waste Generated (wet tons)
2041	8,438	1,541	Waste Generated (wet tons)
2042	8,446	1,542	Waste Generated (wet tons)
2043	8,455	1,544	Waste Generated (wet tons)
2044	8,463	1,545	Waste Generated (wet tons)
2045	8,472	1,547	Waste Generated (wet tons)
2046	8,480	1,549	Waste Generated (wet tons)
2047	8,489	1,550	Waste Generated (wet tons)
2048	8,497	1,552	Waste Generated (wet tons)
2049	8,506	1,553	Waste Generated (wet tons)

Solid Waste:



Transportation and Mobile Sources- Growth Indicator Reference: Households			
Year	Usage	CO2e	Output Name
2010	800,000	2,379	Off Road Energy Equivalent (MMBtu)
2011	801,600	2,384	Off Road Energy Equivalent (MMBtu)
2012	803,203	2,389	Off Road Energy Equivalent (MMBtu)
2013	804,810	2,393	Off Road Energy Equivalent (MMBtu)
2014	806,419	2,398	Off Road Energy Equivalent (MMBtu)
2015	806,661	2,399	Off Road Energy Equivalent (MMBtu)
2016	806,903	2,400	Off Road Energy Equivalent (MMBtu)
2017	807,145	2,400	Off Road Energy Equivalent (MMBtu)
2018	807,387	2,401	Off Road Energy Equivalent (MMBtu)
2019	807,630	2,402	Off Road Energy Equivalent (MMBtu)
2020	807,872	2,402	Off Road Energy Equivalent (MMBtu)
2021	808,114	2,403	Off Road Energy Equivalent (MMBtu)
2022	808,357	2,404	Off Road Energy Equivalent (MMBtu)
2023	808,599	2,405	Off Road Energy Equivalent (MMBtu)
2024	808,842	2,405	Off Road Energy Equivalent (MMBtu)
2025	809,084	2,406	Off Road Energy Equivalent (MMBtu)
2026	809,327	2,407	Off Road Energy Equivalent (MMBtu)
2027	809,570	2,407	Off Road Energy Equivalent (MMBtu)
2028	809,813	2,408	Off Road Energy Equivalent (MMBtu)
2029	810,056	2,409	Off Road Energy Equivalent (MMBtu)
2030	810,299	2,410	Off Road Energy Equivalent (MMBtu)
2031	810,542	2,410	Off Road Energy Equivalent (MMBtu)
2032	810,785	2,411	Off Road Energy Equivalent (MMBtu)
2033	811,028	2,412	Off Road Energy Equivalent (MMBtu)
2034	811,272	2,413	Off Road Energy Equivalent (MMBtu)
2035	811,515	2,413	Off Road Energy Equivalent (MMBtu)
2036	811,758	2,414	Off Road Energy Equivalent (MMBtu)
2037	812,002	2,415	Off Road Energy Equivalent (MMBtu)
2038	812,246	2,415	Off Road Energy Equivalent (MMBtu)
2039	812,489	2,416	Off Road Energy Equivalent (MMBtu)
2040	812,733	2,417	Off Road Energy Equivalent (MMBtu)
2041	812,977	2,418	Off Road Energy Equivalent (MMBtu)
2042	813,221	2,418	Off Road Energy Equivalent (MMBtu)
2043	813,465	2,419	Off Road Energy Equivalent (MMBtu)
2044	813,709	2,420	Off Road Energy Equivalent (MMBtu)
2045	813,871	2,420	Off Road Energy Equivalent (MMBtu)
2046	814,034	2,421	Off Road Energy Equivalent (MMBtu)
2047	814,197	2,421	Off Road Energy Equivalent (MMBtu)
2048	814,360	2,422	Off Road Energy Equivalent (MMBtu)
2049	814,523	2,422	Off Road Energy Equivalent (MMBtu)

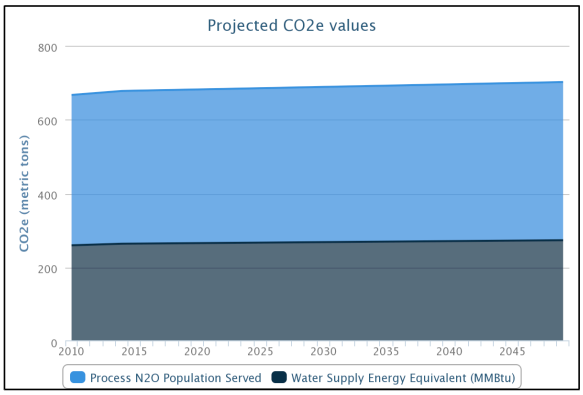
Transportation and Mobile Sources:



2010	110,422,720	54,744	On Road VMT
2011	110,643,565	54,853	On Road VMT
2012	110,864,853	54,963	On Road VMT
2013	111,086,582	55,073	On Road VMT
2014	111,308,755	55,183	On Road VMT
2015	111,342,148	55,200	On Road VMT
2016	111,375,551	55,216	On Road VMT
2017	111,408,963	55,233	On Road VMT
2018	111,442,386	55,250	On Road VMT
2019	111,475,819	55,266	On Road VMT
2020	111,509,262	55,283	On Road VMT
2021	111,542,714	55,299	On Road VMT
2022	111,576,177	55,316	On Road VMT
2023	111,609,650	55,332	On Road VMT
2024	111,643,133	55,349	On Road VMT
2025	111,676,626	55,366	On Road VMT
2026	111,710,129	55,382	On Road VMT
2027	111,743,642	55,399	On Road VMT
2028	111,777,165	55,415	On Road VMT
2029	111,810,698	55,432	On Road VMT
2030	111,844,241	55,449	On Road VMT
2031	111,877,795	55,465	On Road VMT
2032	111,911,358	55,482	On Road VMT
2033	111,944,931	55,499	On Road VMT
2034	111,978,515	55,515	On Road VMT
2035	112,012,108	55,532	On Road VMT
2036	112,045,712	55,549	On Road VMT
2037	112,079,326	55,565	On Road VMT
2038	112,112,949	55,582	On Road VMT
2039	112,146,583	55,599	On Road VMT
2040	112,180,227	55,615	On Road VMT
2041	112,213,881	55,632	On Road VMT
2042	112,247,546	55,649	On Road VMT
2043	112,281,220	55,665	On Road VMT
2044	112,314,904	55,682	On Road VMT
2045	112,337,367	55,693	On Road VMT
2046	112,359,835	55,704	On Road VMT
2047	112,382,307	55,715	On Road VMT
2048	112,404,783	55,727	On Road VMT
2049	112,427,264	55,738	On Road VMT

Water Treatment and Supply- Growth Indicator Reference: Population			
Year	Usage	CO2e	Output Name
2010	9,918	407	Wastewater Treatment Population Served
2011	9,958	409	Wastewater Treatment Population Served
2012	9,998	410	Wastewater Treatment Population Served
2013	10,037	412	Wastewater Treatment Population Served
2014	10,078	414	Wastewater Treatment Population Served
2015	10,088	414	Wastewater Treatment Population Served
2016	10,098	414	Wastewater Treatment Population Served
2017	10,108	415	Wastewater Treatment Population Served
2018	10,118	415	Wastewater Treatment Population Served
2019	10,128	416	Wastewater Treatment Population Served
2020	10,138	416	Wastewater Treatment Population Served
2021	10,148	416	Wastewater Treatment Population Served
2022	10,159	417	Wastewater Treatment Population Served
2023	10,169	417	Wastewater Treatment Population Served
2024	10,179	418	Wastewater Treatment Population Served
2025	10,189	418	Wastewater Treatment Population Served
2026	10,199	419	Wastewater Treatment Population Served
2027	10,209	419	Wastewater Treatment Population Served
2028	10,220	419	Wastewater Treatment Population Served
2029	10,230	420	Wastewater Treatment Population Served
2030	10,240	420	Wastewater Treatment Population Served
2031	10,250	421	Wastewater Treatment Population Served
2032	10,261	421	Wastewater Treatment Population Served
2033	10,271	421	Wastewater Treatment Population Served
2034	10,281	422	Wastewater Treatment Population Served
2035	10,291	422	Wastewater Treatment Population Served
2036	10,302	423	Wastewater Treatment Population Served
2037	10,312	423	Wastewater Treatment Population Served
2038	10,322	424	Wastewater Treatment Population Served
2039	10,333	424	Wastewater Treatment Population Served
2040	10,343	424	Wastewater Treatment Population Served
2041	10,353	425	Wastewater Treatment Population Served
2042	10,364	425	Wastewater Treatment Population Served
2043	10,374	426	Wastewater Treatment Population Served
2044	10,384	426	Wastewater Treatment Population Served
2045	10,395	427	Wastewater Treatment Population Served
2046	10,405	427	Wastewater Treatment Population Served
2047	10,416	427	Wastewater Treatment Population Served
2048	10,426	428	Wastewater Treatment Population Served
2049	10,436	428	Wastewater Treatment Population Served

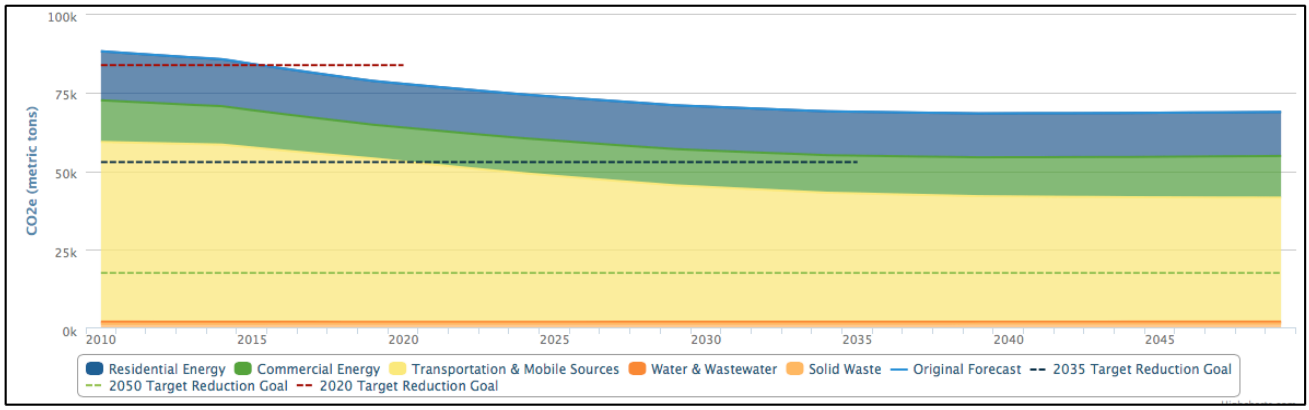
Water Treatment and Supply:



2010	4,403	260	Water Supply Energy Equivalent (MMBtu)
2011	4,421	261	Water Supply Energy Equivalent (MMBtu)
2012	4,438	262	Water Supply Energy Equivalent (MMBtu)
2013	4,456	263	Water Supply Energy Equivalent (MMBtu)
2014	4,474	264	Water Supply Energy Equivalent (MMBtu)
2015	4,478	264	Water Supply Energy Equivalent (MMBtu)
2016	4,483	265	Water Supply Energy Equivalent (MMBtu)
2017	4,487	265	Water Supply Energy Equivalent (MMBtu)
2018	4,492	265	Water Supply Energy Equivalent (MMBtu)
2019	4,496	266	Water Supply Energy Equivalent (MMBtu)
2020	4,501	266	Water Supply Energy Equivalent (MMBtu)
2021	4,505	266	Water Supply Energy Equivalent (MMBtu)
2022	4,510	266	Water Supply Energy Equivalent (MMBtu)
2023	4,514	267	Water Supply Energy Equivalent (MMBtu)
2024	4,519	267	Water Supply Energy Equivalent (MMBtu)
2025	4,523	267	Water Supply Energy Equivalent (MMBtu)
2026	4,528	267	Water Supply Energy Equivalent (MMBtu)
2027	4,532	268	Water Supply Energy Equivalent (MMBtu)
2028	4,537	268	Water Supply Energy Equivalent (MMBtu)
2029	4,541	268	Water Supply Energy Equivalent (MMBtu)
2030	4,546	268	Water Supply Energy Equivalent (MMBtu)
2031	4,551	269	Water Supply Energy Equivalent (MMBtu)
2032	4,555	269	Water Supply Energy Equivalent (MMBtu)
2033	4,560	269	Water Supply Energy Equivalent (MMBtu)
2034	4,564	270	Water Supply Energy Equivalent (MMBtu)
2035	4,569	270	Water Supply Energy Equivalent (MMBtu)
2036	4,573	270	Water Supply Energy Equivalent (MMBtu)
2037	4,578	270	Water Supply Energy Equivalent (MMBtu)
2038	4,582	271	Water Supply Energy Equivalent (MMBtu)
2039	4,587	271	Water Supply Energy Equivalent (MMBtu)
2040	4,592	271	Water Supply Energy Equivalent (MMBtu)
2041	4,596	271	Water Supply Energy Equivalent (MMBtu)
2042	4,601	272	Water Supply Energy Equivalent (MMBtu)
2043	4,605	272	Water Supply Energy Equivalent (MMBtu)
2044	4,610	272	Water Supply Energy Equivalent (MMBtu)
2045	4,615	272	Water Supply Energy Equivalent (MMBtu)
2046	4,619	273	Water Supply Energy Equivalent (MMBtu)
2047	4,624	273	Water Supply Energy Equivalent (MMBtu)
2048	4,629	273	Water Supply Energy Equivalent (MMBtu)
2049	4,633	274	Water Supply Energy Equivalent (MMBtu)

Complete Adjusted 2050 Business As Usual GHG Forecast

Note- This Forecast has been Adjusted for the Renewable Portfolio Standard (RPS) and Pavley I & II.



Category	2010	2011	2012	2013	2014
Residential Energy	15,570	15,393	15,224	15,063	14,911
Non-Residential Energy	13,255	12,978	12,714	12,461	12,220
Transportation & Mobile Sources	57,123	56,908	56,694	56,481	56,269
Solid Waste	1,476	1,482	1,488	1,494	1,500
Water & Wastewater	667	658	649	641	633
Annual Total MTCO2e	88,091	87,419	86,769	86,140	85,533
Reduction Targets					

Category	2015	2016	2017	2018	2019
Residential Energy	14,687	14,476	14,277	14,091	13,915
Non-Residential Energy	11,891	11,582	11,291	11,018	10,761
Transportation & Mobile Sources	55,370	54,485	53,616	52,761	51,921
Solid Waste	1,501	1,503	1,504	1,506	1,507
Water & Wastewater	621	609	598	588	579
Annual Total MTCO2e	84,070	82,655	81,286	79,964	78,683
Reduction Targets					

Category	2020	2021	2022	2023	2024
Residential Energy	13,919	13,924	13,928	13,932	13,936
Non-Residential Energy	10,836	10,912	10,988	11,065	11,143
Transportation & Mobile Sources	50,946	49,990	49,053	48,134	47,234
Solid Waste	1,509	1,510	1,512	1,513	1,515
Water & Wastewater	579	580	580	581	581
Annual Total MTCO2e	77,789	76,916	76,061	75,225	74,409
Reduction Targets	83,775				

Category	2025	2026	2027	2028	2029
Residential Energy	13,940	13,944	13,949	13,953	13,957
Non-Residential Energy	11,221	11,299	11,378	11,458	11,538
Transportation & Mobile Sources	46,441	45,662	44,897	44,145	43,407
Solid Waste	1,516	1,518	1,519	1,521	1,522
Water & Wastewater	582	583	583	584	584
Annual Total MTCO2e	73,700	73,006	72,326	71,661	71,008
Reduction Targets					

Category	2030	2031	2032	2033	2034
Residential Energy	13,961	13,965	13,970	13,974	13,978
Non-Residential Energy	11,619	11,700	11,782	11,865	11,948
Transportation & Mobile Sources	42,928	42,454	41,986	41,524	41,067
Solid Waste	1,524	1,525	1,527	1,529	1,530
Water & Wastewater	585	586	586	587	587
Annual Total MTCO2e	70,617	70,230	69,851	69,479	69,110
Reduction Targets					

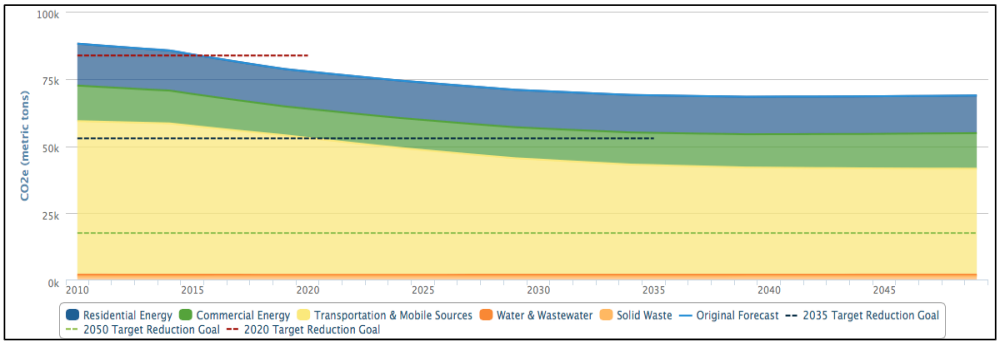
Category	2035	2036	2037	2038	2039
Residential Energy	13,982	13,986	13,991	13,995	13,999
Non-Residential Energy	12,031	12,116	12,200	12,286	12,372
Transportation & Mobile Sources	40,847	40,629	40,412	40,196	39,981
Solid Waste	1,532	1,533	1,535	1,536	1,538
Water & Wastewater	588	588	589	590	590
Annual Total MTCO2e	68,980	68,852	68,727	68,603	68,480
Reduction Targets	54,528				

Category	2040	2041	2042	2043	2044
Residential Energy	14,003	14,007	14,012	14,016	14,020
Non-Residential Energy	12,458	12,546	12,633	12,722	12,811
Transportation & Mobile Sources	39,918	39,855	39,792	39,729	39,666
Solid Waste	1,539	1,541	1,542	1,544	1,545
Water & Wastewater	591	591	592	593	593
Annual Total MTCO2e	68,509	68,540	68,571	68,604	68,635
Reduction Targets					

Category	2045	2046	2047	2048	2049
Residential Energy	14,023	14,026	14,028	14,031	14,034
Non-Residential Energy	12,901	12,991	13,082	13,173	13,266
Transportation & Mobile Sources	39,637	39,608	39,578	39,549	39,520
Solid Waste	1,547	1,549	1,550	1,552	1,553
Water & Wastewater	594	594	595	596	596
Annual Total MTCO2e	68,702	68,768	68,833	68,901	68,969
Reduction Targets					16,737

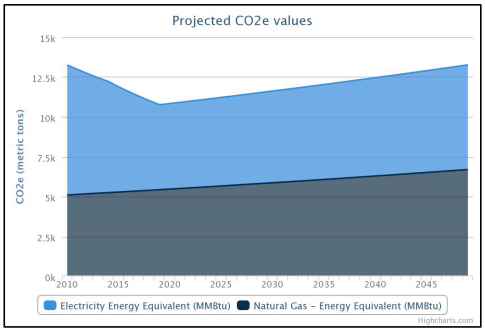
Adjusted 2050 Business As Usual GHG Forecast- Sector Detail

Note- This Forecast has been Adjusted for RPS and Pavley I & II



Non-Residential Energy (Adjusted for RPS)- Growth Indicator: Employment			
Year	**Usage**	**MTCO2e**	**Output Name**
2010	132104	8152	Electricity Energy Equivalent (MMBtu)
2011	133029	7840	Electricity Energy Equivalent (MMBtu)
2012	133960	7539	Electricity Energy Equivalent (MMBtu)
2013	134898	7250	Electricity Energy Equivalent (MMBtu)
2014	135842	6973	Electricity Energy Equivalent (MMBtu)
2015	136793	6607	Electricity Energy Equivalent (MMBtu)
2016	137750	6261	Electricity Energy Equivalent (MMBtu)
2017	138715	5933	Electricity Energy Equivalent (MMBtu)
2018	139686	5622	Electricity Energy Equivalent (MMBtu)
2019	140663	5327	Electricity Energy Equivalent (MMBtu)
2020	141648	5364	Electricity Energy Equivalent (MMBtu)
2021	142640	5402	Electricity Energy Equivalent (MMBtu)
2022	143638	5440	Electricity Energy Equivalent (MMBtu)
2023	144644	5478	Electricity Energy Equivalent (MMBtu)
2024	145656	5516	Electricity Energy Equivalent (MMBtu)
2025	146676	5555	Electricity Energy Equivalent (MMBtu)
2026	147702	5594	Electricity Energy Equivalent (MMBtu)
2027	148736	5633	Electricity Energy Equivalent (MMBtu)
2028	149777	5672	Electricity Energy Equivalent (MMBtu)
2029	150826	5712	Electricity Energy Equivalent (MMBtu)
2030	151882	5752	Electricity Energy Equivalent (MMBtu)
2031	152945	5792	Electricity Energy Equivalent (MMBtu)
2032	154015	5833	Electricity Energy Equivalent (MMBtu)
2033	155094	5874	Electricity Energy Equivalent (MMBtu)
2034	156179	5915	Electricity Energy Equivalent (MMBtu)
2035	157272	5956	Electricity Energy Equivalent (MMBtu)
2036	158373	5998	Electricity Energy Equivalent (MMBtu)
2037	159482	6040	Electricity Energy Equivalent (MMBtu)
2038	160598	6082	Electricity Energy Equivalent (MMBtu)
2039	161723	6125	Electricity Energy Equivalent (MMBtu)
2040	162855	6168	Electricity Energy Equivalent (MMBtu)
2041	163995	6211	Electricity Energy Equivalent (MMBtu)
2042	165143	6254	Electricity Energy Equivalent (MMBtu)
2043	166299	6298	Electricity Energy Equivalent (MMBtu)
2044	167463	6342	Electricity Energy Equivalent (MMBtu)
2045	168635	6386	Electricity Energy Equivalent (MMBtu)
2046	169815	6431	Electricity Energy Equivalent (MMBtu)
2047	171004	6476	Electricity Energy Equivalent (MMBtu)
2048	172201	6521	Electricity Energy Equivalent (MMBtu)
2049	173406	6567	Electricity Energy Equivalent (MMBtu)

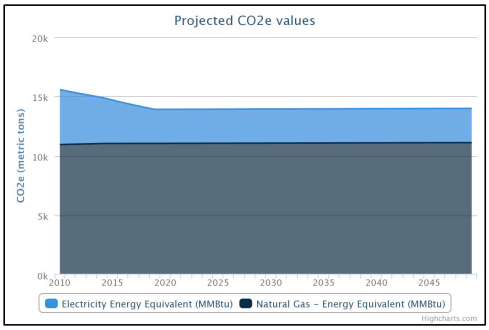
Non-Residential Energy (Adjusted for RPS):



2010	96619	5103	Natural Gas - Energy Equivalent (MMBtu)
2011	97295	5139	Natural Gas - Energy Equivalent (MMBtu)
2012	97976	5175	Natural Gas - Energy Equivalent (MMBtu)
2013	98662	5211	Natural Gas - Energy Equivalent (MMBtu)
2014	99353	5247	Natural Gas - Energy Equivalent (MMBtu)
2015	100048	5284	Natural Gas - Energy Equivalent (MMBtu)
2016	100749	5321	Natural Gas - Energy Equivalent (MMBtu)
2017	101454	5358	Natural Gas - Energy Equivalent (MMBtu)
2018	102164	5396	Natural Gas - Energy Equivalent (MMBtu)
2019	102879	5434	Natural Gas - Energy Equivalent (MMBtu)
2020	103599	5472	Natural Gas - Energy Equivalent (MMBtu)
2021	104325	5510	Natural Gas - Energy Equivalent (MMBtu)
2022	105055	5549	Natural Gas - Energy Equivalent (MMBtu)
2023	105790	5587	Natural Gas - Energy Equivalent (MMBtu)
2024	106531	5626	Natural Gas - Energy Equivalent (MMBtu)
2025	107277	5666	Natural Gas - Energy Equivalent (MMBtu)
2026	108027	5706	Natural Gas - Energy Equivalent (MMBtu)
2027	108784	5745	Natural Gas - Energy Equivalent (MMBtu)
2028	109545	5786	Natural Gas - Energy Equivalent (MMBtu)
2029	110312	5826	Natural Gas - Energy Equivalent (MMBtu)
2030	111084	5867	Natural Gas - Energy Equivalent (MMBtu)
2031	111862	5908	Natural Gas - Energy Equivalent (MMBtu)
2032	112645	5949	Natural Gas - Energy Equivalent (MMBtu)
2033	113433	5991	Natural Gas - Energy Equivalent (MMBtu)
2034	114227	6033	Natural Gas - Energy Equivalent (MMBtu)
2035	115027	6075	Natural Gas - Energy Equivalent (MMBtu)
2036	115832	6118	Natural Gas - Energy Equivalent (MMBtu)
2037	116643	6161	Natural Gas - Energy Equivalent (MMBtu)
2038	117459	6204	Natural Gas - Energy Equivalent (MMBtu)
2039	118282	6247	Natural Gas - Energy Equivalent (MMBtu)
2040	119110	6291	Natural Gas - Energy Equivalent (MMBtu)
2041	119943	6335	Natural Gas - Energy Equivalent (MMBtu)
2042	120783	6379	Natural Gas - Energy Equivalent (MMBtu)
2043	121628	6424	Natural Gas - Energy Equivalent (MMBtu)
2044	122480	6469	Natural Gas - Energy Equivalent (MMBtu)
2045	123337	6514	Natural Gas - Energy Equivalent (MMBtu)
2046	124201	6560	Natural Gas - Energy Equivalent (MMBtu)
2047	125070	6606	Natural Gas - Energy Equivalent (MMBtu)
2048	125945	6652	Natural Gas - Energy Equivalent (MMBtu)
2049	126827	6698	Natural Gas - Energy Equivalent (MMBtu)

Residential Energy (Adjusted for RPS)- Growth Indicator Reference: Households			
Year	Usage	CO2e	Output Name
2010	77937	4624	Electricity Energy Equivalent (MMBtu)
2011	78093	4633	Electricity Energy Equivalent (MMBtu)
2012	78249	4643	Electricity Energy Equivalent (MMBtu)
2013	78406	4652	Electricity Energy Equivalent (MMBtu)
2014	78562	4661	Electricity Energy Equivalent (MMBtu)
2015	78578	4662	Electricity Energy Equivalent (MMBtu)
2016	78594	4663	Electricity Energy Equivalent (MMBtu)
2017	78610	4664	Electricity Energy Equivalent (MMBtu)
2018	78625	4665	Electricity Energy Equivalent (MMBtu)
2019	78641	4666	Electricity Energy Equivalent (MMBtu)
2020	78657	4667	Electricity Energy Equivalent (MMBtu)
2021	78672	4668	Electricity Energy Equivalent (MMBtu)
2022	78688	4669	Electricity Energy Equivalent (MMBtu)
2023	78704	4669	Electricity Energy Equivalent (MMBtu)
2024	78720	4670	Electricity Energy Equivalent (MMBtu)
2025	78735	4671	Electricity Energy Equivalent (MMBtu)
2026	78751	4672	Electricity Energy Equivalent (MMBtu)
2027	78767	4673	Electricity Energy Equivalent (MMBtu)
2028	78783	4674	Electricity Energy Equivalent (MMBtu)
2029	78798	4675	Electricity Energy Equivalent (MMBtu)
2030	78814	4676	Electricity Energy Equivalent (MMBtu)
2031	78830	4677	Electricity Energy Equivalent (MMBtu)
2032	78846	4678	Electricity Energy Equivalent (MMBtu)
2033	78861	4679	Electricity Energy Equivalent (MMBtu)
2034	78877	4680	Electricity Energy Equivalent (MMBtu)
2035	78893	4681	Electricity Energy Equivalent (MMBtu)
2036	78909	4682	Electricity Energy Equivalent (MMBtu)
2037	78925	4683	Electricity Energy Equivalent (MMBtu)
2038	78940	4684	Electricity Energy Equivalent (MMBtu)
2039	78956	4684	Electricity Energy Equivalent (MMBtu)
2040	78972	4685	Electricity Energy Equivalent (MMBtu)
2041	78988	4686	Electricity Energy Equivalent (MMBtu)
2042	79004	4687	Electricity Energy Equivalent (MMBtu)
2043	79019	4688	Electricity Energy Equivalent (MMBtu)
2044	79035	4689	Electricity Energy Equivalent (MMBtu)
2045	79051	4690	Electricity Energy Equivalent (MMBtu)
2046	79067	4691	Electricity Energy Equivalent (MMBtu)
2047	79083	4692	Electricity Energy Equivalent (MMBtu)
2048	79098	4693	Electricity Energy Equivalent (MMBtu)
2049	79114	4694	Electricity Energy Equivalent (MMBtu)

