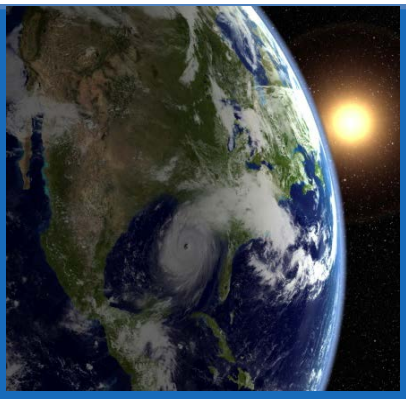
CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance



2015

VCREA Local Government Member Agencies:
2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

VENTURA COUNTY

REGIONAL ENERGY ALLIANCE

PART I: 2010 THROUGH 2012 GREENHOUSE GAS INVENTORIES

December 2015

Prepared with the assistance of:
Anacapa Consulting Services Inc.
Ventura, California

Page Intentionally Left Blank

Acknowledgements

The author extends a very special thanks to the management and staff of VCREA for their patience and support in the preparation of this report: Sue Hughes, Alejandra Tellez, Kelly Cattanach, Rachel Scott, Leigh Walker, and Heather Allen. Also, thank you to my colleagues and assistants at Anacapa: Brooke Farrell and Andrew Wakelee. Thank you, John Brooks, for your enthusiasm about this project and Joe Yahner for improving the landfill emissions methodology. My appreciation goes to VCREA member agencies and utility partners who provided data for this report and answered countless questions.

In anticipation of their consideration, we acknowledge the VCREA Board for sponsoring this project: Supervisor Kathy Long, Chair, Supervisor Steve Bennett, Alternate (County of Ventura), Mayor Cheryl Heitmann, Vice-Chair (City of Ventura), Mayor Douglas Tucker (City of Fillmore), Councilmember Bert Perello, Mayor Tim Flynn, Alternate (City of Oxnard), Mayor John Procter (City of Santa Paula), Joel Price (Thousand Oaks), Board Trustee Larry Kennedy (Ventura Community College District), Board Member Jonathan Sharkey (Ventura Regional Sanitation District), Mary Haffner, Barbara Fitzgerald Alternate (Ventura Unified School District).

Special thanks to the attendees at the September 2, 2015 Champions workshop to discuss an earlier draft of this report: Alma Briseno, SCG; Anne Mumo, Thousand Oaks; Chris Coronel, SCE; David Jones, City of Lancaster; Dr. Helen Cox, California State University, Northridge; Irfan Parekh, SCE; Jeremy Laurentowski, Moorpark; Joe Yahner, Ventura; John Brooks, Thousand Oaks; Kathleen Mallory, Oxnard; Lauren Bianchi-Klemann, Office of Supervisor Kathy Long; Leigh Lain Walker, VCREA; Lynn Rodriguez, WCVC; Marie Lakin, Senator Fran Pavley's Office; Mayra Martinez, County of Ventura; Roger Pichardo, Camarillo; Jennifer Eggertsen, Graduate Student; John Procter, Santa Paula/VCREA representative; Chris Williamson, Oxnard; Steve Offerman, Office of Supervisor Bennett; Maura Macaluso, Fillmore.

This report and project were funded by Southern California Edison Company under the auspices of the California Public Utilities Commission.

Ann Hewitt, PhD
President
Anacapa Consulting Services Inc.

Page Intentionally Left Blank

Climate on the Move
Executive Summary

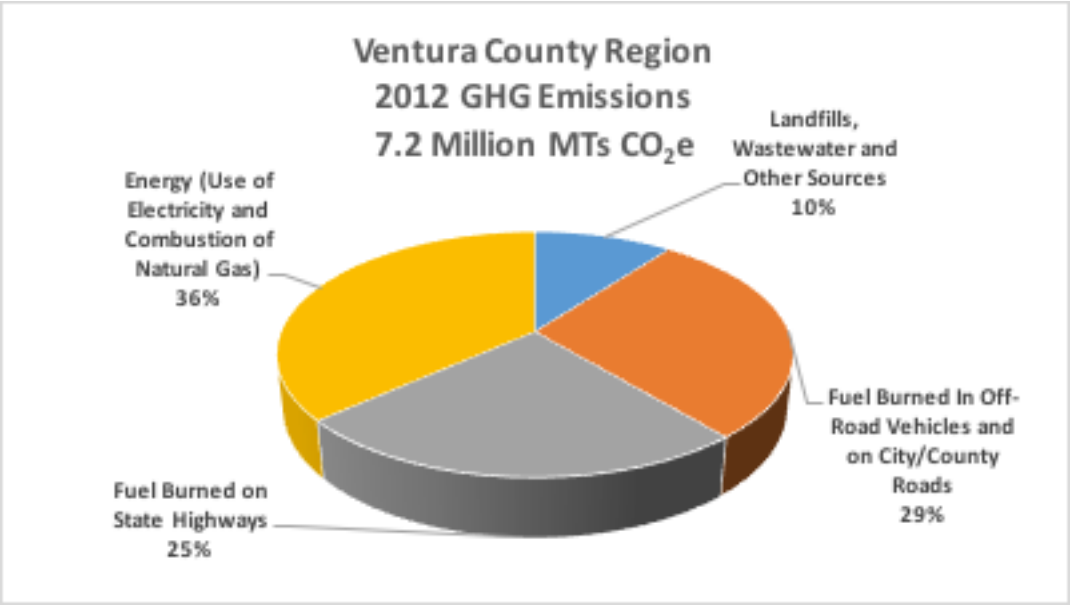
The State of California leads in the world in responding to the challenges we face in response to climate change. Among many significant legislative actions, in 2006, the State legislature passed Assembly Bill 32 (AB 32), the Global Warming Solutions Act. This and other regulations and policies that followed it are moving the State towards a smaller and smaller carbon footprint.

With funding from Southern California Edison (SCE), under the auspices of the California Public Utilities Commission, the Ventura County Regional Energy Alliance (VCREA) prepared this inventory of greenhouse gas (GHG) emissions (2010 through 2012) for the region and for each of its local government member organizations. The inventory will assist with planning to mitigate and address changes that result from climate change including: rising temperatures, changing precipitation patterns, increased wildfire risk, public health impacts, water supply changes, increased demand for summertime cooling, sea level rise and less resilient agriculture.

Climate on the Move Parts I and II includes inventories, forecasts, and target options for the year 2020.

The VCREA inventory (or carbon footprint) is divided into three broad areas: energy (electricity and natural gas combustion), mobile sources (on and off road burning of diesel and gasoline) and other emission sources (including landfill gas, emissions from wastewater treatment plants, and others). GHGs are reported in units of carbon dioxide equivalent (CO_2e). Different gases (like methane and nitrous oxide) have higher abilities to warm the atmosphere than others. These gases are assigned values equivalent to carbon dioxide, for accounting purposes.

In 2012, total County emissions in metric tons (MT) CO_2e were:



2020 forecasts were developed for the major categories in the inventory: emissions from energy use (electricity and natural gas) and on-road mobile emissions. Forecasted emissions in Ventura County will be 8.2% lower in 2020 than in 2010, largely due to State requirements for renewable energy and clean fuels and vehicles. Within that total, emissions from the use of electricity will be reduced by 12% over 2010, from on-road vehicles by 9.5% while emissions from natural gas combustion will increase by 3.6%.

Section 4 of the report provides options for reduction targets for each of the three sectors, at 5%, 10% and 15%, either below 2010 levels or below 2020 adjusted business as usual levels.

Table of Contents

Part I

1. Introduction 1
   1.1 About Ventura County 1
   1.2 Global Climate Change 2
      1.2.1 The Role of Human Activity 4
      1.2.2 Local Climate Change and California 5
2. Greenhouse Gases, Policies and Inventories 8
   2.1 Climate Change Legislation and Policy 8
   2.1 What is a Greenhouse Gas Inventory? 8
   2.2 Approach 9
3. VCREA's Greenhouse Gas Inventories – Our Regional Carbon Footprint 11
   3.1 Total County Emissions 11
   3.2 Energy-based Emissions 12
      3.2.1 Emissions from the Residential Sector 13
      3.2.2 Emissions from the Non-Residential Sector 13
   3.3 Mobile-Based Emissions (Vehicles and Off-Road Equipment) 15
   3.4 Other Emissions 16
      3.4.1 Emissions from Solid Waste 16
      3.4.2 Water and Wastewater Treatment Emissions 17
      3.4.3 High GWP GHG Emissions 17
   3.5 Water and Energy 18
   3.6 Avoided Energy Emissions (2010 through 2014) 18
      3.6.1 Southern California Edison 18
      3.6.2 Rooftop Solar 19
4. Regional Greenhouse Gas Forecasts and Reduction Target Options 1
   4.1 Emissions from Electricity Use 2
   4.2 Emissions from Combustion of Natural Gas 3

4.3 Emissions from On-Road Transportation 4
5. Progress Since 2010 6
5.1 Reductions in Emissions from Electricity Use 6
5.2 Reductions in Emissions from Combustion of Natural Gas.....6
5.3 Reductions in Emissions from On-Road Vehicles.....6

Appendices A-1 through A-10 include Inventories, 2020 Forecasts and Reduction Target Options for VCREA Local Government Members:

A-1: Camarillo

A-2: Fillmore

A-3: Moorpark

A-4: Ojai

A-5: Oxnard

A-6: Port Hueneme

A-7: Santa Paula

A-8: Thousand Oaks

A-9: Ventura

A-10: Unincorporated Area

Appendix B: Methodological Considerations

Appendix C: Data Anomolies

1. Introduction

In 2006, the California State legislature passed Assembly Bill 32 (AB 32), the Global Warming Solutions Act. The law established a limit of greenhouse gas (GHG) emissions for the State of California, so that state-wide emissions would be reduced to 1990 levels by 2020. The law has been implemented through a scoping plan developed by the California Air Resources Board (CARB). That plan recommends that California cities and counties seek to reduce their GHG emissions to be consistent with statewide reductions. Two years later, in 2008, the California Senate passed Senate Bill 375, requiring regional transportation planning to promote reductions in vehicle GHG emissions.

In response to these initiatives, the Ventura County Regional Energy Alliance (VCREA) has prepared an inventory of GHG emissions, and climate action plan templates for each of its local government member organizations. VCREA was formed in 1998 and is in an ideal position to compile countywide information on energy use.

1.1 About Ventura County

Ventura County is the twelfth largest of 58 California counties, with a population of 823,318 residents. It includes ten incorporated cities; Oxnard is the largest with 197,899 residents; and Ojai is the smallest with 7,461 residents. By 2030, the county's population is projected to reach 982,794.[1]

Geographically, Ventura offers a stunning 42 miles of coastline and the Los Padres National Forest, which accounts for 46% of the county's land mass in the northern portion of the county. Fertile valleys in the southern half of the county make Ventura a leading agricultural producer. Together, farming and the Los Padres National Forest occupy half of the county's 1.2 million acres. Ventura County has a strong economic base that includes major industries such as biotechnology, agriculture, advanced technologies, oil production, military testing and development, and tourism.

[1] http://www.ventura.org/vcaaa/demographics

The United States military is the largest employer in the county with more than 16,000 employees working at two naval bases and the Air National Guard base. The County of Ventura (government) is the next largest employer with nearly 8,000 employees located throughout the county. Port Hueneme is California's smallest but only deep water port between Los Angeles and San Francisco which plays a major role in the local economy.

Home to two universities (California State University Channel Islands and California Lutheran University), and three Community Colleges (Oxnard, Ventura, and Moorpark), multiple university extensions, institutes, and adult schools, the county enjoys a strong structure for workforce development.

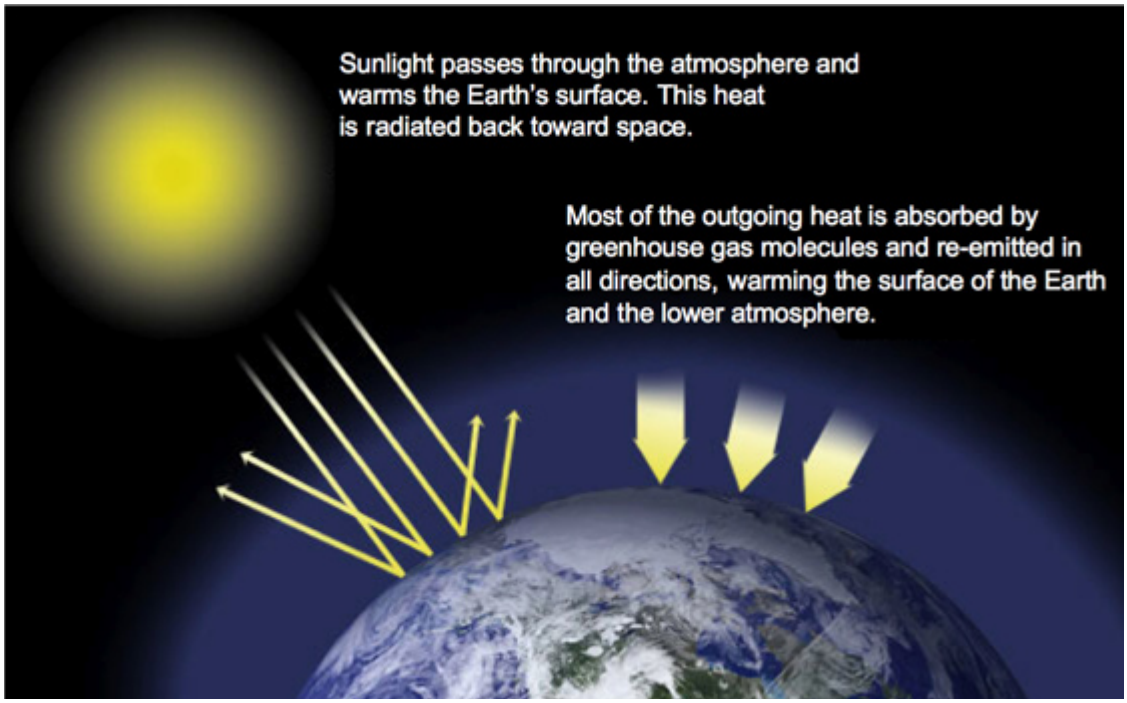
The Gross Domestic Product (GDP) of the county was estimated in 2011 at $70 billion, with more than 25% of this produced by manufacturing industries. Within manufacturing, leading industry clusters include pharmaceuticals ($7.9 billion), computers and electronics ($3.0 billion), machinery manufacturing ($1.1 billion) and bio-medical devices ($561 million). The second largest economic sector in the county is financial services, including insurance and real estate, with $13.7 billion in output. While this industry experienced corporate restructuring during the recession and following years, the county has retained its position as having nearly the largest concentration of jobs in this sector as compared to all other California counties. Agriculture is a powerful economic driver in Ventura County, with an estimated total output of $3.3 billion. The county enjoys some of the highest per-acre agricultural production values in California.[2]

1.2 Global Climate Change[3]

A layer of GHGs – primarily water vapor, and including much smaller amounts of carbon dioxide, methane and nitrous oxide – acts as a thermal blanket for the Earth, absorbing heat and warming the surface to a life-supporting average of 59 degrees Fahrenheit (15 degrees Celsius).

Most climate scientists agree the main cause of the current global warming trend is human expansion of the greenhouse gas effect — warming that results when the atmosphere traps heat radiating from Earth toward space.

[2] http://edc-vc.com/wp-content/uploads/CEDS-report_final.pdf
[3] This description of the causes of global climate change is taken from NASA's Global Climate Change web portal: http://climate.nasa.gov/causes/



Certain gases in the atmosphere block heat from escaping. Long-lived gases that remain semi-permanently in the atmosphere and do not respond physically or chemically to changes in temperature are described as "forcing" climate change. Gases, such as water vapor, which respond physically or chemically to changes in temperature are seen as "feedbacks."

Gases that contribute to the greenhouse effect include:

- Water vapor. The most abundant GHG, but importantly, it acts as a feedback to the climate. Water vapor increases as the Earth's atmosphere warms, but so does the possibility of clouds and precipitation, making these some of the most important feedback mechanisms to the greenhouse effect.

- Carbon dioxide (CO_2). A minor but very important component of the atmosphere, CO_2 is released through natural processes such as respiration and volcano eruptions and through human activities such as deforestation, land use changes, and burning fossil fuels. Humans have increased atmospheric CO_2 concentration by a third since the Industrial Revolution began. This is the most important long-lived "forcing" of climate change.

- Methane (CH_4). A hydrocarbon gas produced both through natural sources and human activities, including the decomposition of wastes in landfills, agriculture, and especially rice cultivation, as well as ruminant digestion and manure management associated with domestic livestock. On a molecule-for-molecule basis, CH_4 is a far more active greenhouse gas than carbon dioxide, but also one which is much less abundant in the atmosphere.

- Nitrous oxide (N_2O). A powerful GHG produced by soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.

- Chlorofluorocarbons. Synthetic compounds entirely of industrial origin used in a number of applications, but now largely regulated in production and release to the atmosphere by international agreement for their ability to contribute to destruction of the ozone layer. They are also GHGs.

On earth, human activities are changing the natural greenhouse. Over the last century the burning of fossil fuels like coal and oil has increased the concentration of atmospheric CO_2. This happens because the coal or oil burning process combines carbon with oxygen in the air to make CO_2. To a lesser extent, the clearing of land for agriculture, industry, and other human activities have increased concentrations of GHGs.

The consequences of changing the natural atmospheric greenhouse are difficult to predict, but certain effects seem likely:

- On average, earth will become warmer. Some regions may welcome warmer temperatures, but others may not.

- Warmer conditions will probably lead to more evaporation and precipitation overall, but individual regions will vary, some becoming wetter and others dryer.

- A stronger greenhouse effect will warm the oceans and partially melt glaciers and other ice, increasing sea level. Ocean water also will expand if it warms, contributing further to sea level rise.

- Meanwhile, some crops and other plants may respond favorably to increased atmospheric CO_2, growing more vigorously and using water more efficiently. At the same time, higher temperatures and shifting climate patterns may change the areas where crops grow best and affect the makeup of natural plant communities.

1.2.1 The Role of Human Activity

In its Fourth Assessment Report, the Intergovernmental Panel on Climate Change (the IPCC), a group of 1,300 independent scientific experts from countries all over the world under the auspices of the United Nations, concluded there's a more than 90 percent probability that human activities over the past 250 years have warmed our planet.

The industrial activities that our modern civilization depends upon have raised atmospheric CO_2 levels from 280 parts per million to 379 parts per million in the last 150 years. The IPCC also concluded there's a better than 90 percent probability that human-produced GHGs such as CO_2, CH_4 and N_2O have caused much of the observed increase in Earth's temperatures over the past 50 years.

The Intergovernmental Panel concluded that the rate of increase in global warming due to these gases is very likely to be unprecedented within the past 10,000 years or more.[4]

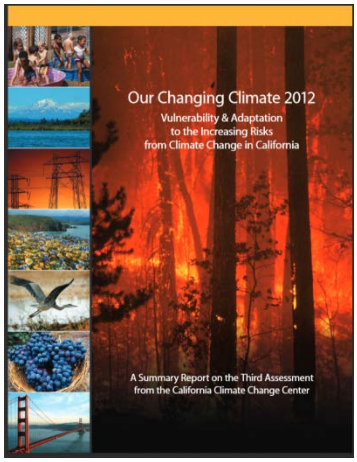
1.2.2 Local Climate Change and California

The State of California produces periodic scientific assessments on the potential impacts of climate change in California and reports potential adaptation responses. Required by Executive Order S-03-05, these assessments influence legislation and inform policy makers:

- The First Climate Change Assessment, released in 2006, looked at the potential impacts of climate change on key state resources such as the water supply, public health, agriculture, coastal areas, forestry, and electricity production and demand. The assessment influenced the passage of AB 32, the California Global Warming Solutions Act of 2006.

- The Second Climate Change Assessment, released in 2009, attempted to provide initial estimates of the economic impacts of climate change. It concluded that adaptation - as a complementary approach to mitigation - could substantially reduce the economic impacts of loss and damage that result from a changing climate. Findings from the Second Assessment were instrumental in preparing California's 2009 Statewide Adaptation Strategy.

- The Third Climate Change Assessment, released in 2012, was shaped by the request for more information on vulnerability and adaptation options discussed in the 2009 California Adaptation Strategy. It made significant progress in projecting climate change impacts, but also in better understanding the interactions of those potential impacts with on the ground exposure, sensitivity, and response capacity of natural and human systems.



The Assessment concluded that:

<u>Temperatures in California will rise significantly during the 21st century.</u>

- By 2050, California is projected to warm by approximately 2.7ºF above 2000 averages, a threefold increase in the rate of warming over the last century.
- By 2100, average temperatures could increase by 4.1 to 8.6ºF, depending on emissions levels.
- Springtime warming – a critical influence on snowmelt – will be particularly pronounced.
- Summer temperatures are projected to rise more than winter temperatures, and increases are projected to be greater in inland California, compared to the coast.

[4] http://climate.nasa.gov/causes/

- Heat waves are projected to be more frequent, hotter, and longer. There are projected to be fewer extremely cold nights.

Precipitation models continue to show a Mediterranean pattern of weather.

- Wet winters and dry summers with variability are projected to persist.
- Several climate models indicate drier conditions by the mid-to-late century, in Central and Southern California.

Wildfire risk in California will increase as a result of climate change.

- Earlier snowmelt, higher temperatures and longer dry periods over a longer fire season would directly increase wildfire risk.
- That risk is also projected to be influenced by changes in vegetation, lightning strikes, and human activities, particularly land use development patterns.

Climate change could have major impacts on public health and well-being.

- Sensitive segments of the human population are particularly vulnerable to extreme heat and ground-level ozone.

Climate change will impact the supply of water throughout the State.

- The State will be challenged to manage water under changing climate conditions, including responding to increased demand for water as temperatures rise, snowmelts and runoff occur earlier and faster than in the past, and historical sea level rise threatens aging coastal water infrastructure.
- Climate change effects on water supplies and stream flows are expected to increase competition among urban and agricultural users.
- Water districts with limited or no access to state water would need to rely on local sources for water, making sustainable groundwater management more critical than in the past.

Increases in average temperature and higher frequency of extreme heat events combined with new residential development across the state are projected to drive up the demand for cooling in summertime.

- The Third Assessment notes that climate change is leading to an increase in energy demand.
- Energy supply from hydropower, especially in higher elevations, is vulnerable to changes in snowpack and spring runoff.
- Transmission lines for electricity are not designed to carry the higher loads projected by the assessment, and are projected to be more vulnerable to destruction by fire as a result of higher temperatures and more wildfires.

Sea level rise is occurring more quickly than had been anticipated in earlier assessments and this impacts coastal flooding.

- Sea level along the state's coastline in 2050 could be 10-18 inches higher than in 2000, and 31-55 inches higher by the end of this century. This represents a four- to eightfold increase in the rate of sea-level rise over that observed in the last century.
- By 2050, coastal 100 year storm events could strike annually on average as a result of sea-level rise.
- Sea level rise and coastal flooding are expected to put critical infrastructure at risk, including ports, transportation routes, power plants, etc.

California's ecosystems are vulnerable to the effects of climate change.