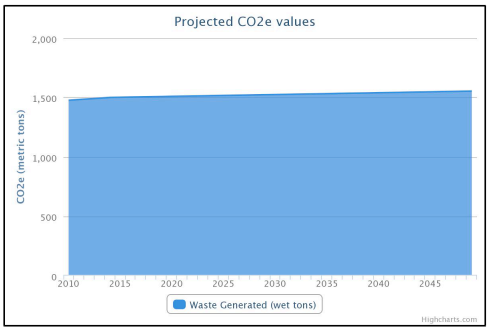
Residential Energy (Adjusted for RPS):



2010	207167	10946	Natural Gas - Energy Equivalent (MMBtu)
2011	207581	10968	Natural Gas - Energy Equivalent (MMBtu)
2012	207996	10990	Natural Gas - Energy Equivalent (MMBtu)
2013	208412	11012	Natural Gas - Energy Equivalent (MMBtu)
2014	208829	11034	Natural Gas - Energy Equivalent (MMBtu)
2015	208871	11036	Natural Gas - Energy Equivalent (MMBtu)
2016	208913	11038	Natural Gas - Energy Equivalent (MMBtu)
2017	208955	11040	Natural Gas - Energy Equivalent (MMBtu)
2018	208996	11043	Natural Gas - Energy Equivalent (MMBtu)
2019	209038	11045	Natural Gas - Energy Equivalent (MMBtu)
2020	209080	11047	Natural Gas - Energy Equivalent (MMBtu)
2021	209122	11049	Natural Gas - Energy Equivalent (MMBtu)
2022	209164	11051	Natural Gas - Energy Equivalent (MMBtu)
2023	209206	11054	Natural Gas - Energy Equivalent (MMBtu)
2024	209247	11056	Natural Gas - Energy Equivalent (MMBtu)
2025	209289	11058	Natural Gas - Energy Equivalent (MMBtu)
2026	209331	11060	Natural Gas - Energy Equivalent (MMBtu)
2027	209373	11063	Natural Gas - Energy Equivalent (MMBtu)
2028	209415	11065	Natural Gas - Energy Equivalent (MMBtu)
2029	209457	11067	Natural Gas - Energy Equivalent (MMBtu)
2030	209499	11069	Natural Gas - Energy Equivalent (MMBtu)
2031	209540	11071	Natural Gas - Energy Equivalent (MMBtu)
2032	209582	11074	Natural Gas - Energy Equivalent (MMBtu)
2033	209624	11076	Natural Gas - Energy Equivalent (MMBtu)
2034	209666	11078	Natural Gas - Energy Equivalent (MMBtu)
2035	209708	11080	Natural Gas - Energy Equivalent (MMBtu)
2036	209750	11082	Natural Gas - Energy Equivalent (MMBtu)
2037	209792	11085	Natural Gas - Energy Equivalent (MMBtu)
2038	209834	11087	Natural Gas - Energy Equivalent (MMBtu)
2039	209876	11089	Natural Gas - Energy Equivalent (MMBtu)
2040	209918	11091	Natural Gas - Energy Equivalent (MMBtu)
2041	209960	11094	Natural Gas - Energy Equivalent (MMBtu)
2042	210002	11096	Natural Gas - Energy Equivalent (MMBtu)
2043	210044	11098	Natural Gas - Energy Equivalent (MMBtu)
2044	210086	11100	Natural Gas - Energy Equivalent (MMBtu)
2045	210128	11102	Natural Gas - Energy Equivalent (MMBtu)
2046	210170	11105	Natural Gas - Energy Equivalent (MMBtu)
2047	210212	11107	Natural Gas - Energy Equivalent (MMBtu)
2048	210254	11109	Natural Gas - Energy Equivalent (MMBtu)
2049	210296	11111	Natural Gas - Energy Equivalent (MMBtu)

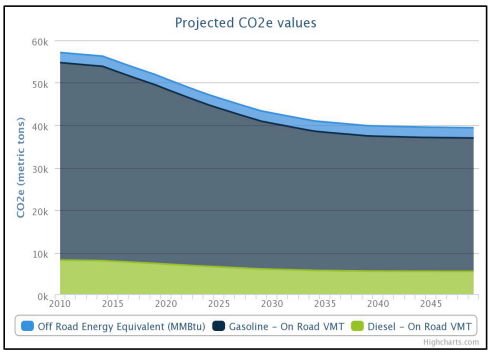
Solid Waste- Growth Indicator Reference: Population			
Year	Usage	CO2e	Output Name
2010	8083	1476	Waste Generated (wet tons)
2011	8115	1482	Waste Generated (wet tons)
2012	8148	1488	Waste Generated (wet tons)
2013	8180	1494	Waste Generated (wet tons)
2014	8213	1500	Waste Generated (wet tons)
2015	8221	1501	Waste Generated (wet tons)
2016	8230	1503	Waste Generated (wet tons)
2017	8238	1504	Waste Generated (wet tons)
2018	8246	1506	Waste Generated (wet tons)
2019	8254	1507	Waste Generated (wet tons)
2020	8263	1509	Waste Generated (wet tons)
2021	8271	1510	Waste Generated (wet tons)
2022	8279	1512	Waste Generated (wet tons)
2023	8287	1513	Waste Generated (wet tons)
2024	8296	1515	Waste Generated (wet tons)
2025	8304	1516	Waste Generated (wet tons)
2026	8312	1518	Waste Generated (wet tons)
2027	8321	1519	Waste Generated (wet tons)
2028	8329	1521	Waste Generated (wet tons)
2029	8337	1522	Waste Generated (wet tons)
2030	8346	1524	Waste Generated (wet tons)
2031	8354	1525	Waste Generated (wet tons)
2032	8362	1527	Waste Generated (wet tons)
2033	8371	1529	Waste Generated (wet tons)
2034	8379	1530	Waste Generated (wet tons)
2035	8387	1532	Waste Generated (wet tons)
2036	8396	1533	Waste Generated (wet tons)
2037	8404	1535	Waste Generated (wet tons)
2038	8413	1536	Waste Generated (wet tons)
2039	8421	1538	Waste Generated (wet tons)
2040	8429	1539	Waste Generated (wet tons)
2041	8438	1541	Waste Generated (wet tons)
2042	8446	1542	Waste Generated (wet tons)
2043	8455	1544	Waste Generated (wet tons)
2044	8463	1545	Waste Generated (wet tons)
2045	8472	1547	Waste Generated (wet tons)
2046	8480	1549	Waste Generated (wet tons)
2047	8489	1550	Waste Generated (wet tons)
2048	8497	1552	Waste Generated (wet tons)
2049	8506	1553	Waste Generated (wet tons)

Solid Waste:



Transportation and Mobile Sources (Adjusted for Pavley I & II)- Growth Indicator Reference: Households			
Year	Usage	CO2e	Output Name
2010	800000	2379	Off Road Energy Equivalent (MMBtu)
2011	801600	2384	Off Road Energy Equivalent (MMBtu)
2012	803203	2389	Off Road Energy Equivalent (MMBtu)
2013	804810	2393	Off Road Energy Equivalent (MMBtu)
2014	806419	2398	Off Road Energy Equivalent (MMBtu)
2015	806581	2399	Off Road Energy Equivalent (MMBtu)
2016	806742	2399	Off Road Energy Equivalent (MMBtu)
2017	806903	2400	Off Road Energy Equivalent (MMBtu)
2018	807065	2400	Off Road Energy Equivalent (MMBtu)
2019	807226	2400	Off Road Energy Equivalent (MMBtu)
2020	807387	2401	Off Road Energy Equivalent (MMBtu)
2021	807549	2401	Off Road Energy Equivalent (MMBtu)
2022	807710	2402	Off Road Energy Equivalent (MMBtu)
2023	807872	2402	Off Road Energy Equivalent (MMBtu)
2024	808034	2403	Off Road Energy Equivalent (MMBtu)
2025	808195	2403	Off Road Energy Equivalent (MMBtu)
2026	808357	2404	Off Road Energy Equivalent (MMBtu)
2027	808518	2404	Off Road Energy Equivalent (MMBtu)
2028	808680	2405	Off Road Energy Equivalent (MMBtu)
2029	808842	2405	Off Road Energy Equivalent (MMBtu)
2030	809004	2406	Off Road Energy Equivalent (MMBtu)
2031	809165	2406	Off Road Energy Equivalent (MMBtu)
2032	809327	2407	Off Road Energy Equivalent (MMBtu)
2033	809489	2407	Off Road Energy Equivalent (MMBtu)
2034	809651	2408	Off Road Energy Equivalent (MMBtu)
2035	809813	2408	Off Road Energy Equivalent (MMBtu)
2036	809975	2409	Off Road Energy Equivalent (MMBtu)
2037	810137	2409	Off Road Energy Equivalent (MMBtu)
2038	810299	2410	Off Road Energy Equivalent (MMBtu)
2039	810461	2410	Off Road Energy Equivalent (MMBtu)
2040	810623	2411	Off Road Energy Equivalent (MMBtu)
2041	810785	2411	Off Road Energy Equivalent (MMBtu)
2042	810947	2412	Off Road Energy Equivalent (MMBtu)
2043	811110	2412	Off Road Energy Equivalent (MMBtu)
2044	811272	2413	Off Road Energy Equivalent (MMBtu)
2045	811434	2413	Off Road Energy Equivalent (MMBtu)
2046	811596	2413	Off Road Energy Equivalent (MMBtu)
2047	811759	2414	Off Road Energy Equivalent (MMBtu)
2048	811921	2414	Off Road Energy Equivalent (MMBtu)
2049	812083	2415	Off Road Energy Equivalent (MMBtu)

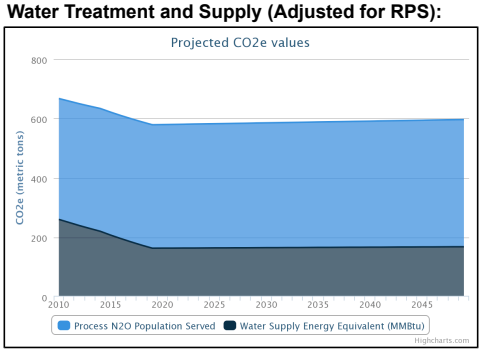
Transportation and Mobile Sources (adjusted for Pavley I/II):



2010	110422720	54744	On Road VMT
2011	110643565	54524	On Road VMT
2012	110864853	54306	On Road VMT
2013	111086582	54088	On Road VMT
2014	111308755	53871	On Road VMT
2015	111331017	52966	On Road VMT
2016	111353283	52076	On Road VMT
2017	111375554	51200	On Road VMT
2018	111397829	50340	On Road VMT
2019	111420109	49494	On Road VMT
2020	111442393	48514	On Road VMT
2021	111464681	47553	On Road VMT
2022	111486974	46612	On Road VMT
2023	111509272	45688	On Road VMT
2024	111531573	44784	On Road VMT
2025	111553880	43986	On Road VMT
2026	111576191	43203	On Road VMT
2027	111598506	42434	On Road VMT
2028	111620825	41679	On Road VMT
2029	111643150	40937	On Road VMT
2030	111665478	40453	On Road VMT
2031	111687811	39976	On Road VMT
2032	111710149	39504	On Road VMT
2033	111732491	39038	On Road VMT
2034	111754837	38577	On Road VMT
2035	111777188	38353	On Road VMT
2036	111799544	38131	On Road VMT
2037	111821904	37910	On Road VMT
2038	111844268	37690	On Road VMT
2039	111866637	37471	On Road VMT
2040	111889010	37404	On Road VMT
2041	111911388	37336	On Road VMT
2042	111933770	37269	On Road VMT
2043	111956157	37202	On Road VMT
2044	111978548	37135	On Road VMT
2045	112000944	37105	On Road VMT
2046	112023344	37076	On Road VMT
2047	112045749	37046	On Road VMT
2048	112068158	37016	On Road VMT
2049	112090572	36987	On Road VMT

Water Treatment and Supply (adjusted for RPS)- Growth Indicator Reference: Population			
Year	Usage	CO2e	Output Name
2010	9918	407	Wastewater Treatment Population Served
2011	9958	409	Wastewater Treatment Population Served
2012	9998	410	Wastewater Treatment Population Served
2013	10037	412	Wastewater Treatment Population Served
2014	10078	414	Wastewater Treatment Population Served
2015	10088	414	Wastewater Treatment Population Served
2016	10098	414	Wastewater Treatment Population Served
2017	10108	415	Wastewater Treatment Population Served
2018	10118	415	Wastewater Treatment Population Served
2019	10128	416	Wastewater Treatment Population Served
2020	10138	416	Wastewater Treatment Population Served
2021	10148	416	Wastewater Treatment Population Served
2022	10159	417	Wastewater Treatment Population Served
2023	10169	417	Wastewater Treatment Population Served
2024	10179	418	Wastewater Treatment Population Served
2025	10189	418	Wastewater Treatment Population Served
2026	10199	419	Wastewater Treatment Population Served
2027	10209	419	Wastewater Treatment Population Served
2028	10220	419	Wastewater Treatment Population Served
2029	10230	420	Wastewater Treatment Population Served
2030	10240	420	Wastewater Treatment Population Served
2031	10250	421	Wastewater Treatment Population Served
2032	10261	421	Wastewater Treatment Population Served
2033	10271	421	Wastewater Treatment Population Served
2034	10281	422	Wastewater Treatment Population Served
2035	10291	422	Wastewater Treatment Population Served
2036	10302	423	Wastewater Treatment Population Served
2037	10312	423	Wastewater Treatment Population Served
2038	10322	424	Wastewater Treatment Population Served
2039	10333	424	Wastewater Treatment Population Served
2040	10343	424	Wastewater Treatment Population Served
2041	10353	425	Wastewater Treatment Population Served
2042	10364	425	Wastewater Treatment Population Served
2043	10374	426	Wastewater Treatment Population Served
2044	10384	426	Wastewater Treatment Population Served
2045	10395	427	Wastewater Treatment Population Served
2046	10405	427	Wastewater Treatment Population Served
2047	10416	427	Wastewater Treatment Population Served
2048	10426	428	Wastewater Treatment Population Served
2049	10436	428	Wastewater Treatment Population Served

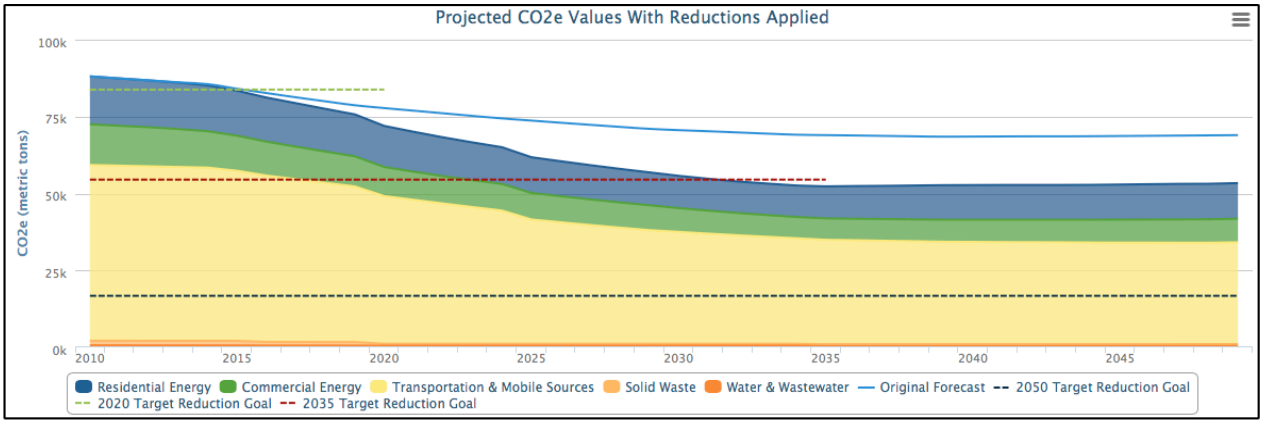
Water Treatment and Supply (Adjusted for RPS):



2010	4403	260	Water Supply Energy Equivalent (MMBtu)
2011	4421	249	Water Supply Energy Equivalent (MMBtu)
2012	4438	239	Water Supply Energy Equivalent (MMBtu)
2013	4456	229	Water Supply Energy Equivalent (MMBtu)
2014	4474	220	Water Supply Energy Equivalent (MMBtu)
2015	4478	207	Water Supply Energy Equivalent (MMBtu)
2016	4483	195	Water Supply Energy Equivalent (MMBtu)
2017	4487	184	Water Supply Energy Equivalent (MMBtu)
2018	4492	173	Water Supply Energy Equivalent (MMBtu)
2019	4496	163	Water Supply Energy Equivalent (MMBtu)
2020	4501	163	Water Supply Energy Equivalent (MMBtu)
2021	4505	163	Water Supply Energy Equivalent (MMBtu)
2022	4510	163	Water Supply Energy Equivalent (MMBtu)
2023	4514	164	Water Supply Energy Equivalent (MMBtu)
2024	4519	164	Water Supply Energy Equivalent (MMBtu)
2025	4523	164	Water Supply Energy Equivalent (MMBtu)
2026	4528	164	Water Supply Energy Equivalent (MMBtu)
2027	4532	164	Water Supply Energy Equivalent (MMBtu)
2028	4537	164	Water Supply Energy Equivalent (MMBtu)
2029	4541	165	Water Supply Energy Equivalent (MMBtu)
2030	4546	165	Water Supply Energy Equivalent (MMBtu)
2031	4551	165	Water Supply Energy Equivalent (MMBtu)
2032	4555	165	Water Supply Energy Equivalent (MMBtu)
2033	4560	165	Water Supply Energy Equivalent (MMBtu)
2034	4564	165	Water Supply Energy Equivalent (MMBtu)
2035	4569	166	Water Supply Energy Equivalent (MMBtu)
2036	4573	166	Water Supply Energy Equivalent (MMBtu)
2037	4578	166	Water Supply Energy Equivalent (MMBtu)
2038	4582	166	Water Supply Energy Equivalent (MMBtu)
2039	4587	166	Water Supply Energy Equivalent (MMBtu)
2040	4592	166	Water Supply Energy Equivalent (MMBtu)
2041	4596	167	Water Supply Energy Equivalent (MMBtu)
2042	4601	167	Water Supply Energy Equivalent (MMBtu)
2043	4605	167	Water Supply Energy Equivalent (MMBtu)
2044	4610	167	Water Supply Energy Equivalent (MMBtu)
2045	4615	167	Water Supply Energy Equivalent (MMBtu)
2046	4619	167	Water Supply Energy Equivalent (MMBtu)
2047	4624	168	Water Supply Energy Equivalent (MMBtu)
2048	4629	168	Water Supply Energy Equivalent (MMBtu)
2049	4633	168	Water Supply Energy Equivalent (MMBtu)

Complete Adjusted 2050 GHG Forecast Graph (Including Reductions from All Modeled Measures)

Note-This Forecast has been Adjusted for the Renewable Portfolio Standard (RPS) + Pavley I & II + All Modeled Local Reduction Measures



Category	2010	2011	2012	2013	2014
Residential Energy	15,570	15,393	15,224	15,063	14,911
Non-Residential Energy	13,255	12,978	12,714	12,347	11,861
Transportation & Mobile Sources	57,123	56,908	56,694	56,481	56,269
Solid Waste	1,476	1,482	1,488	1,494	1,500
Water & Wastewater	667	658	649	641	631
Annual Total MTCO2e	**88,091**	**87,419**	**86,769**	**86,026**	**85,172**
Reduction Targets					

Category	2015	2016	2017	2018	2019
Residential Energy	14,634	14,371	14,121	13,883	13,657
Non-Residential Energy	11,413	10,997	10,567	10,166	9,795
Transportation & Mobile Sources	55,276	54,081	52,910	51,718	50,551
Solid Waste	1,501	1,153	1,155	1,156	1,157
Water & Wastewater	619	608	597	587	577
Annual Total MTCO2e	**83,443**	**81,210**	**79,350**	**77,510**	**75,737**
Reduction Targets					

Category	2020	2021	2022	2023	2024
Residential Energy	13,324	12,965	12,616	12,276	11,944
Non-Residential Energy	9,474	9,155	8,891	8,718	8,624
Transportation & Mobile Sources	48,003	46,781	45,589	44,427	43,295
Solid Waste	583	583	584	585	585
Water & Wastewater	578	578	579	579	580
Annual Total MTCO2e	**71,962**	**70,062**	**68,259**	**66,585**	**65,028**
Reduction Targets	**83,775**				

Category	2025	2026	2027	2028	2029
Residential Energy	11,632	11,376	11,138	10,918	10,713
Non-Residential Energy	8,604	8,427	8,289	8,162	8,046
Transportation & Mobile Sources	40,371	39,475	38,599	37,742	36,904
Solid Waste	586	586	587	588	588
Water & Wastewater	581	581	582	582	583
Annual Total MTCO2e	**61,774**	**60,445**	**59,195**	**57,992**	**56,834**
Reduction Targets					

Category	2025	2026	2027	2028	2029
Residential Energy	11,632	11,376	11,138	10,918	10,713
Non-Residential Energy	8,604	8,427	8,289	8,162	8,046
Transportation & Mobile Sources	40,371	39,475	38,599	37,742	36,904
Solid Waste	586	586	587	588	588
Water & Wastewater	581	581	582	582	583
Annual Total MTCO2e	**61,774**	**60,445**	**59,195**	**57,992**	**56,834**
Reduction Targets					

Category	2030	2031	2032	2033	2034
Residential Energy	10,509	10,356	10,244	10,241	10,264
Non-Residential Energy	7,711	7,443	7,220	7,067	6,910
Transportation & Mobile Sources	36,346	35,796	35,255	34,758	34,268
Solid Waste	589	589	590	590	591
Water & Wastewater	584	584	585	587	587
Annual Total MTCO2e	**55,739**	**54,768**	**53,894**	**53,243**	**52,620**
Reduction Targets					

Category	2035	2036	2037	2038	2039
Residential Energy	10,432	10,634	10,835	11,037	11,239
Non-Residential Energy	6,959	7,007	7,056	7,106	7,156
Transportation & Mobile Sources	33,915	33,757	33,600	33,443	33,287
Solid Waste	592	592	593	593	594
Water & Wastewater	580	580	581	581	582
Annual Total MTCO2e	**52,478**	**52,570**	**52,665**	**52,760**	**52,858**
Reduction Targets	**54,528**				

Category	2040	2041	2042	2043	2044
Residential Energy	11,283	11,294	11,305	11,316	11,327
Non-Residential Energy	7,209	7,263	7,316	7,370	7,424
Transportation & Mobile Sources	33,235	33,184	33,132	33,081	33,029
Solid Waste	595	595	596	596	597
Water & Wastewater	582	583	584	584	585
Annual Total MTCO2e	**52,904**	**52,919**	**52,933**	**52,947**	**52,962**
Reduction Targets					

Category	2045	2046	2047	2048	2049
Residential Energy	11,406	11,486	11,565	11,567	11,569
Non-Residential Energy	7,476	7,528	7,581	7,634	7,684
Transportation & Mobile Sources	33,005	32,981	32,957	32,933	33,074
Solid Waste	598	598	599	599	600
Water & Wastewater	585	586	587	587	588
Annual Total MTCO2e	**53,070**	**53,179**	**53,289**	**53,320**	**53,515**
Reduction Targets					**16,737**

Forecast Growth Indicators

Category	Residential Energy	Non-Residential Energy	Transportation & Mobile Sources	Solid Waste	Water & Wastewater
Indicator	Households	Employment	Households	Population	Population

Forecast Growth Rates (Calculated using Source Data below and the ICLEI ClearPath Compound Growth Rate Calculator)

Name: Population	
1990-1994	
1995-1999	
2000-2004	
2005-2009	
2010-2014	.004
2015-2019	.001
2020-2024	.001
2025-2029	.001
2030-2034	.001
2035-2039	.001
2040-2044	.001
2045-2049	.001

Notes: Values calculated via the ClearPath Compound Growth Rate Calculator, using data provided by DC&E The Planning Center. Holding Growth Rates for 2035-2050 constant at same rate as 2015-2034, until 2035-2050 data is available.

Name: Households	
1990-1994	
1995-1999	
2000-2004	
2005-2009	
2010-2014	.002
2015-2019	.0003
2020-2024	.0003
2025-2029	.0003
2030-2034	.0003
2035-2039	.0003
2040-2044	.0003
2045-2049	.0002

Notes: Values calculated via the ClearPath Compound Growth Rate Calculator, using data provided by DC&E The Planning Center. Holding Growth Rates for 2035-2050 constant at same rate as 2015-2034, until 2035-2050 data is available.

Name: Employment	
1990-1994	
1995-1999	
2000-2004	
2005-2009	
2010-2014	.007
2015-2019	.007
2020-2024	.007
2025-2029	.007
2030-2034	.007
2035-2039	.007
2040-2044	.007
2045-2049	.007

Notes: Values calculated via the ClearPath Compound Growth Rate Calculator, using data provided by DC&E The Planning Center. Holding Growth Rates for 2035-2050 constant at same rate as 2015-2034, until 2035-2050 data is available.

Source Data for Forecast Growth Rates:

SOURCE: Alexis Mena- DC&E Planning Center (see below)

	Absolute Number				Annualized Growth Rate				Notes
Year	Population	Housing Units	Employment	Non-residential Sq. Ft.	Population	Housing Units	Employment	Non-residential Sq. Ft.	
Baseline (2010)	9,918	5,534	6,170	4,029,265	N/A	N/A	N/A	N/A	
2011	9,965	5,534	6,214	4,050,438	0.47389%	0.00000%	0.71231%	0.52549%	
2012	10,012	5,547	6,258	4,071,723	0.47165%	0.23491%	0.71231%	0.52549%	
2013	10,030	5,557	6,303	4,093,119	0.17978%	0.18028%	0.71231%	0.52549%	
2014	10,072	5,580	6,348	4,114,628	0.41874%	0.41389%	0.71231%	0.52549%	
2015	10,078	5,582	6,393	4,136,249	0.05922%	0.02808%	0.71231%	0.52549%	
2016	10,084	5,583	6,438	4,157,985	0.05922%	0.02808%	0.71231%	0.52549%	
2017	10,090	5,585	6,484	4,179,834	0.05922%	0.02808%	0.71231%	0.52549%	
2018	10,096	5,586	6,530	4,201,799	0.05922%	0.02808%	0.71231%	0.52549%	
2019	10,102	5,588	6,577	4,223,879	0.05922%	0.02808%	0.71231%	0.52549%	
2020	10,108	5,589	6,624	4,246,075	0.05922%	0.02808%	0.71231%	0.52549%	
2021	10,114	5,591	6,671	4,268,387	0.05922%	0.02808%	0.71231%	0.52549%	
2022	10,120	5,593	6,719	4,290,817	0.05922%	0.02808%	0.71231%	0.52549%	
2023	10,126	5,594	6,766	4,313,364	0.05922%	0.02808%	0.71231%	0.52549%	
2024	10,132	5,596	6,815	4,336,031	0.05922%	0.02808%	0.71231%	0.52549%	
2025	10,138	5,597	6,863	4,358,816	0.05922%	0.02808%	0.71231%	0.52549%	
2026	10,144	5,599	6,912	4,381,721	0.05922%	0.02808%	0.71231%	0.52549%	
2027	10,150	5,600	6,961	4,404,746	0.05922%	0.02808%	0.71231%	0.52549%	
2028	10,156	5,602	7,011	4,427,892	0.05922%	0.02808%	0.71231%	0.52549%	
2029	10,162	5,604	7,061	4,451,160	0.05922%	0.02808%	0.71231%	0.52549%	
2030	10,168	5,605	7,111	4,474,550	0.05922%	0.02808%	0.71231%	0.52549%	
2031	10,174	5,607	7,162	4,498,063	0.05922%	0.02808%	0.71231%	0.52549%	
2032	10,180	5,608	7,213	4,521,700	0.05922%	0.02808%	0.71231%	0.52549%	
2033	10,186	5,610	7,264	4,545,461	0.05922%	0.02808%	0.71231%	0.52549%	
2034	10,192	5,611	7,316	4,569,347	0.05922%	0.02808%	0.71231%	0.52549%	
2035	10,198	5,613	7,368	4,593,358	0.05922%	0.02808%	0.71231%	0.52549%	

Consistent rates of growth are assumed for employment and non-residential square feet; no major developments were completed in 2010

Uses 2012 population estimate from the U.S. Census; incoroporates completion of 13 addt'l units at Bay Avenue senior homes

Uses 2012 population estimate from the U.S. Census plus addition of Pearson Street homes (assumed full occupancy, at persons per household equivalent to 2012)

Assumes completion of 23 multi-family units at 1575 38th Avenue, approved in 2013; assumes persons per housing unit will be equivalent to 2012/13 levels.