- Climate conditions are changing so rapidly that some vegetation cannot keep pace and some species are unable to quickly adapt to changing temperatures, precipitation and sea level rise.
- Identifying and then providing migration corridors that will allow species to migrate to more suitable habitat will be critical to their survival as the climate changes.

California's agriculture is also vulnerable to climate change.

- Changes in temperature and water availability — annual and seasonal shifts as well as extreme highs and lows — affect both crop yield and quality, making the sector highly sensitive to climate change.[5]

[5] "Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California", CEC Publication # CEC-500-2012-007, July 31, 2012.

2. Greenhouse Gases, Policies and Inventories

2.1 Climate Change Legislation and Policy

In 2006, the State of California adopted landmark climate change legislation: the Global Warming Solutions Act of 2006, more commonly known as AB 32. The Act established the state's goal of reducing its GHG emissions to 1990 levels by 2020. AB 32 was implemented through the development of a Scoping Plan that identified specific actions to be taken to achieve the required reductions. The Plan was subsequently updated in 2014.

In 2008, the Sustainable Communities and Climate Protection Act (SB 375) required Metropolitan Planning Organizations, like the Southern California Association of Governments, to prepare Sustainable Communities Strategies, as part of their Regional Transportation Plans. The intent was for land use, transportation and housing policies to play a part in reducing regional GHG emissions.

A suite of executive orders, regulations and laws have been put in place to maintain momentum on GHG reductions and to expand the reduction goals. These included implementation of the "Pavley" regulations that reduce GHG emissions in new passenger vehicles and adoption of the 2009 Low Carbon Fuel Standards regulations, aimed at reducing the carbon intensity of transportation fuels used in California by at least 10% by 2020.

More recently, in April 2015, Governor Gerry Brown issued an executive order to establish a new GHG reduction target of 40% below 1990 levels by 2030. On October 7, 2105, Governor Brown signed Senate Bill 350. The law requires 50% of all energy used in the State to come from renewable sources, seeks to double energy efficiency in existing buildings and to develop cleaner heating fuels.

2.1 What is a Greenhouse Gas Inventory?

The US EPA describes a greenhouse gas inventory as follows:

> *"… an accounting of greenhouse gases (GHGs) emitted to or removed from the atmosphere over a period of time. Policy makers use inventories to establish a baseline for tracking emission trends, developing mitigation strategies and policies, and assessing progress. An inventory is usually the first step taken by entities that want to reduce their GHG emissions.*
>
> *An inventory can help local governments:*
>
> - *Identify the sectors, sources, and activities within their jurisdiction that are responsible for greenhouse gas emissions*
> - *Understand emission trends*
> - *Quantify the benefits of activities that reduce emissions*
> - *Establish a basis for developing a local action plan*

- *Track progress in reducing emissions*
- *Set goals and targets for future reductions"*

The State of California develops an annual statewide GHG inventory that includes emissions from a large number of sources, including transportation, electricity, stationary combustion and others. With the introduction of California's GHG cap-and-trade program, some large sources of GHG emissions are required to report their GHG emissions to the California Air Resources Board (CARB) and to reduce their emissions over time or pay penalties. Local governments, unless they have large sources of GHGs like landfills or combustion sources, are not required to reduce their emissions. However, beginning in 2008 State agencies recommended that local governments make best efforts to reduce emissions by 15% below current levels by 2020. Many jurisdictions around the State developed inventories in the 2008-2012 time period and chose calendar year (CY) 2005 as the base year for their reductions.

As noted above, the CARB's AB 32 Scoping Plan[6] describes the approach California will take to reduce GHGs to achieve the goal of reducing emissions to 1990 levels by 2020. The Scoping Plan was first considered by the Board in 2008 and was then updated in 2014. The Climate Action Plan templates developed in this project are locally based approaches to GHG reduction.

2.2 Approach

VCREA, with the assistance of Anacapa Consulting Services Inc., has committed to the following actions with respect to GHG reductions:

1. Prepare three annual GHG **inventories** (2010, 2011 and 2012) for the region and for each of its ten local government members (Camarillo, Fillmore, Moorpark, Ojai, Oxnard, Port Hueneme, Santa Paula, Thousand Oaks, the City of Ventura and the County of Ventura).

2. Prepare GHG emissions forecasts and reduction targets for the year 2020 for the region as a whole and for each partner local government

   Part I of this report (Sections 1 through 3) provides a **regional** community-level summary of emissions for the three calendar years. Because these emissions are community-based, the decision was made to include those generated in the City of Simi Valley, even though that City is not currently part of the VCREA partnership. Including these emissions gives a more complete picture of Ventura County's regional carbon footprint. Appendices A-1 through A-10 summarizes emissions data for communities whose local governments are participants in VCREA, i.e., excluding Simi Valley.

3. Prepare climate action templates for the region and member governments that include:

[6] http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

- A GHG emissions **forecast** for the year 2020 for the regional as a whole and for each partner local government.
- Regional and city-specific **reduction targets** for 2020.

Part II (Sections 4 and 5) of this report (and its local government appendices) forecasts total emissions, and separately, energy (electricity and natural gas) and on-road transportation emissions. The report provides options for reduction targets for the year 2020, including one that is consistent with the “15% from current levels” encouraged by the State, as noted above.

.

3. VCREA's Greenhouse Gas Inventories – Our Regional Carbon Footprint

The County and city inventories presented in this report were developed using a geographic boundary approach (i.e., jurisdictional/city limits) to emissions reporting. These inventories are referred to as city-wide inventories. Local government inventories were developed for the areas of each government's operational control. Emissions for a particular source are included in this inventory if the government entity either wholly owns an operation, facility or source, or has full authority to introduce and implement operating policies at the operation. This typically includes government-owned facilities, vehicles, and operations. For some cities, data collection on government-owned vehicle emissions was considered onerous and these emissions were not included in the local government inventory. This tended to be the case for smaller cities where it is assumed that mobile source emissions are a small portion of their cities' emission sources.

The categories reported include:

- Energy based emissions (electricity and natural gas)
- Mobile based emissions (on and off road vehicles)
- Other emissions sources (wastewater, landfills, water delivery)

3.1 Total County Emissions

Total County emissions did not change substantially between 2010 and 2012. In 2012, emission sources were as follows:

Figure 1: Ventura County Regional GHG Emissions

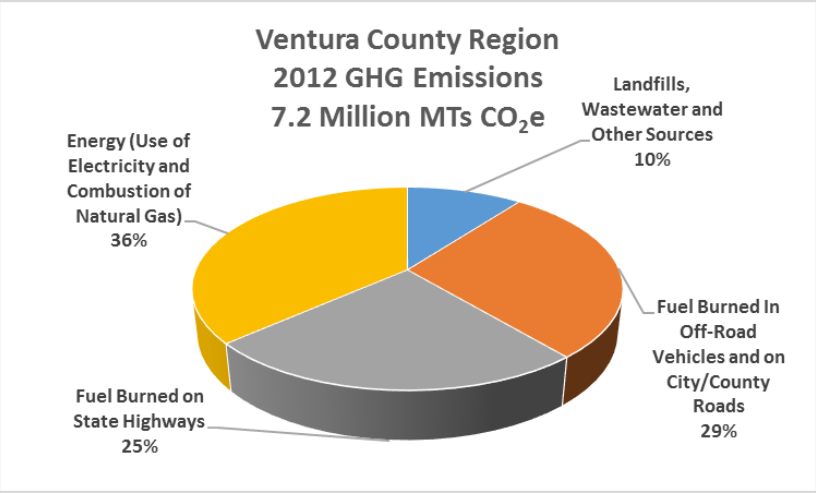


Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012.

Table 1. Community GHG Emissions by Sector for Ventura County

Sector	2010 (MT CO2e)	2011 (MT CO2e)	2012 (MT CO2e)
On-Road Transportation (City/County Roads and State Highways)	3,431,902	3,365,498	3,298,797
Non-Residential Electricity Use	1,180,013	1,193,681	1,203,290
Other Emissions*	695,653	708,326	744,191
Residential Natural Gas Use	652,908	661,374	606,383
Residential Electricity Use	544,774	550,843	528,023
Off-Road Vehicle Use	508,966	511,592	517,748
Non-Residential Natural Gas Use	267,807	295,166	299,306
Total	**7,282,023**	**7,286,479**	**7,197,738**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

Fossil fuel combustion is one of the most significant contributors to climate change, and the largest source of energy in the world. Combustion of that energy occurs either on site (an industrial boiler, a residential heater, a motor vehicle, etc.) or is combusted elsewhere for the benefit of a user (e.g., natural gas burned in a power plant that delivers electricity to end users). Direct combustion results in Scope 1 emissions, indirect use of outputs like electricity and steam results in Scope 2 emissions.[7]

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for Ventura County

Scope	2010 ($MT CO_2e$)	2011 ($MT CO_2e$)	2012 ($MT CO_2e$)
Scope 1 (Direct) emissions	5,593,044	5,581,207	5,476,700
Scope 2 (Indirect) emissions	1,688,979	1,705,273	1,721,038
Total	**7,282,023**	**7,286,479**	**7,197,738**

3.2 Energy-based Emissions

This inventory focuses on energy provided by Southern California Edison (SCE) and the Southern California Gas Company (SCG). There are no other energy utilities/companies in the VCREA region.

[7] The World Resources Institute and the World Business Council for Sustainable Development (WRI/WBCSD) GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition)

3.2.1 Emissions from the Residential Sector

Residential emissions in Ventura County mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG.[8] Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for Ventura County

Year	MT CO_2e
2010	652,908
2011	661,374
2012	606,383

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for Ventura County

Year	MT CO_2e
2010	508,966
2011	511,592
2012	517,748

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

3.2.2 Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. For purposes of this report, all non-residential uses, including commercial, industrial and agricultural operations have been aggregated into a single category.[9] Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data. These sources are considered to be small in comparison to the sources reported in this document.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

[8] See Appendix C for an explanation of data limitations.
[9] See Appendix C for an explanation of data limitations.

Table 5. Non-Residential Emissions from Natural Gas for Ventura County

Year	MT CO_2e
2010	267,807
2011	295,166
2012	299,306

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-residential Emissions from Electricity for Ventura County

Year	MT CO_2e
2010	1,180,013
2011	1,193,681
2012	1,203,290

The emissions reported above are emissions associated with the use of electricity and not its production. The electricity is provided by SCE through the electricity grid. This power could have been produced anywhere in the western power grid. Power is traded like a commodity and is delivered to SCE to meet demand and to meet the expectations of the company's shareholders. The Ventura County region is a net importer of electricity: in 2012, County residents and businesses' electricity use resulted in 1,721,038 MT CO_2e while grid electricity produced in the County by its three power plants (Mandalay, Ormond and McGrath) emitted 285,671 MT CO_2e.

3.2.3 California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the CARB.

The table below contains the facilities within the City of Camarillo subject to GHG emissions reporting during the period 2010 through 2012, and reported emissions values for each facility.

Table 7. Industrial Facilities Subject to AB 32 and their Reported Emissions (MT CO_2e)

Facility	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Aera Energy LLC, Ventura Avenue, 93301, Unincorporated Area	25,793	-	-
Aera Energy Ventura Basin, Unincorporated Area	-	12,598	14,289
Aera Energy Ventura Gas Plant, Unincorporated Area	-	7,567	7,869
Amgen Inc., Thousand Oaks	26,624	26,098	23,211
CI Power Cogeneration Plant, Camarillo	106,568	106,194	106,985
E.F. Oxnard LLC, Oxnard	65,214	78,554	82,804
Houweling Nurseries, Cogeneration Unit, Camarillo	-	-	24,412
Mandalay Generating Station, Oxnard	53,994	49,774	135,517
New-Indy Oxnard LLC Cogen, Oxnard	119,621	104,801	124,336
Ormond Beach Generating Station, Oxnard	82,279	14,076	149,250
Oxnard Wastewater Treatment Plant, Electricity Generation, Oxnard	10,001	-	-
Oxy – Ventura 755, Santa Paula	-	11,927	13,429
P&G Paper Products, Oxnard	327,674	334,676	330,803
Southern California Edison (SCE) – McGrath Peaker, Oxnard	--	--	904
Toland Landfill – Ventura Regional Sanitation District, Electricity Generation, Unincorporated Area	28,986	12,766	11,516
Waste Management – Simi Valley Landfill, Electricity Generation, Simi Valley	79,693	-	-
Total	662,353	609,372	853,886

3.3 Mobile-Based Emissions (Vehicles and Off-Road Equipment)

Mobile-based emissions result from the burning of fossil fuels in on and off-road vehicles and are the largest single source of emissions in this inventory, accounting for approximately 54% of each year's total emissions. On-road vehicles alone account for 46% of those emissions. Emissions were calculated using the State's EMFAC model[10] and California Public Road data made available by the California Department of Transportation (CalTrans). EMFAC is based on gasoline and diesel consumption in a wide range of vehicles found on State roads and highways.

This report includes information on emissions that occur on all roads in Ventura County, including those maintained by the cities and the County, the Department of Defense, the National Park Service, State Highways, State Park Service, U.S. Navy or US Forest

[10] The Emission FACtors (EMFAC) model is developed by the Air Resources Board and used to calculate emission rates from on-road motor vehicles from light-duty passenger vehicles to heavy-duty trucks that operate on highways, freeways, and local roads in California. EMFAC 2014 is the most recent version of this model.

Service. The largest percentage of vehicle emissions (54%) are associated with travel on State highways (e.g., Highways 101, 118, and 123). Using EMFAC and CalTrans data is a geographic approach, incorporating emissions from travel that begins and ends inside Ventura County and emissions from vehicles that travel through the County on State highways. This approach does not take into account the realities of travel, where people often live, work and shop in different locations. It also aggregates all city-to-city travel within the County into a single "travel on State highways" category. In the absence of a local travel demand model with detailed information on land use data and roadway networks, aggregated State highway data and a small amount of travel on other roads is reported separately under the regional section of this report. Emissions related to travel on City roads only will be presented for each jurisdiction. While VCREA has commissioned this GHG inventory, in general, decisions about emissions from vehicles are the purview of the Ventura County Air Pollution Control District and the Ventura County Transportation Commission. Total emissions from on-road vehicles for CYs 2010 through 2012 are listed below.

Table 8: GHG Emissions from On-Road Vehicles in Ventura County

Year	MT CO_2e Total On-Road Emissions	MT CO_2e On-Road Emissions on State Highways
2010	3,431,902	1,845,677
2011	3,365,498	1,810,638
2012	3,298,797	1,774,753

Off-road vehicles and equipment are another source of emissions in the County. The largest source of emissions is construction and mining equipment, agricultural equipment, oil drilling, and pleasure craft. Emissions from these sources are:

Table 9: GHG Emissions from Off-Road Vehicles & Equipment in Ventura County

Year	MT CO_2e Total Off-Road Emissions
2010	544,774
2011	550,843
2012	528,023

3.4 Other Emissions

3.4.1 Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of

landfill gases produced in California is tremendous.[11] Composting operations also emit proportionately small amounts of greenhouse gas. These sources are considered to be minor in comparison to the emissions associated with landfilling of waste materials.

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimated that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the County's total emissions associated with landfilled solid waste are:

Table 10: GHG Emissions from Landfilled Solid Waste

Year	MT CO_2e Emissions from Landfilled Solid Waste
2010	325,230
2011	325,066
2012	327,133

3.4.2 Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure provided by cities and county government in Ventura County totaled 8,475 MT CO_2e for 2012, a very small portion of the inventory. The County's water supply and distribution network includes large suppliers like Calleguas Municipal Water District and Camrosa Water District to small water suppliers and purveyors throughout the County.[12] 2012 GHG emissions from domestic wastewater treatment for Ventura County totaled 33,149 MT CO_2e. This does not include private wastewater treatment at industrial facilities on private land. Emissions from wastewater treatment include purchased electricity to operate treatment plants (8,964 MT CO_2e), and per capita emissions of CH_4 and N_2O (24,185 MT CO_2e) as calculated using the State of California Air Resources Board's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector".

3.4.3 High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These

[11] http://www.energy.ca.gov/biomass/landfill_gas.html

[12] Additional information on Ventura County's water distribution and supply systems in available in the Water Coalition of Ventura County's Integrated Regional Watershed Management Plan (2014). http://www.ventura.org/wcvc/IRWMP/2014IRWMP.htm

gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as high GWP gases.[13]

Emissions from high GWP GHGs for Ventura County in 2012 totaled 392,874 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

3.5 Water and Energy

The water-energy nexus has been in the news since the California Energy Commission's landmark finding in 2005, that water related energy uses account for about 19% of all electricity use and 30% of non-power plant natural gas use in the state.[14] The California Energy Commission has estimated the average electricity needed to convey, treat and distribute water in Southern California is 11,111 kWh/million gallons (or 3.924 MWh/acre foot) for outdoor uses and 13,022 kWh/million gallons (or 4.599 MWh/acre foot).[15] This estimate does not include emissions associated with wastewater treatment or electricity needed for end uses of water.

3.6 Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MTs does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MTs CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

3.6.1 Southern California Edison

SCE provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs in the VCREA Region (excluding Simi

[13] http://www.epa.gov/climatechange/ghgemissions/gases.html
[14] http://epicenergyblog.com/2013/07/08/the-water-energy-nexus-in-california/
[15] http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html

Valley).[16]

Table 11. 2010-2014 Avoided Emissions from SCE Programs in VCREA Region

Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	105,132	29,274	$ 17,473,636
2010 to 2012 Residential	75,484	21,019	$ 6,383,623
2010 to 2012 Total	**180,617**	**50,293**	**$ 23,857,259**
2013 Non-Residential	34,579	9,629	$ 7,562,701
2013 Residential	8,338	2,322	$ 1,333,499
2013 Total	**42,917**	**11,950**	**$ 8,896,201**
2014 Non-Residential	37,224	10,365	$ 9,066,966
2014 Residential	8,873	2,471	$ 2,086,464
2014 Total	**46,097**	**12,836**	**$ 11,153,430**

Program data for the SCG was not available at the time this report was written.

3.6.2 Rooftop Solar

Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the region, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in the VCREA region for CYs 2010 through 2014 as a result of solar energy production are:

Table 12: Avoided GHG Emissions through Solar/PV Installations

Year	MT CO_2e
2010	923
2011	1,085
2012	1,801
2013	3,197
2014	3,624

[16] Detailed project data is available in Appendix D.

Page Intentionally Left Blank

VENTURA COUNTY

REGIONAL ENERGY ALLIANCE

PART II: REGIONAL GREENHOUSE GAS FORECAST TO 2020, REDUCTION TARGET OPTIONS

December 2015

Prepared by:

Anacapa Consulting Services Inc.

Ventura, California

Page Intentionally Left Blank

4 Regional Greenhouse Gas Forecasts and Reduction Target Options

As part of funding for the Climate on the Move project, VCREA has committed to identifying emission reduction targets for 2020. 2020 was the original year established by AB 32, California's Global Warming Solutions Act of 2006. The Act established 1990 as a baseline year and committed to a 15% reduction over that baseline by 2020. A range of measures were identified in the State's Scoping Plan and subsequently implemented; the State is confident that the 15% reduction will be met and exceeded. The Scoping Plan was updated in May 2014 to reflect the 2030 target of 40% below 1990 levels, as established by Governor Brown's Executive Order B-30-15. This is considered an interim goal, with the longer term goal of 80% below 1990 by 2050, established by SB 32 in June 2015.

To achieve these aggressive targets, local governments and public partnerships like VCREA will be expected to play their part. Although there are no regulatory requirements imposed on local governments that are specific to reducing GHG emissions: the State encourages local leadership in reducing GHG emissions.

The forecast section of this report provides an estimate of 2020 emissions if growth continues at current rates and nothing more is done by local governments to reduce CO_2e emissions.

- For emissions from electricity use, the forecast takes into account the State's Renewable Portfolio Standard (RPS) requirement that the mix of State power must include 33% renewable energy by 2020. In 2012 Southern California's renewable energy percentage was published at 15%, and in 2013 at 22%.[17] A business as usual (BAU) model would not take into account the emissions reductions associated with the RPS. An adjusted business-as-usual forecast provides an estimate of CO_2e emissions in 2020 as if no new local measures were implemented between 2012 and 2020, but it includes reductions associated with the power mix.[18]

- Emissions from natural gas combustion were based on the California Energy Commission's published data on anticipated demand for natural gas in Ventura County in 2020 and associated annual growth rates, a BAU model.

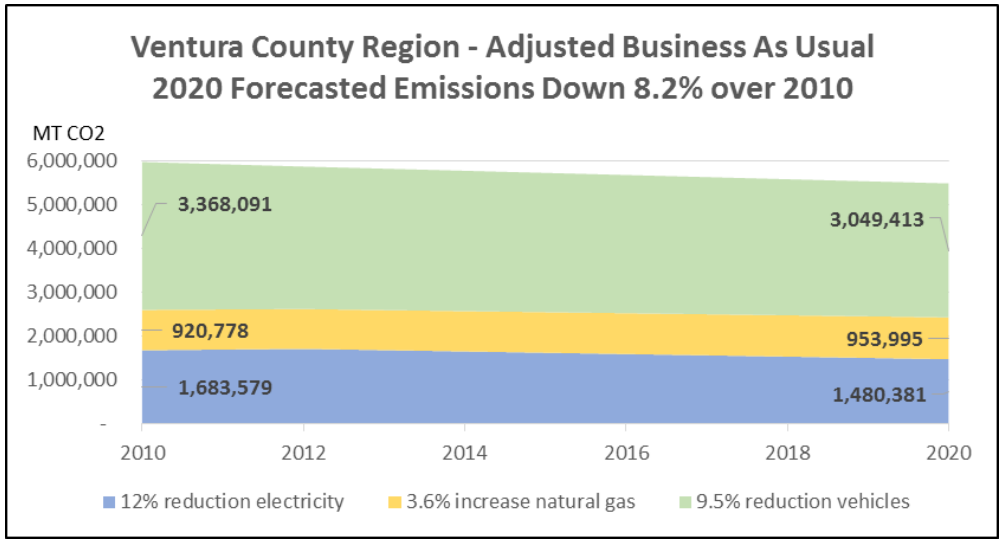
- Vehicle emissions were projected using State modelling software that takes into account both clean fuel and clean car legislation, an adjusted BAU model.

Forecasts were developed for the major categories in the inventory: emissions from energy use (electricity and natural gas) and on-road mobile emissions. The remaining

[17] http://www.energy.ca.gov/sb1305/labels/2013_labels/IOUs/Southern_California_Edison_2013.pdf

[18] VCREA GHG inventories were developed for CYs 2010 through 2012. Forecasts were developed based on 2010.

emissions categories constitute a relatively small portion of the regional inventory. The result is that emissions in Ventura County will be 8.2% lower in 2020 than in 2010, because of the State's actions related to renewable energy and clean fuels and vehicles. Within that total, emissions from the use of electricity will be reduced by 12% over 2010, from on-road vehicles by 9.5% while emissions from natural gas combustion will increase by 3.6%.



Based on these projections, three scenarios have been developed, to include potential emissions reduction targets of 5%, 10% and 15% below the adjusted business as usual 2020 levels.