Carbon Intensity Modifiers (Source: ICLEI- SEEC ClearPath Carbon Intensity Reference Sheet, https://s3.amazonaws.com/CEMS_Docs/SEEC+ClearPath+Carbon+Intensity+Reference+Sheet.pdf)

Name	RPS Scenario 1
1990-1994	
1995-1999	
2000-2004	
2005-2009	
2010-2014	-.045
2015-2019	-.059
2020-2024	
2025-2029	
2030-2034	
2035-2039	
2040-2044	
2045-2049	
Notes	

Name	Pavley I & II
1990-1994	
1995-1999	
2000-2004	
2005-2009	
2010-2014	-.006
2015-2019	-.017
2020-2024	-.02
2025-2029	-.018
2030-2034	-.012
2035-2039	-.006
2040-2044	-.002
2045-2049	-.001
Notes	

References (Source- ICLEI ClearPath Carbon Intensity Reference Sheet, https://s3.amazonaws.com/CEMS_Docs/SEEC+ClearPath+Carbon+Intensity+Reference+Sheet.pdf) :

Carbon Intensity Factors for California RPS

Utility	2010-1014	2015-2019
Anaheim Public Utilities	-0.031	-0.024
City and County of San Francisco	-0.031	-0.024
City of Palo Alto Public Utilities	-0.031	-0.024
Glendale Water & Power	-0.030	-0.031
Los Angeles Department of Water & Power	-0.024	-0.028
Pacific Gas & Electric Company	-0.045	-0.059
PacifiCorp	-0.031	-0.024
Pasadena Water & Power	-0.030	-0.031
Riverside Public Utilities	-0.030	-0.031
Roseville Electric	-0.030	-0.031
Sacramento Municipal Utility District	-0.037	-0.046
San Diego Gas & Electric	-0.058	-0.053
Sierra Pacific Resources	-0.031	-0.024
Southern California Edison	-0.028	-0.034
Turlock Irrigation District	-0.030	-0.031
CA Total	-0.034	-0.034

VMT Carbon Intensity Factors for Pavley/CAFE

Forecast Period	Passenger Vehicle Carbon Intensity Factors	All Traffic Carbon Intensity Factors
2010-2014	-0.007	-0.006
2015-2019	-0.022	-0.017
2020-2024	-0.026	-0.020
2025-2029	-0.023	-0.018
2030-2034	-0.015	-0.012
2035-2039	-0.008	-0.006
2040-2044	-0.003	-0.002
2045-2049	-0.001	-0.001

Transportation							
On-Road Transportation Emission Coefficients							
Vehicle Classification	**LDA**	**LDT1**	**LDT2**	**MDV**	**LHDT1**	**LHDT2**	**MHDT**
CO2 Emissions Factor (g/mi)	410.4938272	504.2668735	508.1300813	692.717584369	940.1709402	869.5652174	1481.481481
CH4 Emission Factor (g/mi)	0.049382716	0.069821567	0.054200542	0.053285968	0.085470085	0.144927536	0.092592593
Vehicle Classification	**HHDT**	**OBUS**	**SBUS**	**UB**	**MH**	**MCY**	
CO2 Emissions Factor (g/mi)	1951.219512	0	1111.111111	2608.69565217	909.0909091	114.9425287	
CH4 Emission Factor (g/mi)	0.243902439	0	0	0	0	0.344827586	

Source: Capitola 2010 Baseline GHG Inventory, Association of Monterey Bay Area Governments-EMFAC Model Outputs

Solid Waste

Landfilled Solid Waste Coefficient
0.1826 MTCO2e per ton of waste

Source: Capitola 2010 Baseline GHG Inventory- Association of Monterey Bay Area Governments- CACP Outputs

Individual Waste Material Types	CH4 Coefficient (Metric Tons of CH4 per Ton of Waste)
Paper Products	0.09237
Food Waste	0.05229
Plant Waste	0.02963
Wood/Textile	0.02614

Source: ICLEI- CACP Outputs

Waste Characterization	
Percentage Mixed MSW	0
Percentage Newspaper	1.3
Percentage Office Paper	4.9
Percentage Corrugated Cardboard	5.2
Percentage Magazines / Third Class Mail	5.9
Percentage Food Scraps	15.5
Percentage Grass	1.9
Percentage Leaves	1.9
Percentage Branches	3.3
Percentage Dimensional Lumber	14.5

Source: Data from 2008 California Overall Waste Characterization Study (http://www.calrecycle.ca.gov/Publications/Documents/General/2009023.pdf)

Electricity

Purveyor	CO2 (lbs/kWh)	CH4 (lbs/kWh)	N2O (lbs/kWh)	CO2e (metric tonnes/kWh)
PG&E	0.445	0.000029	0.000011	0.0002036737
Direct Access	0.74509	0.000044	0.000006	0.0003392334

Source: Pacific Gas & Electric/AMBAG

Natural Gas

	CO2 (lbs/kWh)	CH4 (lbs/kWh)	N2O (lbs/kWh)	CO2e (metric tonnes/therm)
PG&E	11.7	0.001		0.00532

Source: Pacific Gas & Electric/AMBAG

Community Wide Energy Usage and Savings Data and Infographics for Jurisdictions of the Association of Monterey Bay Area Governments

Provided to:	Chris Sentieri csentieri@ambag.org
from	AMBAG
Date:	12/15/2012
Provided by (PG&E Representative):	John Joseph Green Communities and Innovator Pilots
Contact Information	GHGDataRequests@pge.com (415) 973-5737

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Residential Solar PV Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-340
Peak/Maximum Annual MTCO2e Reduction:	-10

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions
• 1643 kWh/yr per kW of Installed Capacity
• Phase I model Assumes an Additional 10 kW of Installed Solar PV per year for the duration of the Measure Implementation

Start Year: 2015 **End Year:** 2019

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Increased Residential Solar Photovoltaic

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Solar PV Generation Reference Sheet:

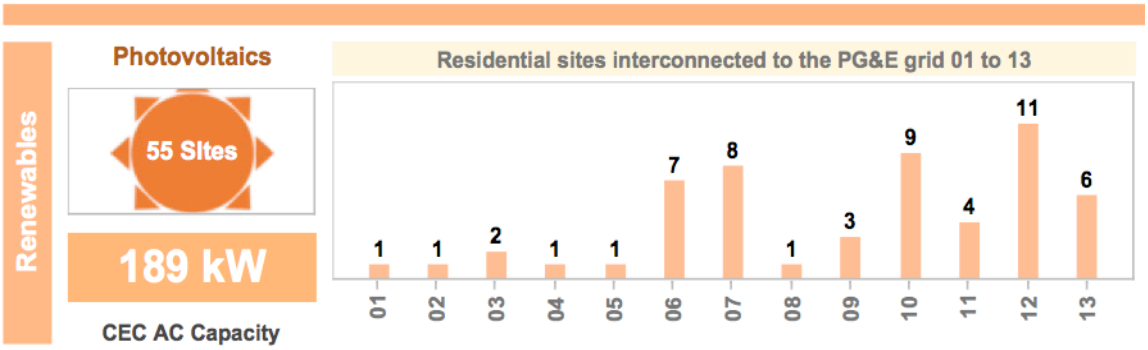
Air District	Average Generation per kW installed Capacity (kWh/yr)
Amador County	1,619
Antelope Valley	1,678
Bay Area	1,643
Butte County	1,619
Calaveras County	1,619
Colusa County	1,619
El Dorado County	1,758
Feather River	1,619
Glenn County Orland	1,619
Great Basin Unified	1,836
Imperial County	1,706
Kern County	1,694
Lake County	1,619
Lassen County	1,758
Mariposa County	1,688
Mendocino County	1,643
Modoc County	1,758
Mojave Desert	1,962
Monterey Bay Unified	1,643
North Coast Unified	1,360
Northern Sierra	1,619
Northern Sonoma County	1,644
Placer County	1,619
Sacramento Metro	1,619
San Diego County	1,704
San Joaquin Valley Unified	1,688
San Luis Obispo County	1,782
Santa Barbara County	1,782
Shasta County	1,360
Siskiyou County	1,454
South Coast	1,678
Tehama County	1,619
Tuolumne County	1,619
Ventura County	1,678
Yolo-Solano	1,619

*Adapted from Table AE-2.1 of Quantifying Greenhouse Gas Mitigation Measures. CAPCOA. August 2010. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

ICLEI/SEEC ClearPath Increased Residential Solar Photovoltaic Calculator Inputs:

Increased Solar Capacity	10	kW Installed Capacity / Year
Energy Impacts		
Use this Reference Sheet for guidance on the generation potential in your area.		
Generation Potential	1,643	kWh / kW Installed Capacity

Historical Uptake of Solar PV in Capitola's Residential sector:



Source: PG&E/AMBAG

Residential Solar PV Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -1411

Peak/Maximum Annual MTCO2e Reduction: -50

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumption:
• 1643 kWh/yr per kW of Installed Capacity
• Phase II model Assumes an Additional 60 kW of Installed Solar PV per year for the duration of the Measure Implementation

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Increased Residential Solar Photovoltaic

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Increased Residential Solar Photovoltaic Calculator Inputs:

Residential Solar Hot Water Heaters Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-500
Peak/Maximum Annual MTCO2e Reduction:	-25

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Electricity Savings per system installed = 2889 kWh/yr
- Natural Gas Savings per system installed = 137 therms/yr
- Percent of Homes with Electric Water Heating = 20%
- Model assumes 10 Additional Systems Installed annually for the duration of the measure

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Increased Residential Solar Thermal

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Solar Thermal Reference Sheet:

Average per Unit Energy Savings for Solar Thermal Systems by Climate Zone

California Climate Zone	Average Gas Saved (Therms)	Average Electricity Saved (kWh)
Climate Zone 1	112	2332
Climate Zone 2	139	2889
Climate Zone 3	137	2889
Climate Zone 4	142	2975
Climate Zone 5	148	3128
Climate Zone 6	139	2908
Climate Zone 7	139	2904
Climate Zone 8	146	3051
Climate Zone 9	147	3048
Climate Zone 10	144	3068
Climate Zone 11	133	2732
Climate Zone 12	137	2832
Climate Zone 13	141	2879
Climate Zone 14	147	3024
Climate Zone 15	142	2822
Climate Zone 16	136	2836
Statewide Average	139	2895

* Values obtained from Solar Rating & Certification Corporation (http://securedb.fsec.ucf.edu/srcc/Annual_search?action=search&show_options=1&debug=0&mlocation=0&mcompany=0) Accessed August 3, 2011.

ICLEI/SEEC ClearPath Increased Residential Solar Thermal Calculator Inputs:

Number of Systems Installed Annually	10	Systems Installed / Year
Energy Impacts		
Specify the split between homes that have electric vs natural gas water heating and the savings potential for each fuel type. Use the following Reference Sheet for guidance on the savings potential.		
Percent of Homes with Electric Water Heating	20	%
Electricity Savings per System	2889	kWh / System / Year
Natural Gas Savings per System	137	Therms / System / Year

Non-Residential Solar PV Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-406
Peak/Maximum Annual MTCO2e Reduction:	-13

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumption:
• 1643 kWh/yr per kW of Installed Capacity
• Phase I model Assumes an Additional 15 kW of Installed Solar PV per year for the duration of the Measure Implementation

Start Year: 2018 **End Year:** 2022

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Increased Commercial Solar Photovoltaic

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Solar PV Generation Potential Reference Sheet:

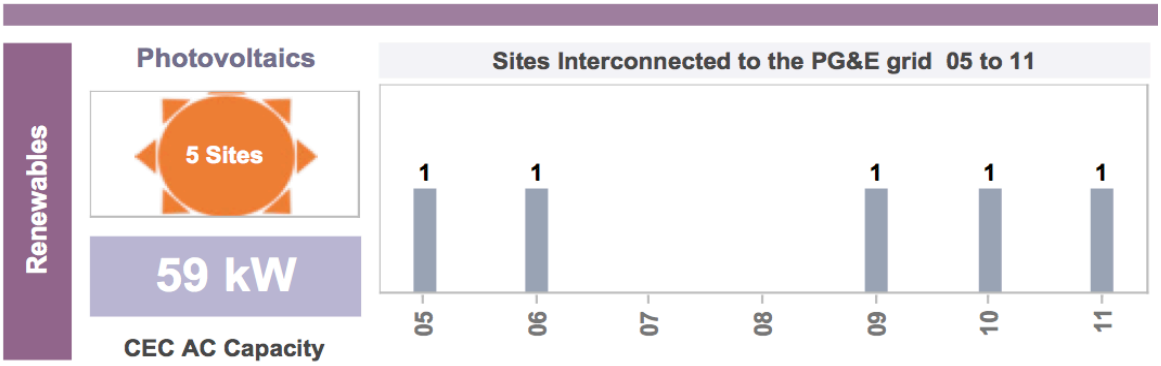
Air District	Average Generation per kW installed Capacity (kWh/yr)
Amador County	1,619
Antelope Valley	1,678
Bay Area	1,643
Butte County	1,619
Calaveras County	1,619
Colusa County	1,619
El Dorado County	1,758
Feather River	1,619
Glenn County Orland	1,619
Great Basin Unified	1,836
Imperial County	1,706
Kern County	1,694
Lake County	1,619
Lassen County	1,758
Mariposa County	1,688
Mendocino County	1,643
Modoc County	1,758
Mojave Desert	1,962
Monterey Bay Unified	1,643
North Coast Unified	1,360
Northern Sierra	1,619
Northern Sonoma County	1,644
Placer County	1,619
Sacramento Metro	1,619
San Diego County	1,704
San Joaquin Valley Unified	1,688
San Luis Obispo County	1,782
Santa Barbara County	1,782
Shasta County	1,360
Siskiyou County	1,454
South Coast	1,678
Tehama County	1,619
Tuolumne County	1,619
Ventura County	1,678
Yolo-Solano	1,619

*Adapted from Table AE-2.1 of Quantifying Greenhouse Gas Mitigation Measures. CAPCOA. August 2010. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

ICLEI/SEEC ClearPath Increased Commercial Solar Photovoltaic Inputs:

Increased Solar Capacity	15	kW Installed Capacity / Year
Energy Impacts		
Use this Reference Sheet for guidance on the generation potential in your area.		
Generation Potential	1,643	kWh / kW Installed Capacity

Historical Uptake of Solar PV in Capitola's Non-Residential sector:



Source: PG&E/AMBAG

Non-Residential Solar PV Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -1832

Peak/Maximum Annual MTCO2e Reduction: -66

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• 1643 kWh/yr per kW of Installed Capacity

• Phase II model Assumes an Additional 75 kW of Installed Solar PV per year for the duration of the Measure Implementation

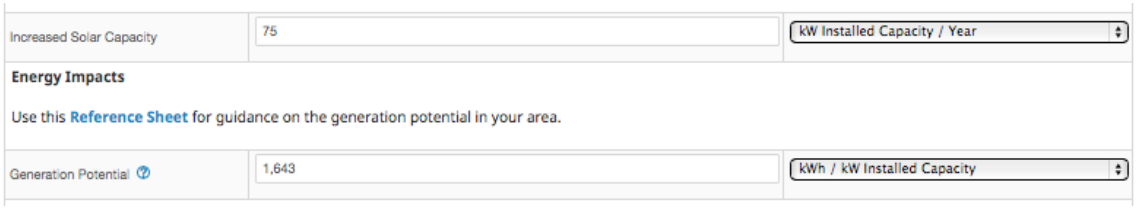
Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Increased Commercial Solar Photovoltaic

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Increased Commercial Solar Photovoltaic Calculator Inputs:



EUC Whole Home Retrofit Program- Electricity Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -200

Peak/Maximum Annual MTCO2e Reduction: -8

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Average Annual Electricity Savings = 750 kWh/yr per participating residence
• Phase I model assumes 20 Participating Residences per year for the duration of the Measure Implementation

Start Year: 2015 **End Year:** 2019

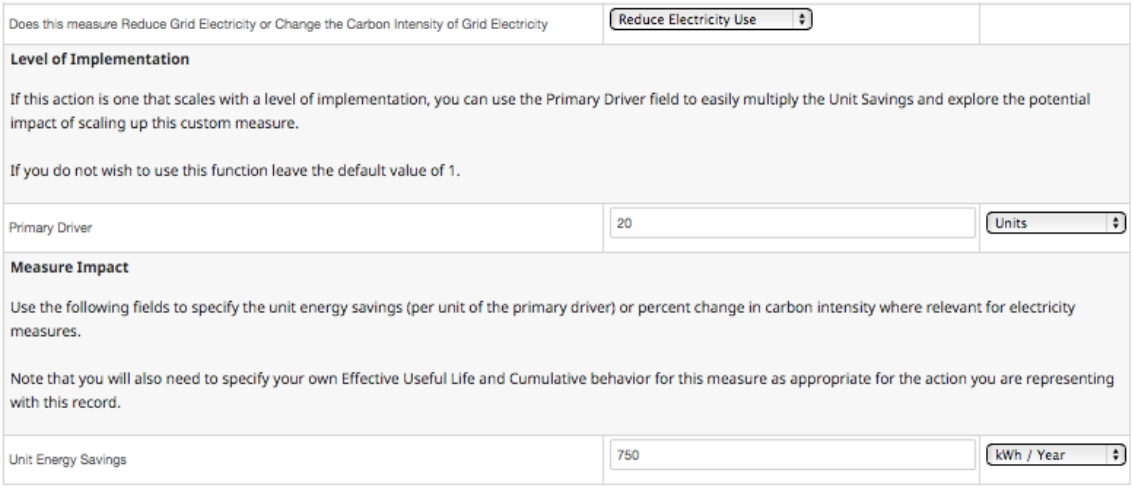
Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Electricity

Source Data, Calculator Inputs and Supporting References

Average Electricity Savings (per Participating Account): 750 kWh/yr
SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Residential Electricity Calculator Inputs:



Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	20	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	750	kWh / Year

EUC Whole Home Retrofit Program- Electricity Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -702

Peak/Maximum Annual MTCO2e Reduction: -28

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Average Annual Electricity Savings = 750 kWh/yr per participating residence
• Phase II model assumes 50 Participating Residences per year for the duration of the Measure Implementation

Start Year: 2020 **End Year:** 2029

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Electricity

Source Data, Calculator Inputs and Supporting References

Average Electricity Savings (per Participating Account): 750 kWh/yr
SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Residential Electricity Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	50	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	750	kWh / Year

EUC Whole Home Retrofit Program- Natural Gas Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -2350

Peak/Maximum Annual MTCO2e Reduction: -235

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Average Annual Electricity Savings = 445 therms/yr per participating residence
• Phase I model assumes 20 Participating Residences per year for the duration of the Measure Implementation

Start Year: 2015 **End Year:** 2019

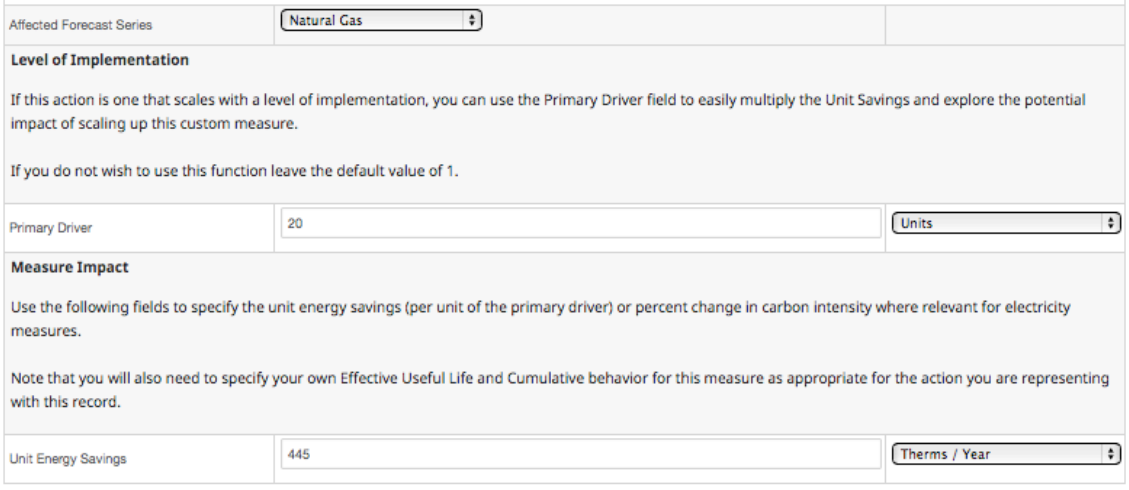
Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Natural Gas

Source Data, Calculator Inputs and Supporting References

Average Electricity Savings (per Participating Account): 445 therms/yr
SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Residential Natural Gas Calculator Inputs:



EUC Whole Home Retrofit Program- Natural Gas Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -11700

Peak/Maximum Annual MTCO2e Reduction: -1170

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Average Annual Electricity Savings = 445 therms/yr per participating residence
• Phase II model assumes 50 Participating Residences per year for the duration of the Measure Implementation

Start Year: 2020 **End Year:** 2029

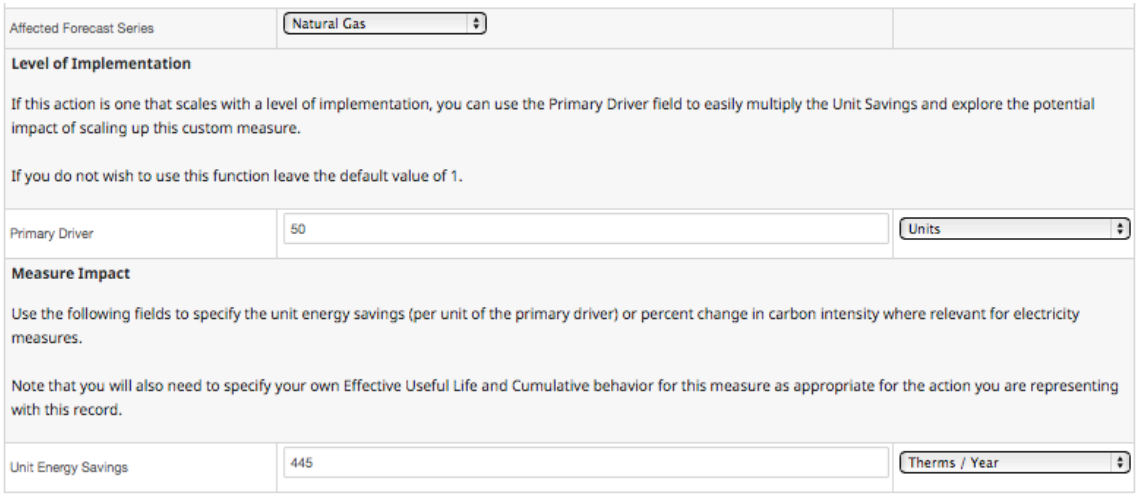
Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Natural Gas

Source Data, Calculator Inputs and Supporting References

Average Electricity Savings (per Participating Account): 445 therms/yr
SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Residential Natural Gas Calculator Inputs:



Residential Energy Efficiency Education Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -4569

Peak/Maximum Annual MTCO2e Reduction: -266

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Average Annual Electricity Savings = 619 kWh/yr per participating residence
• Average Annual Natural Gas Savings = 56 therms/yr per participating residence
• Phase I model assumes 150 Participating Homes annually for the duration of the Measure Implementation.

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Residential Energy Efficiency Education

Source Data, Calculator Inputs and Supporting References

Average Annual Electricity (619/kWh/yr) and Natural Gas (56 therms/yr) per participating residence from: Information Gateway measure listed in Options for Energy Efficiency in Existing Buildings, report number CEC-400-2005-039 (http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF)

ICLEI/SEEC ClearPath Residential Energy Efficiency Education Calculator Inputs:

Residential Energy Efficiency Education Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -3578

Peak/Maximum Annual MTCO2e Reduction: -235

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Annual Electricity Savings = 619 kWh/yr per participating residence
- Average Annual Natural Gas Savings = 56 therms/yr per participating residence
- Phase II model assumes 250 Participating Homes annually for the duration of the Measure Implementation

Start Year: 2030 **End Year:** 2032

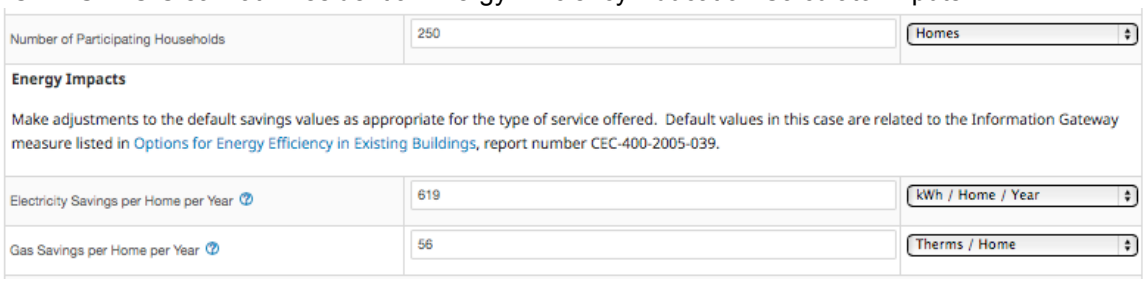
Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Residential Energy Efficiency Education

Source Data, Calculator Inputs and Supporting References

Average Annual Electricity (619/kWh/yr) and Natural Gas (56 therms/yr) per participating residence from: Information Gateway measure listed in Options for Energy Efficiency in Existing Buildings, report number CEC-400-2005-039 (http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF)

ICLEI/SEEC ClearPath Residential Energy Efficiency Education Calculator Inputs:



Number of Participating Households	250	Homes
Energy Impacts		
Make adjustments to the default savings values as appropriate for the type of service offered. Default values in this case are related to the Information Gateway measure listed in Options for Energy Efficiency in Existing Buildings, report number CEC-400-2005-039.		
Electricity Savings per Home per Year	619	kWh / Home / Year
Gas Savings per Home per Year	56	Therms / Home

Residential Weatherization Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -2615

Peak/Maximum Annual MTCO2e Reduction: -170

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Annual Electricity Savings per participating residence = 261 kWh/yr
- Average Annual Natural Gas Savings per participating residence = 125 therms/yr
- Model assumes 50 Participating Residences per year for the duration of the Measure Implementation

Start Year: 2021 **End Year:** 2025

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Low Income Weatherization

Source Data, Calculator Inputs and Supporting References

Average Electricity (261 kWh/yr) and Natural Gas (125 therms/yr) Savings per Home from CEC. 2005. Options for Energy Efficiency in Existing Buildings. CEC-400-2005-039-CMF (http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF)

ICLEI/SEEC ClearPath Low Income Weatherization Calculator Inputs:

Number of Homes Weatherized Each Year	50	Homes
Energy Impacts		
Make adjustments to the default savings values as appropriate for the type of service offered. Default values in this case cover a basic weatherization program consisting largely of equipment tune-ups in multi-family housing. See Options for Energy Efficiency in Existing Buildings, report number CEC-400-2005-039 for more options.		
Electricity Savings per Home per Year	261	kWh / Home / Year
Gas Savings per Home per Year	125	Therms / Home

Community Choice Aggregation- Residential Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -18263

Peak/Maximum Annual MTCO2e Reduction: -627

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• CCA Program at Full Enrollment at 2020 “Start Date” for Phase I Measure (ie- program launched prior to 2020, and has phased in Full Customer Load Base by 2020)
• Increasing Renewable and Carbon Free Content (Reduced Carbon Intensity)- 5% Annually for duration of Phase I Implementation

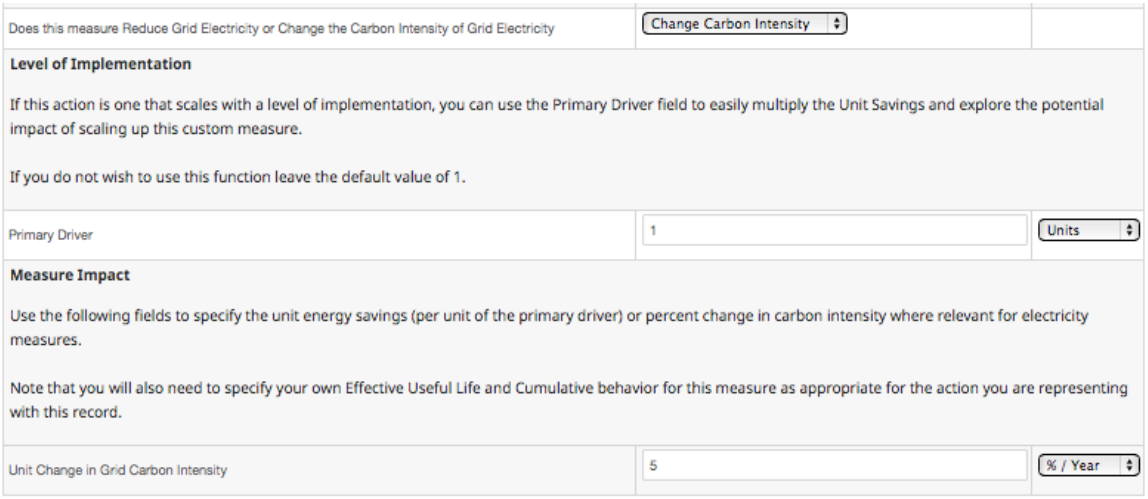
Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Electricity (Carbon Intensity)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Residential Electricity (Carbon Intensity) Calculator Inputs:



NOTE: See Community Choice Aggregation Non-Residential Phase I section for additional references provided for context and qualitative comparisons of GHG Impact Modeling approaches and outcomes.