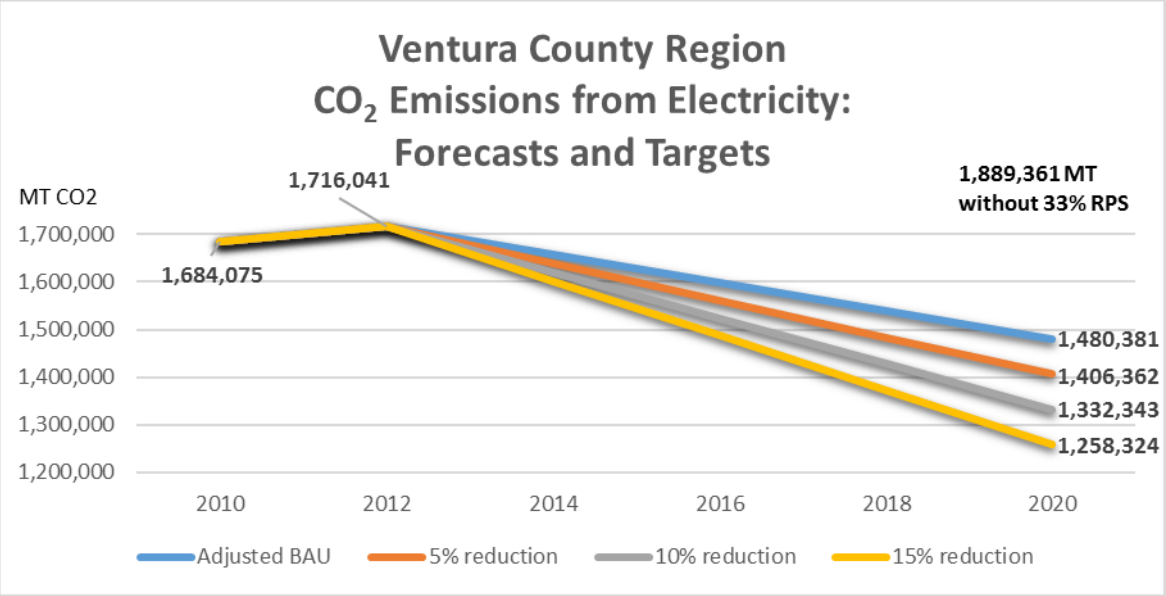
4.1 Emissions from Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual scenario where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[19] For the VCREA region, a BAU scenario means that emissions would total 1,889,361 MT CO_2e in 2020, as compared to the 2010 levels of 1,684,075 MT CO_2e.[20] The adjusted BAU scenario projects 2020 emissions at 1,480,381 MT CO_2e. Associated reduction targets are shown below:

[19] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[20] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

Figure 2: Forecasts and Targets: Emissions from Electricity Use



Based on this adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

Table 13: GHG Reductions Required to Meet Electricity Targets

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below Adjusted BAU 2020 Levels (MT CO_2e)
5% reduction	84,179	309,679
10% reduction	168,358	383,698
15% reduction	252,611	457,717

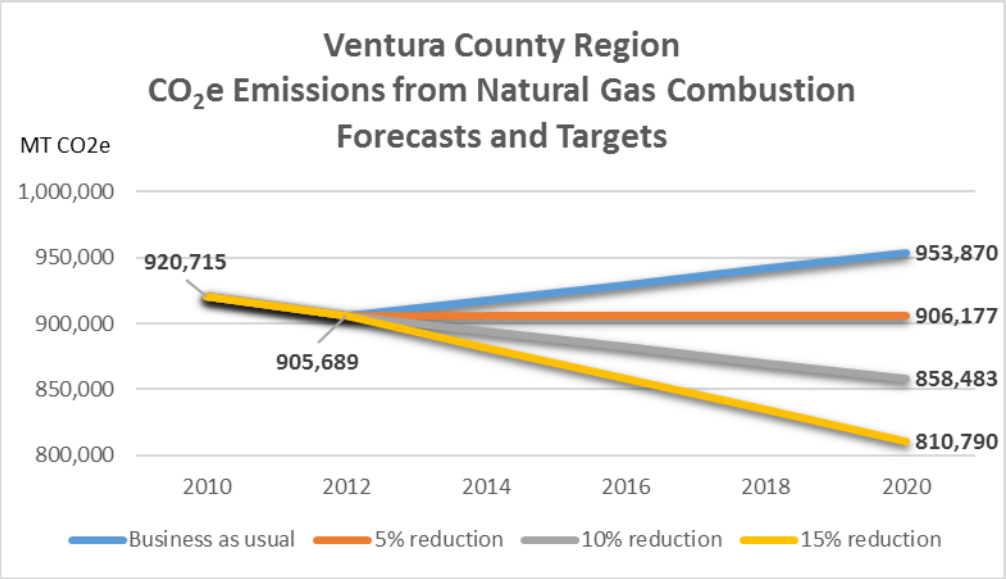
4.2 Emissions from Combustion of Natural Gas

The California Energy Commission has also estimated a business as usual scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[21] For the VCREA region, a BAU scenario means that emissions would total

[21] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

953,870 MT CO2e in 2020, as compared to the 2010 levels of 920,715 MT CO_2e. Associated reduction targets are shown below:

Figure 3: Forecasts and Targets: Emissions from Natural Gas Combustion



Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

Table 14: GHG Reductions Required to Meet Natural Gas Combustion Targets

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	45,290	-488[22]
10% reduction	90,581	47,212
15% reduction	135,871	94,912

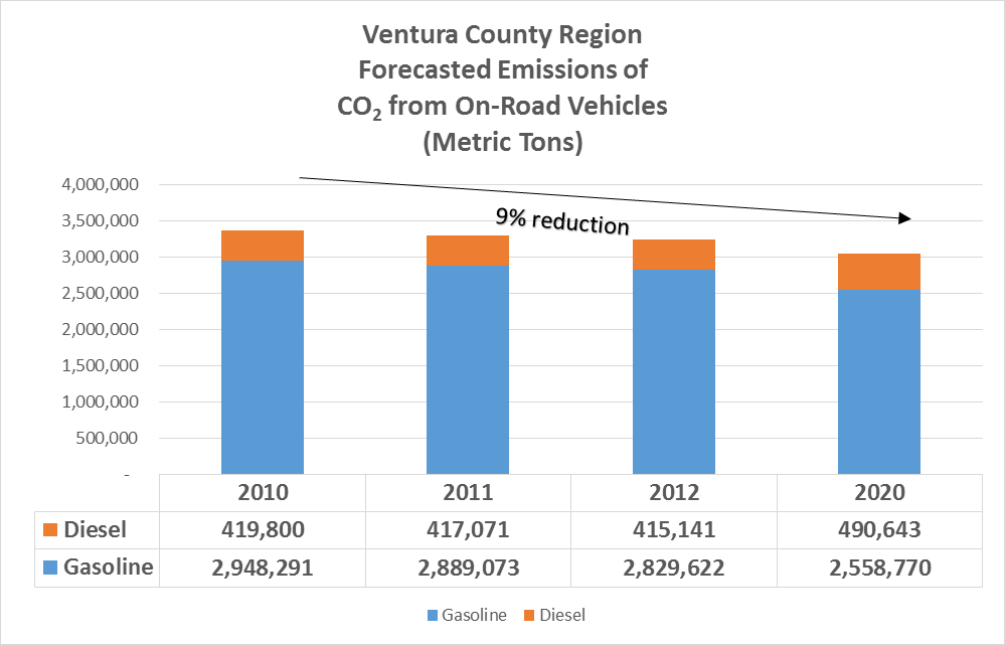
4.3 Emissions from On-Road Transportation

CARB has developed a model to estimate emissions from on-road vehicles, including cars, trucks, and buses. This report uses that model (EMFAC) and data on maintained miles in the County to estimate the emissions generated by vehicles travelled on County roads, and to forecast those emissions for CY 2020. Because the State of California and the U.S EPA and Department of Transportation have introduced regulations to improve fuel efficiency and vehicle mileage, Ventura County can expect to see a reduction in GHG emissions from vehicles, even if there is growth in number of vehicles and miles traveled. That reduction is substantial: the

[22] Because growth in natural gas use is relatively low, a 5% reduction below 2020 levels would result in emissions that were higher than those in 2012. Also note that anomalies in data provided by SCG may result in projections that are inaccurate. See appendix for further details.

projected reduction is 9% between 2012 and 2020. EMFAC provides the region with the following estimate of current and forecasted emissions:

Figure 4: Forecasts and Targets: Emissions from On-Road Vehicles



To achieve a 15% reduction, emissions would need to be reduced an additional 205,900 MT CO_2e by 2020.

5 Progress Since 2010

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for the VCREA member communities.

Reductions required 2010 to 2020	Below 2010 Levels ($MT CO_2$)	Below Adjusted BAU 2020 Levels ($MT CO_2$)
5% reduction	84,179	309,679
10% reduction	168,358	383,698
15% reduction	252,611	457,717

5.1 Reductions in Emissions from Electricity Use

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations as reported by the California Solar Initiative. As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 68,801

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	40,559	40,559	2,798	2,798	43,357	43,357
2013	8,661	49,220	2,814	5,612	11,475	54,832
2014	10,524	59,744	3,445	9,057	13,969	68,801

5.2 Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Ventura County, with MT CO_2e of 920,715, 956,540 and 905,689 in 2010, 2011 and 2012 respectively. However, those emissions will increase with the anticipated rise in demand by 2020. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

5.3 Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

Appendix A.1

City of Camarillo

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Camarillo, incorporated in 1964, lies within Ventura County covering approximately 20 square miles, with a 2012 population of 65,201 according to the California Department of Finance.[1] Camarillo enjoys a reputation as a preferred location for high-tech, retail and specialty businesses. To support this, the City boasts a highly educated workforce, modern industrial buildings, strong relationships with local business leaders and other government agencies, and a streamlined permitting process.

The majority of Camarillo's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Camarillo's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Camarillo were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Camarillo's Community Inventory

The City of Camarillo's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG), for residential and non-residential sectors. Southern California Edison (SCE) provided electricity data for residential, commercial, and industrial sectors.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012 for the City of Camarillo. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (49%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 32% of emissions each year.[2]

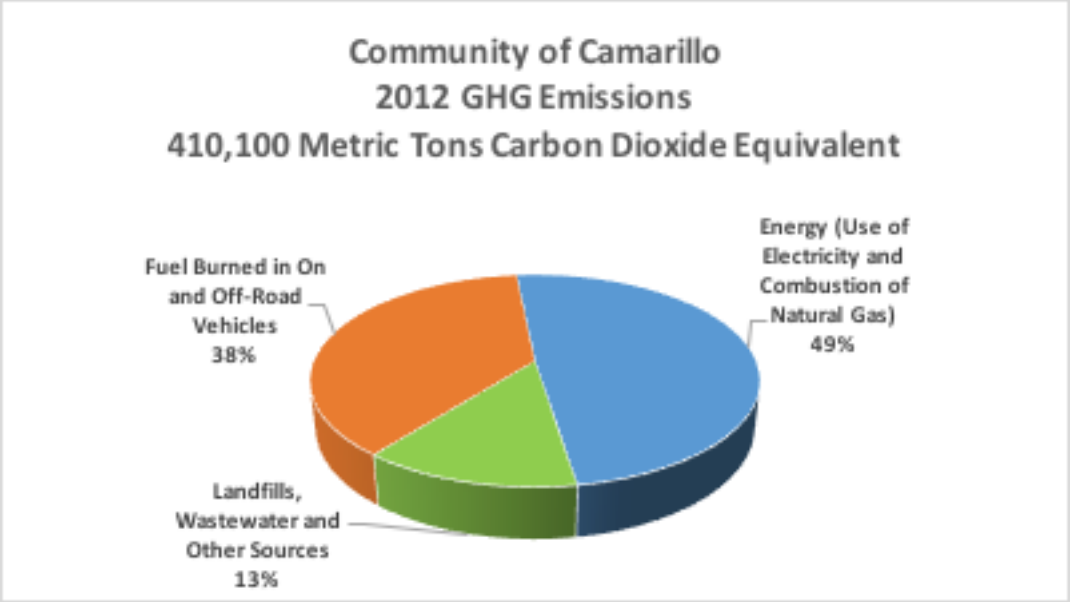
Table 1. Community GHG Emissions by Sector for the City of Camarillo

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	129,897	127,384	124,859
Non-Residential Electricity Use	81,106	80,470	80,562
Other Emissions*	47,815	48,888	54,369
Residential Natural Gas Use	52,347	54,517	49,273
Residential Electricity Use	47,556	47,843	47,556
Off-Road Vehicle Use	29,302	29,981	28,099
Non-Residential Natural Gas Use	22,076	22,378	21,502
Total	**410,100**	**411,461**	**406,221**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. 2012 Community GHG Emissions for the City of Camarillo



As explained in the body of this report, emissions are categorized based on control of the processes from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the organization, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g., purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Camarillo

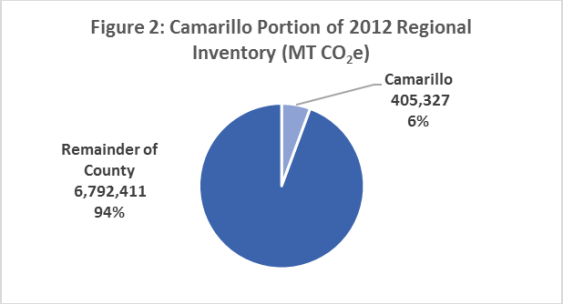
Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	281,437	283,148	277,209
Scope 2 (Indirect) emissions	128,662	128,313	128,118
Total	**410,100**	**411,461**	**405,327**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Camarillo totaled 405,327 metric tons of carbon dioxide equivalent (MT CO2e). The City is the fifth-largest incorporated city in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the

largest overall contributors to GHG emissions in the City of Camarillo. As shown in Figure 2, emissions from the City of Camarillo in 2012 accounted for about 6% of overall GHG emissions for Ventura County. Camarillo's 2012 per capita GHG emissions are 6.13 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO2e.



A discussion of the City of Camarillo's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions in the City of Camarillo mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Camarillo

Year	MT CO_2e
2010	52,347
2011	54,517
2012	49,273

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Camarillo

Year	MT CO_2e
2010	47,556
2011	47,843
2012	47,556

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part 1, Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Camarillo

Year	MT CO_2e
2010	22,076
2011	22,378
2012	21,502

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-residential Emissions from Electricity for the City of Camarillo

Year	MT CO_2e
2010	81,106
2011	80,470
2012	80,562

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB).

The table below contains the facilities within the City of Camarillo subject to GHG emissions reporting during the period 2010 through 2012, and reported emissions values for each facility.

Table 7. Industrial Facilities Subject to AB32 and their Reported Emissions (MT CO_2e)

Facility Name	2010	2011	2012
CI Power Cogeneration Plant	106,568	106,194	106,985
Houweling Nurseries Cogeneration			24,412
Total	**106,568**	**106,194**	**131,397**

Facility emissions data was reported to, and obtained from the CARB mandatory reporting website.

On-Road Transportation Emissions

Vehicle miles travelled on Camarillo roads account for approximately 4% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 124,859 MT CO_2e, which represents 31% of total Camarillo community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Camarillo in 2012 resulted in 28,099 MT CO_2e, which represents 6.9% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

Table 7. Emissions from Landfilled Solid Waste for the City of Camarillo

Year	MT CO_2e
2010	18,480
2011	18,269
2012	20,227

There is no municipal solid waste landfill in Camarillo. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Camarillo totaled 1,031 MT CO_2e for 2012, which represents 0.2% of overall emissions.

2012 GHG emissions from domestic wastewater treatment for the City of Camarillo totaled 2,822 MT CO_2e. Emissions from wastewater treatment include purchased electricity to operate treatment plants (893 MT CO_2e), and per capita emissions of CH_4 and N_2O (1,928 MT CO_2e) as calculated using the CARB's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector".

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as High GWP gases.[4]

Emissions from High GWP GHGs for the City of Camarillo in 2012 totaled 31,320 MT

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CY 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Camarillo.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Camarillo

Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	12,562	3,498	$2,034,753
2010 to 2012 Residential	4,861	1,354	$539,506
2010 to 2012 Total	**17,423**	**4,851**	**$2,574,259**
2013 Non-Residential	4,981	1,387	$413,329
2013 Residential	1,341	373	$207,827
2013 Total	**6,322**	**1,760**	**$621,156**
2014 Non-Residential	4,118	1,147	$1,211,130
2014 Residential	795	221	$224,854
2014 Total	**4,913**	**1,368**	**$1,435,983**

*Slight differences in totals due to rounding.

[5] Detailed project data is available in Appendix C.

Program data for the SCG was not available at the time this report was written.

Rooftop Solar

Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses that install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Camarillo for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Camarillo

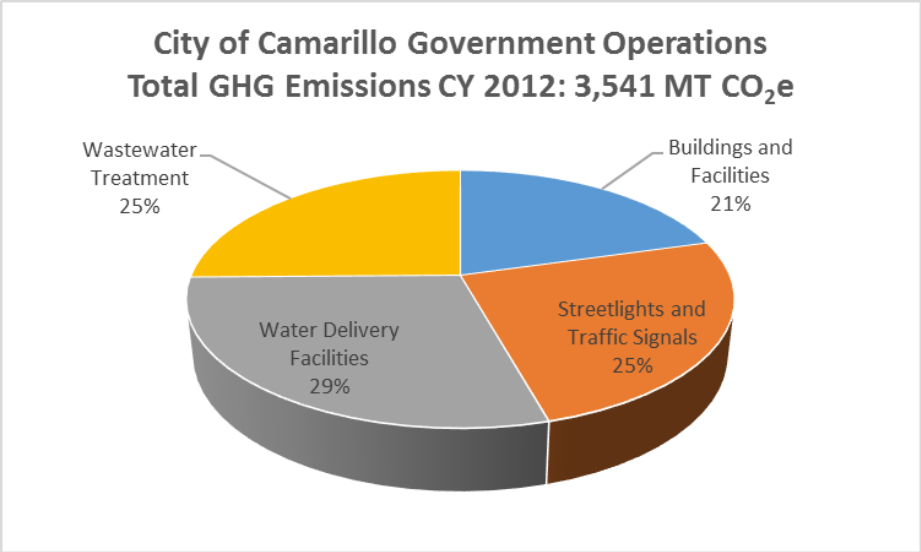
Year	MT CO_2e
2010	152
2011	186
2012	264
2013	441
2014	392

3 Camarillo City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping, and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Camarillo Government Operations



Emissions from the Use of Electricity

Camarillo purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Camarillo Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	786	762	764
Lighting and Traffic Control	851	892	887
Water and Pumping	949	974	1,031
Wastewater Treatment	800	853	893
Total	**3,315**	**3,412**	**3,541**

Emissions from the Combustion of Natural Gas

The City of Camarillo purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its larger buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Camarillo Government Operations

Year	MT CO_2e
2010	508
2011	496
2012	490

Emissions from City Owned and Operated Vehicles

The City of Camarillo owns and operates both gasoline and diesel fueled vehicles. Based on data provided by the City's Fleet manager (fuel usage and mileage), emissions from these vehicles is as follows:

Table 12. Emissions from City of Camarillo Vehicle Fleet

Year	MT CO_2e
2010	71
2011	70
2012	35

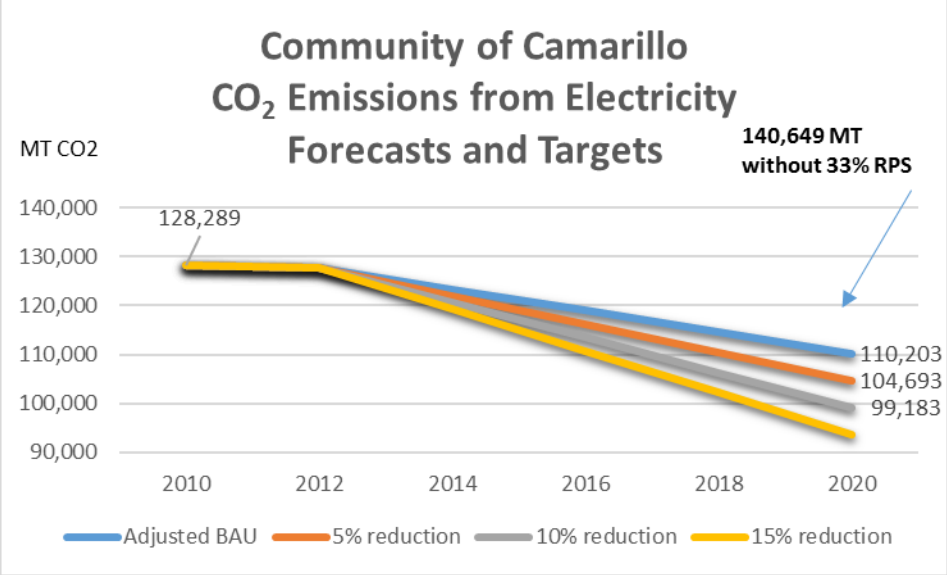
4 Camarillo Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual (BAU) scenario where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Camarillo, a BAU scenario means that emissions would total 140,649 MT CO_2 in 2020, as compared to the 2010 levels of 128,251 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 110,203 MT CO_2. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Camarillo



Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

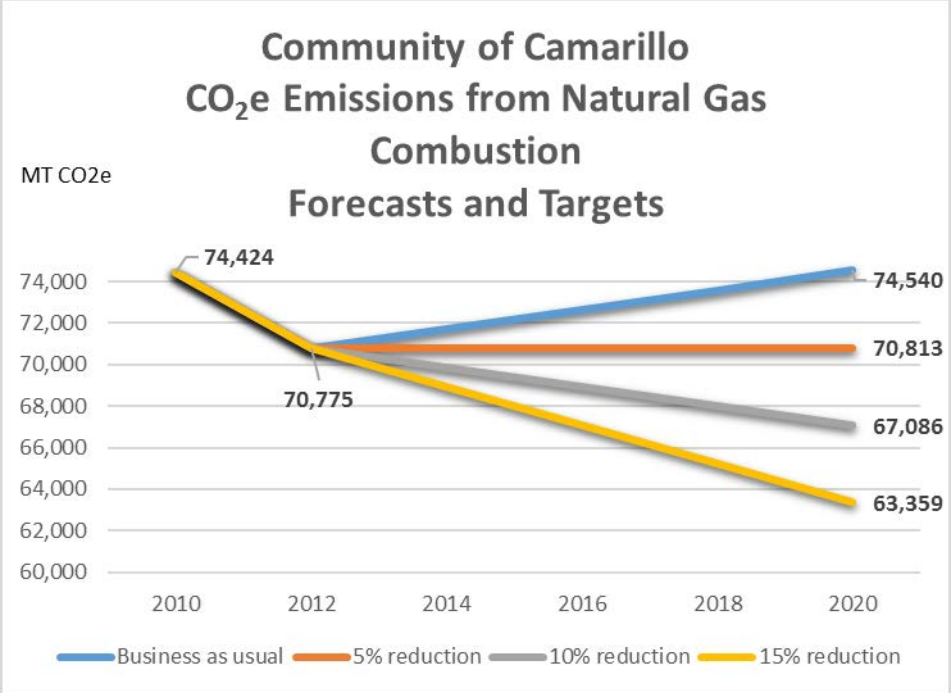
Table 13. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Camarillo

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	6,413	23,558
10% reduction	12,825	29,068
15% reduction	19,243	34,616

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a BAU scenario where natural gas use in 2020 in SCG territory will increase by 0.65% per year over 2011 levels.[8] For Camarillo, a BAU scenario means that emissions would total 74,540 MT CO_2e in 2020, as compared to the 2010 levels of 74,424 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Camarillo



Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

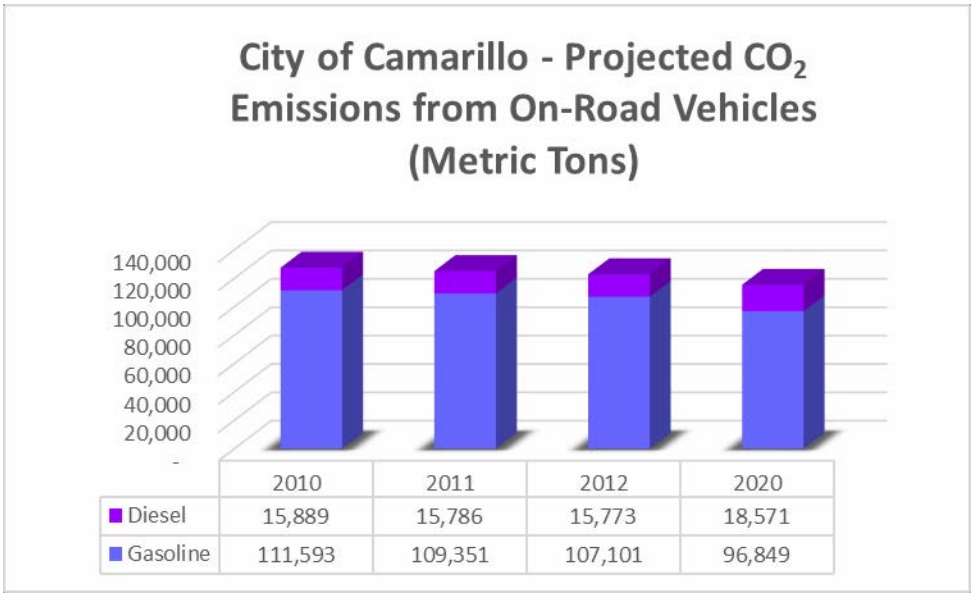
Table 14. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Camarillo

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2 e)	Below BAU 2020 Levels (MT CO_2 e)
5% reduction	3,721	3,611
10% reduction	7,442	7,338
15% reduction	11,164	11,065

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, state and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Camarillo, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Camarillo



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Camarillo City Government Greenhouse Gas Forecasts and Reduction Targets

Camarillo: Energy Action Plan

In 2014, the City of Camarillo, in collaboration with VCREA presented an Energy Action Plan to SCE. The plan identified the City's highest energy users (2008) as its Sanitation Plant, Library, City Hall and Corporation Yard. The City committed to a 10% reduction in municipal energy use over the 2008 baseline by 2020.[9] The targeted kWhs are 11,037,294 kWhs.

[9] Note that this commitment applied to electricity use only and did not address the use of natural gas.

6 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Camarillo.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	6,413	23,558
10% reduction	12,825	29,068
15% reduction	19,243	34,616

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 9,416 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	4,851	4,851	603	603	5,454	5,454
2013	1,760	6,612	441	1,044	2,201	7,656
2014	1,368	7,980	392	1,436	1,760	9,416

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Camarillo, totaling 74,434, 76,906 and 70,786 MT CO_2e in 2010, 2011 and 2012 respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures. In order to meet a 10% target below 2010 levels, on-road emissions in Camarillo would need to be cut by an additional 686 MT CO_2e and to meet the 15% target, an additional 7,060 MT CO_2e.

Appendix A.2

City of Fillmore

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories

2020 Forecasts

And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Fillmore, incorporated in 1914 (but originally founded in 1888), lies within northeastern Ventura County, and covers approximately 3.4 square miles, with a population of around 15,000 according to the California Department of Finance[1]. Fillmore is a small valley town largely driven by agriculture, primarily citrus.

The majority of Fillmore's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Fillmore's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Fillmore were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Fillmore's Community Inventory

The City of Fillmore's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG). Southern California Edison (SCE) provided electricity data.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (43%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 25% of emissions each year.[2]

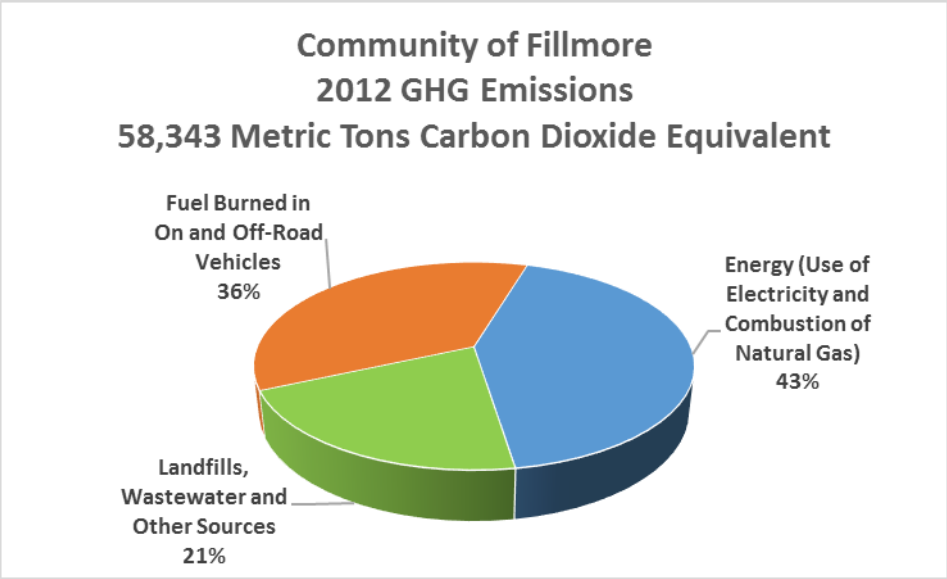
Table 1. Community GHG Emissions by Sector for the City of Fillmore

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	15,375	15,077	14,779
Non-Residential Electricity Use	7,515	7,481	7,664
Other Emissions*	11,578	11,494	12,169
Residential Natural Gas Use	9,077	9,112	8,248
Off-Road Vehicle Use	6,742	6,838	6,408
Residential Electricity Use	7,071	7,022	7,471
Non-Residential Natural Gas Use	1,739	1,661	1,603
Total	**59,098**	**58,685**	**58,343**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1 2012 Community GHG Emissions for the City of Fillmore



As explained in the body of this report, emissions are categorized based on control of the processes from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the organization, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Fillmore

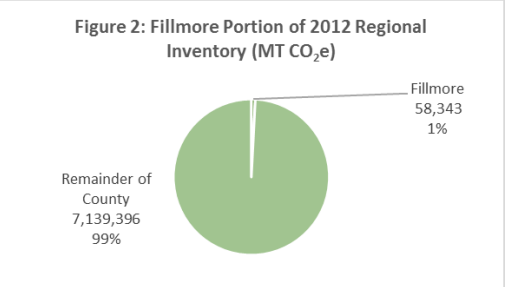
Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	44,511	44,183	43,208
Scope 2 (Indirect) emissions	14,587	14,502	15,135
Total	**59,098**	**58,685**	**58,343**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Fillmore totaled 58,343 metric tons of carbon dioxide equivalent (MT CO_2e). Fillmore is the ninth-largest incorporated city in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the

largest overall contributors to GHG emissions in the City of Fillmore. As shown in Figure 2, emissions from the City of Fillmore in 2012 accounted for about 1% of overall GHG emissions for Ventura County. Fillmore's 2012 per capita GHG emissions are 3.87 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO_2e.



A discussion of the City of Fillmore's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Fillmore mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Fillmore

Year	MT CO_2e
2010	9,077
2011	9,112
2012	8,248

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Fillmore

Year	MT CO_2e
2010	7,071
2011	7,022
2012	7,471

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I: Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Fillmore

Year	MT CO_2e
2010	1,739
2011	1,661
2012	1,603

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Fillmore

Year	MT CO_2e
2010	7,515
2011	7,481
2012	7,664

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB). There are no facilities in Fillmore subject to this reporting requirement.

On-Road Transportation Emissions

Vehicle miles traveled on Fillmore roads account for approximately 0.45% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 14,779 MT CO_2e, which represents 25% of total Fillmore community emissions. These emissions included vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Fillmore in 2012 resulted in 6,408 MT CO_2e, which represents 10.9% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuses in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane, but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

Table 7. Emissions from Landfilled Solid Waste for the City of Fillmore

	MT CO_2e
2010	4,829
2011	4,511
2012	4,587

There is no municipal solid waste landfill in Fillmore. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Fillmore totaled 337 MT CO_2e for the period, which represents 0.01% of overall emissions.

2012 GHG emissions from wastewater treatment per capita emissions of CH_4 and N_2O (440 MT CO_2e) as calculated using the State of CARB's methodology. Because the City does not operate the community wastewater treatment plant, data on energy use was not available for this analysis.

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro- chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as high GWP gases.[4]

Emissions from high GWP GHGs for the City of Fillmore in 2012 totaled 7,143 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Fillmore.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Fillmore

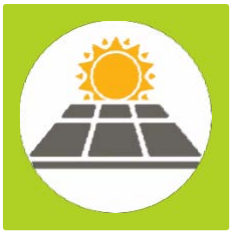
Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	2,010	560	$285,221
2010 to 2012 Residential	965	269	$77,828
2010 to 2012 Total	**2,975**	**828**	**$363,049**
2013 Non-Residential	1,137	317	$504,474
2013 Residential	158	44	$11,872
2013 Total	**1,296**	**361**	**$516,346**
2014 Non-Residential	714	199	$152,691
2014 Residential	141	39	$34,522
2014 Total	**855**	**238**	**$187,213**

*Slight differences in totals due to rounding.

Program data for the SCG was not available at the time this report was written.

[5] Detailed project data is available in Appendix C.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses that install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Fillmore for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Fillmore

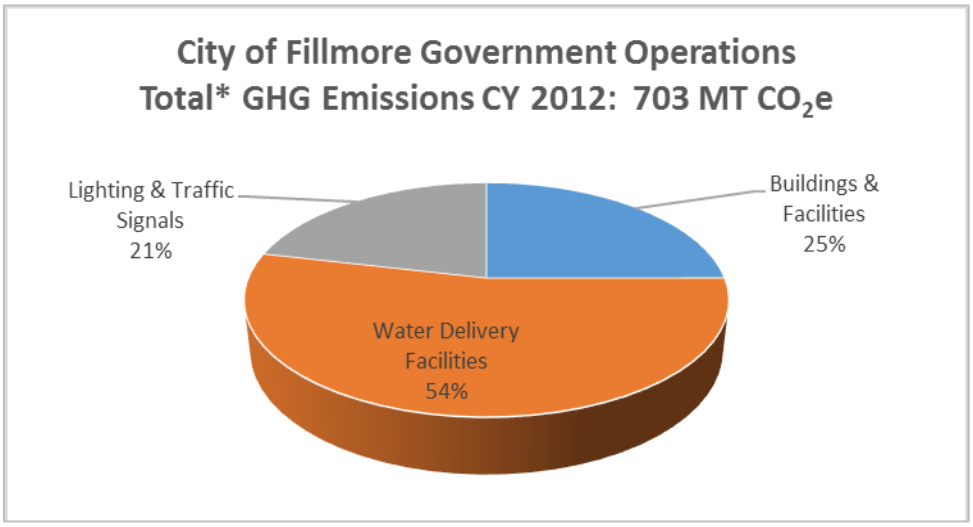
Year	MT CO_2e
2010	9
2011	6
2012	32
2013	49
2014	60

3 Fillmore City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and waste water pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Fillmore Government Operations



*Note that the City of Fillmore's inventory does not include emissions from city-owned and operated vehicles. Emissions were calculated based on electricity and natural gas only.

Emissions from the Use of Electricity

Fillmore purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Fillmore Government Operations

	2010 $MTCO_2e$	2011 $MT\ CO_2e$	2012 $MT\ CO_2e$
Buildings and Facilities	240	233	176
Lighting and Traffic	163	157	151
Water and Pumping	326	346	377
Total	**729**	**736**	**703**

Emissions from the Combustion of Natural Gas

The City of Fillmore purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its municipal buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Fillmore Government Operations

Year	$MT\ CO_2e$
2010	124
2011	96
2012	99

Emissions from City Owned and Operated Vehicles

Data on emissions from city owned vehicles were not available.

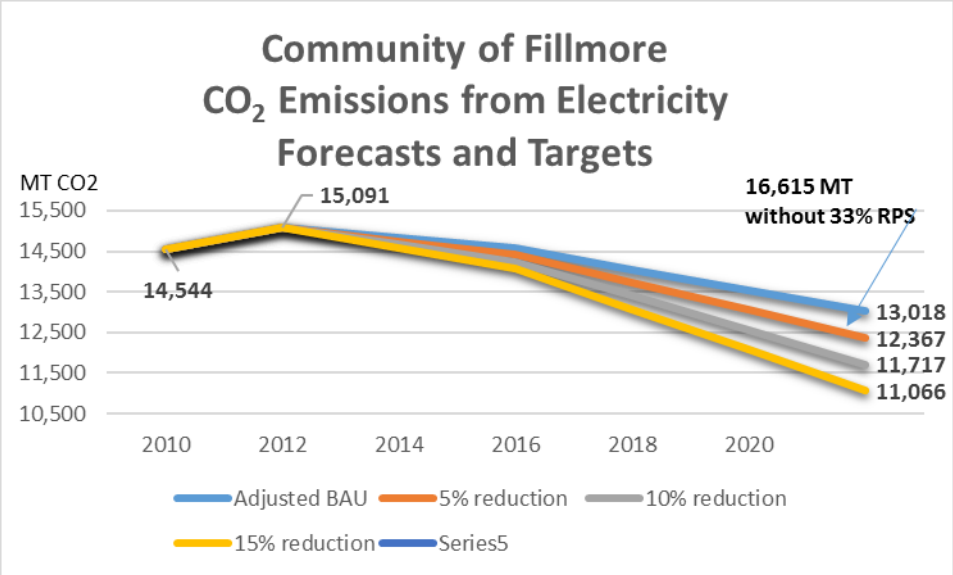
4 Fillmore Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual (BAU) scenario where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Fillmore, a BAU scenario means that emissions would total 16,615 MT CO_2e in 2020, as compared to the 2010 levels of 14,544 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emission at 13,018 MT CO_2e. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Fillmore



[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

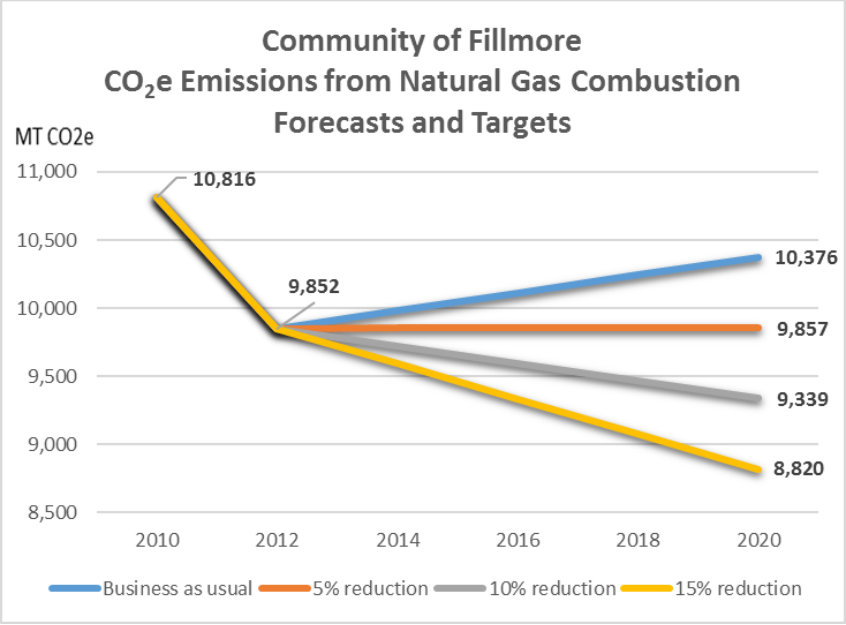
Table 12. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Fillmore

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	727	2,723
10% reduction	1,454	3,374
15% reduction	2,182	4,025

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a BAU scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For Fillmore, a BAU scenario means that emissions would total 10,376 MT CO_2e in 2020, as compared to the 2010 levels of 10,816 MT CO2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Fillmore



[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

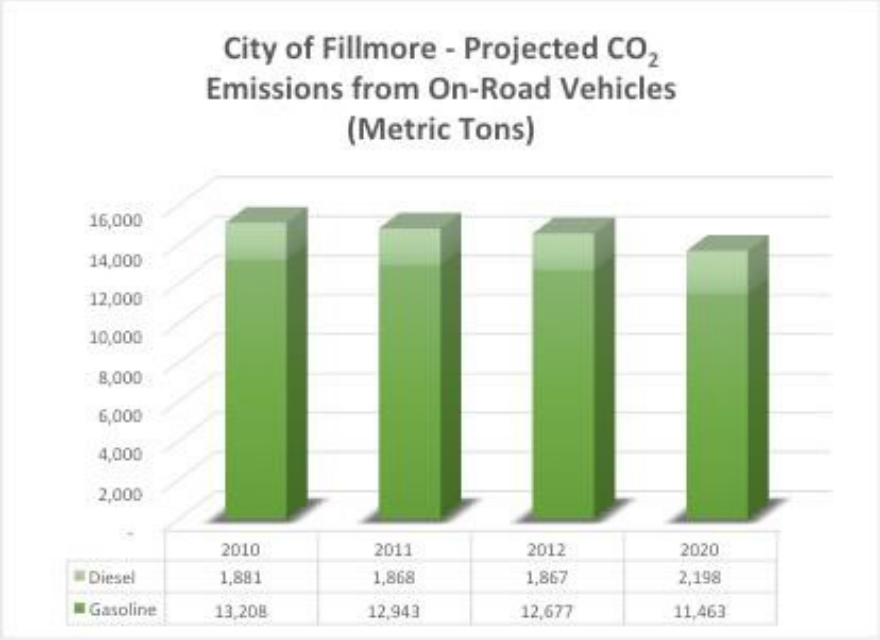
Table 13. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Fillmore

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	541	-5
10% reduction	1,082	513
15% reduction	1,622	1,032

Forecasted Emissions from and Targets for On Road Transportation

As noted in the Part I of this report, state and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Fillmore, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could bring increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Fillmore



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Fillmore City Government Greenhouse Gas Forecasts and Reduction Targets

Fillmore: Energy Action Plan

In 2014, the City of Fillmore, in collaboration with VCREA presented an energy action plan to SCE. The plan identified the City's highest energy users (2006) as City Hall, the Policy Department, Fire Department, Parks and Recreation Theater Lighting, and the Community Center. The City committed to a 20% reduction in municipal energy use by 20% over the 2006 baseline by 2020.[9] The targeted kWhs are 2,386,198 kWhs.

[9] Note that this commitment applied to electricity use only and did not address the use of natural gas.

6 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Fillmore.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	727	2,723
10% reduction	1,454	3,374
15% reduction	2,182	4,024

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects, and rooftop solar installations, as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 1.580 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	828	828	47	47	47	875
2013	359	1,187	49	96	143	1,283
2014	237	1,424	60	156	299	1,580

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Fillmore, totaling 1,739, 1,661 and 1,603 MT CO_2e in 2010, 2011 and 2012, respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

Appendix A.3

City of Moorpark

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories

2020 Forecasts

And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Moorpark, founded in 1900, lies within central Ventura County and has a population of roughly 35,000 residents according to the California Department of Finance.[1]

The majority of Moorpark's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Moorpark's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Moorpark were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Moorpark's Community Inventory

The City of Moorpark's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG). Southern California Edison (SCE) provided electricity data.

Table 1 quantifies the contributions of each sector to total community emissions generated during the period of 2010 through 2012. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of greenhouse gases for the community (52%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 23% of emissions each year.[2]

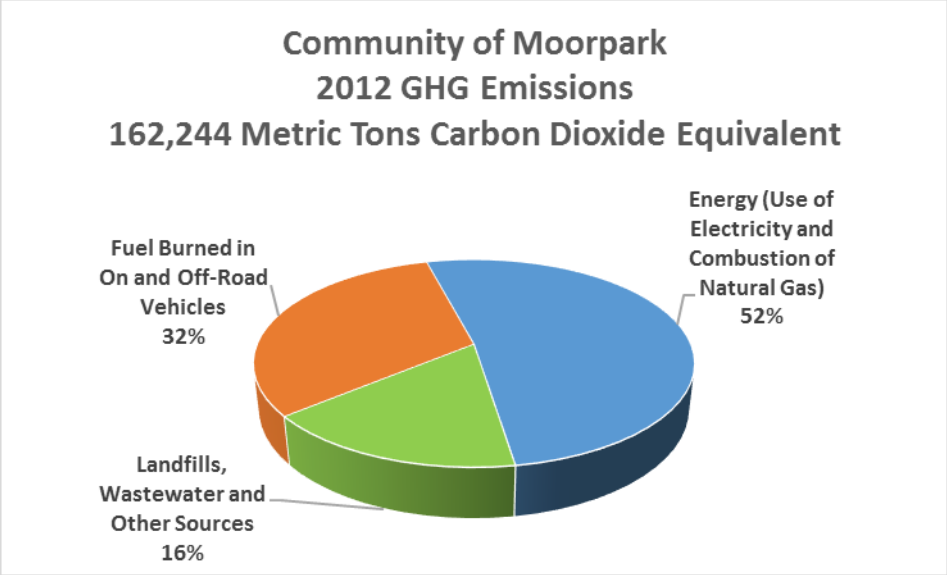
Table 1. Community GHG Emissions by Sector for the City of Moorpark

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	38,437	37,694	36,947
Other Emissions*	24,904	25,265	26,782
Non-Residential Electricity Use	27,666	27,452	28,286
Residential Natural Gas Use	27,071	27,398	25,219
Residential Electricity Use	24,138	24,109	24,704
Off-Road Vehicle Use	15,469	15,697	14,736
Non-Residential Natural Gas Use	6,202	6,250	5,572
Total	**163,888**	**163,865**	**162,244**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. 2012 Community GHG Emissions for the City of Moorpark



As explained in the body of this report, emissions are categorized based on control of the processes from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the organization, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g., purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below document that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Moorpark

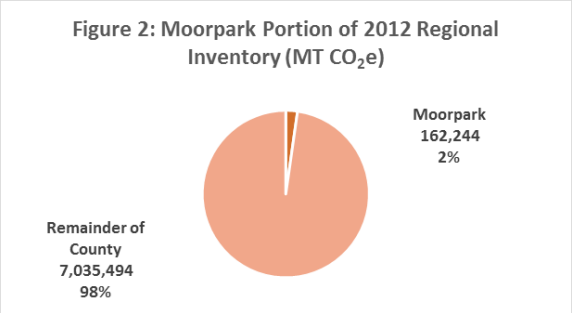
Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	112,084	112,304	109,255
Scope 2 (Indirect) emissions	51,805	51,561	52,989
Total	**163,888**	**163,865**	**162,244**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Moorpark totaled 162,244 metric tons of carbon dioxide equivalent (MT CO_2e). Moorpark is the sixth-largest incorporated city in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the largest

overall contributors to GHG emissions in the City of Moorpark. As shown in Figure 2, emissions from the City of Moorpark in 2012 accounted for about 2% of overall GHG emissions for Ventura County. Moorpark's 2012 per capita GHG emissions are 4.68 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO_2e.