Community Choice Aggregation- Residential Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -20580

Peak/Maximum Annual MTCO2e Reduction: -850

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Increasing Renewable and Carbon Free Content (Reduced Carbon Intensity)- 10% Annually for duration of Phase II Implementation

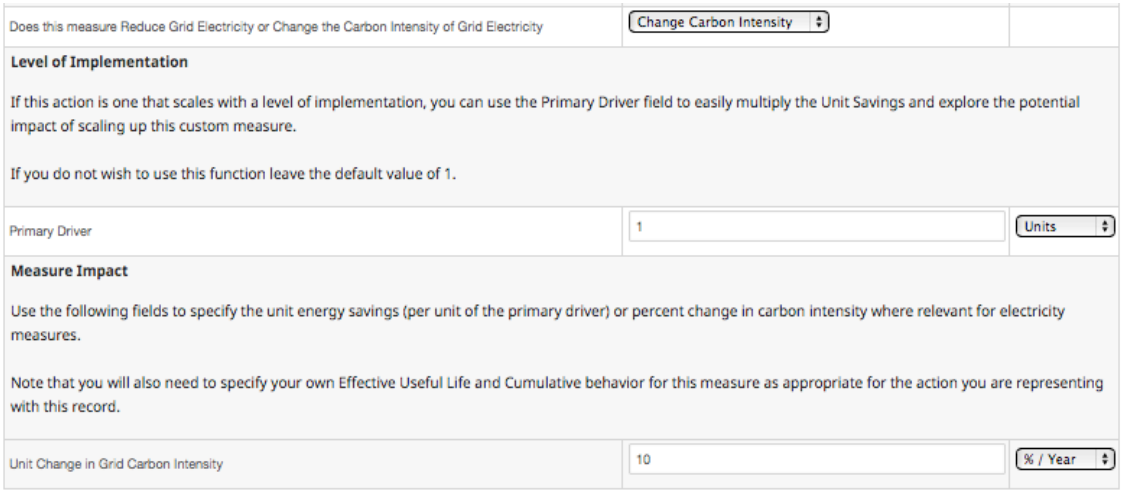
Start Year: 2025 **End Year:** 2029

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Electricity (Carbon Intensity)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Residential Electricity (Carbon Intensity) Calculator Inputs:



Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Change Carbon Intensity	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Change in Grid Carbon Intensity	10	% / Year

Community Choice Aggregation- Residential Phase III Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -15849

Peak/Maximum Annual MTCO2e Reduction: -815

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Increasing Renewable and Carbon Free Content (Reduced Carbon Intensity)- 20% Annually for duration of Phase III Implementation

Start Year: 2030 **End Year:** 2034

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Residential Electricity (Carbon Intensity)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Residential Electricity (Carbon Intensity) Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Change Carbon Intensity	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Change in Grid Carbon Intensity	20	% / Year

Community Choice Aggregation- Non-Residential Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -28219

Peak/Maximum Annual MTCO2e Reduction: -968

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• CCA Program at Full Enrollment at 2020 “Start Date” for Phase I Measure (ie- program launched prior to 2020, and has phased in Full Customer Load Base by 2020)

• Increasing Renewable and Carbon Free Content (Reduced Carbon Intensity)- 5% Annually for duration of Phase I Implementation

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Commercial Electricity (Carbon Intensity)

Source Data, Calculator Inputs and Supporting References

Inputs:

Affected Forecast Series	Electricity	
Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Change Carbon Intensity	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Change in Grid Carbon Intensity	5	% / Year

NOTE: The following references are provided for context and qualitative comparisons of GHG Impact Modeling approaches and outcomes.

Source: Sonoma Clean Power CCA Feasibility Study, pg 40 (http://www.leanenergyus.org/wp-content/uploads/2013/10/Sonoma.CCA-Feasibility-Study.2011.pdf)

Figure 9: Forecasted GHG Emissions

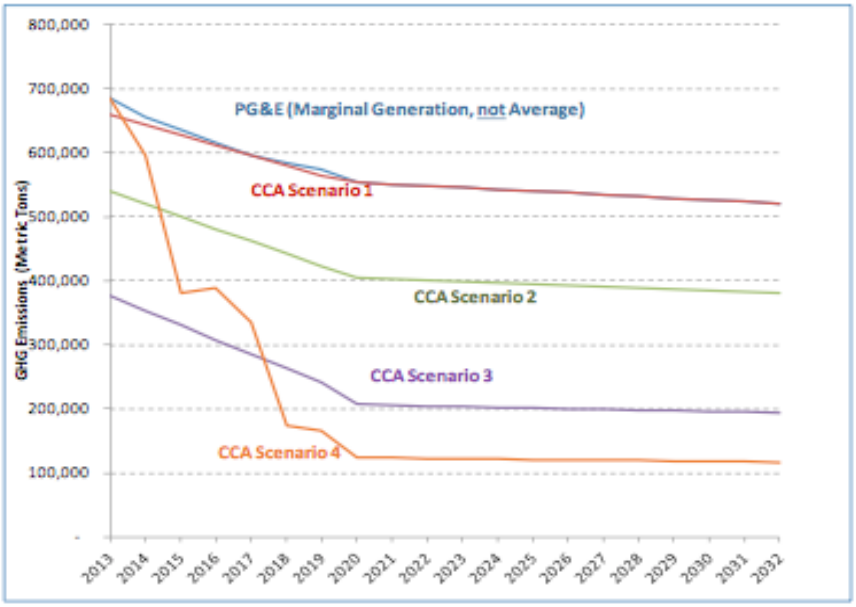


Figure 22: Scenario 4 Annual GHG Emissions

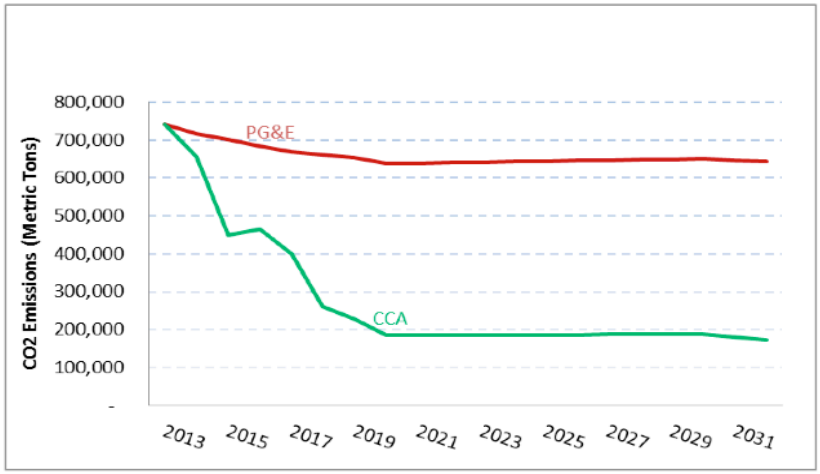


Table 16: Scenario 4 GHG Reductions

GHG Metric	Amount
GHG Reduction, Cumulative (2013-2032)	7.6 Million Metric Tons CO_2
GHG Reduction, Annual	380,000 Metric Tons CO_2
GHG Reduction, Change in Electric Sector CO_2 emissions	-58%

Greenhouse Gas Impacts

To calculate the greenhouse gas (GHG) impacts of the Sonoma CCA providing service to customers instead of PG&E it is necessary to identify the marginal generating resources on the PG&E system that would not operate due to Sonoma's departure. The emission factors for these resources can be used to create a baseline for comparison with each of the Draft Report's scenarios. If Sonoma customers were to depart, PG&E would need to procure less renewable generation in order to meet the state's standard, thus it is reasonable to apply the same renewable standard to avoided generation assumptions. The remainder of the baseline consists of electricity generation "on the margin" that PG&E would not procure due to customer departure.

DMC's baseline emissions rate assumption properly includes the RPS percentage, and for the remainder relies on the unspecified power emissions rate as determined by the California Air and Resources Board of 0.435 Metric Tons/MWh. This is probably a conservative assumption (i.e., the emissions rate avoided by the CCA) because this emissions rate includes both marginal resources and more efficient gas-fired resources that are likely to be on the margin for very few hours of the year, if at all. A more accurate emission rate may be 0.499 Metric Tons/MWh, which is the value recommended by the California Energy Commission and the California Public Utilities Commission.[20] Updating the assumption for the higher marginal emissions rate yields a baseline emissions rate that is ~15% higher than the emissions rate used in DMC's analysis. Thus, the Draft Report may *underestimate* the GHG emission reductions associated with the CCA.

It should also be noted that even with accelerated renewables deployment, the Sonoma CCA's *average* emission rates would exceed PG&E's average emission rates in all but the most aggressive scenario. This is due to PG&E's fleet of GHG-neutral generation resources, in particular its large hydroelectric facilities and nuclear power generation.[21] While comparison of the average emission rate is not the proper means of evaluating the GHG impacts of Sonoma CCA customers departing PG&E load, Sonoma should be aware that opponents may point to these figures as they did in the case of Marin Clean Energy.

The Draft Report shows GHG emissions reductions for each scenario separately and does not offer a value for PG&E emissions. This makes it difficult to assess whether the reductions represented are a large percentage of overall emissions. Figure 9 below shows the GHG emissions expected in each year of the forecast for PG&E and for each CCA Scenario. From this figure, it is clear that the more aggressive scenarios (Scenarios 2 through 4) offer substantial reductions relative to PG&E's marginal emissions.

[20] California Air Resources Board Staff Report. Initial Statement of Reasons for Rulemaking: Revisions to the Regulation for Mandatory Reporting of Greenhouse Gas Emissions Pursuant to the California Global Warming Solutions Act of 2006. October 28, 2010, p. 168.
[21] Note that PG&E's large hydroelectric and nuclear facilities are not counted toward meeting PG&E's RPS goals.

Source: Santa Cruz County Climate Action Strategy Scoping Plan (http://www.sccoplanning.com/Portals/2/County/Planning/policy/Final%20Climate%20Action%20Strategy%20as%20of%201-10-13.pdf)

Reduction Strategy: Community Choice Aggregation Program (50% Participation, 100% Carbon-Free)
Using the emissions from the use of electricity in the 2009 inventory and the forecast emissions for 2035 as inputs, the emissions reduction represented by increasing the renewable, carbon-free content to 100 percent for 50 percent of the projected electricity load in 2035 was estimated. This effectively eliminates emissions from 50 percent of the total projected load as a result of a CCA program. 50 percent participation was chosen randomly as a conservative estimate. The goal of a successful program would be closer to 100 percent participation by 2035 with a portfolio of 100 percent carbon free sources.
Total Emissions Reduction: 83,320 MT CO_2e

County Climate Action Strategy						
Energy						
CCA (50% Participation, 100% Carbon-Free)	Evaluate CCA program	If a CCA is formed, program participation rates and energy portfolio	Annual	County	83,320	0

Table 4-1: Summary of Potential Emissions Reduction by 2035 by Strategy[1]

Strategy	With CCA		Without CCA	
	Potential Reduction Amount in 2035 (Metric Tons CO_2e)	Percent of Total Reductions Needed	Potential Reduction Amount in 2035 (Metric Tons CO_2e)	Percent of Total Reductions Needed
Statewide Initiatives				
California Clean Car Standards and Low Carbon Fuel Standards	186,450	49%	186,450	49%
California Renewable Portfolio Standard (RPS)[2]	34,820	9%	69,650	18%
Statewide Initiatives Subtotal	**221,270**	**58%**	**256,100**	**67%**
County Climate Action Strategy				
Energy				
Community Choice Aggregation Program(CCA)[3]	83,320	22%	0	0%
Energy Efficiency	35,430	9%	47,240	12%
Green Business Program	12,290	3%	23,970	6%
Renewable Energy	3,520	1%	15,060	4%
Education	800	<1%	1,200	<1%
Beyond Title 24	160	<1%	160	<1%
Energy Subtotal	**135,520**	**36%**	**87,630**	**23%**
Transportation				
Transportation Infrastructure and Land Use Planning[4]	20,130	5%	20,130	5%
Electric Vehicle Charging	10,590	3%	10,590	3%
Carpooling	3,730	1%	3,730	1%
Transportation Subtotal	**34,450**	**9%**	**34,450**	**9%**
Solid Waste				
Waste to Energy	3,770	1%	3,770	1%
Solid Waste Subtotal	**3,770**	**1%**	**3,770**	**1%**
Climate Action Strategy Subtotal	**173,740**	**46%**	**125,850**	**33%**
Total Potential Reductions in 2035	**395,010**	**104%**	**381,950**	**101%**
Total Reductions Needed in 2035	**380,000**	**100%**	**380,000**	**100%**

Notes:

(1) See Appendix D for details on emissions reductions calculations for each strategy.

(2) The Renewable Portfolio Standard (RPS) requires all of the state's electricity retailers to meet a 33 percent renewable energy target for retail power by 2020. This calculation assumes future regulations would require a 50 percent carbon free portfolio for PG&E power by 2035. The emissions reductions estimates from the RPS for our local area will vary depending on whether or not a CCA program is implemented. Reductions from a CCA program covering half the projected electricity load in 2035 are reported on a separate line. With a CCA program the reduction from the RPS is estimated by applying a 50 percent carbon free portfolio to half of the projected electricity load (PG&E customers) in 2035. Without a CCA program the reduction is estimated by applying the 50 percent carbon free portfolio to the entire projected electricity load in 2035.

(3) Reductions from energy procurement only for a program with a 100 percent carbon free portfolio applied to half the projected electricity load (CCA customers) in 2035.

(4) Research and empirical evidence shows that improvements to transportation infrastructure (transit, bike, pedestrian) and land use planning (mixed use, infill) result in reductions in vehicle miles traveled (VMT) and corresponding reductions in emissions. See Appendix D for details on the model used for this calculation.

Source: County of Santa Cruz, 2013.

Source: County of Marin Climate Action Plan (http://www.marincounty.org/~/media/files/departments/cd/planning/sustainability/climate-and-adaptation/marincapupdate_publicdraft20140825.pdf?la=en)

Table C-1. Summary of GHG Reductions, Costs, Savings, and Benefits Associated with Local Community Emissions Reduction Strategies

Strategy Area	Local Strategy	2020 GHG Reduction	Saving (cost) per MT Reduced	Net Present Value (cost)[a]	Payback (years)
ENERGY EFFICIENCY & RENEWABLE ENERGY	Energy-1. Community Choice Aggregation	2,744	Not estimated	Not estimated	Not estimated
	Energy-2.1. Community Energy Efficiency Retrofits	1,925	Not estimated	Not estimated	Not estimated
	Energy-2.2. Expand Community Energy Efficiency Retrofits Program	5,601	$340-$480	$22,000,000-$31,000,000	2-5
	Energy-2.3. Tree Planting	23	Not estimated	Not estimated	Not estimated
	Energy-3.1. Solar Installations for New Residential Development[b]	34	$23–$196 (DP); $160-$320 (PPA)	$11,000-$93,000 (DP) $74,000-$149,000 (PPA)	13-15 (DP); 0 (PPA)
	Energy-3.2. Solar Installations for New Nonresidential Development[b]	23	$27–$396 (DP); $150–$300 (PPA)	$8,700-$130,000 (DP) $49,000-$97,000 (PPA)	10-15 (DP) 0 (PPA)
	Energy-3.3. Solar Installations for Existing Residential Development[b]	3,950	$21–$179 (DP); $137–$280 (PPA)	$1,000,000-$10,000,000 (DP) $7,000,000-$15,000,000 (PPA)	13-15 (DP); 0 (PPA)

Summary Metrics:

2020 GHG Reduction[a]	% of All Reductions[b]	% of Local Reductions	% of BE Reductions[c]	Savings (Cost)/MT	Initial Capital Cost	Annual Savings (Cost)
2,744	2.6%	8.2%	15.7%	-[d]	-[d]	-[d]

[a] Presented in terms of $MTCO_2e$.

[b] State and local reductions for all sectors.

[c] Local reductions for Building Energy (BE) including energy efficiency and renewable energy strategies.

[d] Cost analysis not prepared for this measure.

Assumptions: In addition to assumptions listed in Table C-7, the following were also considered.

- The participation rate in MCE's Deep Green energy service would increase from 1% in 2012 to 5% in 2020 (MCE 2013).

Analysis Method: New MCE Deep Green customers were assumed to be previous PG&E customers (not MCE Light Green customers). The increase in participation from 1% to 5% represents a fivefold increase in Deep Green customers, and an associated fivefold increase in Deep Green electricity service. The increase in Deep Green electricity is equal to a decrease in PG&E electricity. GHG emission reductions were calculated by multiplying the new Deep Green electricity use by the 2020 RPS-adjusted emission factors for PG&E.

Community Choice Aggregation- Non-Residential Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -34839

Peak/Maximum Annual MTCO2e Reduction: -1444

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Increasing Renewable and Carbon Free Content (Reduced Carbon Intensity)- 10% Annually for duration of Phase II Implementation

Start Year: 2025 **End Year:** 2029

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Commercial Electricity (Carbon Intensity)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Commercial Electricity (Carbon Intensity) Calculator Inputs:

Affected Forecast Series	Electricity	
Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Change Carbon Intensity	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Change in Grid Carbon Intensity	10	% / Year

Community Choice Aggregation- Non-Residential Phase III Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -32175

Peak/Maximum Annual MTCO2e Reduction: -1661

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Increasing Renewable and Carbon Free Content (Reduced Carbon Intensity)- 20% Annually for duration of Phase III Implementation

Start Year: 2030 **End Year:** 2034

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Commercial Electricity (Carbon Intensity)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Commercial Electricity (Carbon Intensity) Calculator Inputs:

Affected Forecast Series	Electricity	
Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Change Carbon Intensity	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Change in Grid Carbon Intensity	20	% / Year

AMBAG Energy Watch Energy Efficiency Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -1370

Peak/Maximum Annual MTCO2e Reduction: -55

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Annual Electricity Savings (for projects completed Q1 2006 thru Q2 2012): 272,342.55 kWh/yr

• Annualized Average projection based on historical participation rates; Assumes similar participation rates to the 2006-Q2 of 2012 in future years

• Projected Energy Savings from Measure Implementation = 41,899 kWh/yr [272,343 kWh/yr / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 41,899 kWh/yr (Source: PG&E/AMBAG)]

Start Year: 2013 **End Year:** 2023

Calculator(s) Used (Source, Platform, Calculator Name)

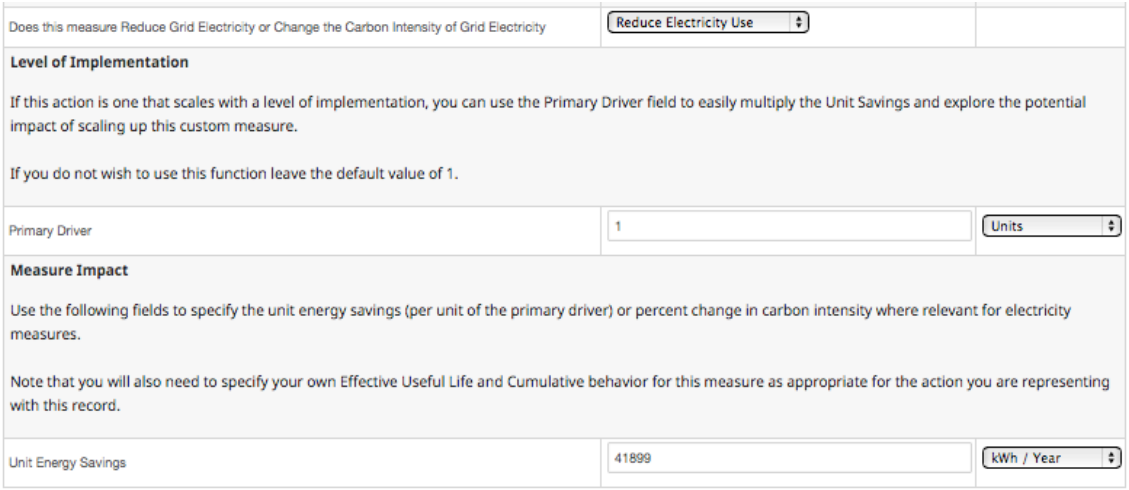
ICLEI/SEEC, ClearPath, User Defined Non-Residential Electricity

Source Data, Calculator Inputs and Supporting References

AMBAG Energy Watch Direct Install
Annual kWh Savings *(data for projects completed prior to Q2 of 2012)*
272,342.55

SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Non-Residential Electricity Calculator Inputs:



PG&E Energy Efficiency Programs- Electricity Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -11884

Peak/Maximum Annual MTCO2e Reduction: -494

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Annual Electricity Savings 2,258,627.55 kWh/yr (from projects completed 2006 thru Q2 of 2012)

• Annualized Average projection based on historical participation rates; Assumes similar participation rates to the 2006-Q2 of 2012 in future years

• Projected Energy Savings from Measure Implementation = 347,481 kWh/yr [2,258,627.55 kWh/yr / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 347,481 kWh/yr (Source: PG&E/AMBAG)]

Start Year: 2013 **End Year:** 2023

Calculator(s) Used (Source, Platform, Calculator Name)

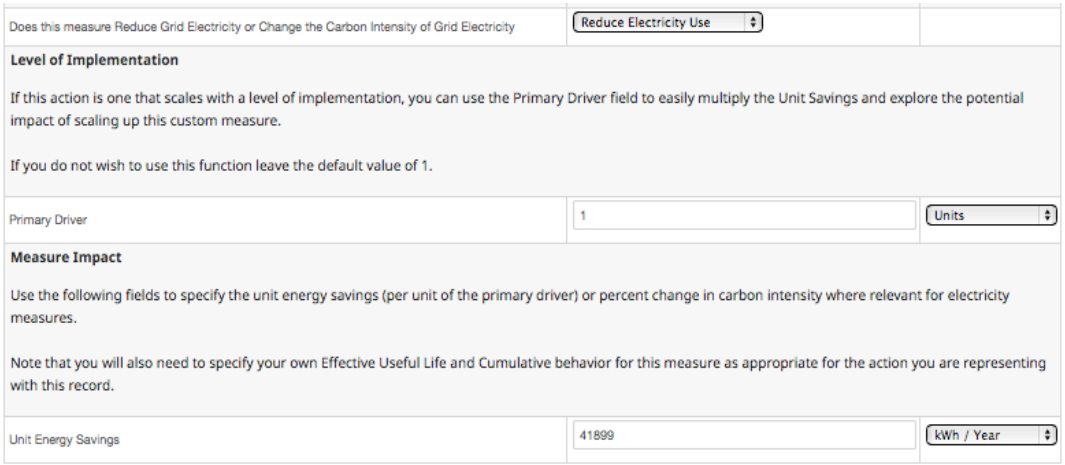
ICLEI/SEEC, ClearPath, User Defined Non-Residential Electricity

Source Data, Calculator Inputs and Supporting References

PG&E Energy Efficiency Programs
Annual kWh Savings *(data for projects completed prior to Q2 of 2012)*
2,258,627.55

SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Non-Residential Electricity Calculator Inputs:



PG&E EE Programs Included in this calculation (note- does not include Energy Watch or Right Lights, which were modeled separately)

AG CALCULATED INCENTIVES
MASS MARKET COMMERCIAL (NONRESIDENTIAL)
AGRICULTURAL PROGRAMS - CALCULATED
UNIVERSITY OF CALIFORNIA/CALIFORNIA STATE UNIVERSITY
Agricultural Programs - Deemed
SCHOOL & COLLEGES (IOU)
Heavy Industry Energy Efficiency Program
CALIFORNIA COMMUNITY COLLEGES
Commercial Programs - Deemed
COM CALCULATED INCENTIVES
DEPARTMENT OF CORRECTIONS AND REHABILITATION
Commercial Industrial Boiler Efficiency Program
SAVINGS BY DESIGN COMMERCIAL NEW CONSTRUCTION
Air Care Plus
HI-TECH FACILITIES (IOU)
IND CALCULATED INCENTIVES
School Energy Efficiency
HOSPITALITY FACILITIES (IOU)
RETAIL STORES (IOU)
Ozone Laundry Energy Efficiency
EnergySmart Grocer
HeatWise Program, Energy Solutions
SmartVent for Energy-Efficient Kitchens
LARGE COMMERCIAL (IOU)
Cool Controls Plus
Coin Operated Laundry CAL_UCONS
Wine Industry Efficiency Solutions
FAB PRCSS & HVY INDL MFG (IOU)
CAMPUS HOUSING EFFICIENCY SOLUTIONS D&R INTERNATIONAL
HVAC - Upstream Equip
MASS MARKET RESIDENTIAL
Industrial Programs - Deemed
Pre-rinse Spray Valve Installation CUWWC

Residential Programs - Multifamily
Residential Programs - Home EE Rebates
HVAC - Res and Com Quality Maintenance
California Preschool Energy Efficiency Program
California Preschool Energy Efficiency Program (CPEEP), LIF
Comprehensive Retail Energy Management
Cool and Light Program, Energy Solutions
Ecos Air Program
Energy Efficiency Program for Entertainment Centers
Energy Efficiency Services for Oil and Gas Production
Industrial Refrigeration Performance Plus
K-12 Private Schools and Colleges Audit Retrofit
LED Accelerator
LodgingSavers
MEDICAL FACILITIES (IOU)
PGE Comprehensive Manufactured Mobile Home - Synergy Company
PGE ONSITE (Ag & Food Processing)
PUMP EFFICIENCY SERVICES
Process Wastewater Treatment EM Pgm for Ag Food Processing
Retail Furniture Store Energy Efficiency Program
STATE OF CALIFORNIA
Small Commercial Comprehensive Refrigeration (SCCR) Program

PG&E Energy Efficiency Programs- Natural Gas Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-1210
Peak/Maximum Annual MTCO2e Reduction:	-110

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Annual Natural Gas Savings: 2187 Therms/yr (from projects completed Q1 of 2006 thru Q2 of 2012)

• Annualized Average projection based on historical participation rates; Assumes similar participation rates to the 2006-Q2 of 2012 in future years

• Projected Energy Savings from Measure Implementation = 2186.6 therms/yr calculation: [14,213 (therms/yr from 2006 thru Q2 of 2012) / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 2186.6 Therms/yr (Source: PG&E/AMBAG)]

Start Year: 2013 **End Year:** 2023

Calculator(s) Used- (Source, Platform, Calculator Name)

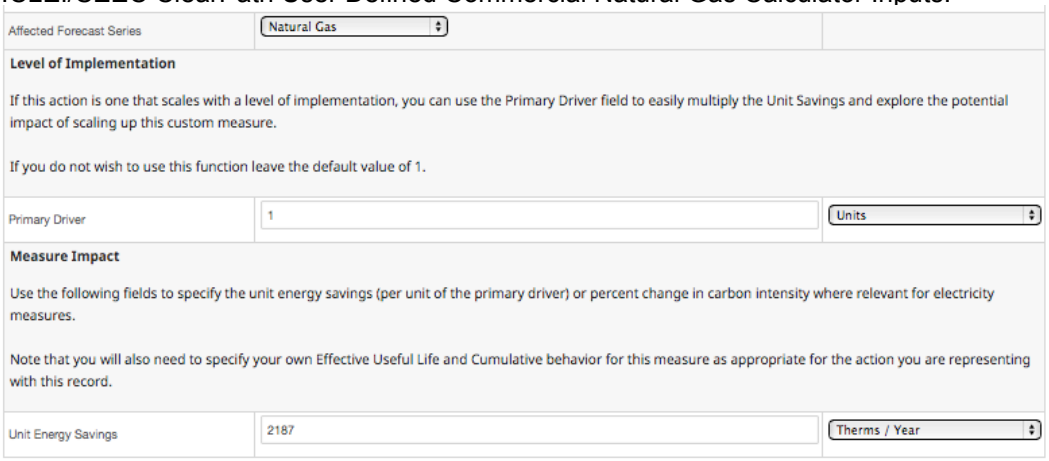
ICLEI/SEEC, ClearPath, User Defined Commercial Natural Gas

Source Data, Calculator Inputs and Supporting References

PG&E Programs
Annual Therm Savings *(data for projects completed prior to Q2 of 2012)*
14,213.00

SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Commercial Natural Gas Calculator Inputs:



Affected Forecast Series	Natural Gas	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	2187	Therms / Year

PG&E EE Programs Included in this calculation (note- does not include Energy Watch or Right Lights, which were modeled separately)

AG CALCULATED INCENTIVES
MASS MARKET COMMERCIAL (NONRESIDENTIAL)
AGRICULTURAL PROGRAMS - CALCULATED
UNIVERSITY OF CALIFORNIA/CALIFORNIA STATE UNIVERSITY
Agricultural Programs - Deemed
SCHOOL & COLLEGES (IOU)
Heavy Industry Energy Efficiency Program
CALIFORNIA COMMUNITY COLLEGES
Commercial Programs - Deemed
COM CALCULATED INCENTIVES
DEPARTMENT OF CORRECTIONS AND REHABILITATION
Commercial Industrial Boiler Efficiency Program
SAVINGS BY DESIGN COMMERCIAL NEW CONSTRUCTION
Air Care Plus
HI-TECH FACILITIES (IOU)
IND CALCULATED INCENTIVES
School Energy Efficiency
HOSPITALITY FACILITIES (IOU)
RETAIL STORES (IOU)
Ozone Laundry Energy Efficiency
EnergySmart Grocer
HeatWise Program, Energy Solutions
SmartVent for Energy-Efficient Kitchens
LARGE COMMERCIAL (IOU)
Cool Controls Plus
Coin Operated Laundry CAL_UCONS
Wine Industry Efficiency Solutions
FAB PRCSS & HVY INDL MFG (IOU)
CAMPUS HOUSING EFFICIENCY SOLUTIONS D&R INTERNATIONAL
HVAC - Upstream Equip
MASS MARKET RESIDENTIAL
Industrial Programs - Deemed
Pre-rinse Spray Valve Installation CUWWC