A discussion of the City of Moorpark's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Moorpark mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Moorpark

Year	MT CO_2e
2010	27,071
2011	27,398
2012	25,219

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Moorpark

Year	MT CO_2e
2010	24,138
2011	24,109
2012	24,704

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I: Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Moorpark

Year	MT CO_2e
2010	6,202
2011	6,250
2012	5,572

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Moorpark

Year	MT CO_2e
2010	27,666
2011	27,452
2012	28,286

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of greenhouse gas emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB). There are no facilities in Moorpark subject to this reporting requirement.

On-Road Transportation Emissions

Vehicle miles traveled on Moorpark roads account for approximately 1% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 36,947 MT CO_2e, which represents 24% of total Moorpark community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Moorpark in 2012 resulted in 14,736 MT CO_2e, which represents 9.4% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

Table 7. Emissions from Solid Waste for the City of Moorpark

Year	MT CO_2e
2010	9,417
2011	9,233
2012	9,346

There is no municipal solid waste landfill in Moorpark. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Moorpark totaled 15 MT CO_2e for the period, which represents 0.01% of overall emissions.

2012 GHG emissions from wastewater treatment include per capita emissions of CH_4 and N_2O (1,011 MT CO_2e) as calculated using the CARB's methodology. Because the City does not operate the community wastewater treatment plant, data on energy use was not available for this analysis.

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as high GWP gases.[4]

Emissions from high GWP GHGs for the city of Moorpark in 2012 totaled 16,425 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CY 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Moorpark.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Moorpark

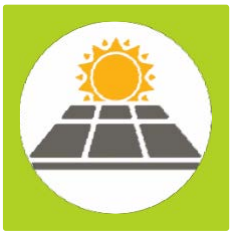
Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	5,346	1,489	$724,730
2010 to 2012 Residential	4,493	1,251	314,106
2010 to 2012 Total	**9,839**	**2,740**	**$1,038,836**
2013 Non-Residential	1,170	326	$349,096
2013 Residential	211	59	$31,062
2013 Total	**1,381**	**385**	**$380,158**
2014 Non-Residential	1,013	282	$166,602
2014 Residential	604	168	$66,237
2014 Total	**1,616**	**450**	**$232,839**

*****Slight differences in totals due to rounding.

Program data for the SCG was not available at the time this report was written.

[5] Detailed project data is available in Appendix D.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses that install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Moorpark for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Moorpark

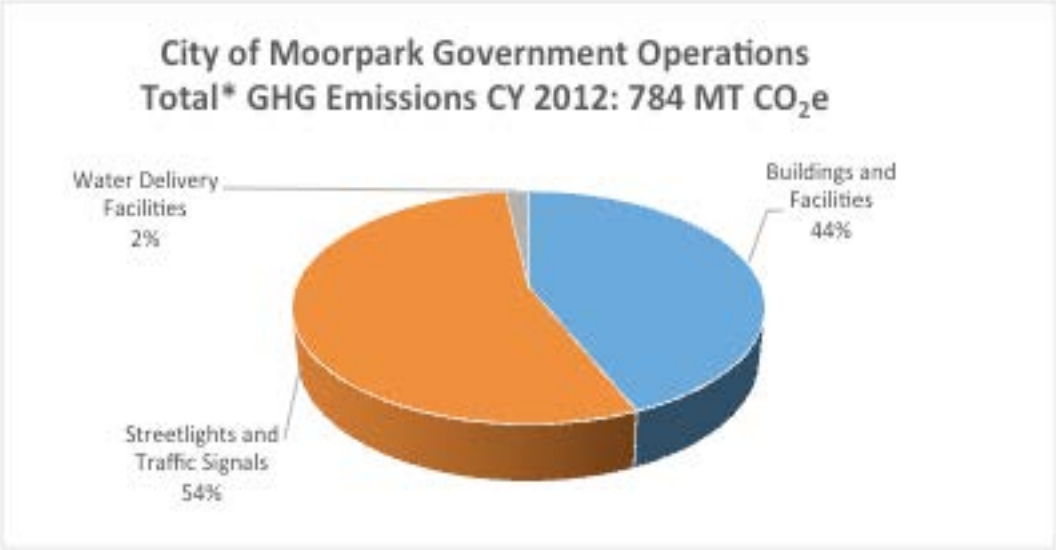
Year	MT CO_2e
2010	37
2011	98
2012	171
2013	309
2014	183

3 Moorpark City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Moorpark Government Operations



* Note that the City of Moorpark's inventory does not include emissions from city-owned and operated vehicles. Emissions were calculated based on electricity and natural gas only.

Emissions from the Use of Electricity

Moorpark purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Moorpark Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	390	387	369
Lighting and Traffic Control	441	445	427
Water and Pumping	11	15	15
Total	**843**	**848**	**810**

Emissions from the Combustion of Natural Gas

The City of Moorpark purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its larger buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Moorpark Government Operations

Year	MT CO_2e
2010	30
2011	29
2012	26

Emissions from City Owned and Operated Vehicles

Data on emissions from city owned vehicles were not available. While financial data on fuel purchases were available, the researchers considered them to be less reliable than needed for the purposes of estimating fuel use and GHG emissions.

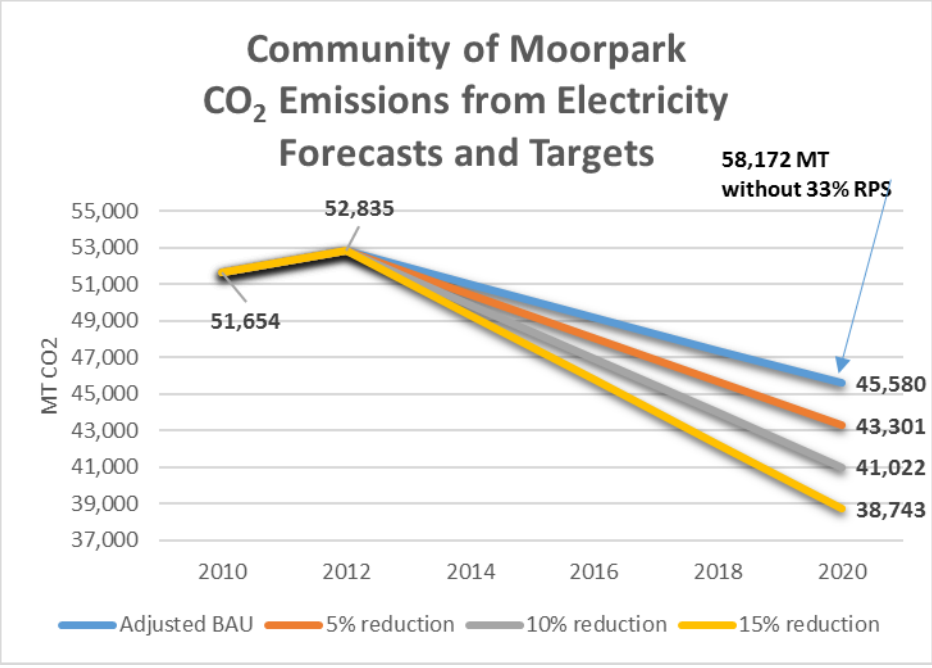
4 Moorpark Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual scenario (BAU) where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Moorpark, a BAU scenario means that emissions would total 58,172 MT CO_2e in 2020, as compared to the 2010 levels of 51,654 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 45,580 metric tons. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Moorpark



[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

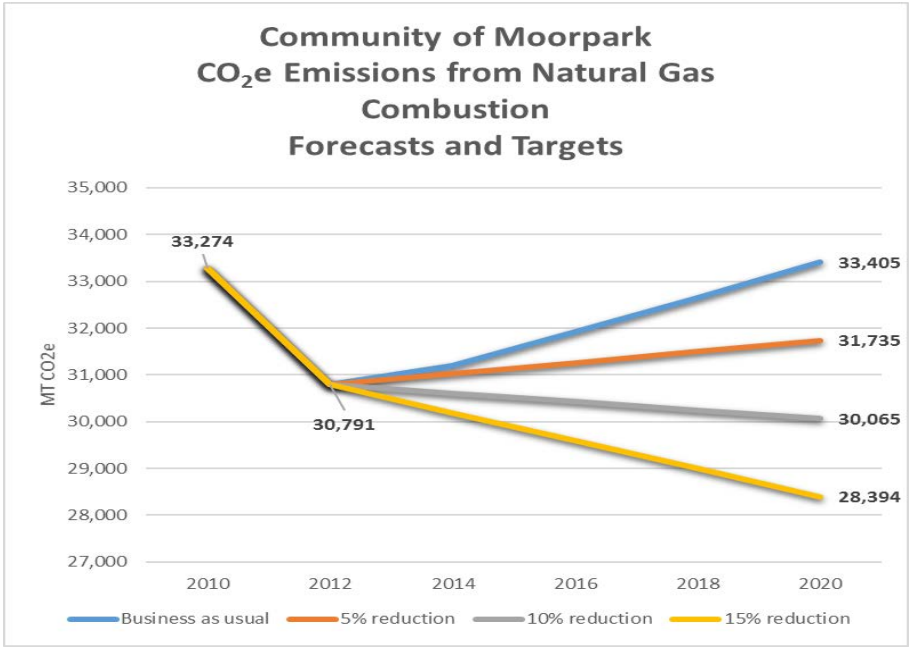
Table 12 Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Moorpark

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	2,582	9,535
10% reduction	5,164	11,814
15% reduction	7,748	14,093

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a BAU scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For Moorpark, a BAU scenario means that emissions would total 33,405 MT CO_2e in 2020, as compared to the 2010 levels of 33,274 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Moorpark



[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

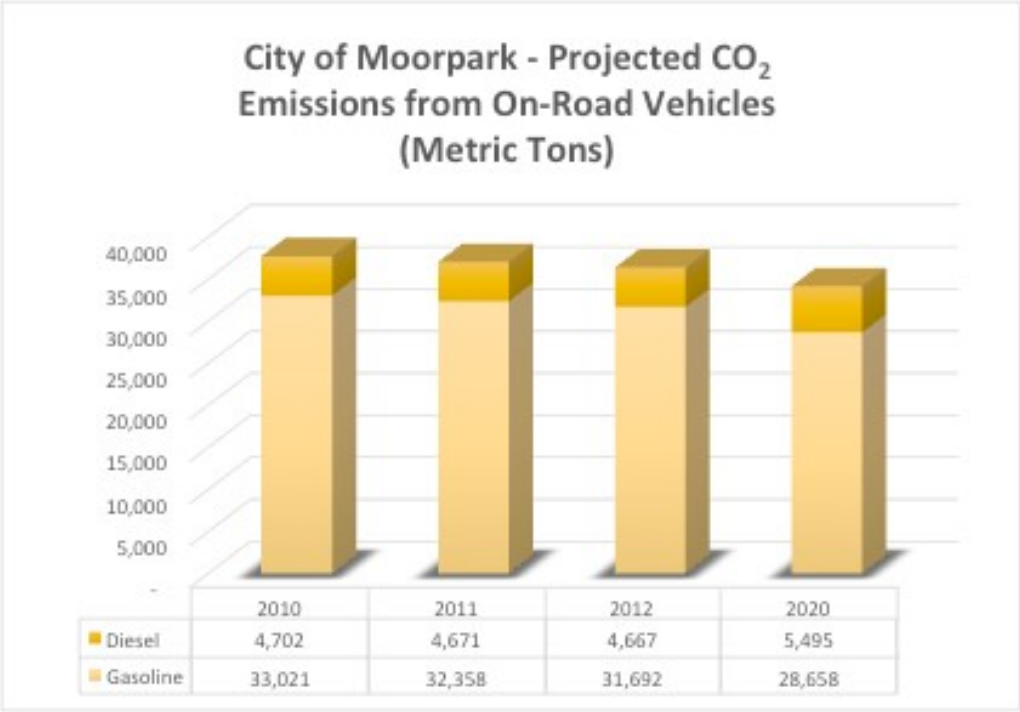
Table 13. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Moorpark

Reductions required 2012 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	1,664	-944
10% reduction	3,328	726
15% reduction	4,991	2,397

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, state and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Moorpark, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Moorpark



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Moorpark.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	2,582	9,535
10% reduction	5,164	11,814
15% reduction	7,748	14,093

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects, and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 4,237 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	2,740	2,740	260	260	3,000	3,000
2013	385	3,124	309	569	3,569	3,693
2014	450	3,574	183	752	4,321	4,326

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Moorpark, totaling 33,274, 33,398 and 30,791 MT CO_2e in 2010, 2011 and 2012, respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

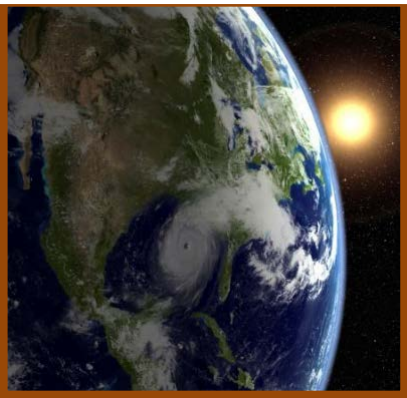
Page Intentionally Left Blank

Appendix A.4

City of Ojai

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance



2015

2010-2012 Greenhouse Gas Inventories

2020 Forecasts

And Reduction Target Option

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Ojai boasts its title as the smallest city in Ventura County, with a population of only about 7,500 people according to the California Department of Finance.[1] This small tourist town is considered a haven for artists, musicians and health enthusiasts.

The majority of Ojai's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Ojai's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Ojai were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Community Inventory

The City of Ojai's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG). Southern California Edison (SCE) provided electricity data.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of greenhouse gases for the community (59%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 18% of emissions each year.[2]

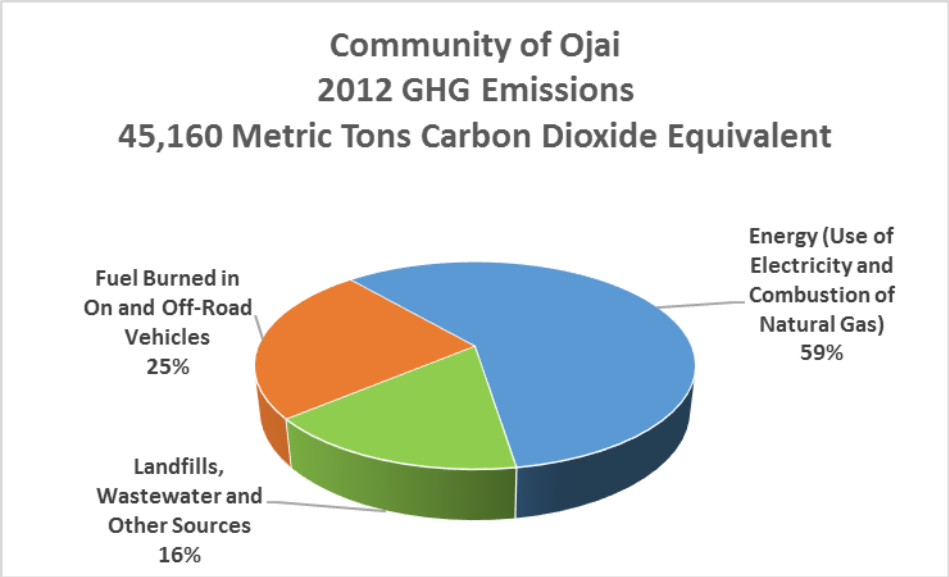
Table 1. Community GHG Emissions by Sector for the City of Ojai

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	8,305	8,145	7,983
Residential Natural Gas Use	8,585	9,033	7,822
Non-Residential Electricity Use	8,075	8,231	9,043
Residential Electricity Use	6,992	7,105	6,311
Other Emissions	7,291	7,247	7,410
Non-Residential Natural Gas Use	3,416	3,569	3,402
Off-Road Vehicle Use	3,353	3,397	3,188
Total	**46,019**	**46,725**	**45,160**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

.Figure 1. 2012 Community GHG Emissions for the City of Ojai



As explained in the body of this report, emissions are categorized based on control of the processes from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the organization, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

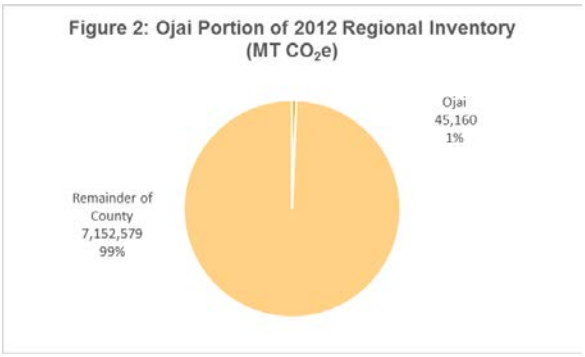
Table 2. Direct and Indirect Emissions for the City of Ojai

Scope	2010 (MT CO2e)	2011 (MT CO2e)	2012 (MT CO2e)
Scope 1 (Direct) emissions	30,951	31,389	29,805
Scope 2 (Indirect) emissions	15,068	15,336	15,354
Total	**46,019**	**46,725**	**45,160**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Ojai totaled 45,160 MT CO_2e. Ojai is the smallest incorporated city contributor in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the largest overall contributors to GHG emissions in the City of Ojai. As shown in Figure 2, emissions from the City of Ojai in 2012 accounted for about 1% of overall GHG emissions for Ventura County. Ojai's 2012 per capita GHG emissions are 6.02 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO_2e.



A discussion of the City of Ojai's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Ojai mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Ojai

Year	MT CO_2e
2010	8,585
2011	9,033
2012	7,822

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Ojai

Year	MT CO_2e
2010	6,992
2011	7,105
2012	6,311

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I: Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Ojai

Year	MT CO_2e
2010	3,416
2011	3,569
2012	3,402

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Ojai

Year	MT CO_2e
2010	8,075
2011	8,231
2012	9,043

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of greenhouse gas emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB). There are no facilities in Ojai subject to this reporting requirement.

On-Road Transportation Emissions

Vehicle miles traveled on Ojai roads account for approximately 0.2% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 7,983 MT CO_2e, which represents 18% of total Ojai community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Ojai in 2012 resulted in 3,188 MT CO_2e, which represents 7% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

Table 7. Emissions from Landfilled Solid Waste for the City of Ojai

Year	MT CO_2e
2010	3,934
2011	3,777
2012	3,637

There is no municipal solid waste landfill in Ojai. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

2012 GHG emissions from wastewater include per capita emissions of CH_4 and N_2O (219 MT CO_2e) as calculated using the CARB's methodology. Because the City does not operate the community wastewater treatment plant, data on energy use was not available for this analysis.

The City of Ojai does not have GHG emissions from electricity consumption for water supply and irrigation infrastructure. These services are provided by privately owned companies.

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as high GWP gases.[4]

Emissions from high GWPs GHGs for the City of Ojai in 2012 totaled 3,554 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MTs does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MTs of CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Ojai.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Camarillo

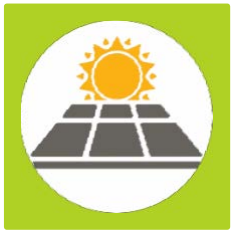
Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	2,025	564	$504,381
2010 to 2012 Residential	1,325	369	$121,080
2010 to 2012 Total	**3,350**	**933**	**$625,461**
2013 Non-Residential	513	143	$256,281
2013 Residential	115	32	$23,629
2013 Total	**628**	**175**	**$279,910**
2014 Non-Residential	805	224	$199,796
2014 Residential	254	71	$60,844
2014 Total	**1,058**	**295**	**$260,640**

***Slight differences in totals due to rounding.

Program data for the SCG was not available at the time this report was written.

[5] Detailed project data is available in Appendix C.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses that install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Ojai for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Ojai

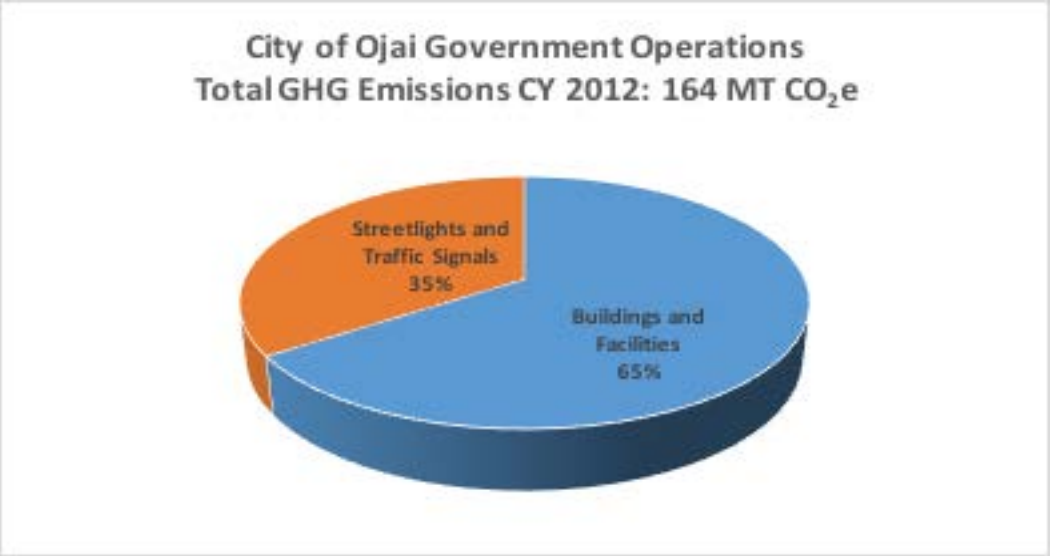
Year	MT CO_2e
2010	128
2011	92
2012	98
2013	163
2014	147

3 Ojai City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Ojai Government Operations



* Note that the City of Ojai's inventory does not include emissions from city-owned and operated vehicles. Emissions were calculated based on electricity and natural gas only.

Emissions from the Use of Electricity

Ojai purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Ojai Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	109	86	93
Lighting and Traffic Control	57	57	57
Total	**166**	**143**	**149**

Emissions from the Combustion of Natural Gas

The City of Ojai purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its municipal buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Ojai Government Operations

Year	MT CO_2e
2010	11
2011	12
2012	14

Emissions from City Owned and Operated Vehicles

Data on emissions from city owned vehicles were not available.

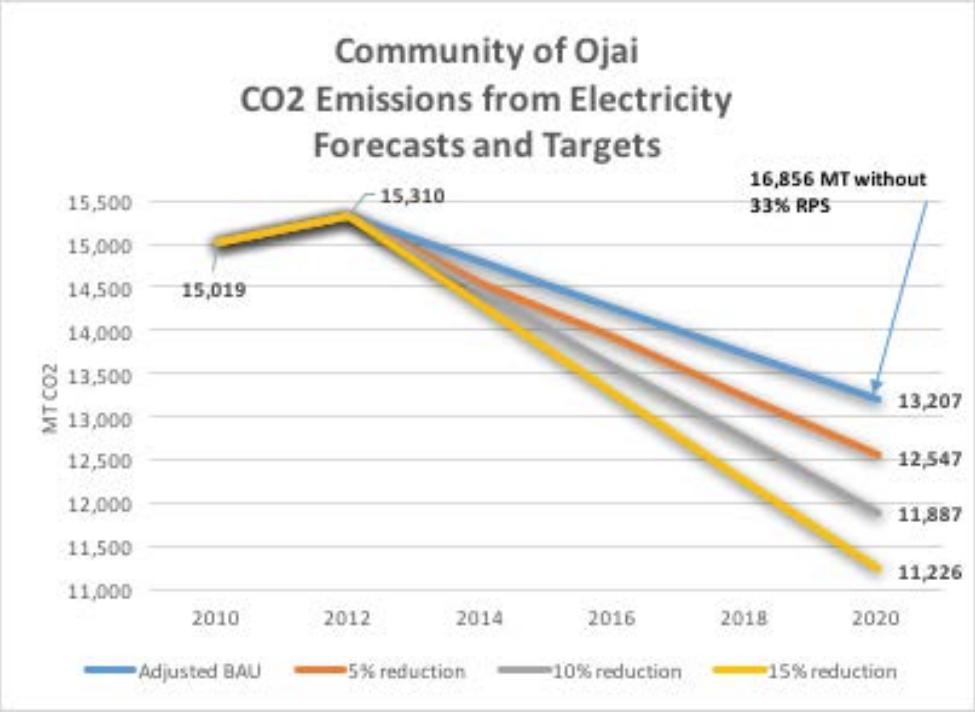
4 Ojai Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual scenario (BAU) where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Ojai, a BAU scenario means that emissions would total 16,856 MT CO_2e in 2020, as compared to the 2010 levels of 15,019 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 13,207 metric tons. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Ojai



[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

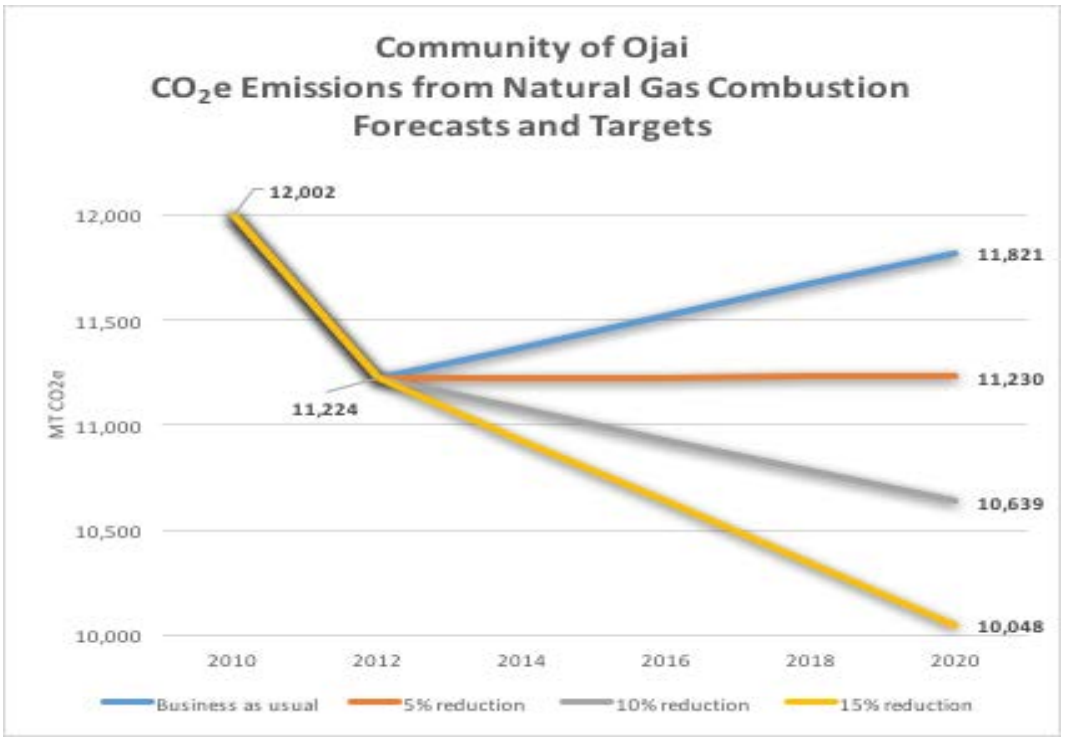
Table 12. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Ojai

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	751	2,763
10% reduction	1,502	3,423
15% reduction	2,254	4,084

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a BAU scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels. For Ojai, a BAU scenario means that emissions would total 11,821 MT CO_2e in 2020, as compared to the 2010 levels of 12,002 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Ojai



Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

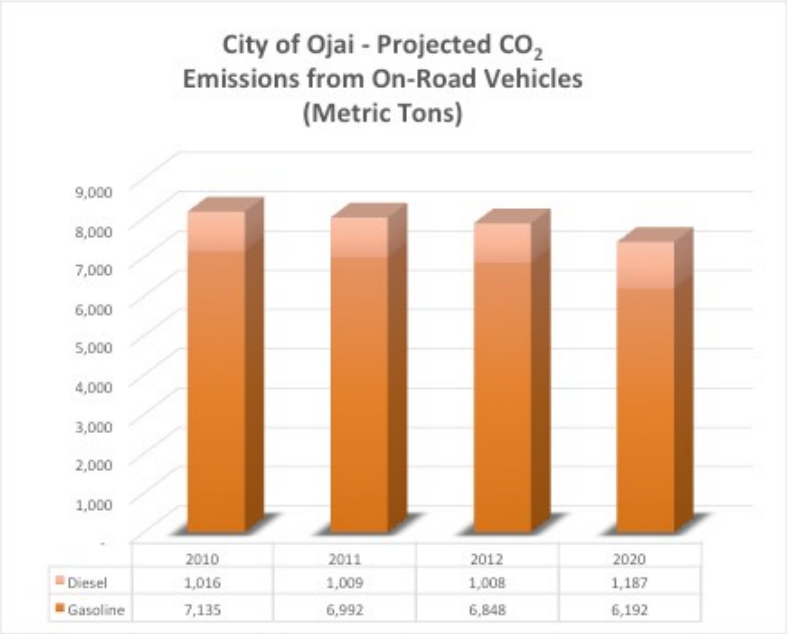
Table 13. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Ojai

Reductions required 2012 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	600	-6
10% reduction	1,200	585
15% reduction	1,800	1,176

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, state and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Ojai, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Ojai



* Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Ojai.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	751	2,763
10% reduction	1,502	3,423
15% reduction	2,254	4,084

There are two readily available sources of information on reductions in emissions from electricity use since 2010 through 2014: avoided emissions as a result of SCE projects, and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 1,902 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	933	933	190	190	1,123	1,123
2013	175	1,108	163	353	338	1,461
2014	295	1,403	147	500	441	1,902

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Ojai, totaling 12,002, 12,601 and 11,224 MT CO_2e in 2010, 2011 and 2012, respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

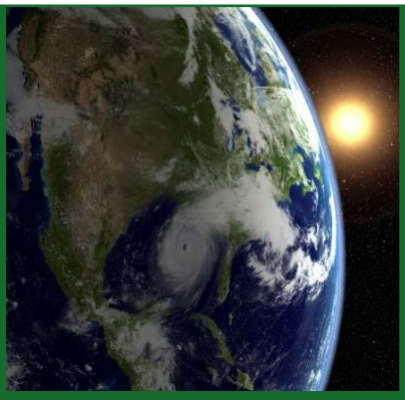
Page Intentionally Left Blank

Appendix A.5

City of Oxnard

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance



2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Oxnard, incorporated in 1903, is the most populous city in Ventura County, with a population of roughly 203,000 people according to the California Department of Finance[1].

The majority of Oxnard's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Oxnard's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Oxnard were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Oxnard's Community Inventory

The City of Oxnard's Community GHG Inventory encompasses Emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG). Southern California Edison (SCE) provided electricity data.

Table 1 below quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (44%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 29% of emissions each year[2].

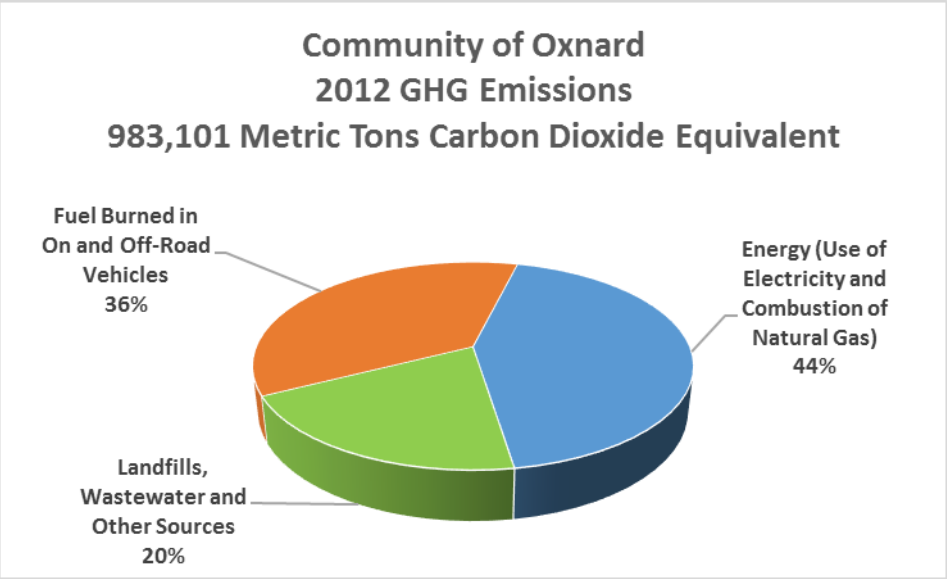
Table 1. Community GHG Emissions by Sector for the City of Oxnard

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	283,750	278,259	272,745
Non-Residential Electricity Use	178,365	175,740	180,614
Other Emissions*	186,266	193,385	196,922
Residential Natural Gas Use	107,263	105,799	101,849
Off-Road Vehicle Use	88,936	90,327	84,792
Residential Electricity Use	71,989	72,264	71,979
Non-Residential Natural Gas Use	68,855	68,418	74,200
Total	**985,424**	**984,192**	**983,101**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. 2012 Community GHG Emissions for the City of Oxnard



As explained in the body of this report, emissions are categorized based on control of the process from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the reporter, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Oxnard

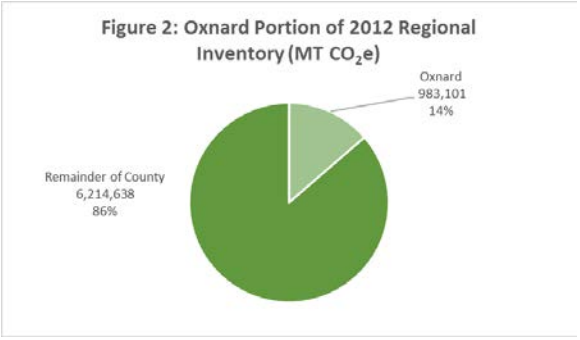
Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	620,793	530,194	529,742
Scope 2 (Indirect) emissions	364,631	453,999	453,359
Total	**985,424**	**984,192**	**983,101**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Oxnard totaled 983,101 metric tons of carbon dioxide equivalent (MT CO_2e). Oxnard is the largest incorporated city in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the largest overall contributors to GHG emissions in the City of Oxnard.

As shown in Figure 2, emissions from the City of Oxnard in 2012 accounted for about 14% of overall GHG emissions for Ventura County. Oxnard's 2012 per capita GHG emissions are 4.93 MT CO2e, compared to countywide per capita emissions of 6.52 MT CO2e.



A discussion of City of Oxnard's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Oxnard mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Oxnard

Year	MT CO_2e
2010	107,263
2011	105,799
2012	101,849

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Oxnard

Year	MT CO_2e
2010	71,989
2011	72,264
2012	71,979

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I Regional Inventory of this report. For that reason, the three non- residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Oxnard

Year	MT CO_2e
2010	68,894
2011	68,458
2012	74,251

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Oxnard

Year	MT CO_2e
2010	178,365
2011	175,740
2012	180,614

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB).

The table below contains the facilities within the City of Oxnard subject to greenhouse gas emissions reporting during the period 2010 through 2012, and reported emissions values for each facility.

Table 7. Oxnard Industrial Facilities Subject to AB32 and their Reported Emissions

Facility Name	2010	2011	2012
PG&E Paper Produce	327,674	334,676	330,803
Ormond Beach Generating Station	82,279	14,076	149,250
Mandalay Generating Station	53,994	49,774	135,517
International Paper - Hueneme Mill	119,621	104,801	124,336
E.F. Oxnard LLC	65,214	78,554	82,804
Southern California Edison (SCE) - McGrath Peaker	n/a	n/a	904
Oxnard Wastewater Treatment Plant	10,001		
Total	**658,784**	**581,881**	**823,614**

Facility emissions data was reported to, and obtained from the CARB mandatory reporting website.

On-Road Transportation Emissions

Vehicle miles traveled on Oxnard roads account for approximately 8% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 272,745 MT CO_2e, which represents 28% of total Oxnard community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Oxnard in 2012 resulted in 84,792 MT CO_2e, which represents 8.6% of emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

Table 8. Emissions from Landfilled Solid Waste for the City of Oxnard

Year	MT CO_2e
2010	97,228
2011	101,137
2012	96,592

There is no active municipal solid waste landfill in Oxnard. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Oxnard totaled 222 MT CO_2e for the period.

2012 Greenhouse gas emissions from domestic wastewater treatment required for the City of Oxnard totaled 8,836 MT CO_2e. Emissions from wastewater treatment include purchased electricity to operate treatment plants (3,018 MT CO_2e), and per capita emissions of CH_4 and N_2O (5,818 MT CO_2e) as calculated using the CARB's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector".

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as High GWP gases[4].

Emissions from GWP GHGs for the City of Oxnard in 2012 totaled 94,512 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CY 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Oxnard.[5]

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

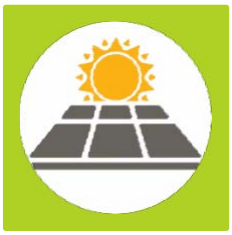
[5] Detailed project data is available in Appendix C.

Table 9. 2010-2014 Avoided Emissions from SCE Programs in the City of Oxnard

Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	33,164	9,235	$4,728,628
2010 to 2012 Residential	27,814	7,745	$1,915,169
2010 to 2012 Total	**60,978**	**16,980**	**$6,643,797**
2013 Non-Residential	5,284	1,471	$1,408,825
2013 Residential	2,397	668	$332,480
2013 Total	**7,682**	**2,139**	**$1,741,305**
2014 Non-Residential	11,239	3,130	$2,856,018
2014 Residential	2,845	792	$828,969
2014 Total	**14,085**	**3,922**	**$3,684,986**

Program data for the SCG was not available at the time this report was written.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Oxnard for CYs 2010 through 2012 as a result of solar energy production are:

Table 10. Avoided Emissions from Solar Production in the City of Oxnard

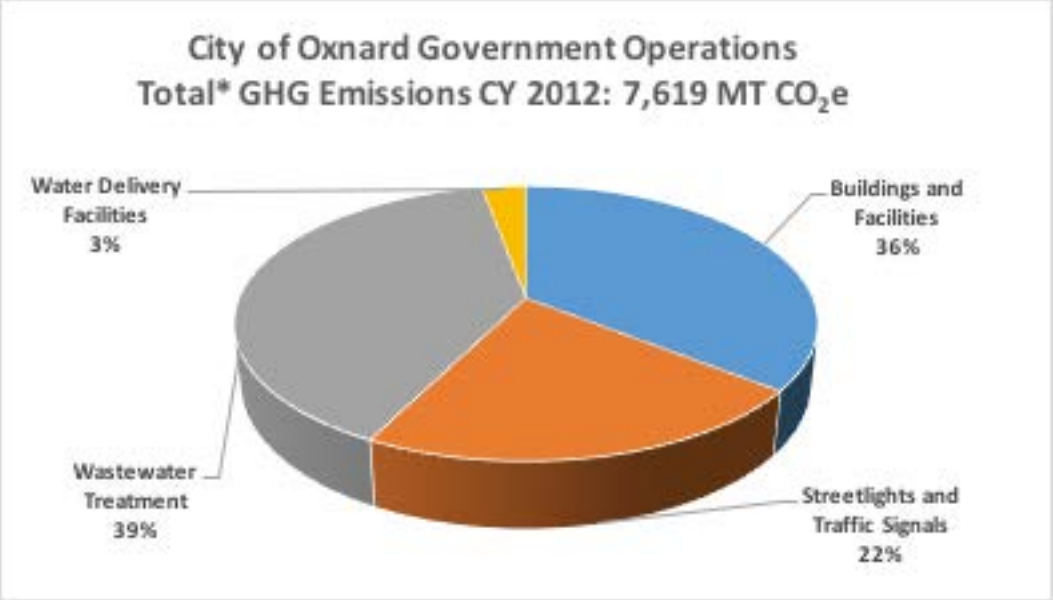
Year	MT CO_2e
2010	63
2011	54
2012	227
2013	123
2014	243

3 Oxnard City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Oxnard Government Operations



Emissions from the Use of Electricity

Oxnard purchases its electricity from SCE. Because the researchers identified significant anomalies in kWhs delivered to the City's water treatment plant in 2010, no annual comparisons on electricity use are being reported at this time.

Emissions from the Combustion of Natural Gas

The City of Oxnard purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its municipal buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Oxnard Government Operations

Year	MT CO_2e
2010	669
2011	711
2012	629

Emissions from City Owned and Operated Vehicles

Data on emissions from city owned vehicles were not available.

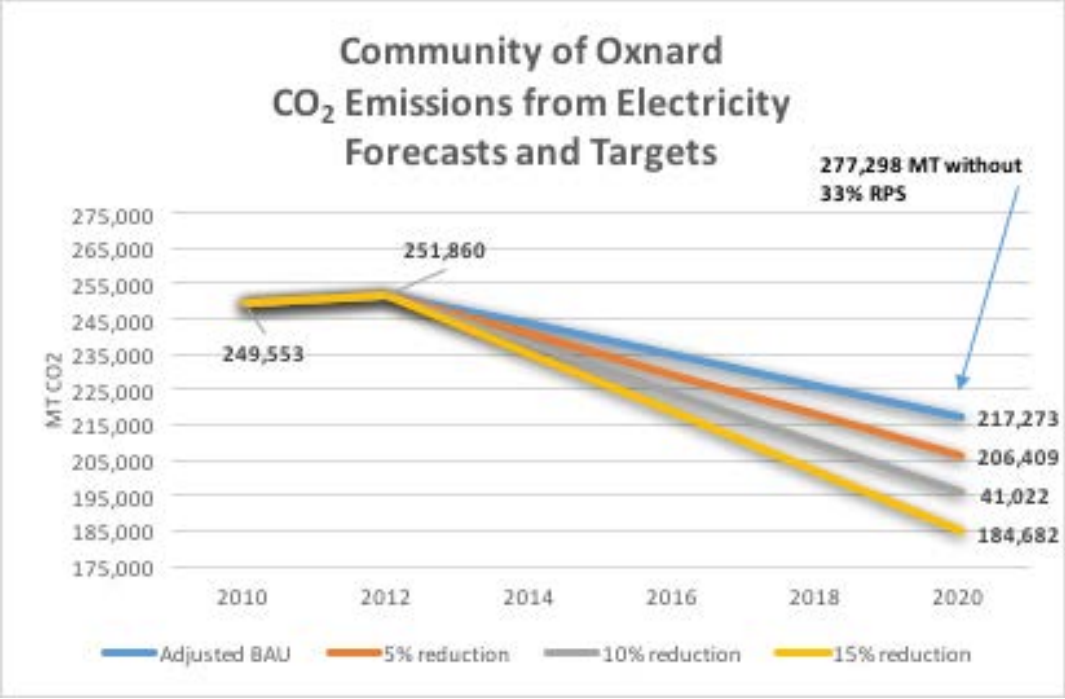
4 Oxnard Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual scenario (BAU) where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Oxnard, a BAU scenario means that emissions would total 277,298 MT CO_2e in 2020, as compared to the 2010 levels of 249,553.6 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 217,273 metric tons. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Oxnard



Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

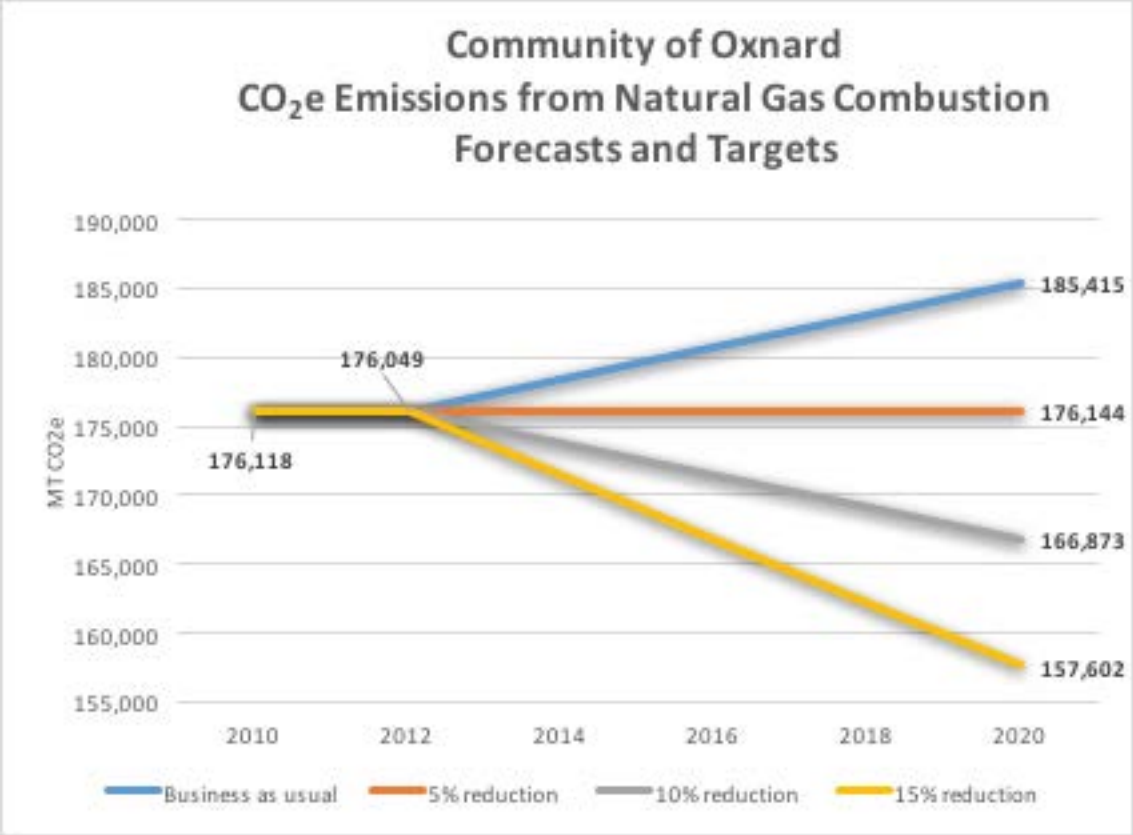
Table 12. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Oxnard

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	12,478	45,451
10% reduction	24,955	56,315
15% reduction	37,433	67,178

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a business as usual scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For Oxnard, a BAU scenario means that emissions would total 185,415 MT CO_2e in 2020 as compared to the 2010 levels of 176,118 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Oxnard



[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

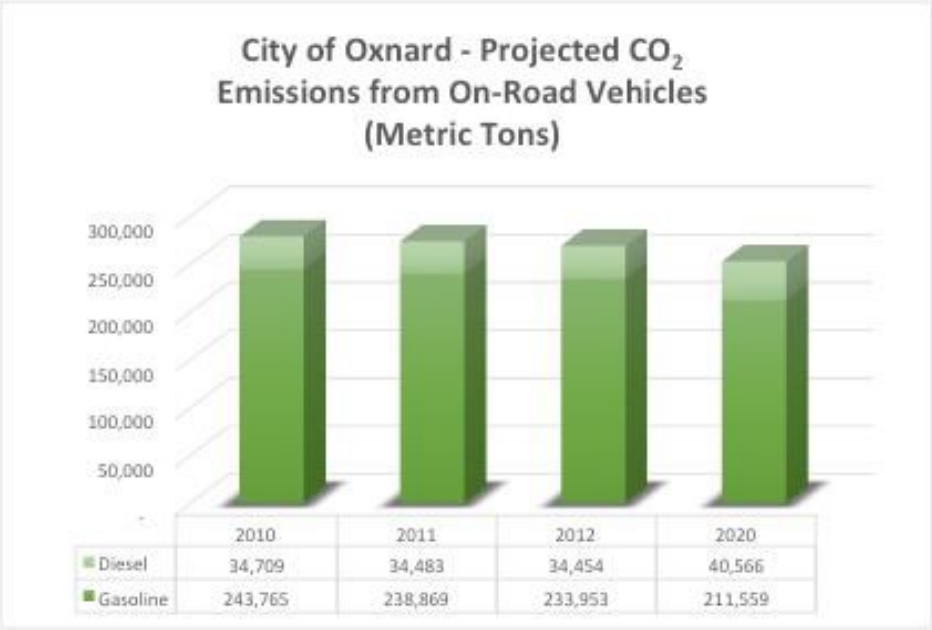
Table 13. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Oxnard

Reductions required 2012 to 2020	Below 2012 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	8,806	-95
10% reduction	17,612	9,176
15% reduction	26,418	18,447

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, State and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Oxnard, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuter and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Oxnard[8]



* Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Oxnard City Government Greenhouse Gas Reduction Targets

City of Oxnard: Energy Action Plan

In 2013, the City of Oxnard adopted an Energy Action Plan as a component of its Climate Action and Adaptation Plan. The plan identified the top 5 electricity using government facilities: the wastewater treatment plant, water yard, service center/fire administration, public safety building, and Oxnard public library. The top 10 natural gas using facilities were Palm Vista Housing Complex, Plaza Vista Housing Complex, Annex 1 (administrative services building), Oxnard Public Library and the Corporate Yard. The City has committed to an EAP target of 10% net of renewable energy production. This target applies to both City operations and the community as a whole.