Residential Programs - Multifamily
Residential Programs - Home EE Rebates
HVAC - Res and Com Quality Maintenance
California Preschool Energy Efficiency Program
California Preschool Energy Efficiency Program (CPEEP), LIF
Comprehensive Retail Energy Management
Cool and Light Program, Energy Solutions
Ecos Air Program
Energy Efficiency Program for Entertainment Centers
Energy Efficiency Services for Oil and Gas Production
Industrial Refrigeration Performance Plus
K-12 Private Schools and Colleges Audit Retrofit
LED Accelerator
LodgingSavers
MEDICAL FACILITIES (IOU)
PGE Comprehensive Manufactured Mobile Home - Synergy Company
PGE ONSITE (Ag & Food Processing)
PUMP EFFICIENCY SERVICES
Process Wastewater Treatment EM Pgm for Ag Food Processing
Retail Furniture Store Energy Efficiency Program
STATE OF CALIFORNIA
Small Commercial Comprehensive Refrigeration (SCCR) Program

Hospitality Energy Efficiency Campaign- Electricity Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -2491

Peak/Maximum Annual MTCO2e Reduction: -112

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Annual Electricity Savings = 15,542 kWh/yr per Participating Hospitality Firm
• Model assumes 10 Participating Firms annually for the duration of the Measure Implementation

Start Year: 2015 **End Year:** 2019

Calculator(s) Used- (Source, Platform, Calculator Name)

AMBAG Energy Watch, Excel, PG&E Savings Browser Weighted Average
ICLEI/SEEC, ClearPath, User Defined Electricity

Source Data, Calculator Inputs and Supporting References

Top 3 Using Sectors (kwh)					
		SAIDs	Part.	Total Usage	Total Savings
Retail	Small	166	14	1,361,727	129,588
	Medium	72	10	2,841,236	294,822
	Large	132	32	15,238,789	1,761,348
Hospitality	Small	47	3	417,841	34,602
	Medium	52	11	3,655,642	115,108
	Large	106	14	2,966,593	281,343
Offices	Small	195	7	819,347	86,550
	Medium	110	6	1,409,112	139,931
	Large	54	12	1,973,221	89,856

Top 3 Saving	Sectors (kwh)				
		SAIDs	Part.	Total Usage	Total Savings
Retail	Small	166	14	1,361,727	129,588
	Medium	72	10	2,841,236	294,822
	Large	132	32	15,238,789	1,761,348
Hospitality	Small	47	3	417,841	34,602
	Medium	52	11	3,655,642	115,108
	Large	106	14	2,966,593	281,343
Offices	Small	195	7	819,347	86,550
	Medium	110	6	1,409,112	139,931
	Large	54	12	1,973,221	89,856

Source: PG&E/AMBAG

AMBAG Energy Watch/PG&E Savings Browser Weighted Average Calculator Inputs/Outputs:

Weighted Average Calculator- kWh (Electricity)

	Relative Segment Size (by # of SAID)	Relative Segment Size (by Usage)	Percent of Participation	Segment	SAIDs	Part.	Total Usage	Total Savings	AVG Savings	Weighted AVG Savings (*based on Historical Uptake)	Distributed AVG Savings (*based on Relative Segment Size)
Capitola_Inc Hospitality	23%	6%	11%	Small	47	3	417,841	34,602	11,534	1,236	2,644
	25%	52%	39%	Medium	52	11	3,655,642	115,108	10,464	4,111	2,654
	52%	42%	50%	Large	106	14	2,966,593	281,343	20,096	10,048	10,391
	100%	100%	100%	Totals	205	28	7,040,076	431,053	Final AVG	15,395	15,690
									Verification	431,053	n/a
								Double Weighted Average (*based on Historical Uptake and Relative Segment Size)			15,542

ICLEI/SEEC ClearPath User Defined Electricity Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	10	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	15542	kWh / Year

Hospitality Energy Efficiency Campaign- Natural Gas Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -350

Peak/Maximum Annual MTCO2e Reduction: -35

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
- Average Annual Natural Gas Savings = 140 therms/yr per Participating Hospitality Firm
- Model assumes 10 Participating Firms annually for the duration of the Measure Implementation

Start Year: 2015 **End Year:** 2019

Calculator(s) Used- (Source, Platform, Calculator Name)

AMBAG Energy Watch, Excel, PG&E Savings Browser Weighted Average
ICLEI/SEEC, ClearPath, User Defined Natural Gas

Source Data, Calculator Inputs and Supporting References

Top 3 Using Sectors (therms)					
		SAIDs	Part.	Total Usage	Total Savings
Hospitality	Small	47	3	28,573	180
	Medium	52	11	276,623	3,246
	Large	106	14	141,041	942
Retail	Small	166	14	40,816	3,825
	Medium	72	10	16,629	139
	Large	132	32	137,699	4,392
Offices	Small	195	7	25,258	-
	Medium	110	6	71,899	748
	Large	54	12	23,178	-

Top 3 Saving Sectors (therms)					
		SAIDs	Part.	Total Usage	Total Savings
Retail	Small	166	14	40,816	3,825
	Medium	72	10	16,629	139
	Large	132	32	137,699	4,392
Hospitality	Small	47	3	28,573	180
	Medium	52	11	276,623	3,246
	Large	106	14	141,041	942
Offices	Small	195	7	25,258	-
	Medium	110	6	71,899	748
	Large	54	12	23,178	-

Source: PG&E/AMBAG

AMBAG Energy Watch/PG&E Savings Browser Weighted Average Calculator Inputs/Outputs:

Weighted Average Calculator- Therm (Nat. Gas)

	Relative Segment Size	Relative Segment Size (by Usage)	Percent of Participation	Segment	SAIDs	Part.	Total Usage	Total Savings	AVG Savings	Weighted AVG Savings (*based on Historical Uptake)	Distributed AVG Savings (*based on Relative Segment Size)
Capitola_Inc Hospitality	23%		11%	Small	47	3	28,573	180	60	6	14
	25%		39%	Medium	52	11	276,623	3,246	295	116	75
	52%		50%	Large	106	14	141,041	942	67	34	35
	100%		100%	Totals	205	28	446,237	4,368	Final AVG	156	123
									Verification	4,368	n/a
								Double Weighted Average (*based on Historical Uptake and Relative Segment Size)			140

ICLEI/SEEC ClearPath User Defined Natural Gas Calculator Inputs:

Affected Forecast Series: Natural Gas

Level of Implementation

If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure.

If you do not wish to use this function leave the default value of 1.

Primary Driver: 10 — Units

Measure Impact

Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures.

Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.

Unit Energy Savings: 140 — Therms / Year

Retail Energy Efficiency Campaign- Electricity Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -4459

Peak/Maximum Annual MTCO2e Reduction: -188

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:
• Average Annual Electricity Savings = 34,279 kWh/yr per Participating Retail Firm
• Model assumes 10 Participating Firms annually for the duration of the Measure Implementation.

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

AMBAG Energy Watch, Excel, PG&E Savings Browser Weighted Average
ICLEI/SEEC, ClearPath, User Defined Electricity

Source Data, Calculator Inputs and Supporting References

Top 3 Using Sectors (kwh)					
		SAIDs	Part.	Total Usage	Total Savings
Retail	Small	166	14	1,361,727	129,588
	Medium	72	10	2,841,236	294,822
	Large	132	32	15,238,789	1,761,348
Hospitality	Small	47	3	417,841	34,602
	Medium	52	11	3,655,642	115,108
	Large	106	14	2,966,593	281,343
Offices	Small	195	7	819,347	86,550
	Medium	110	6	1,409,112	139,931
	Large	54	12	1,973,221	89,856

Top 3 Saving Sectors (kwh)					
		SAIDs	Part.	Total Usage	Total Savings
Retail	Small	166	14	1,361,727	129,588
	Medium	72	10	2,841,236	294,822
	Large	132	32	15,238,789	1,761,348
Hospitality	Small	47	3	417,841	34,602
	Medium	52	11	3,655,642	115,108
	Large	106	14	2,966,593	281,343
Offices	Small	195	7	819,347	86,550
	Medium	110	6	1,409,112	139,931
	Large	54	12	1,973,221	89,856

Source: PG&E/AMBAG

AMBAG Energy Watch/PG&E Savings Browser Weighted Average Calculator Inputs/Outputs:

Weighted Average Calculator- kWh (Electricity)											
	Relative Segment Size (by # of SAID)	Relative Segment Size (by Usage)	Percent of Participation	Segment	SAIDs	Part.	Total Usage	Total Savings	AVG Savings	Weighted AVG Savings (*based on Historical Uptake)	Distributed AVG Savings (*based on Relative Segment Size)
Capitola_Inc Retail	45%	7%	25%	Small	166	14	1,361,727	129,588	9,256	2,314	4,153
	19%	15%	18%	Medium	72	10	2,841,236	294,822	29,482	5,265	5,737
	36%	78%	57%	Large	132	32	15,238,789	1,761,348	55,042	31,453	19,637
	100%	100%	100%	Totals	370	56	19,441,752	2,185,758	Final AVG	39,031	29,527
									Verification	2,185,758	n/a
								Double Weighted Average (*based on Historical Uptake and Relative Segment Size)			34,279

ICLEI/SEEC ClearPath User Defined Electricity Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	10	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	34279	kWh / Year

Retail Energy Efficiency Campaign- Natural Gas Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -400

Peak/Maximum Annual MTCO2e Reduction: -40

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Annual Natural Gas Savings = 162 therms/yr per Participating Retail Firm (Source: AMBAG/PG&E)

• Model assumes 10 Participating Firms annually for the duration of the Measure Implementation

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

AMBAG Energy Watch, Excel, PG&E Savings Browser Weighted Average
ICLEI/SEEC, ClearPath, User Defined Natural Gas

Source Data, Calculator Inputs and Supporting References

Top 3 Using Sectors (therms)					
		SAIDs	Part.	Total Usage	Total Savings
Hospitality	Small	47	3	28,573	180
	Medium	52	11	276,623	3,246
	Large	106	14	141,041	942
Retail	Small	166	14	40,816	3,825
	Medium	72	10	16,629	139
	Large	132	32	137,699	4,392
Offices	Small	195	7	25,258	-
	Medium	110	6	71,899	748
	Large	54	12	23,178	-

Top 3 Saving Sectors (therms)					
		SAIDs	Part.	Total Usage	Total Savings
Retail	Small	166	14	40,816	3,825
	Medium	72	10	16,629	139
	Large	132	32	137,699	4,392
Hospitality	Small	47	3	28,573	180
	Medium	52	11	276,623	3,246
	Large	106	14	141,041	942
Offices	Small	195	7	25,258	-
	Medium	110	6	71,899	748
	Large	54	12	23,178	-

Source: PG&E/AMBAG

AMBAG Energy Watch/PG&E Savings Browser Weighted Average Calculator Inputs/Outputs:

Weighted Average Calculator- Therm (Nat. Gas)

	Relative Segment Size	Relative Segment Size (by Usage)	Percent of Participation	Segment	SAIDs	Part.	Total Usage	Total Savings	AVG Savings	Weighted AVG Savings (*based on Historical Uptake)	Distributed AVG Savings (*based on Relative Segment Size)
Capitola_Inc Retail	45%		25%	Small	166	14	40,816	3,825	273	68	123
	19%		18%	Medium	72	10	16,629	139	14	2	3
	36%		57%	Large	132	32	137,699	4,392	137	78	49
	100%		100%	Totals	370	56	195,144	8,356	Final AVG	149	174
									Verification	8,356	n/a
								Double Weighted Average (*based on Historical Uptake and Relative Segment Size)			162

ICLEI/SEEC ClearPath User Defined Natural Gas Inputs:

Affected Forecast Series: Natural Gas

Level of Implementation

If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure.

If you do not wish to use this function leave the default value of 1.

Primary Driver: 10 Units

Measure Impact

Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures.

Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.

Unit Energy Savings: 162 Therms / Year

Right Lights Energy Efficiency Program Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-5729
Peak/Maximum Annual MTCO2e Reduction:	-238

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Annual Electricity Savings: 1,100,263.9 kWh/yr (for projects completed between Q1 2006 thru Q2 of 2012)

• Annualized Average projection based on historical participation rates; Assumes similar participation rates to the 2006-Q2 of 2012 in future years

• Projected Energy Savings from Measure Implementation = 169271.2 kWh/yr; 1,100,263.90 kWh/yr from 2006 thru Q2 of 2012) / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 169271.2 kWh/yr (Source: PG&E/AMBAG)

Start Year: 2013 **End Year:** 2023

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Commercial Electricity

Source Data, Calculator Inputs and Supporting References

Ecology Action - RightLights
Annual kWh Savings (data for projects completed prior to Q2 of 2012)
1,100,263.90

SOURCE: PG&E/AMBAG

ICLEI/SEEC ClearPath User Defined Commercial Electricity Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	169271	kWh / Year

Green Business Certification Program- Certified To-date Electricity & Water Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -4783

Peak/Maximum Annual MTCO2e Reduction: -139

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Of the 35 Total Businesses Certified in Capitola to-date, 27 Businesses have been certified by the GBP since January 1, 2011 (the year immediately following the 2010 Baseline GHG inventory Year)

• The table below provides the derivative/prorated estimated Electricity and Water Energy savings for the 27 Businesses certified since 1/1/11

• Model assumes 10 year participation by Certified Businesses

Businesses Certified To-date (2011-2014)	**Annual New Certifications Goal**	**Annual Water Savings (gallons)**	**kWh per Gallon** *(Includes: Supply, Conveyance, Distribution and Treatment. Source*)*	**Annual kWh (water) Savings**	**Annual MMBTU (water) Savings**
27	n/a	3,127,180	0.0035	10,945	37
Annual kWh (energy) Savings	**Annual Solid Waste Savings (lbs/yr)**				
793,174	12,323				

Source: Regional Green Business Certification Program Coordinator- Josephine Fleming

Start Year: 2014 **End Year:** 2023

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Electricity
ICLEI/SEEC, ClearPath, User Defined Water

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Electricity Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	793174	kWh / Year

ICLEI/SEEC ClearPath User Defined Water Calculator Inputs:

Affected Forecast Series	Water Supply Energy	
Does this measure Reduce Energy Used or the Carbon Intensity of Energy	Reduce Energy Use	
Reduction in Water Supply Energy	37	MMBtu

NOTE- Data below was requested/received from the Regional Green Business Certification Program Coordinator- Josephine Fleming (phone: 831-706-7384) on 11/13/14. The data is specific to the City of Capitola.

Reports for:			
Programs	City	Sectors	
Santa Cruz	Capitola	All	
	Per Year	Since Enrollment	Total Cost Savings Since Enrollment
Greenhouse Gas Emissions Saved	1,337,499 lbs of CO2	4,300,119 lbs of CO2	$7,310.20
Recycling and Composting	674,035 lbs of CO2	2,252,836 lbs of CO2	$3,829.82
All other measures	663,465 lbs of CO2	2,047,284 lbs of CO2	$3,480.38
Solid Waste Diverted from Landfill	1,265,351 lbs	4,231,831 lbs	$284,167.48
Energy Saved	1,028,189 kWh	3,177,259 kWh	$321,919.86
Water Saved	4,053,752 gallons of water	13,785,540 gallons of water	$27,571.08
Hazardous Waste Reduced (gallons)	360 gallons	1,012 gallons	$644.99
Mercury Reduced	1,459 mgs	4,247 mgs	$9.93
Fuel Saved	12 gallons	34 gallons	$131.59
Hazardous Waste Reduced (lbs)	600 lbs	329 lbs	$

Green Business Certification Program- Expansion Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -4260

Peak/Maximum Annual MTCO2e Reduction: -189

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Model assumes that an additional 10 Businesses will be Certified each year of the Measure Implementation

• The table below provides the derivative/prorated estimated Electricity and Water Energy savings for each additional Business Certified

• Assumes 10 year participation by Certified Businesses

Note- The table below indicates the modeled impacts of each (1) additional new Business Certifie

Businesses Certified To-date (2011-2014)	**Annual New Certifications Goal**	**Annual Water Savings (gallons)**	**kWh per Gallon** *(Includes: Supply, Conveyance, Distribution and Treatment. Source*)*	**Annual kWh (water) Savings**	**Annual MMBTU (water) Savings**
n/a	1	115,821	0.0035	405	1
Annual kWh (energy) Savings	**Annual Solid Waste Savings (lbs/yr)**				
29,377	456.4				

Start Year: 2017 **End Year:** 2021

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Electricity
ICLEI/SEEC, ClearPath, User Defined Water

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Electricity Calculator Inputs:

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	10	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	29377	kWh / Year

ICLEI/SEEC ClearPath User Defined Water Calculator Inputs:

Affected Forecast Series	Water Supply Energy	
Does this measure Reduce Energy Used or the Carbon Intensity of Energy	Reduce Energy Use	
Reduction in Water Supply Energy	1	MMBtu

Increased Community-wide Recycling Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-7665
Peak/Maximum Annual MTCO2e Reduction:	-219

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Community-wide Annual Baseline (2010) Solid Waste landfilled = 8083 tons
- Phase I model assumes a 30% improvement in overall Waste Diversion through increased participation in Recycling

Start Year: 2016 **End Year:** 2017

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, ClearPath, Solid Waste Curbside Collection

Source Data, Calculator Inputs and Supporting References

ICLEI ClearPath Curbside Collection Calculator Inputs:

Baseline Waste Disposal	8083	tons MSW / Year
Baseline Emissions	1476	MT CO2e
Receiving Landfill Gas Collection	Yes	
Calculation Approach		
Select whether you will provide the total waste diverted directly or whether you will estimate that value from generation rates and diversion rates. For jurisdictions anticipating to enace a new curbside composting requirement, many factors will affect diversion rates. Based on jurisdictions in Alameda County, California, typical diversion rates from the additions of curbside composting is in the range of 10-25%. **See [TBD] website** for further information on program impact estimating.		
Enter or Estimate Total Waste Diverted?	Estimate Diversion	
Waste Diversion		
In this section you will specify quantity of waste diverted from the waste stream. You can either enter this value directly or estimate it from the expected percent diverted from the total waste stream generated by the target group (Residents) for this measure. If you are estimating diversion, default waste characterization values as well as percent of total baseline generation by residents and expected diversion rates are provided. You may update any of these values to better match local conditions. If you have previously determined total diversion from this action, you may choose to enter that value directly. In that case, the default waste characterization values have been normalized to provide relative percentages of 100% of the total diversion value you enter.		
Percentage of Total Waste Generated by Residents	100	%
Percent Diversion	30	%
Percent Food Scraps	29.3	%
Percent Compostable Paper	17.3	%
Percent Grass	1	%
Percent Leaves	1	%
Percent Branches / Stumps / Trimmings	1	%

Estimated Waste Stream Proportions Source: ICLEI/SEEC ClearPath- CA 2008 Waste Characterization Study, Table 12.
http://calrecycle.ca.gov/WasteChar/Tables/ResDetails.pdf

Increased Community-wide Recycling Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-12183
Peak/Maximum Annual MTCO2e Reduction:	-393

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Projected Annual (wet tons) Solid Waste landfilled = 7,241 tons (starting point after Phase I completion)

• Phase II model assumes a 60% improvement in overall Waste Diversion through increased participation in Recycling

Start Year: 2019 **End Year:** 2020

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, ClearPath, Solid Waste Curbside Collection

Source Data, Calculator Inputs and Supporting References

Source: ICLEI ClearPath Curbside Collection Inputs

Baseline Waste Disposal	7241	tons MSW / Year
Baseline Emissions	1322	MT CO2e
Receiving Landfill Gas Collection	Yes	

Calculation Approach

Select whether you will provide the total waste diverted directly or whether you will estimate that value from generation rates and diversion rates.

For jurisdictions anticipating to enace a new curbside composting requirement, many factors will affect diversion rates. Based on jurisdictions in Alameda County, California, typical diversion rates from the additions of curbside composting is in the range of 10-25%. **See [TBD] website** for further information on program impact estimating.

Enter or Estimate Total Waste Diverted?	Estimate Diversion	

Waste Diversion

In this section you will specify quantity of waste diverted from the waste stream. You can either enter this value directly or estimate it from the expected percent diverted from the total waste stream generated by the target group (Residents) for this measure.

If you are estimating diversion, default waste characterization values as well as percent of total baseline generation by residents and expected diversion rates are provided. You may update any of these values to better match local conditions.

If you have previously determined total diversion from this action, you may choose to enter that value directly. In that case, the default waste characterization values have been normalized to provide relative percentages of 100% of the total diversion value you enter.

Percentage of Total Waste Generated by Residents	100	%
Percent Diversion	60	%
Percent Food Scraps	29.3	%
Percent Compostable Paper	17.3	%
Percent Grass	1	%
Percent Leaves	1	%
Percent Branches / Stumps / Trimmings	1	%

Estimated Waste Stream Proportions Source: ICLEI/SEEC ClearPath- CA 2008 Waste Characterization Study, Table 12. http://calrecycle.ca.gov/WasteChar/Tables/ResDetails.pdf

Increased Community-wide Food Waste Diversion Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-4515
Peak/Maximum Annual MTCO2e Reduction:	-129

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Community-wide Food Waste Estimated Tons = 29.3% of Total Tons Landfilled (8083 tons) = 2368 (wet) tons

• Phase I Model assumes a 30% improvement in Food Waste Diversion

Start Year: 2016 **End Year:** 2017

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, ClearPath, Curbside Organics Collection

Source Data, Calculator Inputs and Supporting References

ICLEI ClearPath Curbside Organics Collection Calculator Inputs:

Baseline Waste Disposal	2368	tons MSW / Year
Baseline Emissions	434	MT CO2e
Receiving Landfill Gas Collection	Yes	

Calculation Approach

Select whether you will provide the total waste diverted directly or whether you will estimate that value from generation rates and diversion rates.

For jurisdictions anticipating to enace a new curbside composting requirement, many factors will affect diversion rates. Based on jurisdictions in Alameda County, California, typical diversion rates from the additions of curbside composting is in the range of 10-25%. **See [TBD] website** for further information on program impact estimating.

Enter or Estimate Total Waste Diverted?	Estimate Diversion	

Waste Diversion

In this section you will specify quantity of waste diverted from the waste stream. You can either enter this value directly or estimate it from the expected percent diverted from the total waste stream generated by the target group (Residents) for this measure.

If you are estimating diversion, default waste characterization values as well as percent of total baseline generation by residents and expected diversion rates are provided. You may update any of these values to better match local conditions.

If you have previously determined total diversion from this action, you may choose to enter that value directly. In that case, the default waste characterization values have been normalized to provide relative percentages of 100% of the total diversion value you enter.

Percentage of Total Waste Generated by Residents	100	%
Percent Diversion	30	%
Percent Food Scraps	100	%
Percent Compostable Paper	0	%
Percent Grass	0	%
Percent Leaves	0	%
Percent Branches / Stumps / Trimmings	0	%

Estimated 29.3% of Total Waste Stream = Food Waste Source: ICLEI/SEEC ClearPath- CA 2008 Waste Characterization Study, Table 12. http://calrecycle.ca.gov/WasteChar/Tables/ResDetails.pdf

Increased Community-wide Food Waste Diversion Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-5611
Peak/Maximum Annual MTCO2e Reduction:	-181

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Projected Annual (wet tons) Food Waste Estimated = 1658 tons (Starting point after Phase I complete)

• Phase II Model assumes a 60% improvement in Food Waste Diversion

Start Year: 2019 **End Year:** 2020

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, ClearPath, Curbside Organics Collection

Source Data, Calculator Inputs and Supporting References

ICLEI ClearPath Curbside Organics Collection Calculator Inputs:

Baseline Waste Disposal	1658	tons MSW / Year
Baseline Emissions	304	MT CO2e
Receiving Landfill Gas Collection	Yes	
Calculation Approach		
Select whether you will provide the total waste diverted directly or whether you will estimate that value from generation rates and diversion rates.		
For jurisdictions anticipating to enace a new curbside composting requirement, many factors will affect diversion rates. Based on jurisdictions in Alameda County, California, typical diversion rates from the additions of curbside composting is in the range of 10-25%. **See [TBD] website** for further information on program impact estimating.		
Enter or Estimate Total Waste Diverted?	Estimate Diversion	
Waste Diversion		
In this section you will specify quantity of waste diverted from the waste stream. You can either enter this value directly or estimate it from the expected percent diverted from the total waste stream generated by the target group (Residents) for this measure.		
If you are estimating diversion, default waste characterization values as well as percent of total baseline generation by residents and expected diversion rates are provided. You may update any of these values to better match local conditions.		
If you have previously determined total diversion from this action, you may choose to enter that value directly. In that case, the default waste characterization values have been normalized to provide relative percentages of 100% of the total diversion value you enter.		
Percentage of Total Waste Generated by Residents	100	%
Percent Diversion	60	%
Percent Food Scraps	100	%
Percent Compostable Paper	0	%
Percent Grass	0	%
Percent Leaves	0	%
Percent Branches / Stumps / Trimmings	0	%

Estimated 29.3% of Total Waste Stream = Food Waste Source: ICLEI/SEEC ClearPath- CA 2008 Waste Characterization Study, Table 12. http://calrecycle.ca.gov/WasteChar/Tables/ResDetails.pdf

Carshare Program Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-2651
Peak/Maximum Annual MTCO2e Reduction:	-136

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Assumes expansion of existing Santa Cruz County Careshare program to Capitola
- Average Annual VMT per person before joining Carshare = 8,081 miles/yr
- 30% Reduction in VMT for New Careshare Participants
- Average Passenger Vehicle Fuel Economy = 23 MPG
- Phase I model assumes 25 New Participants annually for the duration of the Measure Implementation

Start Year: 2015 **End Year:** 2019

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI CAPPA v1.5 Carshare
ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Carshare Calculator Inputs/Outputs (Note- this models the impacts of each New Carshare Participant):

Community	
1	Number of Carshare Participants

Community	
$3.00	Price of Gasoline ($ per gallon)
30	Percent Reduction in Vehicle Miles
8,081	Average Annual Vehicle Miles per Person Before Joining Carshare
$2.40	Carshare Cost per Mile
23	Average Passenger Fuel Economy
2,424	Annual Vehicle Mile Reduction
105	Annual Gasoline Savings (gallons)
$316	Annual Cost Savings on Energy
-$5,776	Annual Avoided Cost of Car Ownership

30% driving reduction figure from Litman, Todd. 2007. “Win-Win Emissions Reduction Strategies (http://www.vtpi.org/wwclimate.pdf). A National Carshare provider reports much stronger reduction among its users from 5295 miles/yr before joining to 369 miles/yr after (http://www.zipcar.com/press/onlinemediakit/environmental_and_community_impact.pdf)

8081 AVG miles/person before joining carshare figure from 2001 Household Travel Survey. Http://www.eia.doe.gov/emeu/rtecs/nhts_survey/2001/index.html)

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	25	Units
Reduction Quantity	2424	Reduced VMT per Year

Carshare Program Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-2201
Peak/Maximum Annual MTCO2e Reduction:	-124

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Assumes expansion of existing Santa Cruz County Careshare program to Capitola
- Average Annual VMT per person before joining Carshare = 8,081 miles/yr
- 30% Reduction in VMT for New Careshare Participants
- Average Passenger Vehicle Fuel Economy = 23 MPG
- Phase II model assumes 25 New Participants annually for the duration of the Measure Implementation

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI CAPPA v1.5 Carshare Model Output
ICLEI/SEEC, ClearPath, User Defined Transporation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Carshare Calculator Inputs/Outputs (Note- this models the impacts of each New Carshare Participant):

Community	
1	Number of Carshare Participants

Community	
$3.00	Price of Gasoline ($ per gallon)
30	Percent Reduction in Vehicle Miles
8,081	Average Annual Vehicle Miles per Person Before Joining Carshare
$2.40	Carshare Cost per Mile
23	Average Passenger Fuel Economy
2,424	Annual Vehicle Mile Reduction
105	Annual Gasoline Savings (gallons)
$316	Annual Cost Savings on Energy
-$5,776	Annual Avoided Cost of Car Ownership

30% driving reduction figure from Litman, Todd. 2007. “Win-Win Emissions Reduction Strategies (http://www.vtpi.org/wwclimate.pdf). A National Carshare provider reports much stronger reduction among its users from 5295 miles/yr before joining to 369 miles/yr after (http://www.zipcar.com/press/onlinemediakit/environmental_and_community_impact.pdf)

8081 AVG miles/person before joining carshare figure from 2001 Household Travel Survey. Http://www.eia.doe.gov/emeu/rtecs/nhts_survey/2001/index.html)

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs (Note- Models impacts for full implementation of the Measure- 25 New Participants annually):

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	25	Units
Reduction Quantity	2424	Reduced VMT per Year

Increased Bus Ridership Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -296

Peak/Maximum Annual MTCO2e Reduction: -207

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Passenger Vehicle Fuel Economy = 23 MPG
- Average Trip Length = 5 miles
- VMT Reduction = 1825 miles per Additional Dail Rider
- Phase I model assumes 50 New Daily Riders annually for the duration of Measure Implementation

Start Year: 2015 **End Year:** 2019

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, CAPPA v1.5, Increase Bus Use
ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Increase Bus Use Calculator Inputs/Outputs (Note- this models the impacts of each Additional Bus Rider):

Community	
1	Number of Additional Daily Bus Passengers

Community	
$3.00	Price of Gasoline ($ per gallon)
5.0	Average Trip Length (mi)
23	Average Passenger Vehicle Fuel Economy
1,825	Annual Vehicle Mile Reduction
79	Annual Gasoline Savings (gallons)
62	Increased Diesel Use (gallons)

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	50	Units
Reduction Quantity	1825	Reduced VMT per Year

Note: Estimated Average Bus Trip Length used for modeling this measure was 5 miles (conservative to help factor out longer trip lengths and larger populations of Watsonville and Scotts Valley)

Average Trip Length Data provided by the Santa Cruz County Regional Transportation Agency (SCCRTC- Ginger Dykaar, Rachel Moriconi):

	Avg Miles
Drive Alone	6.40
Shared Ride	6.40
Walk	1.00
Bike	2.00
Transit	7.00
School Bus	3.00
Other	0.00

Table 3. Mean Travel Time by Mode to Work[13]	Census 2000		2006-2010 ACS		Is Change Significant in Minutes? **
	Minutes	MOE(+/-)	Minutes	MOE(+/-)	
	At Place of Residence				
Total Workers (does not include workers who worked at home)	27.8	0.4	25.7	0.8	Yes
Drove alone	27.7	0.5	25.5	0.9	Yes
Carpooled	30.9	1.1	28.1	4.0	No
Public Transportation	37.0	2.6	44.1	8.2	No
Taxi, Motorcycle, Walk, Bicycle and Other means	19.1	1.3	17.3	2.4	No

Increased Bus Ridership Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -4916

Peak/Maximum Annual MTCO2e Reduction: -379

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Passenger Vehicle Fuel Economy = 23 MPG
- Average Trip Length = 5 miles
- VMT Reduction = 1825 miles per Additional Daily Rider
- Phase II model assumes 100 New Daily Riders annually for the duration of Measure Implementation

Start Year: 2020 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, CAPPA v1.5, Increase Bus Use
ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Increase Bus Use Calculator Inputs/Outputs (Note- this models the impacts of each Additional Bus Rider):

Community	
1	Number of Additional Daily Bus Passengers

Community	
$3.00	Price of Gasoline ($ per gallon)
5.0	Average Trip Length (mi)
23	Average Passenger Vehicle Fuel Economy
1,825	Annual Vehicle Mile Reduction
79	Annual Gasoline Savings (gallons)
62	Increased Diesel Use (gallons)

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	100	Units
Reduction Quantity	1825	Reduced VMT per Year

Improved Bike Infrastructure Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-5985
Peak/Maximum Annual MTCO2e Reduction:	-189

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Number of Daily Trips per Person = 3.3
- Average Bike Trip Length = 2 miles
- Estimated Percentage of VMT from Diesel = 20%
- 10 Years To Implement (ie- Benefits are accumulated incrementally over a 10-year period)

Start Year: 2015 **End Year:** 2024

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Improved Bike Infrastructure

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Bike Infrastructure Reference Sheet:

Table 1 below demonstrates anticipated bicycle mode share associated with different combinations of density and cycling facilities. Implementation levels A, B, and C represent different increasing levels of cycling infrastructure to facilitate more travelers to make cycling a mode of first choice. The level descriptions and the associated cycling mode share come from the Moving Cooler analysis, examining the national level potential of increasing the percentage of regular cyclists. If more refined local examples are available for your community, you may use those figures instead.