6 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Oxnard.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	12,478	45,451
10% reduction	24,955	56,315
15% reduction	37,444	67,178

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of Southern California Edison projects and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 23,688 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	16,980	16,980	281	281	17,261	17,261
2013	2,139	19,119	123	404	2,262	19,523
2014	3,922	23,040	243	647	4,165	23,688

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Oxnard, totaling 176,118, 174,217 and 176,049 MT CO_2e in 2010, 2011 and 2012 respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emission from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

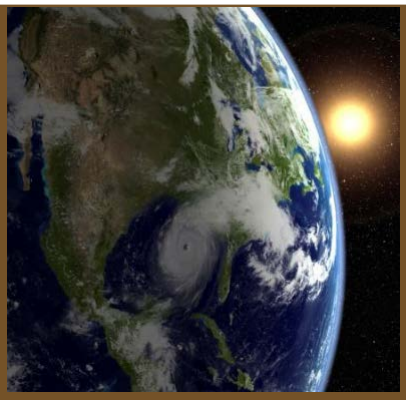
The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

Appendix A.6

City of Port Hueneme

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance



2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The small coastal City of Port Hueneme takes up only 4.6 square miles and is located just south of Oxnard. Port Hueneme has a population of roughly 22,000 according to the California Department of Finance[1] and was incorporated in 1948.

The majority of Port Hueneme's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Port Hueneme's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Port Hueneme were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Port Hueneme's Community Inventory

The City of Port Hueneme's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG). Southern California Edison (SCE) provided electricity data.

Table 1 below quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012 for the City of Port Hueneme. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (44%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 31% of emissions each year.[2]

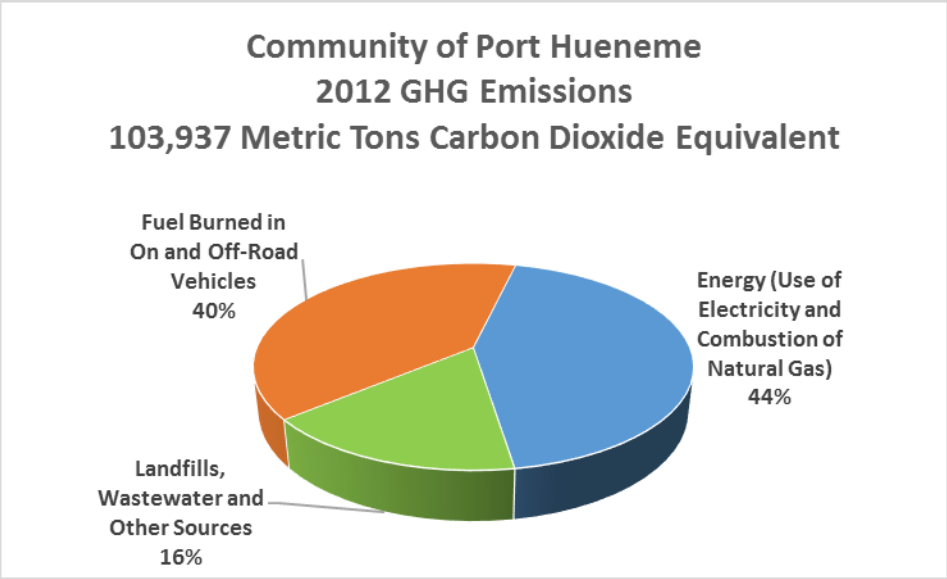
Table 1. Community GHG Emissions by Sector for the City of Port Hueneme

Sector	2010 ($MT CO_2e$)	2011 ($MT CO_2e$)	2012 ($MT CO_2e$)
On-Road Transportation	33,392	32,746	32,097
Non-Residential Electricity Use	23,161	22,614	21,007
Other Emissions*	16,168	16,072	17,142
Residential Natural Gas Use	13,219	13,109	12,405
Residential Electricity Use	9,575	9,644	9,672
Off-Road Vehicle Use	9,762	9,770	9,176
Non-Residential Natural Gas Use	2,612	2,530	2,436
Total	**107,890**	**106,485**	**103,937**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. 2012 Community GHG Emissions for the City of Port Hueneme



As explained in the body of this report, emissions are categorized based on control of the process from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the reporter, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Port Hueneme

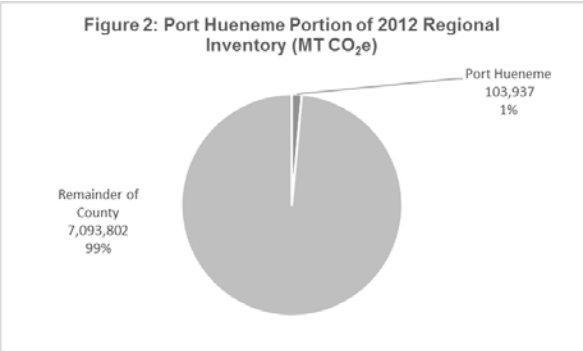
Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	68,560	51,125	50,832
Scope 2 (Indirect) emissions	39,329	55,360	53,104
Total	**107,890**	**106,485**	**103,937**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and no-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Port Hueneme totaled 103,937 metric tons of carbon dioxide equivalent (MT CO_2e). The City is the eight-largest incorporated city contributor in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the largest overall contributors to GHG emissions in the City of Port

Hueneme. As shown in Figure 2, emissions from the City of Port Hueneme in 2012 accounted for about 1% of overall GHG emissions for Ventura County. Port Hueneme's 2012 per capita GHG emissions are 4.82 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO_2e.



A discussion of City of Port Hueneme's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Port Hueneme mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Port Hueneme

Year	MT CO_2e
2010	13,219
2011	13,109
2012	12,405

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Port Hueneme

Year	MT CO_2e
2010	9,575
2011	9,644
2012	9,672

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I,: Regional Inventory of this report. For that reason, the three non- residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Port Hueneme

Year	MT CO_2e
2010	2,612
2011	2,530
2012	2,436

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Port Hueneme

Year	MT CO_2e
2010	23,161
2011	22,614
2012	21,007

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB).

There are no facilities in Port Hueneme subject to this reporting requirement.

On-Road Transportation Emissions

Vehicle miles traveled on Port Hueneme roads account for approximately 1% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 32,097 MT CO_2e, which represents 31% of total Port Hueneme community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Port Hueneme in 2012 resulted in 9,176 MT CO_2e, which represents 9% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

Table 7. Emissions from Solid Waste for the City of Port Hueneme

Year	MT CO_2e
2010	6,395
2011	6,093
2012	6,285

There is no municipal solid waste landfill in Port Hueneme. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Port Hueneme totaled 26 MT CO_2e for 2012, which represents 0.02% of overall emissions.

2012 GHG emissions from domestic wastewater treatment for the City of Port Hueneme totaled 630 MT CO_2e. Emissions include per capita emissions of CH_4 and N_2O as calculated using the CARB's methodology.

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High GWP.[4]

Emissions from High GWP GHGs for the City of Port Hueneme in 2012 totaled 10,228 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects.

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MTs does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MTs CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Port Hueneme.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Port Hueneme

Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	2,115	589	$378,454
2010 to 2012 Residential	1,596	444	$118,342
2010 to 2012 Total	**3,711**	**1,033**	**$496,796**
2013 Non-Residential	335	93	$27,835
2013 Residential	472	132	$37,335
2013 Total	808	225	$65,170
2014 Non-Residential	1,122	312	$250,188
2014 Residential	171	48	$23,410
2014 Total	**1,293**	**360**	**$273,598**

*Slight differences in totals due to rounding.

Program data for the SCG was not available at the time this report was written.

[5] Detailed project data is available in Appendix C.

Rooftop Solar

Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but in some cities it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move. It does not appear to have been a significant factor in the population's approach to its energy management.

Some of the avoided emissions in Port Hueneme for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Port Hueneme

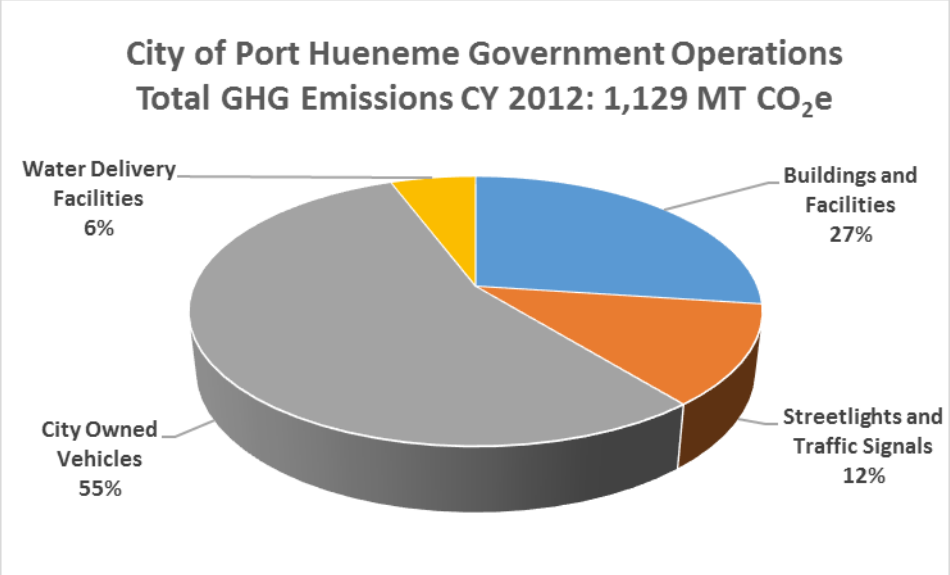
Year	MT CO_2e
2010	0
2011	0
2012	6
2013	11
2014	6

3 Port Hueneme City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Port Hueneme Government Operations



Emissions from the Use of Electricity

Port Hueneme purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Port Hueneme Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	294	293	306
Lighting and Traffic Control	202	201	136
Water and Pumping	65	39	26
Total	**560**	**533**	**468**

Emissions from the Combustion of Natural Gas

The City of Port Hueneme purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its municipal buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Port Hueneme Government Operations

Year	MT CO_2e
2010	25
2011	24
2012	25

Emissions from City Owned and Operated Vehicles

The City of Port Hueneme owns and operates both gasoline and diesel fueled vehicles. Based on data provided by the City's Fleet manager (fuel usage and mileage), emissions from these vehicles is as follows:

Table 12. Emissions from City of Port Hueneme Vehicle Fleet

Year	MT CO_2e
2010	655
2011	640
2012	622

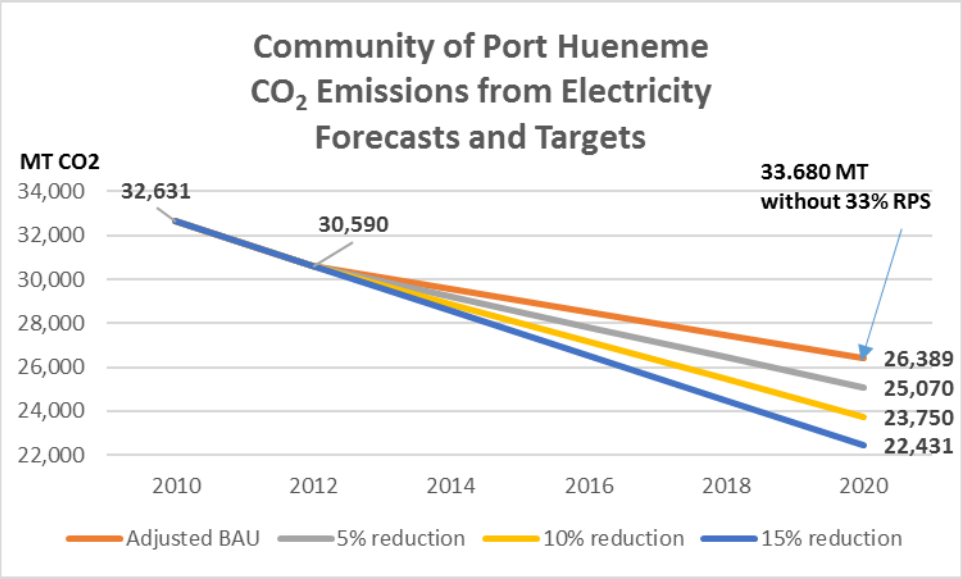
4 Port Hueneme Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual scenario (BAU) where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Port Hueneme, a BAU scenario means that emissions would total 33,680 MT CO_2e in 2020, as compared to the 2010 levels of 32,631.[7] The adjusted BAU scenario projects 2020 emissions at 26,389 metric tons. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Port Hueneme



[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

Based on this adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

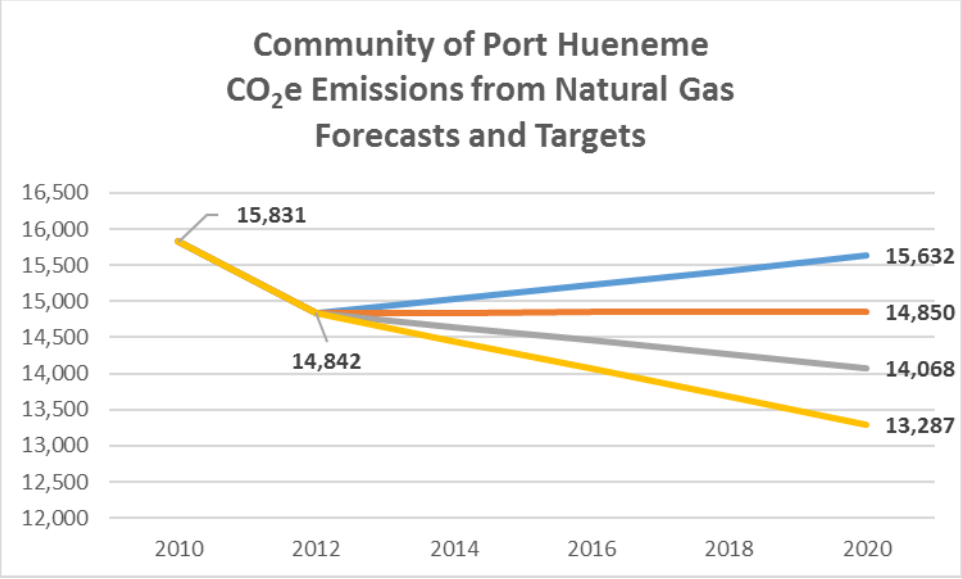
Table 13. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Port Hueneme

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	1,632	5,520
10% reduction	3,263	6,840
15% reduction	4,895	8,159

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a business as usual scenario where natural gas use in 2020 in SCG territory will increase by 0.65% per year over 2011 levels.[8] For Port Hueneme, a BAU scenario means that emissions would total 15,632 MT CO_2e in 2020 as compared to the 2010 levels of 15.831 MT CO_2e . Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Port Hueneme



Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

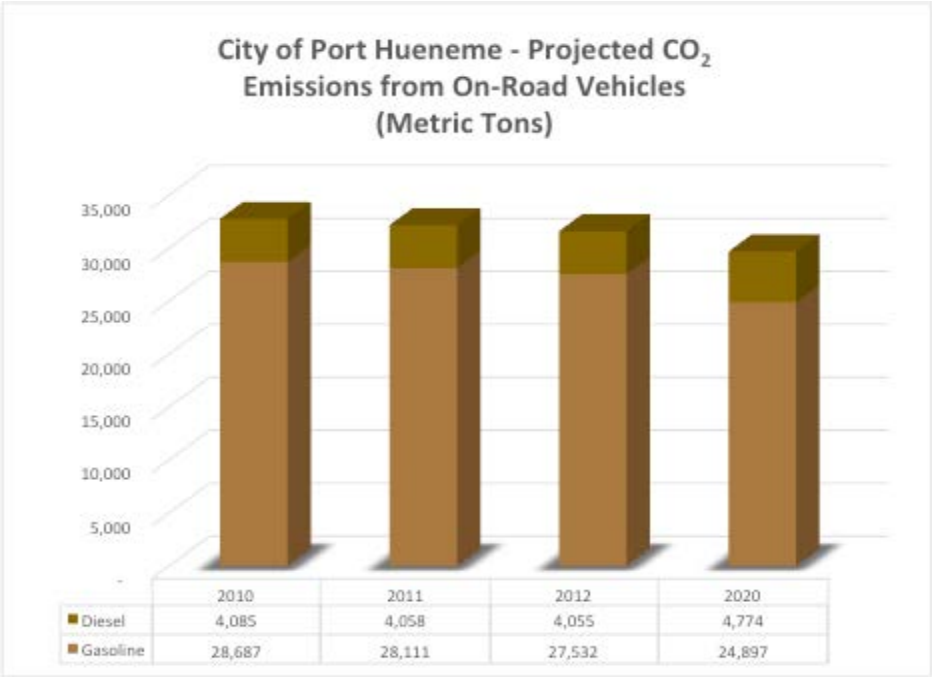
Table 14. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Port Hueneme

Reductions required 2012 to 2020	Below 2012 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	792	-8
10% reduction	1,583	774
15% reduction	2,375	1,555

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, State and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010.** Any additional activities on the part of Port Hueneme, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Port Hueneme



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Progress Since 2012

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Port Hueneme.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	1,632	5,520
10% reduction	3,263	6,840
15% reduction	4,895	8,159

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations as reported by the California Solar Initiative. As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 1,641 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	1,033	1,033	6	6	1,039	1,039
2013	225	1,258	11	17	236	1,275
2014	360	1,618	6	23	366	1,641

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Port Hueneme, totaling 15,831, 15,639 and 14,842 MT CO_2e in 2010, 2011 and 2012 respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

Page Intentionally Left Blank

Appendix A.7

City of Santa Paula

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories

2020 Forecasts

And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Santa Paula is a small agricultural town in northern Ventura County known for its citrus. Originally founded in 1872 and incorporated in 1902, it covers an area of 4.7 square miles and has a population of approximately 30,000 residents according to the California Department of Finance.[1]

The majority of Santa Paula's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Santa Paula's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Santa Paula were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Santa Paula's Community Inventory

The City of Santa Paula's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG), for residential and non-residential sectors. Southern California Edison (SCE) provided electricity data for residential, commercial, and industrial sectors.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012 for the City of Santa Paula. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (46%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 23% of emissions each year.[2]

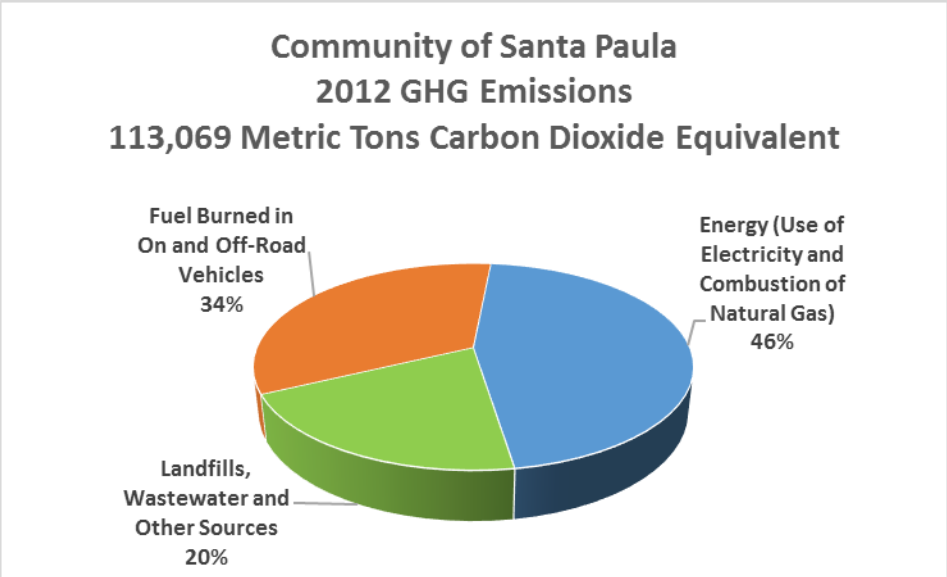
Table 1. Community GHG Emissions by Sector for the City of Santa Paula

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	26,426	25,914	25,401
Other Emissions*	21,527	21,860	23,048
Non-Residential Electricity Use	17,548	18,062	18,276
Residential Natural Gas Use	17,388	16,753	15,963
Residential Electricity Use	13,247	13,320	13,386
Off-Road Vehicle Use	13,177	13,356	12,644
Non-Residential Natural Gas Use	4,470	4,834	4,351
Total	**115,14**	**114,100**	**113,069**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. Community GHG Emissions for the City of Santa Paula



As explained in the body of this report, emissions are categorized based on control of the processes from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the organization, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period, with a small peak in 2011.