- Level A implementation locations have bike stations in central business districts that provide secure parking, repair, rentals, and proper changing facilities. There is a continuous network of on-street bicycle lanes for a combined network density of 2 miles of bicycle lanes per square mile.
- Level B provides a continuous network of routes for cyclists including bike lanes, boulevards, and shared-use paths. Boulevards include traffic diverters to limit automobile use/speed. There are four miles of bicycle lanes per square mile.
- Level C includes approaches similar to Level A; bike stations are locations at all major business centers and transit hubs. This approach also includes bike lanes, boulevards, and shared use paths for a total of eight miles of bicycle lanes per square mile.

Table 1: Urban Area Bicycle Mode Share by Mode Share

Area Population Density	No Amenities	A	B	C
0-500K	.3%	1.5%	2.7%	5.0%
500-2K	.3%	1.5%	2.7%	5.0%
2K-4K	.3%	1.5%	2.7%	5.0%
4K-10K	.4%	2.1%	3.7%	6.8%
>10K	.8%	4.4%	7.6%	14.0%
All	.4%	2.2%	3.9%	7.4%

Table 2 provides trip generation rates by region according to the California Statewide Travel Survey.

Table 2: 2000-2001 Weekday Person Trips per Person By Region

Region	Person Trips
California	3.0
AMBAG	3.3
Butte	3.8
Fresno	2.5
Kern	2.9
Merced	3.1
MTC	3.5
Rural	3.7
SACOG	3.2
San Diego	3.2
San Joaquin	2.8
San Luis Obispo	3.6
Santa Barbara	3.5
SCAG	2.8
Shasta	3.2
Stanislaus	2.6
Tulare	3.1
Western Slope/ Sierra Nevada	3.2

Citation: Adamu, Ayalew, Azita Fatemi, and Gregory Miyata. *2000-2001 California Statewide Travel Survey Weekday Travel Report.* June 2003. http://www.dot.ca.gov/hq/tsip/tab/documents/travelsurveys/Final2001_StwTravelSurveyWkdayRpt.pdf

ICLEI/SEEC ClearPath Improved Bike Infrastructure Calculator Inputs:

Area Population	9918	People
Trip Frequency	3.3	Trips / Person / Day
Average Bike Trip Length	2	Miles

Cycling Mode Share by Density

Next consider the mode share of cyclists in different densities with their current level of cycling facilities. Bicycle mode share will be generally higher at higher population densities due to the greater variety of destinations within easy cycling distance.

Note that you may put 100% of population within a single density class, or spread the population across density classes as appropriate for the scope of the initiative you are considering.

Percent of Population in Low Density 0-500 PPM	0.08	%
Unimproved Low Density Mode Share	.3	%
Percent of Population at Low-Medium Denisty 500 - 2,000 PPM	1.27	%
Unimproved Low-Medium Mode Share	1	%
Percent of Population at Medium Denisty 2,000-4,000 PPM	6.4	%
Unimproved Medium Density Mode Share	1.5	%
Percent of Population at Medium-High Denisty 4,000-10,000 PPM	58.82	%
Unimproved Medium-High Density Mode Share	2.1	%
Percent of Population at High Denisty 10,000+ PPM	33.43	%
Unimproved High Density Mode Share	4.4	%

Improved Mode Share

Use this section to specify the improved mode share with improved facilities within each density class. Note that the percent of population in each class will remain the same as specified in the previous section.

Use this Reference Sheet for guidance on the values to use.

Improved Low Density Mode Share	1.5	%
Improved Low-Medium Density Mode Share	2.7	%
Improved Medium Density Mode Share	2.7	%
Improved Medium-High Density Mode Share	3.7	%
Improved High Density Mode Share	8.2	%

Final Adjustments

Use the following fields to specify how much of the savings would be attributed to diesel emissions from your forecast.

Next specify the number of years you expect the changes to be fully implemented. Because these types of changes take place over years, the impact will not be fully realized immediately at the start time. The number you enter here will spread the impact over that number of years in the scenario planner. Take care to set the start and end implementation dates in the scenario planner to match this number of years. Setting it for a higher number of years will continue to phase in additional impact. Setting it for a lower number of years will result in less than the full impact being accounted for.

Percent of Reduced VMT Attributable to Diesel	20	%
Number of Years for Changes to be Implemented	10	Years

Capitola TAZ Level Population Densities

TAZ Level Population Density Analysis for the City of Capitola		
Density Category	**Population**	**Percent of Total Population**
Low (0-500 PPM)	8	0.08%
Low-Med (500-2k PPM)	126	1.27%
Medium (2k-4k PPM)	635	6.40%
Med-High (4k-10k PPM)	5837	58.82%
High (>10k PPM)	3317	33.43%

Source: TAZ data requested/received 12/15/14 from AMBAG/Cody Meyer

TAZ	AREA	Housing Units	Population	Population Density (PPM)	Density Rating
0608700000527	0.01	112.00	200.00	20000.00	High (>10k/mile)
0608700000504	0.04	435.00	779.00	19475.00	High (>10k/mile)
0608700000540	0.04	325.00	583.00	14575.00	High (>10k/mile)
0608700000505	0.02	153.00	274.00	13700.00	High (>10k/mile)
0608700000506	0.02	131.00	234.00	11700.00	High (>10k/mile)
0608700000538	0.04	242.00	434.00	10850.00	High (>10k/mile)
0608700000537	0.07	398.00	713.00	10185.71	High (>10k/mile)
0608700000545	0.01	56.00	100.00	10000.00	High (>10k/mile)
0608700000547	0.05	234.00	419.00	8380.00	Med-High (4k-10k/mile)
0608700000544	0.03	138.00	248.00	8266.67	Med-High (4k-10k/mile)
0608700000536	0.02	92.00	165.00	8250.00	Med-High (4k-10k/mile)
0608700000535	0.09	407.00	729.00	8100.00	Med-High (4k-10k/mile)
0608700000529	0.02	87.00	156.00	7800.00	Med-High (4k-10k/mile)
0608700000530	0.02	87.00	156.00	7800.00	Med-High (4k-10k/mile)
0608700000543	0.03	128.00	229.00	7633.33	Med-High (4k-10k/mile)
0608700000502	0.01	42.00	74.00	7400.00	Med-High (4k-10k/mile)
0608700000484	0.02	82.00	147.00	7350.00	Med-High (4k-10k/mile)
0608700000539	0.05	203.00	364.00	7280.00	Med-High (4k-10k/mile)
0608700000507	0.03	121.00	217.00	7233.33	Med-High (4k-10k/mile)
0608700000525	0.03	112.00	201.00	6700.00	Med-High (4k-10k/mile)
0608700000526	0.02	75.00	134.00	6700.00	Med-High (4k-10k/mile)
0608700000531	0.04	137.00	245.00	6125.00	Med-High (4k-10k/mile)
0608700000534	0.06	204.00	365.00	6083.33	Med-High (4k-10k/mile)
0608700000501	0.09	299.00	536.00	5955.56	Med-High (4k-10k/mile)
0608700000548	0.10	305.00	547.00	5470.00	Med-High (4k-10k/mile)
0608700000479	0.02	55.00	99.00	4950.00	Med-High (4k-10k/mile)
0608700000533	0.02	53.00	94.00	4700.00	Med-High (4k-10k/mile)
0608700000528	0.05	129.00	232.00	4640.00	Med-High (4k-10k/mile)
0608700000503	0.04	100.00	180.00	4500.00	Med-High (4k-10k/mile)
0608700000500	0.03	72.00	130.00	4333.33	Med-High (4k-10k/mile)
0608700000519	0.01	24.00	43.00	4300.00	Med-High (4k-10k/mile)

0608700000546	0.03	71.00	127.00	4233.33	Med-High (4k-10k/mile)
0608700000517	0.03	53.00	94.00	3133.33	Medium (2k-4k/mile)
0608700000542	0.05	84.00	151.00	3020.00	Medium (2k-4k/mile)
0608700000516	0.02	32.00	57.00	2850.00	Medium (2k-4k/mile)
0608700000511	0.05	72.00	130.00	2600.00	Medium (2k-4k/mile)
0608700000518	0.05	66.00	119.00	2380.00	Medium (2k-4k/mile)
0608700000515	0.04	47.00	84.00	2100.00	Medium (2k-4k/mile)
0608700000480	0.04	32.00	57.00	1425.00	Low-Med (500-2k/mile)
0608700000513	0.02	9.00	17.00	850.00	Low-Med (500-2k/mile)
0608700000508	0.10	29.00	52.00	520.00	Low-Med (500-2k/mile)
0608700000522	0.05	4.00	8.00	160.00	Low (0-500/mile)
0608700000477	0.08	0.00	0.00	0.00	Low (0-500/mile)
0608700000478	0.04	0.00	0.00	0.00	Low (0-500/mile)
0608700000482	0.04	0.00	0.00	0.00	Low (0-500/mile)
0608700000483	0.03	0.00	0.00	0.00	Low (0-500/mile)
0608700000485	0.04	0.00	0.00	0.00	Low (0-500/mile)
0608700000486	0.04	0.00	0.00	0.00	Low (0-500/mile)
0608700000487	0.03	0.00	0.00	0.00	Low (0-500/mile)
0608700000488	0.04	0.00	0.00	0.00	Low (0-500/mile)
0608700000489	0.04	0.00	0.00	0.00	Low (0-500/mile)
0608700000490	0.03	0.00	0.00	0.00	Low (0-500/mile)
0608700000491	0.01	0.00	0.00	0.00	Low (0-500/mile)
0608700000492	0.00	0.00	0.00	0.00	Low (0-500/mile)
0608700000493	0.02	0.00	0.00	0.00	Low (0-500/mile)
0608700000494	0.12	0.00	0.00	0.00	Low (0-500/mile)
0608700000495	0.01	0.00	0.00	0.00	Low (0-500/mile)
0608700000496	0.07	0.00	0.00	0.00	Low (0-500/mile)
0608700000497	0.01	0.00	0.00	0.00	Low (0-500/mile)
0608700000499	0.06	0.00	0.00	0.00	Low (0-500/mile)
0608700000509	0.03	0.00	0.00	0.00	Low (0-500/mile)
0608700000510	0.01	0.00	0.00	0.00	Low (0-500/mile)
0608700000520	0.02	0.00	0.00	0.00	Low (0-500/mile)
0608700000521	0.01	0.00	0.00	0.00	Low (0-500/mile)
0608700000523	0.03	0.00	0.00	0.00	Low (0-500/mile)
0608700000524	0.02	0.00	0.00	0.00	Low (0-500/mile)
0608700000541	0.08	0.00	0.00	0.00	Low (0-500/mile)
0608700000573	0.09	0.00	0.00	0.00	Low (0-500/mile)
0608700000579	0.22	0.00	0.00	0.00	Low (0-500/mile)
0608700000582	0.16	0.00	0.00	0.00	Low (0-500/mile)

Figure C.10 – Per Capita Reductions of Vehicle Miles Traveled and Greenhouse Gas Emissions for 2014 RTP relative to 2005 for Passenger Vehicles

Project Type	Postprocessing Reductions for VMT/GHG Emissions
Pedestrian facility and traffic calming improvements	-0.30%
Bicycle facility improvements	-2.22%

Source: Santa Cruz County Regional Transportation Commission- Regional Transportation Plan Technical Documentation- Appendix C Performance Analysis- Bicycle Facility Improvements (http://www.sccrtc.org/wp-content/uploads/2014/01/App-C-FULL.pdf)

Improved Bike Infrastructure Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-413
Peak/Maximum Annual MTCO2e Reduction:	-19

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Number of Daily Trips per Person = 3.3
- Average Bike Trip Length = 2 miles
- Estimated Percentage of VMT from Diesel = 20%
- 15 Years To Implement (ie- Benefits are accumulated incrementally over a 15-year period)

Start Year: 2025 **End Year:** 2034

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, Improved Bike Infrastructure

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath Improved Bike Infrastructure Calculator Inputs:

Area Population	9918	People
Trip Frequency	3.3	Trips / Person / Day
Average Bike Trip Length	2	Miles
Cycling Mode Share by Density Next consider the mode share of cyclists in different densities with their current level of cycling facilities. Bicycle mode share will be generally higher at higher population densities due to the greater variety of destinations within easy cycling distance. Note that you may put 100% of population within a single density class, or spread the population across density classes as appropriate for the scope of the initiative you are considering.		
Percent of Population in Low Density 0-500 PPM	0.08	%
Unimproved Low Density Mode Share	1.5	%
Percent of Population at Low-Medium Denisty 500 - 2,000 PPM	1.27	%
Unimproved Low-Medium Mode Share	1.5	%
Percent of Population at Medium Denisty 2,000-4,000 PPM	6.4	%
Unimproved Medium Density Mode Share	1.5	%
Percent of Population at Medium-High Denisty 4,000-10,000 PPM	58.82	%
Unimproved Medium-High Density Mode Share	2.1	%
Percent of Population at High Denisty 10,000+ PPM	33.43	%
Unimproved High Density Mode Share	4.5	%

Improved Mode Share

Use this section to specify the improved mode share with improved facilities within each density class. Note that the percent of population in each class will remain the same as specified in the previous section.

Use this Reference Sheet for guidance on the values to use.

Improved Low Density Mode Share	1.5	%
Improved Low-Medium Density Mode Share	1.7	%
Improved Medium Density Mode Share	2.2	%
Improved Medium-High Density Mode Share	2.5	%
Improved High Density Mode Share	5	%

Final Adjustments

Use the following fields to specify how much of the savings would be attributed to diesel emissions from your forecast.

Next specify the number of years you expect the changes to be fully implemented. Because these types of changes take place over years, the impact will not be fully realized immediately at the start time. The number you enter here will spread the impact over that number of years in the scenario planner. Take care to set the start and end implementation dates in the scenario planner to match this number of years. Setting it for a higher number of years will continue to phase in additional impact. Setting it for a lower number of years will result in less than the full impact being accounted for.

Percent of Reduced VMT Attributable to Diesel	20	%
Number of Years for Changes to be Implemented	15	Years

Low Carbon Transportation Education Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-2615
Peak/Maximum Annual MTCO2e Reduction:	-138

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Annual Vehicle Miles per Person = 8081
- Annual VMT Reduction = 5%
- Average Passenger Vehicle Fuel Economy = 23 MPG
- Annual VMT Reduction = 1042 miles per Participant
- Model assumes 100 Participants annually for the duration of the Measure Implementation.

Start Year: 2018 **End Year:** 2020

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, CAPPA v1.5, Low-carbon Transportation Education
ICLE/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Low-Carbon Transportation Education Calculator Inputs/Outputs (Note- this models the impacts of a single Participating Household):

Community	
1	Number of Households Targeted

Community	
$3.00	Price of Gasoline ($ per gallon)
8,081	Average Vehicle Miles per Person
5	Percent Reduction in Vehicle Miles
29	Cost per Household
23.0	Average Fuel Economy
1,042	Annual Vehicle Mile Reduction
45	Annual Gasoline Savings (gallons)
$136	Annual Cost Savings
0.2	Simple Payback (years)

Average Vehicle Miles per Person (8081) Source: ICLEI via- 2001 Household Travel Survey. http://www.nctr.usf.edu/pdf/527-09.pdf

Percent Reduction in Vehicle Miles (5%) Source: ICLEI via- Victoria Transportation Policy Institute http://vtpi.org/tdm/tdm23.htm

ICLE/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	100	Units
Reduction Quantity	1042	Reduced VMT per Year

Support Uptake of Electric Vehicles Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-6399
Peak/Maximum Annual MTCO2e Reduction:	-217

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Average Passenger Vehicle Fuel Economy = 23 MPG
- Average Electric Vehicle Fuel Economy (Gasoline Equivalent) = 105 MPG
- Average Annual VMT for Internal Combustion Engine (ICE) Vehicles being replaced by EV's = 10,000 miles
- Phase I model assumes that 50 New Electric Vehicles will be in service (registered) in Capitola by 2020

Note: Additional Electricity Consumption required to power these new EV's is modeled separately (seeVMT-5.2a section for details)

Start Year: 2020 **End Year:** 2034

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, CEMS, Provide Electric Vehicle Charging
ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC CEMS Provide Electric Vehicle Charging Calculator Inputs/Outputs:

Electric Vehicles

Degree of Implementation 50 Vehicles

Enter the number of vehicles that will be replaced with an electric powered model.

Average VMT 10,000 Miles

Enter the average annual miles traveled for all vehicles included in this calculation. Consider creating multiple records for substantially different vehicles.

Existing Vehicles

CO2 Reduction

Existing Vehicle Fuel Economy 23 MPG

Gasoline Consumption Reduced **21,739** Gallons per Year

CO2 Reduced **191** MTCO2 per year

N2O Reduction

N2O Emissions Factor 0 g/mi

N2O Reduced **0** MTCO2e per Year

CH4 Reduction

CH4 Emissions Factor 0 g/mi

CH4 Reduced **0** MTCO2e per Year

Total Gasoline Emissions Reduced **191** MTCO2e per Year

Electric Vehicles

CO2 Production

Electric Vehicle Fuel Economy 105 MPGGe

Enter the fuel economy for the replacement vehicle being considered. Electric Vehicle fuel economy numbers are reported in terms of Miles per Gallon Gasoline Equivalent (MPGGe). Values for a variety of models are available at www.FuelEconomy.gov

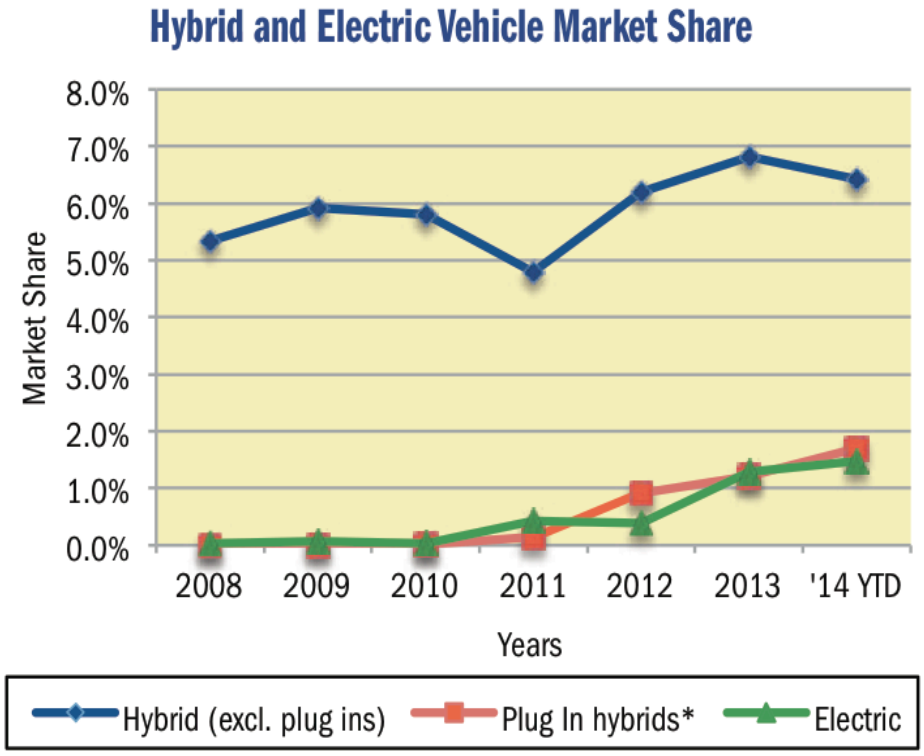
Equivalent Gallons of Gasoline Consumed **4,762** Gallons

Increased Electricity Consumption **174,385** kWh per Year

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	1	Units
Reduction Quantity	499997	Reduced VMT per Year

The following data for the State of California indicates a rapidly increasing market share for EV. Source: California New Car Dealers Association (CNCDA). California Auto Outlook Comprehensive information on the California vehicle market Volume 10, Number 4 (http://www.cncda.org/CMS/Pubs/Cal_Covering_3Q_14.pdf) Released November 2014 Covering Third Quarter 2014:



Hybrid and Electric New Vehicle Registrations and Market Share					
	2010	2011	2012	2013	YTD 2014
Hybrid regs.(excl. plug ins)	64211	58563	94878	116912	89486
Hybrid share(excl. plug ins)	5.8%	4.8%	6.2%	6.8%	6.4%
Plug in hybrid regs.*	97	1662	14103	20633	23648
Plug in hybrid share	0.0%	0.1%	0.9%	1.2%	1.7%
Electric regs.	300	5302	5990	21912	20516
Electric share	0.0%	0.4%	0.4%	1.3%	1.5%

Support Uptake of Electric Vehicles Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-51246
Peak/Maximum Annual MTCO2e Reduction:	-1971

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Passenger Vehicle Fuel Economy = 23 MPG

• Average Electric Vehicle Fuel Economy (Gasoline Equivalent) = 105 MPG

• Average Annual VMT for Internal Combustion Engine (ICE) Vehicles being replaced by EV's = 10,000 miles

• Phase II model assumes that 500 New Electric Vehicles will be in service (registered) in Capitola by 2025

Note: Additional Electricity Consumption required to power these new EV's is modeled separately (see VMT-5.2b section for details)

Start Year: 2025 **End Year:** 2039

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, CEMS, Provide Electric Vehicle Charging
ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC CEMS Provide Electric Vehicle Charging Calculator Inputs/Outputs:

Electric Vehicles

Degree of Implementation 50 Vehicles

Enter the number of vehicles that will be replaced with an electric powered model.

Average VMT 10,000 Miles

Enter the average annual miles traveled for all vehicles included in this calculation. Consider creating multiple records for substantially different vehicles.

Existing Vehicles

CO2 Reduction

Existing Vehicle Fuel Economy 23 MPG

Gasoline Consumption Reduced **21,739** Gallons per Year

CO2 Reduced **191** MTCO2 per year

N2O Reduction

N2O Emissions Factor 0 g/mi

N2O Reduced **0** MTCO2e per Year

CH4 Reduction

CH4 Emissions Factor 0 g/mi

CH4 Reduced **0** MTCO2e per Year

Total Gasoline Emissions Reduced **191** MTCO2e per Year

Electric Vehicles

CO2 Production

Electric Vehicle Fuel Economy 105 MPGGe

Enter the fuel economy for the replacement vehicle being considered. Electric Vehicle fuel economy numbers are reported in terms of Miles per Gallon Gasoline Equivalent (MPGGe). Values for a variety of models are available at www.FuelEconomy.gov

Equivalent Gallons of Gasoline Consumed **4,762** Gallons

Increased Electricity Consumption **174,385** kWh per Year

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	1	Units
Reduction Quantity	4999993	Reduced VMT per Year

Electricity Consumed by New Electric Vehicles Phase I Model Outputs

Total MTCO2e Increased (over the lifetime of this Measure): 645

Peak/Maximum Annual MTCO2e Reduction: n/a

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Increased Annual Electricity Consumption = 174,385 kWh/yr for lifespan of vehicle
- Assumed Life of EV's = 10 years

Start Year: 2020 **End Year:** 2034

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, CEMS, Provide Electric Vehicle Charging
ICLEI/SEEC, ClearPath, User Defined Commercial Electricity

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC CEMS Provide Electric Vehicle Charging Calculator Inputs/Outputs:

Electric Vehicles

Degree of Implementation 50 Vehicles
Enter the number of vehicles that will be replaced with an electric powered model.

Average VMT 10,000 Miles
Enter the average annual miles traveled for all vehicles included in this calculation. Consider creating multiple records for substantially different vehicles.

Existing Vehicles

CO2 Reduction

Existing Vehicle Fuel Economy 23 MPG
Gasoline Consumption Reduced **21,739** Gallons per Year
CO2 Reduced **191** MTCO2 per year

N2O Reduction

N2O Emissions Factor 0 g/mi
N2O Reduced **0** MTCO2e per Year

CH4 Reduction

CH4 Emissions Factor 0 g/mi
CH4 Reduced **0** MTCO2e per Year

Total Gasoline Emissions Reduced **191** MTCO2e per Year

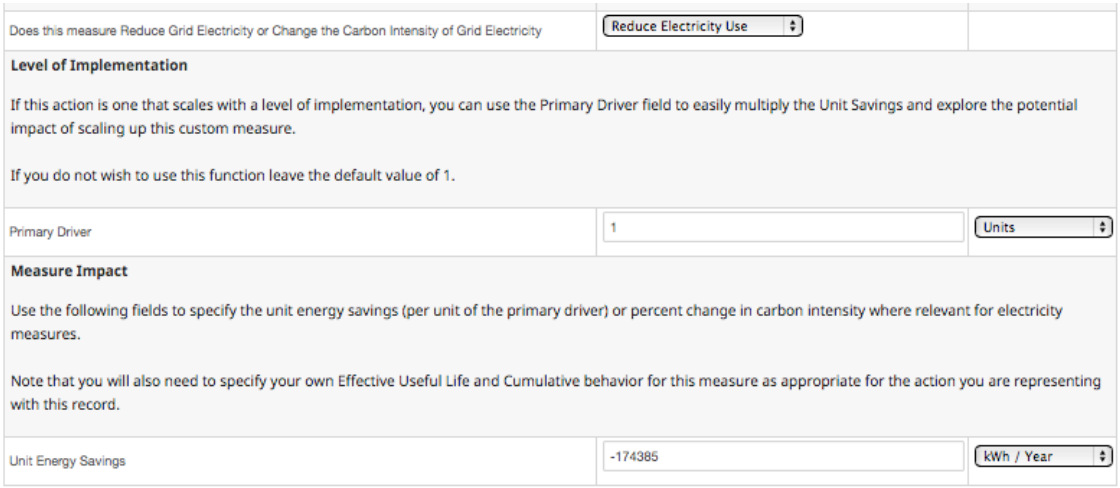
Electric Vehicles

CO2 Production

Electric Vehicle Fuel Economy 105 MPGGe
Enter the fuel economy for the replacement vehicle being considered. Electric Vehicle fuel economy numbers are reported in terms of Miles per Gallon Gasoline Equivalent (MPGGe). Values for a variety of models are available at www.FuelEconomy.gov

Equivalent Gallons of Gasoline Consumed **4,762** Gallons
Increased Electricity Consumption **174,385** kWh per Year

ICLEI/SEEC ClearPath User Defined Commercial Electricity Calculator Inputs (Note- This models the impacts of the additional electricity consumption required to charge the new EV's. The – (negative) kWh/yr indicates additional electricity consumption):



Electricity Consumed by New Electric Vehicles Phase I Model Outputs

Total MTCO2e Increased (over the lifetime of this Measure): 4056

Peak/Maximum Annual MTCO2e Reduction: n/a

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Increased Annual Electricity Consumption = 1,743,845 kWh/yr for lifespan of vehicle
- Assumed Life of EV's = 10 years

Start Year: 2025 **End Year:** 2039

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, CEMS, Provide Electric Vehicle Charging
ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC CEMS Provide Electric Vehicle Charging Calculator Inputs/Outputs:

Electric Vehicles

Degree of Implementation 50 Vehicles

Enter the number of vehicles that will be replaced with an electric powered model.

Average VMT 10,000 Miles

Enter the average annual miles traveled for all vehicles included in this calculation. Consider creating multiple records for substantially different vehicles.

Existing Vehicles

CO2 Reduction

Existing Vehicle Fuel Economy 23 MPG

Gasoline Consumption Reduced **21,739** Gallons per Year

CO2 Reduced **191** MTCO2 per year

N2O Reduction

N2O Emissions Factor 0 g/mi

N2O Reduced **0** MTCO2e per Year

CH4 Reduction

CH4 Emissions Factor 0 g/mi

CH4 Reduced **0** MTCO2e per Year

Total Gasoline Emissions Reduced **191** MTCO2e per Year

Electric Vehicles

CO2 Production

Electric Vehicle Fuel Economy 105 MPGGe

Enter the fuel economy for the replacement vehicle being considered. Electric Vehicle fuel economy numbers are reported in terms of Miles per Gallon Gasoline Equivalent (MPGGe). Values for a variety of models are available at www.FuelEconomy.gov

Equivalent Gallons of Gasoline Consumed **4,762** Gallons

Increased Electricity Consumption **174,385** kWh per Year

ICLEI/SEEC ClearPath User Defined Commercial Electricity Calculator Inputs (Note- This models the impacts of the additional electricity consumption required to charge the new EV's. The – (negative) kWh/yr indicates additional electricity consumption.):

Does this measure Reduce Grid Electricity or Change the Carbon Intensity of Grid Electricity	Reduce Electricity Use	
Level of Implementation If this action is one that scales with a level of implementation, you can use the Primary Driver field to easily multiply the Unit Savings and explore the potential impact of scaling up this custom measure. If you do not wish to use this function leave the default value of 1.		
Primary Driver	1	Units
Measure Impact Use the following fields to specify the unit energy savings (per unit of the primary driver) or percent change in carbon intensity where relevant for electricity measures. Note that you will also need to specify your own Effective Useful Life and Cumulative behavior for this measure as appropriate for the action you are representing with this record.		
Unit Energy Savings	-1743845	kWh / Year

Light Passenger Rail Phase I Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -31155

Peak/Maximum Annual MTCO2e Reduction: -1005

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Passengers per Vehicle (bus) = 25.8

• Average Passenger Vehicle Fuel Economy = 23 MPG

• Annual VMT Reduction = 3850 miles per New Daily Rider

• Phase I model assumes Launch Rail Service in 2020; and the Number of Daily Capitola Riders = 600

Start Year: 2020 **End Year:** 2050

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, CAPPA v1.5, Light Rail

ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Light Rail Calculator Inputs/Outputs (Note- this models the impacts of a single New Rail Passenger):

Community	
1	Number of New Daily Transit Passengers

Community	
	Price of Gasoline ($ per gallon)
25.8	Passengers per Vehicle
2.7	Leverage Factor
6.2	Average Trip Length (mi)
23.0	Average Passenger Vehicle Fuel Economy
1,426	Annual Transit Passenger Miles
3,850	Annual Vehicle Mile Reduction
167	Annual Gasoline Savings (gallons)
481	Increased Electricity Use (kWh)

Passengers per Vehicle Default Value = 25.8 Source: ICLEI CAPPA v1.5 (broken link: http://www.apta.com/research/stats/energy/efficiency.cfm) Average

Vehicle Miles Reduced per Transit Passenger Mile (aka Leverage Factor) (2.7 miles) [Conservative] Source: Holtclaw. “Does A Mile In A Car Equal A Mile On A Train? Exploring Public Transit's Effectiveness in Reducing Driving. Http://sierraclub.org/sprawl/articles/reducedriving.asp

Average Trip Length Data and Ridership Projections provided by the Santa Cruz County Regional Transportation Agency (SCCRTC- Ginger Dykaar, Rachel Moriconi) Source: Santa Cruz Metro and Fehr & Peers:

Erich from Metro about a year ago gave me the estimate of 6.2 miles/person as an average distance for a transit trip (just the transit portion not including to and from the bus).

Chris Breiland (F&P) estimated the following trip distances for the Santa Cruz County RTP health target (SOV) performance analysis.

	Avg Miles
Drive Alone	6.40
Shared Ride	6.40
Walk	1.00
Bike	2.00
Transit	7.00
School Bus	3.00
Other	0.00

Here is data from the American Community Survey on travel time by mode to work trips.

Table 3. Mean Travel Time by Mode to Work[13]	Census 2000		2006-2010 ACS		Is Change Significant in Minutes? **
	Minutes	MOE(+/-)	Minutes	MOE(+/-)	
	At Place of Residence				
Total Workers (does not include workers who worked at home)	27.8	0.4	25.7	0.8	Yes
Drove alone	27.7	0.5	25.5	0.9	Yes
Carpooled	30.9	1.1	28.1	4.0	No
Public Transportation	37.0	2.6	44.1	8.2	No
Taxi, Motorcycle, Walk, Bicycle and Other means	19.1	1.3	17.3	2.4	No

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	600	Units
Reduction Quantity	3850	Reduced VMT per Year

Light Passenger Rail Phase II Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure):	-16210
Peak/Maximum Annual MTCO2e Reduction:	-767

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

• Average Passengers per Vehicle (bus) = 25.8

• Average Passenger Vehicle Fuel Economy = 23 MPG

• Annual VMT Reduction = 3850 miles per New Daily Rider

• Phase II assumes an Additional 50 Daily Riders annually for the duration of the Measure Implementation

Start Year: 2025 **End Year:** 2035

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI, CAPPA v1.5, Light Rail

ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI CAPPA v1.5 Light Rail Calculator Inputs/Outputs (Note- this models the impacts of a single New Rail Passenger):

Community	
1	Number of New Daily Transit Passengers

Community	
	Price of Gasoline ($ per gallon)
25.8	Passengers per Vehicle
2.7	Leverage Factor
6.2	Average Trip Length (mi)
23.0	Average Passenger Vehicle Fuel Economy
1,426	Annual Transit Passenger Miles
3,850	Annual Vehicle Mile Reduction
167	Annual Gasoline Savings (gallons)
481	Increased Electricity Use (kWh)

Passengers per Vehicle Default Value = 25.8 Source: ICLEI CAPPA v1.5 (broken link: http://www.apta.com/research/stats/energy/efficiency.cfm) Average

Vehicle Miles Reduced per Transit Passenger Mile (aka Leverage Factor) (2.7 miles) [Conservative] Source: Holtclaw. “Does A Mile In A Car Equal A Mile On A Train? Exploring Public Transit's Effectiveness in Reducing Driving. Http://sierraclub.org/sprawl/articles/reducedriving.asp

Average Trip Length Data and Ridership Projections provided by the Santa Cruz County Regional Transportation Agency (SCCRTC- Ginger Dykaar, Rachel Moriconi) Source: Santa Cruz Metro and Fehr & Peers:

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	50	Units
Reduction Quantity	3850	Reduced VMT per Year

Regional Transportation Plan/Sustainable Communities Strategy Model Outputs

Total MTCO2e Reduced (over the lifetime of this Measure): -97563

Peak/Maximum Annual MTCO2e Reduction: -3742

Relevant Assumptions, Supporting Calculations, Measure Start/End Years

Assumptions:

- Total Annual Passenger Car + Light Duty Truck VMT = 94,648,669
- AMBAG MTP/SCS: -5.85% reduction (from 2005 Levels) by 2035
- SCCRTC RTP: -17.9% reduction by 2035
- Model Assumes a Net -10% Reduction in Capitola's VMT by 2035
- 94,648,669 * 10% = 9,464,867 Reduction in VMT
- Implementation spread out over 20 year period (Benefits accumulate incrementally over 20 years)
- Incremental Annual VMT Reduction= 473,243 miles/yr (for 20 years) [9,464,867 / 20 yrs = 473,243 VMT avoided per year]

Note: Bike Infrastructure Improvements were modeled separately, so this measure does not include additional reductions for Bike Infrastructure.

Start Year: 2016 **End Year:** 2035

Calculator(s) Used- (Source, Platform, Calculator Name)

ICLEI/SEEC, ClearPath, User Defined Transportation (VMT Reduction)

Source Data, Calculator Inputs and Supporting References

ICLEI/SEEC ClearPath User Defined Transportation (VMT Reduction) Calculator Inputs:

Does this measure Reduce VMT or Change the Carbon Intensity of VMT for the Fuel Type	Reduce VMT	
Primary Driver	1	Units
Reduction Quantity	473243	Reduced VMT per Year

Source: AMBAG MTP/SCS and MTP/SCS-EIR GHG Sections (http://www.ambag.org/programs-services/planning/metro-transport-plan); http://www.arb.ca.gov/cc/sb375/ambag_tech_eval.pdf

excerpted from 2035 SCS:

Meeting GHG Targets

On September 23, 2010, CARB set targets for lowering GHG in the Monterey Bay region. They call for a zero percent increase, in per capita GHG emissions from passenger vehicles by 2020 (compared with 2005); and a five percent per capita reduction by 2035 through land use and transportation planning.

The 2035 MTP/SCS demonstrates that the Monterey Bay region will meet these targets by focusing housing and employment growth in urbanized areas; protecting sensitive habitat and open space; and investing in a transportation system that provides residents, workers and visitors with transportation options that are more effective and diverse.

excerpts from 2035 MTP/SCS and RTPs for Monterey, San Benito, and Santa Cruz EIR

Section 4.8 Greenhouse Gas Emissions/Climate Change

For the AMBAG region, the targets set by CARB are not to exceed 2005 emissions levels by 2020 and to reduce GHG emissions five percent from 2005 levels by 2035. In 2005, GHG emissions from passenger vehicles in the AMBAG region were approximately 15.4 pounds of CO_2 per capita. Therefore,

4.8-12

AMBAG

2035 MTP/SCS and RTPs for Monterey, San Benito, and Santa Cruz EIR

Section 4.8 Greenhouse Gas Emissions/Climate Change

AMBAG must maintain these levels in order to meet the 2020 target and reduce these levels in order to meet the 2035 target. If regionwide GHG emissions associated with the 2035 MTP/SCS do not exceed 15.4 pounds CO_2 per capita in 2020 and 14.62 pounds CO_2 per capita in 2035, the MTP/SCS would meet the mandate of SB 375 and be consistent with the overall emission reduction targets of AB 32.

Table 4.8-3
Per Capita Carbon Dioxide Emission Comparison: Passenger Vehicles

Scenario	Population	Per Capita CO_2 Emissions (lbs/day)	Percent change from 2005
2005 RTDM Auto Only All Trips ~~Includes XI-IX~~	740,048	~~15.4~~ 19.26	N/A
2005 RTDM Auto Only External Trips Reduction[1]	740,048	15.4	N/A
2010 Baseline	732,708	~~18.1~~ 18.69	~~+17.5%~~ -2.92%
2020 No Project Scenario	800,000	~~18.3~~ 19.00	~~+18.8%~~ -1.31%
2020 MTP/SCS External Trips Reduction[1]	800,000	~~15.1~~ 14.86	~~-1.9%~~ -3.47%
2035 No Project Scenario	885,000	~~19.4~~ 19.87	~~+26.0%~~ +3.20%
2035 No Project Scenario External Reductions[1]	885,000	~~15.9~~ 15.49	~~+3.2%~~ +0.64%
2035 MTP/SCS External Reductions and Off Model Adjustments [1, 2]	885,000	~~14.5~~ 14.49	-5.85%

[1] *"External Reduction" For the purposes of modeling GHG emissions for the 2035 MTP/SCS, AMBAG subtracted all emissions from through trips (X-X and ½ of all emissions from trips that either begin or end within the region but travel to/from neighboring regions (X-I and I-X).*

[2] *"Off Model Adjustments" are estimated at a ~~1.95% reduction in passenger vehicle emissions with the 2035 MTP/SCS in 2020, and a 5.85%~~ 4.01% reduction in passenger vehicle emissions with the 2035 MTP/SCS in 2035. Refer to Section 4.12, Transportation and Circulation, for a detailed discussion of the off model adjustment methodology.*

Source: Santa Cruz County Regional Transportation Commission- Regional Transportation Plan Technical Documentation- Appendix C Performance Analysis- GHG Reductions (http://www.sccrtc.org/wp-content/uploads/2014/01/App-C-FULL.pdf)

Pg C-16: The greenhouse gas emissions results for Santa Cruz County for 2035 based on the list of projects that have been prioritized in the 2014 RTP are estimated to be a 17.9% reduction relative to 2005. This corresponds to a CO2 per capita emission rate of 12.3 lbs/day/person for 2035 which includes reductions from both transportation and land use changes. The regional travel demand model results determined 13.1% of this reduction (Figure C.10) and the postprocessing accounts for the remainder of the reduction (4.7%) (Figure C.10). [The postprocessing reduction of 5.46% (Figure C.11) is applied to the 2035 VMT and CO2 results from model as opposed to the 2005 values and thus results in an additional 4.7% reduction relative to 2005.] See the documentation at the end of this target discussion for additional information on how the postprocessing was calculated. The per capita CO2 reduction of 17.9% is slightly greater than the per capita VMT reductions of 17.1% likely due to more efficient vehicle speeds and speed consistency in 2035 relative to 2005 (Figure C.12).

VMT and GHG Calculations for Passenger Vehicles	2005	2035
Daily VMT (miles/workday/capita) - modeled	15.29	13.40
Daily CO2 (lbs/workday/capita) - modeled	15.02	13.05
Modeled reduction in VMT from 2005		-12.4%
Modeled reduction in CO2 from 2005		-13.1%
Daily VMT (miles/workday/capita) - modeled and postprocessed		12.67
Daily CO2 (lbs/workday/capita) - modeled and postprocessed		12.34
Total per capita VMT % Reduction from 2005		**-17.1%**
Total per capita CO2 % Reduction from 2005		**-17.9%**

Figure C.10 – Per Capita Reductions of Vehicle Miles Traveled and Greenhouse Gas Emissions for 2014 RTP relative to 2005 for Passenger Vehicles

C-16

Project Type	Postprocessing Reductions for VMT/GHG Emissions
Pedestrian facility and traffic calming improvements	-0.30%
Bicycle facility improvements	-2.22%
Intelligent Transportation Systems/Transportation System Management programs	-0.13%
Transportation Demand Management programs	-1.75%
Transit improvements	-0.80%
Increased work at home	-0.26%
Total Postprocessing Reductions	**-5.46%**

Figure C.11 – Postprocessing Reductions of Vehicle Miles Traveled and Greenhouse Gas Emissions for 2014 RTP relative to 2005

APPENDIX B

2020 TARGET OPTIONS CONSIDERED BUT REJECTED

APPENDIX B

2020 TARGET OPTIONS CONSIDERED BUT REJECTED

This appendix considers several potential GHG reduction targets that were considered for this CAP but ultimately rejected. It describes each potential target and the reasons for the rejection.

I. AB 32 ABSOLUTE 1990 EMISSIONS GOAL

Based on the original 2008 Scoping Plan and the statewide GHG emissions inventory data, the City considered the following target option:

- **Reduce GHG emissions to 1990 levels by 2020**.

This is a direct translation of the AB 32 goal; however, because the City did not conduct a 1990 emissions inventory, and data is not available to conduct such an inventory today, this target option is not feasible.

II. STATEWIDE BAU REDUCTION EQUIVALENT

The California Air Resources Board (CARB) has projected statewide Business As Usual (BAU) GHG emissions for the year 2020. Accordingly, there is a certain percentage by which the entire state must reduce its BAU emissions to meet the goal of AB 32. Therefore, the City considered the following target option:

- **Reduce 2020 Capitola BAU GHG emissions by a percentage equivalent to the statewide reduction percentage necessary to achieve 1990 emissions levels.**

This option is similar to the selected option, but relies on percentage reductions from Business as Usual, rather than from Baseline levels.

Neither the 2008 Scoping Plan nor the 2014 Update mandate specific levels of GHG reductions for local governments. The 2008 Scoping Plan's

recommendations for communitywide reductions targets applied to California as whole, but did not require each individual city in California to meet a specific target in order to support the State's goal of reducing emissions to 1990 levels by the year 2020. Because Capitola's projected BAU emissions are not growing as fast as those of California overall, it is not necessary for Capitola to reduce its 2020 BAU emissions by a percentage that is equivalent to the statewide level.[1] Therefore, this target option was also rejected for this Climate Action Plan.

III. STATEWIDE BAU REDUCTION EQUIVALENT

This is a target option that is derived from the 2008 Scoping Plan, which indicated that the State would need to reduce GHG emissions by 28.5 percent from 2020 BAU levels in order to reach 1990 levels.

- **Reduce GHG emissions by approximately 30 percent below the 2020 BAU forecast.**

Both this target and rejected target option #2 utilize the same approach of a percentage reduction from the 2020 BAU forecast. However, option #3 would be based on outdated data from the 1990 to 2004 statewide GHG emissions inventory, so it would exacerbate the discrepancy between anticipated increase in BAU emissions in Capitola and these outdated projections for the state. Therefore, the City also rejected this approach.

[1] California's 2020 Business as Usual GHG emissions were projected to grow to 509.4 million $MTCO_2e$ in the BAU forecast that accompanied the 2014 update of the Scoping Plan. This represents a projected 12.4 percent increase from 2010 levels of 453.1 million $MTCO_2e$. By contrast, Capitola's 2020 BAU GHG emissions were projected to be 89,812 $MTCO_2e$, which is only 2 percent higher than its 2010 Baseline emissions of 88,091 $MTCO_2e$.

APPENDIX C

THE ASSOCIATION OF MONTEREY BAY AREA GOVERNMENTS | ENERGY WATCH, 2010, CITY OF CAPITOLA 2010 BASELINE COMMUNITYWIDE GREENHOUSE GAS EMISSIONS INVENTORY

City of Capitola

2010 Baseline Community-wide Greenhouse Gas Emissions Inventory

Prepared by: The Association of Monterey Bay Area Governments | Energy Watch

With Assistance from ICLEI - Local Governments for Sustainability USA and Pacific Gas and Electric Company

Prepared for: The City of Capitola

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Jamie Goldstein, City Manager
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Kerynn Gianotti, Senior Program Manager
John Joseph, Program Manager

ICLEI-Local Governments for Sustainability USA

Michael Schmitz, Executive Director
Michael Steinhoff, Senior Climate Program Officer
Amruta Sudhalker, Climate Program Officer

DC&E | The Planning Center

Ben Noble, Associate Principal
Alexis Mena, Associate
Nicole Vermilion, Associate

This report was prepared by Chris Sentieri, Special Projects Associate at the Association of Monterey Bay Area Governments. The Association of Monterey Bay Area Governments Energy Watch team would like to thank the City of Capitola staff for providing much of the insight and local information necessary for the completion of this report.

October 2013

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Executive Summary

The City of Capitola recognizes that greenhouse gas (GHG) emissions from human activity are catalyzing profound climate change, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community. Furthermore, Capitola has multiple opportunities to benefit by acting quickly to reduce community GHG emissions. These opportunities include: reducing energy and transportation costs for residents and businesses, creating green jobs, improving health of residents, making your community a more resilient and attractive place to live and locate a business.

Capitola has begun the climate action planning process, starting with inventorying emissions. This report provides estimates of greenhouse gas emissions resulting from activities in Capitola as a whole in 2010.

Table ES 1: 2010 Capitola Community-wide Baseline GHG Emissions Inventory Summary

Source/Activity	2010 Community-wide Baseline GHG Inventory
Electricity Consumption	12,776
Stationary Fuel Combustion	16,049
Transportation and Mobile Sources	57,123
Solid Waste Generation	1,476
Water Treatment and Distribution	667
TOTAL	**88,091**

There are a variety of emissions sources and activities included in the community-wide inventory. A subset of these, identified as local government significantly influenced emissions, are most policy relevant. Figure ES 1 shows significantly influenced emissions from in-boundary Sources, while Figure ES 2 shows the significantly influenced emissions Activities. As you can see, the largest contributor in this set is Transportation and Mobile Sources with 57,123 Metric Tons of Carbon Dioxide Equivalent (MTCO2e) of emissions. The next largest contributors are Stationary Fuel Combustion (i.e. – Residential and Commercial/Industrial Natural Gas Consumption) with 16,049 MTCO2e and Electricity Consumption with 12,776 MTCO2e. Actions to reduce emissions in each of these sectors will be a key part of a climate action plan. Solid Waste Generation and Water Treatment and Distribution were responsible for the remainder of significantly influenced sources of emissions.

Figure ES 1: Community Emissions Sources Subject to Local Government Significant Influence

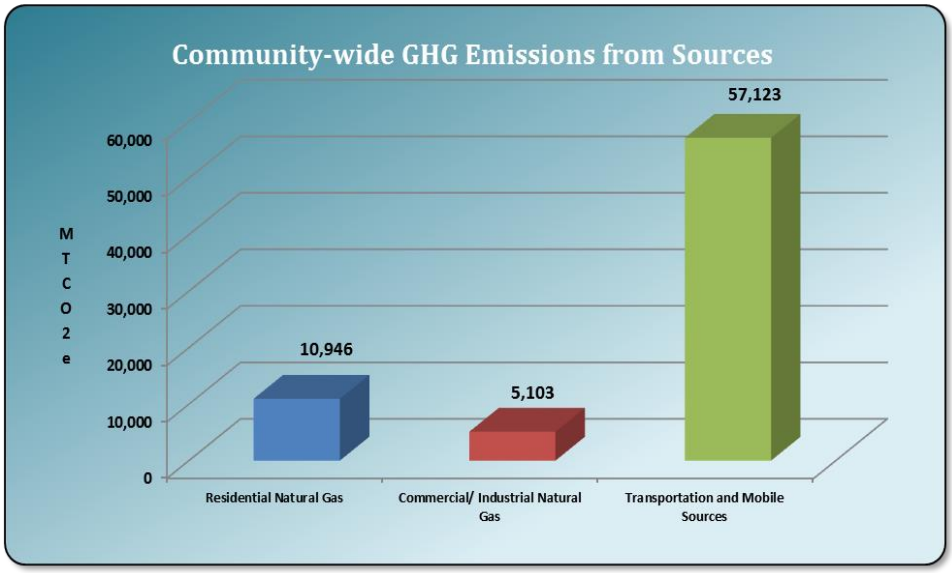
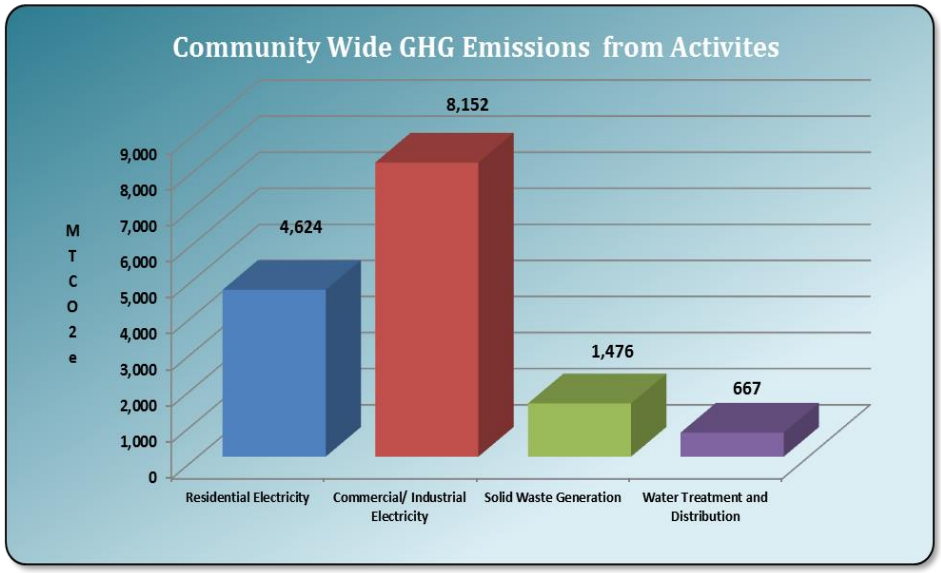


Figure ES 2: Community Emissions Activities Subject to Local Government Significant Influence



Climate Change Background

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is the burning of fossil fuels for transportation, home heating, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise.

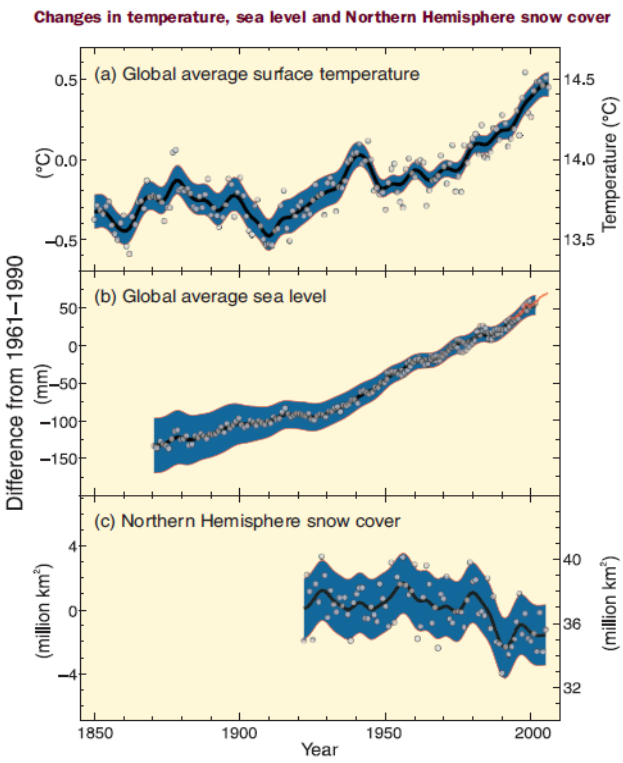


Figure 1: Observed changes in global temperature, sea level and snow cover

Capitola could be impacted by the effects of sea-level rise, changes in precipitation patterns, extreme weather events, increased wildfires, and other inclement effects of climate change. Current and expected impacts to Capitola related to climate change are explained below. Other expected impacts in California include frequent and damaging storms accompanied by flooding and landslides, summer water shortages as a result of reduced snow pack, and the disruption of ecosystems, habitats, and agricultural activities.

Many communities in the United States have taken responsibility for addressing climate change at the local level. Reducing fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient use of energy decreases utility and transportation costs for residents and businesses. Retrofitting homes and businesses to be more efficient creates local jobs. In addition, money not spent on energy is more likely to be spent a local businesses and add to the local economy. Reducing fossil fuel use improves air quality, and increasing opportunities for walking and bicycling improves residents' health.

Evidence of Human-Caused Climate Change

There is overwhelming scientific consensus that the global climate is changing, and that human actions, primarily the burning of fossil fuels, are the main cause of those changes. The Intergovernmental Panel on Climate Change (IPCC) is the scientific body charged with bringing together the work of thousands of climate scientists. The IPCC's Fourth Assessment Report states that "warming of the climate system is unequivocal."[1] Furthermore, the report finds that "most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic GHG concentrations."

2012 was the hottest year on record for the continental United States, with two dozen cities breaking or tying their all-time high temperature records.[2] Globally, the 12 years from 2001-2012 are among the 14 hottest on record, and 1998 was the only year in the 20th century hotter than 2012.[3] 1976 was the last year with a below average global temperature. The steady uptick in average temperatures is significant and expected to continue if action is not taken to greatly reduce greenhouse gas emissions.

California Policy

California has a number of state level policies that serve as regulatory drivers for climate action planning at the local government level, which are described below.

Global Warming Solutions Act (AB32)

California passed the Global Warming Solutions Act (AB 32) in 2006, which charged the California Air Resources Board (CARB) with implementing a comprehensive statewide program to reduce greenhouse gas emissions. AB 32 established the following greenhouse gas emissions reduction targets for the state of California:

- 2000 levels by 2010
- 1990 levels by 2020

SB 375

SB 375 enhances California's ability to reach its AB 32 goals by promoting good planning with the goal of more sustainable communities. SB 375 requires CARB to develop regional greenhouse gas emission reduction targets for passenger vehicles. CARB is to establish targets for 2020 and 2035 for each region covered by one of the State's 18 metropolitan planning organizations (MPOs).

[1] IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

[2] Burt, Christopher C. "2012 a Record Warm Year for Continental U.S"., January 2, 2013. http://www.wunderground.com/blog/weatherhistorian/comment.html?entrynum=112

[3] NOAA: State of the Climate 2012 Summary. http://www.ncdc.noaa.gov/sotc/

Executive Order S-3-05

Executive Order S-3-05, issued by Governor Schwarzenegger, reinforces these goals and also sets a schedule for the reporting of both the measured impacts of climate change upon California's natural environment and the emissions reduction efforts undertaken by a myriad of state, regional, and local groups. Executive Order S-3-05 establishes an additional target of 80% below 1990 levels by 2050. Capitola's GHG emissions inventory is intended to enable the City to develop effective GHG reduction policies and programs to meet these targets and track emissions reduction progress.

Figure 2: ICLEI Climate Mitigation Milestones

California Environmental Quality Act (CEQA)

CEQA requires public agencies to evaluate the environmental impacts of discretionary development plans and projects in their jurisdictions. CEQA guidelines were updated in March 2010 to require analysis of climate change in CEQA documents. Many jurisdictions are finding that climate change impacts from local government activities are "significant" under CEQA, and are identifying emissions reductions targets and Climate Action Plans as mitigation measures to reduce climate change impacts to less-than-significant levels.

ICLEI Climate Mitigation Program

In response to the problem of climate change, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts.

ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones, also shown in Figure 2:

1. Conduct an inventory and forecast of local greenhouse gas emissions;

2. Establish a greenhouse gas emissions reduction target;
3. Develop a climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

This report represents the completion of ICLEI's Climate Mitigation Milestone One for the community as a whole, and provides a foundation for future work to reduce greenhouse gas emissions in Capitola.

Sustainability & Climate Change Mitigation Activities in Capitola

Capitola has already implemented and/or participated in programs that have or will lead to ancillary benefits in the form of energy conservation and greenhouse gas mitigation. The following are some examples:

- Lead-by-example actions to reduce government operations emissions
    - Active and Ongoing Participation in the AMBAG Energy Watch energy efficiency and conservation programs
    - Formation of the Commission on the Environment, which informs City staff and elected on issues related to environmental protection and stewardship
- Business engagement and recognition programs
    - Monterey Bay Green Business Certification Program
- Recycling and waste reduction programs

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from the Capitola community as a whole. Emissions from government operations is a subset of the community inventory included as part of the Non-residential sector, as shown in Figure 3. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles.

Figure 3: Relationship of Community and Government Operations Inventories

As local governments have continued to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the Community Greenhouse Gas Emissions Protocol (Community Protocol)[4].

Community Emissions Protocol

The Community Protocol was released by ICLEI in October 2012, and represents a new national standard in guidance to help U.S. local governments develop effective community GHG emissions inventories. It establishes reporting requirements for all community GHG emissions inventories, provides detailed accounting guidance for quantifying GHG emissions associated with a range of emission sources and community activities, and provides a number of optional reporting frameworks to help local governments customize their community GHG emissions inventory reports based on their local goals and capacities. The State of California Governor's Office of Planning and Research recommends that California local governments follow the Community Protocol when undertaking their greenhouse gas emissions inventories.

[4] http://www.icleiusa.org/tools/ghg-protocol/community-protocol

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by "sources" located within the community boundary, and 2) GHG emissions produced as a consequence of community "activities".

Source	Activity
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere	**The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions.**

By reporting on both GHG emissions sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities. A purely source-based emissions inventory could be summed to estimate total emissions released within the community's jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. The division of emissions into sources and activities replaces the scopes framework that is used in government operations inventories, but that does not have a clear definition for application to community inventories.

Base Year

The inventory process requires the selection of a base year with which to compare current emissions. Capitola's community greenhouse gas emissions inventory utilizes 2010 as its base year.

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.[5]
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used: *Activity Data x Emission Factor = Emissions*

All emissions sources in this inventory are quantified using calculation based methodologies. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see appendices for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh of electricity).

For this inventory, calculations were made using the data and emissions factors provided by ICLEI, Pacific Gas and Electric Company (PG&E), CalRecycle, CalTrans, and the Monterey Bay Unified Air Pollution Control District.

[5] Capitola's community inventory includes emissions data provided by the [INSERT ENTITY] that was gathered through [INSERT MEHTOD, E.G: DIRECT MEASUREMENT].

Community-wide Emissions Inventory Results

Following the Community Protocol, this inventory report organizes emissions in several frames. Each frame includes a particular set of emissions sources and activities, and each helps to tell a different story about community emissions. This report looks at Capitola's community emissions through the following frames:

- Local Government Significant Influence
- Household Consumption

Community Profile

To put emissions inventory data in context, it is helpful to have some basic information about community such as population and number of households. This information is provided in Table 1.

Table 1: Capitola Community Indicators

Estimated 2010 Population	9,918
Estimated 2010 Households	5,534
Estimated 2010 Jobs	6,170

Significantly Influenced Emissions Frame

Capitola has chosen first to focus on emissions over which the City government has significant influence. This frame emphasizes policy relevance, highlighting a set of emission sources and activities that Capitola has the greatest opportunity to address. This frame includes all of the five Basic Emissions Generating Activities required by the community protocol. Table 2 and Figure 6 summarize significantly influenced emissions by source and activity.

Table 2: Significantly Influenced GHG Emissions by Activity and Source

Sector	Sources	Activities	TOTALS
Residential	10,946	4,624	15,570
Commercial / Industrial	5,103	8,152	13,255
Transportation and Mobile Sources	57,123	n/a	57,123
Solid Waste	n/a	1,476	1,476
Water Treatment and Distribution	n/a	667	667
TOTALS	73,172	14,920	88,091
Percentage of Total CO2e	83%	17%	100.0%

Capitola will focus on these emissions sources and activities in developing a climate action plan. The total significantly influenced emissions of 88,091 tons CO2e will be the baseline for setting an emissions reduction target and measuring future emissions reductions against. Figure 4 shows significant influence activity emissions by sector, while Figure 5 shows significant influence source emissions by sector. These figures only show emissions that are included in the significant influence frame, and are not intended to be comprehensive of all in-boundary sources or community activities.

Figure 4: Significantly Influenced Emissions by Sector (MTCO2e)

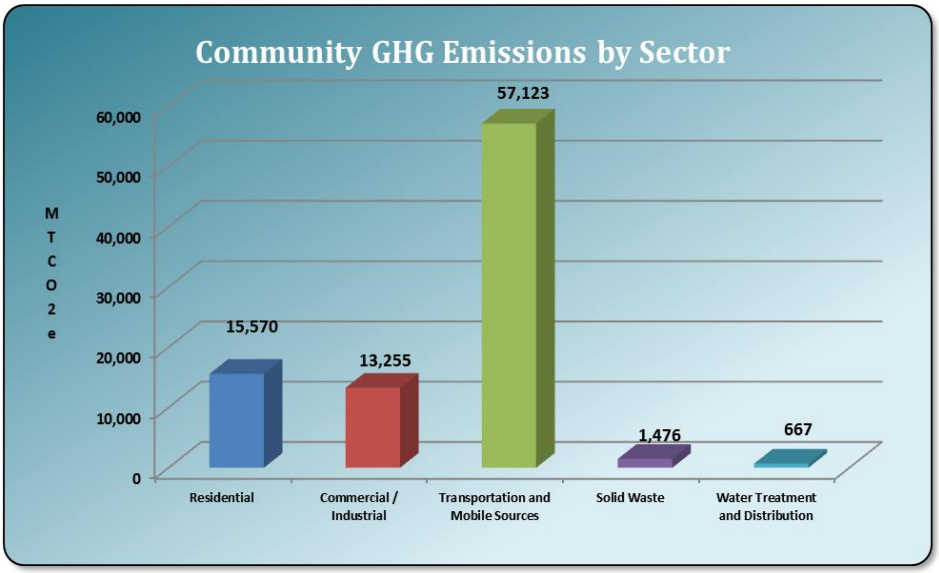


Figure 5: Significant Influence Emissions by Sector (Percentage of Total Emissions)

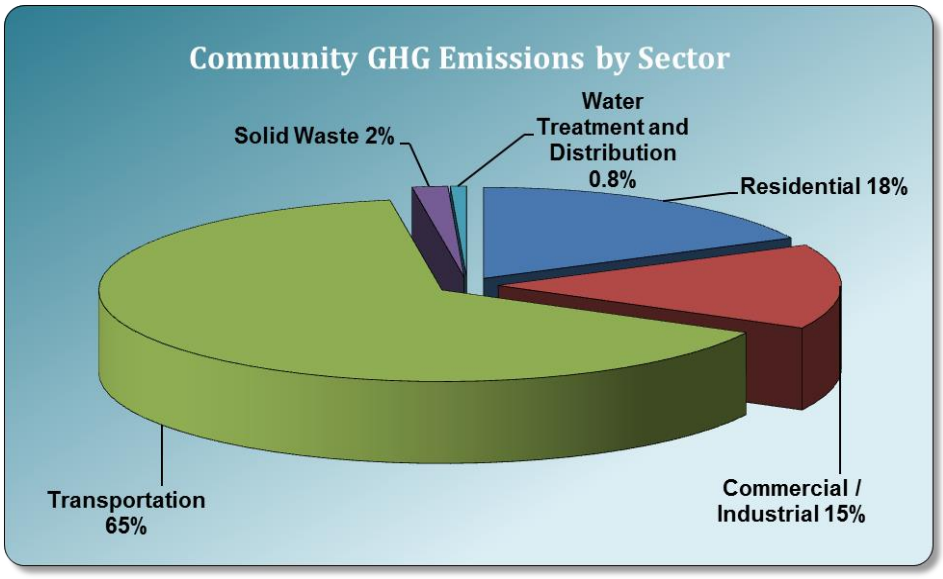


Figure 6 shows a more detailed breakdown of significantly influenced activity emissions, and Figure 7 shows a more detailed breakdown of significantly influenced source emissions.

Figure 6: Significantly Influenced Source Emissions (MTCO2e)

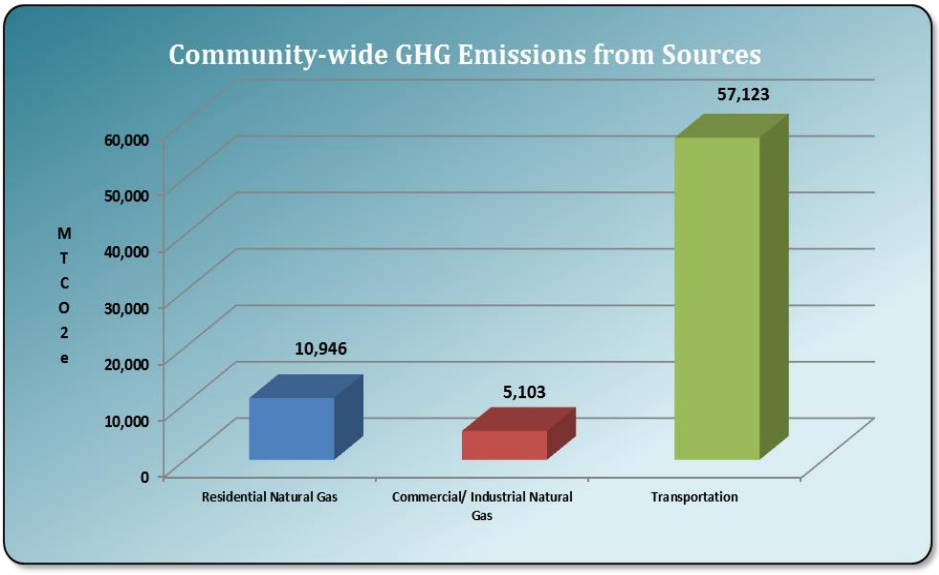
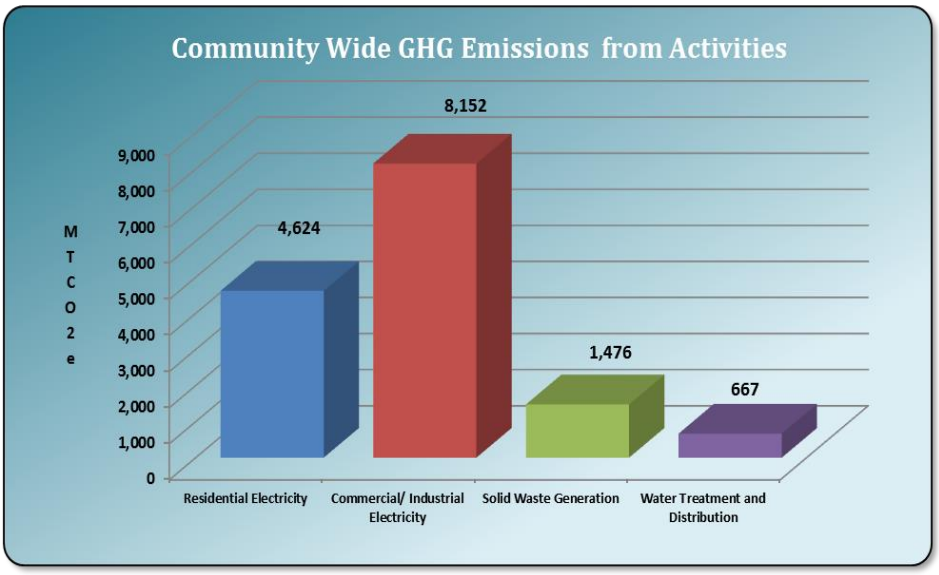


Figure 7: Significantly Influenced Activity Emissions (MTCO2e)



The Transportation sector is the largest contributor to emissions over which Capitola has significant influence, representing approximately 65% of the City's total emissions. This will be an important activity to focus efforts on in developing a climate action plan. The Residential and Commercial/Industrial sectors also account for a large part of significantly influence emissions, and will also be important to address.

Table 3: Community-Wide GHG Emissions by Category

Source or Activity	Activity Data Quantity and Unit	Emissions (MTCO2e)
Residential Use of Electricity	22,835,419 kWh	**4,624**
Commercial/Industrial Use of Electricity	36,291,610 kWh	**8,152**
Residential Stationary Combustion	2,071,672 therms	**10,946**
Commercial Stationary Combustion	966,194 therms	**5,103**
On-road Vehicle Travel	302,528 vehicle miles traveled daily	**54,744**
Off-road Vehicle Emissions	*n/a**	**2,379**
Potable Water Treatment and Distribution	1,120 acre feet per year	**260**
Wastewater Treatment	1.08 million gallons per day	**407**
Generation of Solid Waste	8,803 tons	**1,476**
	Total Community-Wide Emissions	**88,091**

*Note- Source for Off-road Vehicle Travel emissions estimate: Santa Cruz County Regional Transportation Commission Study- *2004 Inventory of Greenhouse Gas Emissions.*

Household Consumption Frame

The second frame through which Capitola has chosen to look at emissions is that of household consumption. The household consumption frame helps to illustrate the full, life cycle impacts of residents' activities. Household consumption includes lifecycle emissions associated with household electricity use, household natural gas use, household personal vehicle transportation, household use of public transportation, household use of water and wastewater services, household production of garbage, and household use of materials and services. Many of these emissions overlap with those looked at through the local government influence and communitywide activities frames. But the household consumption frame also includes emissions that are not included in the other frames, in particular emissions from goods and services that are produced outside the community.

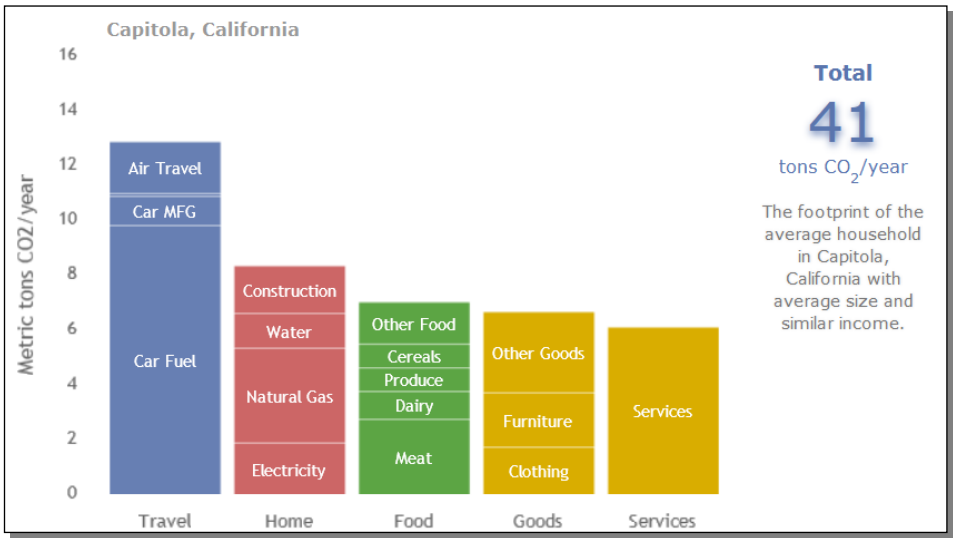
Consumption-based emissions for communities in the U.S. are often – but not always – higher than in-boundary emissions. Consumption based emissions are also larger than geographic emissions for the nation as a whole, although communities with small residential populations, limited government presence, and large industrial or tourism activities (businesses serving non-resident customers) would find their consumption-based emissions to be relatively small. But regardless of whether consumption based emissions are larger or smaller, some of the emissions are *different*, and they represent additional ways in which the community contributes to climate change and by extension, additional opportunities for the community to reduce its contribution to climate change. Table 4 shows total household consumption

emissions for Capitola, while Figure 8 shows household consumption emissions for an average household in Capitola.

Table 4: Total Household Consumption Emissions for Capitola (Source: Cool Climate Calculator)

Average Household Emissions (MTCO2e/Year)	Number of Households	Total Household Consumption Emissions (MTCO2e/Year)
41	5,534	226,894

Figure 8: Household Consumption Emissions for an Average Household in Capitola



Looking at the household emissions frame shows that Food and Purchased Goods are large contributors to emissions, comparable in size to Household Energy Use. A range of actions can help to reduce these emissions, including materials management, reduction of wasted food, and sustainable purchasing practices by governments, businesses, and households. Capitola may want to look at educational efforts in some of these areas as part of its climate action plan.

Consumption emissions for an average household were obtained from the calculator at http://coolclimate.berkeley.edu. Residents who want to learn more about consumption-based emissions from their own household can use the calculator to obtain emissions based on their personal energy use, transportation and purchasing.

Community Emissions Forecast

In order to plan for GHG emission reductions strategies jurisdictions must estimate (or "forecast") future emissions under a Business As Usual (BAU) scenario, which assumes no policies or actions are implemented to curb GHG emissions. GHG Forecasting takes into account historical emission levels established in the Baseline year (2010), as well as expected growth or changes in conditions within the jurisdiction (i.e. - changes in population, expected new development in the Residential and/or Commercial/Industrial sectors, etc.).

The City of Capitola municipal staff and their contracted consultants have developed growth assumptions for the community's recent General Plan Update, which estimate the growth in populations, housing units, and employment in future years. Those growth assumptions provide the basis for the Compound Annual Growth Rates (CAGR) that have been applied to the appropriate sectors of the 2010 Baseline GHG Inventory to create the 2035 and 2050 BAU GHG Forecasts for the City of Capitola.

Table 5 shows expected changes in key indicators used in generating the forecast.

Table 5: Indicators Used in Emissions Forecast (Source: DC&E The Planning Center)

Indicator	2010 Value	2035 Value	Annual Growth Rate	Percent Change from 2010 to 2035
Population	**9,918**	**10,198**	**0.11%**	**2.75%**
Households	**5,534**	**5,613**	**0.06%**	**1.41%**
Employment	**6,170**	**7,368**	**0.71%**	**16.26%**

Under a business-as-usual scenario, the City of Capitola's significantly influenced emissions will grow by approximately 7 percent by the year 2050—from 88,091 MTCO2e to 94,430 MTCO2e—under a business as usual scenario.

Table 6 below shows the results of the 2035 and 2050 BAU GHG Forecast.

Table 6: 2035 and 2050 Business As Usual GHG Emissions Forecast

Source/Activity	2010 Community-wide GHG Inventory Update	2035 BAU GHG Forecast	2050 BAU GHG Forecast	Percent Change from 2010 to 2050
Electricity Consumption	12,776	14,082	14,928	17%
Stationary Fuel Combustion	16,049	17,689	18,753	17%
Transportation and Mobile Sources	57,123	57,986	58,510	2%
Solid Waste	1,476	1,517	1,542	4%
Water Treatment and Distribution	667	686	697	4%
TOTAL	**88,091**	**91,960**	**94,430**	**7%**

Conclusion

This inventory marks completion of Milestone One of the Five Milestones for Climate Mitigation. The next steps are to set an emissions reduction target, and to develop a climate action plan that identifies specific quantified strategies that can cumulatively meet that target. In addition, Capitola should continue to track key energy use and emissions indicators on an on-going basis. ICLEI recommends completing a re-inventory at least every five years to measure emissions reduction progress.

Emissions reduction strategies to consider for the climate action plan include energy efficiency, renewable energy, vehicle fuel efficiency, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction, and community education and engagement among others. This inventory shows that emissions from the transportation sector and energy consumption in the built environment (Electricity consumption and Stationary Fuel Combustion) will be particularly important to focus on. Through these efforts and others the City of Capitola can achieve additional benefits beyond reducing emissions, including: increase energy security and independency, saving businesses and residents money, creating jobs and improving Capitola's economic vitality and its quality of life.

Appendix A: Community Inventory Details

Table A-1 provides a summary of the emissions sources and activities that are included in the community inventory, as well as those potential sources that are excluded.

Table A-1: Summary of Included and Excluded Community Emissions

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks:			Excluded (IE, NA, NO, or NE)	Explanatory Notes	Emissions ($MTCO_2e$)
				SI	CA	HC			
Built Environment									
Use of fuel in residential and commercial stationary combustion equipment		Source AND Activity	x	x					
Industrial stationary combustion sources		Source	x	x					
Electricity	Power generation in the community	Source					NO		
	Use of electricity by the community	Activity	x	x					
District Heating/ Cooling	District heating/cooling facilities in the community	Source					NO		
	Use of district heating/cooling by the community	Activity					NO		
Industrial process emissions in the community		Source					NE		
Refrigerant leakage in the community		Source					NE		
Transportation and Other Mobile Sources									
On-road Passenger Vehicles	On-road passenger vehicles operating within the community boundary	Source	x	x					
	On-road passenger vehicle travel associated with community land uses	Activity					NE		
On-road Freight Vehicles	On-road freight and service vehicles operating within the community boundary	Source					NE		
	On-road freight and service vehicle travel associated with community land uses	Activity					NE		
On-road transit vehicles operating within the community boundary		Source	x	x					
Transit Rail	Transit rail vehicles operating within the community boundary	Source					NO		
	Use of transit rail travel by the community	Activity					NE		
Inter-city passenger rail vehicles operating within the community boundary		Source					NO		
Freight rail vehicles operating within the community boundary		Source					NE		

Emissions Type		Source or Activity?	Required Activities	Included under reporting frameworks: SI	CA	HC	Excluded	Notes	Emissions (MTCO2e)
Marine	Marine vessels operating within the community boundary	Source					NE		
	Use of ferries by the community	Activity					NO		
Off-road surface vehicles and other mobile equipment operating within the community boundary		Source	x	x					
Use of air travel by the community		Activity	x			x			
Solid Waste									
Solid Waste	Operation of solid waste disposal facilities in the community	Source					NO		
	Generation and disposal of solid waste by the community	Activity	x	x					
Water and Wastewater									
Potable Water - Energy Use	Operation of water delivery facilities in the community	Source					NO		
	Use of energy associated with use of potable water by the community	Activity	x	x					
Use of energy associated with generation of wastewater by the community		Activity	x	x					
Centralized Wastewater Systems - Process Emissions	Process emissions from operation of wastewater treatment facilities located in the community	Source					NO		
	Process emissions associated with generation of wastewater by the community	Activity	x	x					
Use of septic systems in the community		Source AND activity					NE		
Agriculture									
Domesticated animal production		Source					NO		
Manure decomposition and treatment		Source					NO		
Upstream Impacts of Community-Wide Activities									
Upstream impacts of fuels used in stationary applications by the community		Activity					NE		
Upstream and transmission and distribution (T&D) impacts of purchased electricity used by the community		Activity					NE		
Upstream impacts of fuels used for transportation in trips associated with the community		Activity					NE		
Upstream impacts of fuels used by water and wastewater facilities for water used and wastewater generated within the community boundary		Activity					NE		
Upstream impacts of select materials (concrete, food, paper, carpets, etc.) used by the whole community		Activity					NE		

Emissions Type	Source or Activity?		Included under reporting frameworks: SI	CA	HC	Excluded	Notes	Emissions (MTCO2e)
Independent Consumption-Based Accounting								
Household Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all households in the community)	Activity	x			x			
Government Consumption (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all governments in the community)	Activity					NE		
Life cycle emissions of community businesses (e.g., gas & electricity, transportation, and the purchase of all other food, goods and services by all businesses in the community)	Activity					NE		

Table A-2 provides details on calculation methods and data sources for each included activity and source.

Table A-2: Community Inventory Calculation Method and Data Source Details

Residential use of electricity	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	22,835,419	kWh	0.000203674	MTCO2e/kWh	PG&E	BE.2.1
Method and data source notes:						

Commercial use of electricity	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	36,291,610	kWh	0.000203674	MTCO2e/kWh	PG&E	BE.2.1
Method and data source notes:						

Residential use of stationary combustion equipment	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	2,071,672	therm	0.00532	MTCO2e/therm	PG&E	BE.1.1
Method and data source notes:						

Commercial use of stationary combustion equipment	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	966,194	therm	0.00532	MTCO2e/therm	PG&E	BE.1.1
Method and data source notes:						

On-road passenger vehicle travel associated with community land uses	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	302,528	Daily Vehicle Miles Traveled	Variable (See below)	See below	DC&E The Planning Center (VMT), AMBAG (EMFAC/TDM Outputs)	TR.1.A
Method and data source notes: **EMFAC. Bhupendra Patel, Senior Transportation Modeler- AMBAG: bpatel@ambag.org**						

On-road freight and service vehicle travel associated with community land uses	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	n/a					n/a
Method and data source notes:						

Generation of solid waste by the community	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	8,083	tons	0.1826	MTCO2e/ton	ICLEI/CACP	SW.4.1
Method and data source notes: http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097						

Use of energy associated with use of potable water	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	1,277,338	kWh	0.000203674	MTCO2e/kWh	PG&E	Other
Method and data source notes: Capitola Potable Water Consumption data provided by DC&E The Planning Center (Source: Soquel Creek Water District, 2010 Urban Water Management Plan) = 1,120 Acre Feet per Year Consumed = 364,953,600 Gallons Consumed * 0.0035 kWh/Gallon (Supply, Conveyance, Distribution and Treatment. Source: Table 2-E from CAPCOA. Quantifying Greenhouse Gas Mitigation Methods. August, 2010. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf)						

Use of energy associated with generation of wastewater	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	1.08	Million Gallons Per Day (MGD)	See below	See below	DC&E The Planning Center	Other

Method and data source notes:
Capitola Wastewater is treated by the City of Santa Cruz Wastewater Treatment Facility. On October 2, 2013 Dan Seidel (SCWWTF Superintendent) provided the Total Average Daily Flow to the WWTF (10.6 MGD). That data, in conjunction with the Estimated Capitola MGD (1.08) provided by DC&E The Planning Center and the MBUAPCD provided data for total 2010 SCWWTF GHG Emissions (3,998 MTCO2e), was used to calculate the Estimated Emissions from Capitola's 2010 Wastewater. This includes the estimated emissions from the SCWWTF's energy consumption, process, and effluent.

[Additional activity/source]	Activity data		Emissions factor			Method
	Value	Unit	Value	Unit	Source	
	n/a					n/a

Method and data source notes:

PLACEWORKS

Community Planning | Design | Environmental Services
Landscape Architecture | Economics | School Planning

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