Table 2. Direct and Indirect Emissions for the City of Santa Paula

Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	82,988	82,717	81,407
Scope 2 (Indirect) emissions	30,795	31,383	31,662
Total	**113,783**	**114,100**	**113,069**

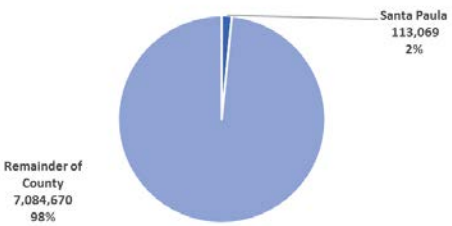
A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Santa Paula totaled 113,069 metric tons of carbon dioxide equivalent (MT CO_2e). The City is the seventh-largest incorporated city in terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are

the largest overall contributors to GHG emissions in the City of Santa Paula. As shown in Figure 2**,** emissions from the City of Santa Paula in 2012 accounted for about 2% of overall GHG emissions for Ventura County. Santa Paula's 2012 per capita GHG emissions are 3.8 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO_2e.

Figure 2: Santa Paula Portion of 2012 Regional Inventory (MT CO_2e)



A discussion of City of Santa Paula's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Santa Paula mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Santa Paula

Year	MT CO_2e
2010	17,388
2011	16,753
2012	15,963

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Santa Paula

Year	MT CO_2e
2010	13,247
2011	13,320
2012	13,386

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I, Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Santa Paula

Year	MT CO_2e
2010	4,470
2011	4,834
2012	4,351

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Santa Paula

Year	MT CO_2e
2010	17,548
2011	18,062
2012	18,276

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB).

The table below contains the facilities within the City of Santa Paula subject to GHG emissions reporting during the period 2010 through 2012, and reported emissions values for each facility.

Table 7. Industrial Facilities Subject to AB32 and their Reported Emissions (MT CO_2e)

Facility Name	2010	2011	2012
Oxy – Ventura (Oil and Gas)	0	11,927	13,429
Toland Landfill – Ventura Regional Sanitation District (Electricity Generation)	28,986	12,766	11,516
Total	**28,986**	**24,693**	**24,945**

Facility emissions data was reported to, and obtained from the CARB mandatory reporting website.

On-Road Transportation Emissions

Vehicle miles traveled on Santa Paula roads account for approximately 1% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 25,401 MT CO_2e, which represents 22% of total Santa Paula community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Santa Paula in 2012 resulted in 12,644 MT CO_2e, which represents 11% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

Table 7. Emissions from Landfilled Solid Waste for the City of Santa Paula

Year	MT CO_2e
2010	8,335
2011	8,220
2012	8,087

There is no municipal solid waste landfill in Santa Paula. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Santa Paula totaled 785 MT CO_2e for the period, which represents 0.5% of overall emissions.

2012 GHG emissions from domestic wastewater treatment for the City of Santa Paula totaled 1,883 MT CO_2e, which represents 1.7% of Santa Paula's total 2012 emissions. Emissions from wastewater treatment include purchased electricity to operate treatment plants (1,015 MT CO_2e), and per capita emissions of CH_4 and N_2O (868 MT CO_2e) as calculated using the State of California Air Resources Board's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector".

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons).These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High GWP gases.[4]

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

Emissions from High GWP GHGs for the City of Santa Paula in 2012 totaled 14,094 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MTs does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MTs CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Santa Paula.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Santa Paula

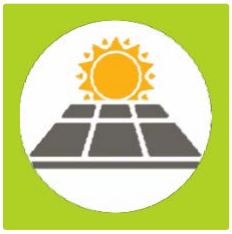
Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	9,534	2,655	$1,013,095
2010 to 2012 Residential	1,825	508	$151,542
2010 to 2012 Total	**11,359**	**3,163**	**$1,164,637**
2013 Non-Residential	689	192	$260,823
2013 Residential	134	37	$15,148
2013 Total	**823**	**229**	**$275,972**
2014 Non-Residential	1,047	292	$490,430
2014 Residential	309	86.0	$101,158
2014 Total	**1,356**	**377**	**$591,588**

*Slight differences in totals due to rounding.

[5] Detailed project data is available in Appendix C.

Program data for the SCG was not available at the time this report was written.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Santa Paula for CYs 2010 through 2012 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Santa Paula

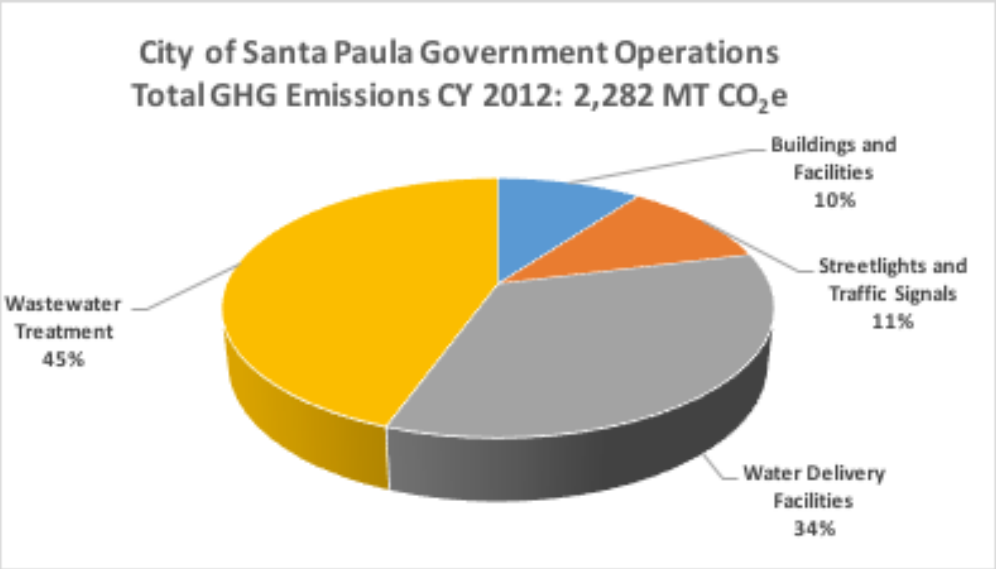
Year	MT CO_2e
2010	10
2011	12
2012	22
2013	31
2014	585

3 Santa Paula City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Santa Paula Government Operations



*Note that the City of Santa Paula's inventory does not include emissions from city-owned and operated vehicles. Emissions were calculated based on electricity and natural gas only.

Emissions from the Use of Electricity

Santa Paula purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Santa Paula Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	181	181	188
Lighting and Traffic Control	259	257	251
Water and Pumping	838	744	785
Wastewater Treatment	528	1,028	1,015
Total	**1,807**	**2,210**	**2,239**

Emissions from the Combustion of Natural Gas

The City of Santa Paula purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its municipal buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Santa Paula Government Operations

Year	MT CO_2e
2010	42
2011	40
2012	43

Emissions from City Owned and Operated Vehicles

No data was available on city owned vehicles.

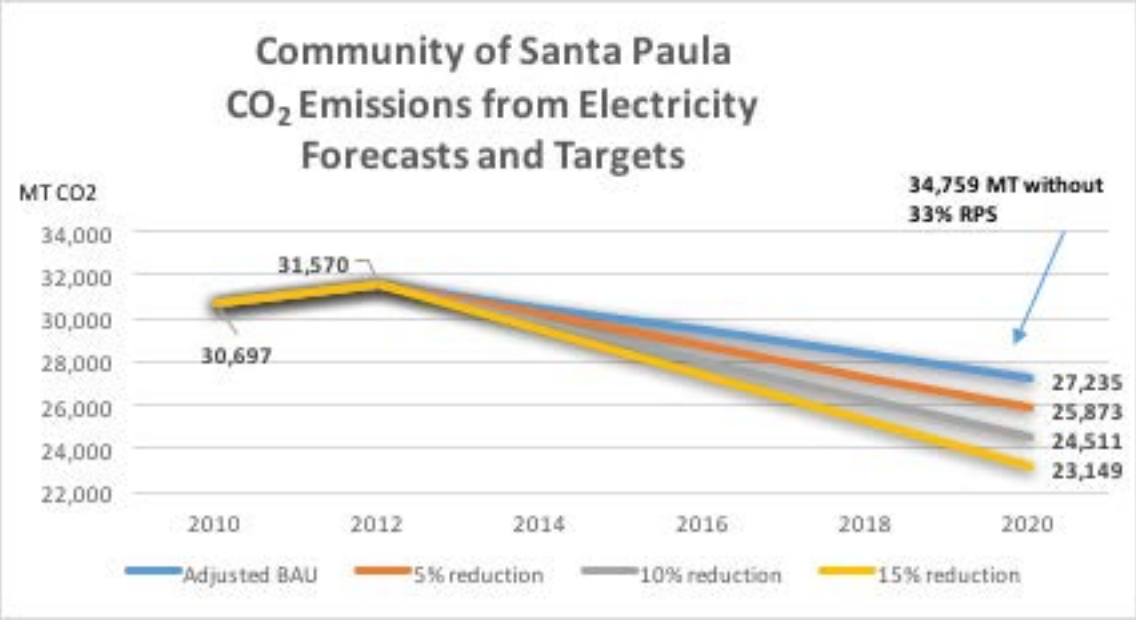
4 Santa Paula Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual (BAU) scenario where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Santa Paula, a BAU scenario means that emissions would total 34,759 MT CO_2e in 2020, as compared to the 2010 levels of 30,697 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 27,235 MT CO_2e. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Santa Paula



Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

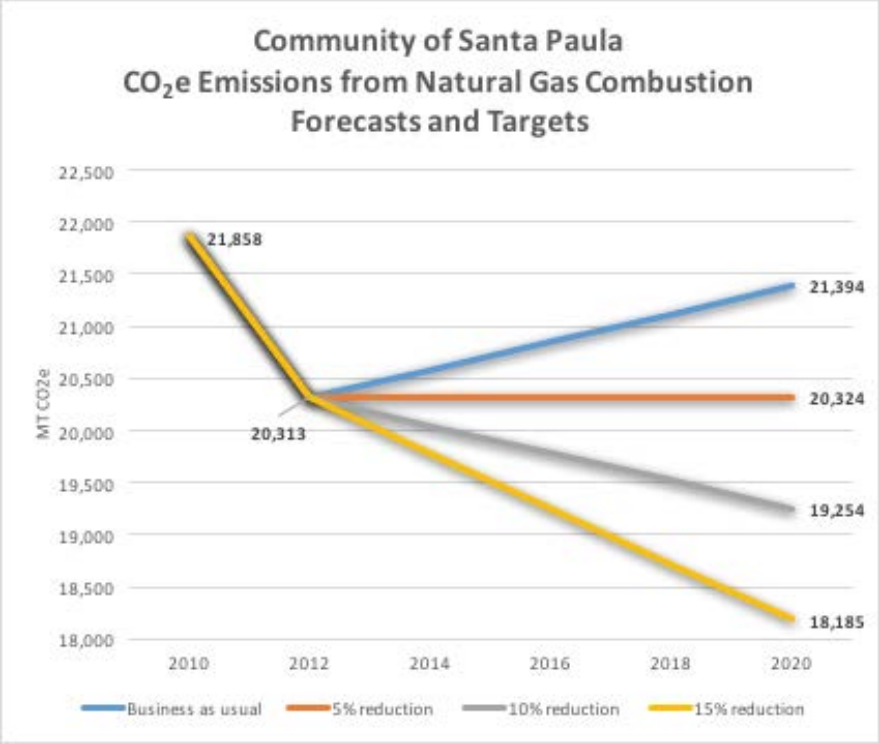
Table 12. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Santa Paula

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	1,535	5,697
10% reduction	3,070	7,059
15% reduction	4,605	8,421

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a business as usual scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For the City, a BAU scenario means that emissions would total 21,394 MT CO_2e in 2020 as compared to the 2010 levels of 21,858. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Santa Paula



Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

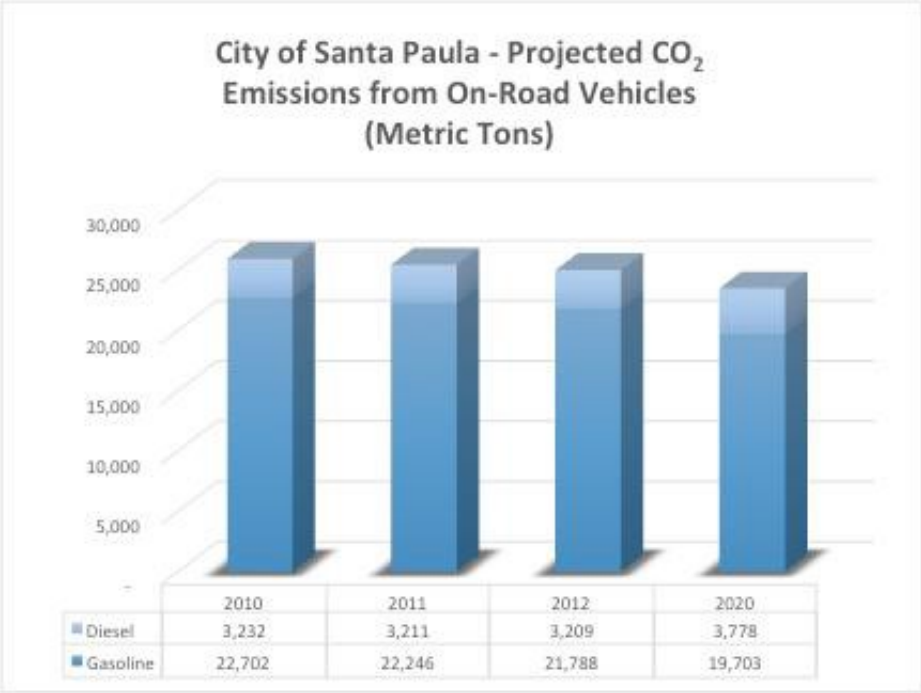
Table 13. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Santa Paula

Reductions required 2012 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	1,093	-11
10% reduction	2,186	1,059
15% reduction	3,279	2,128

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, State and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Santa Paula, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Santa Paula[8]



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Santa Paula.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels ($MT CO_2e$)	Below BAU 2020 Levels ($MT CO_2e$)
5% reduction	1,632	5,697
10% reduction	3,263	7,059
15% reduction	4,895	8,421

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 9,416 metric tons CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	3,163	3,163	34	34	3,197	3,197
2013	229	3,392	31	65	260	3,457
2014	377	3,770	585	650	962	4,420

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion remained relatively stable in Santa Paula, totaling 21,858, 21,587 and 20,313 MT CO_2e in 2010, 2011 and 2012 respectively. SB 350 specifically recognizes the importance of increasing energy efficiency in existing buildings one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

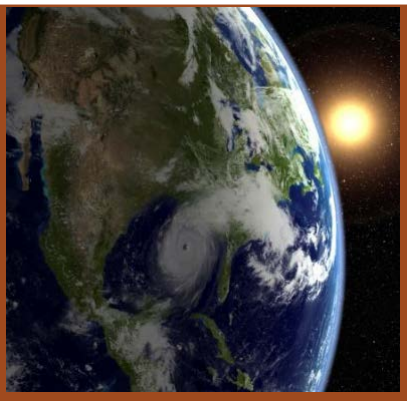
Page Intentionally Left Blank

Appendix A.8

City of Thousand Oaks

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance



2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill (AB) 32 which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of Thousand Oaks, incorporated in 1964, is nestled against the Santa Monica Mountains and boasts more than 15,000 acres of natural publicly owned open space located within the City's boundaries. The City is 56 square miles and has a population of approximately 129,000 residents according to the California Department of Finance.[1]

The majority of Thousand Oaks' GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Thousand Oaks' geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Thousand Oaks were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Thousand Oaks' Community Inventory

The City of Thousand Oaks' Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG). Southern California Edison (SCE) provided electricity data.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (51%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second contributor to community emissions, accounting for about 31% of emissions each year.[2]

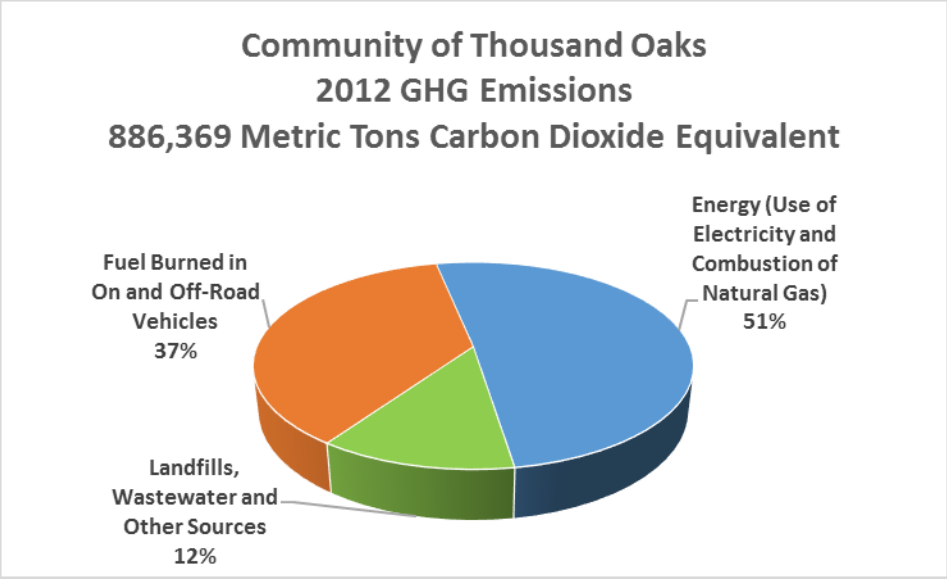
Table 1. Community GHG Emissions by Sector for the City of Thousand Oaks

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	285,274	279,754	274,210
Non-Residential Electricity Use	174,844	176,307	177,819
Residential Natural Gas Use	134,951	133,603	123,611
Other Emissions*	101,197	102,512	108,202
Residential Electricity Use	107,358	108,042	110,680
Off-Road Vehicle Use	56,932	57,689	54,176
Non-Residential Natural Gas Use	38,495	38,226	37,673
Total	**899,051**	**896,133**	**886,369**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. 2012 Community GHG Emissions for the City of Thousand Oaks



As explained in the body of this report, emissions are categorized based on control of the process from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the reporter, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below demonstrates that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Thousand Oaks

Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	616,847	611,784	597,871
Scope 2 (Indirect) emissions	282,202	284,349	288,499
Total	**899,051**	**896,133**	**886,369**

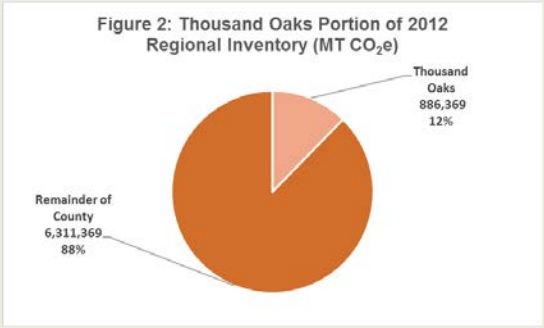
Values in this table and others may not add due to rounding.

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Thousand Oaks totaled 886,369 metric tons of carbon dioxide equivalent (MT CO_2e). Thousand Oaks is the second-largest incorporated city contributor in terms of total County emissions. Electricity, natural gas, gasoline, and

diesel consumption are the largest overall contributors to GHG emissions in the City of Thousand Oaks. As shown in Figure 2, emissions from the City of Thousand Oaks in 2012 accounted for about 12% of overall GHG emissions for Ventura County. Thousand Oaks' 2012 per capita GHG emissions are 6.96 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO_2e.



A discussion of the City of Thousand Oaks' GHG emissions for each major sector, focusing on calendar (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Thousand Oaks mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Thousand Oaks

Year	MT CO_2e
2010	134,951
2011	133,603
2012	123,611

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Thousand Oaks

Year	MT CO_2e
2010	107,358
2011	108,042
2012	110,680

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I: Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the City of Thousand Oaks

Year	MT CO_2e
2010	38,495
2011	38,226
2012	37,673

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the City of Thousand Oaks

Year	MT CO_2e
2010	174,844
2011	176,307
2012	177,819

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of greenhouse gas emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB).

The table below contains the facilities within the City of Thousand Oaks subject to greenhouse gas emissions reporting during the period 2010-2012, and reported emissions values for each facility.

Table 7. Industrial Facilities Subject to AB32 and their Reported Emissions (MT CO_2e)

Facility Name	2010	2011	2012
Amgen Inc.	26,624	26,098	23,211

On-Road Transportation Emissions

Vehicle miles traveled on Thousand Oaks roads accounted for approximately 8% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 274,210 MT CO_2e, which represents 31% of total Thousand Oaks community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Thousand Oaks in 2012 resulted in 54,176 MT CO_2e, which represents 6 % of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

Table 7. Emissions from Landfilled Solid Waste for the City of Thousand Oaks

Year	MT CO_2e
2010	44,200
2011	43,596
2012	44,098

There is no municipal solid waste landfill in Thousand Oaks. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Thousand Oaks totaled 813 MT CO_2e for the period, which represents 0.1% of overall community emissions.

2012 GHG from domestic wastewater treatment for the City of Thousand Oaks totaled 4,113 MT CO_2e, which represents 0.4% of Thousand Oaks' total 2012 emissions. Emissions from wastewater treatment include purchased electricity to operate treatment plants (396 MT CO_2e), and per capita emissions of CH_4 and N_2O (3,717 MT CO_2e) as calculated using the CARB's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector."

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g.,chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as high GWP gases.[4]

Emissions from high GWP GHGs for the City of Thousand Oaks in 2012 totaled 60,386 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Thousand Oaks.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Thousand Oaks

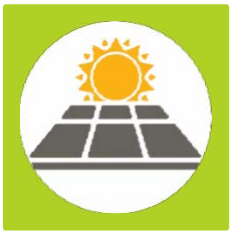
Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	19,386	5,398	$4,231,986
2010 to 2012 Residential	19,438	5,413	$2,069,663
2010 to 2012 Total	**38,824**	**10,811**	**$6,301,649**
2013 Non-Residential	10,751	2,994	$892,118
2013 Residential	1,920	535	$438,132
2013 Total	**12,671**	**3,528**	**$1,330,249**
2014 Non-Residential	9,915	2,761	$1,476,848
2014 Residential	2,426	675	$456,617
2014 Total	**12,341**	**3,436**	**$1,933,465**

*Slight differences in totals due to rounding.

Program data for the SCG was not available at the time this report was written.

[5] Detailed project data is available in Appendix D.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Thousand Oaks for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Thousand Oaks

Year	MT CO_2e
2010	308
2011	393
2012	563
2013	1015
2014	989

3 Thousand Oaks City Government Operations Inventory

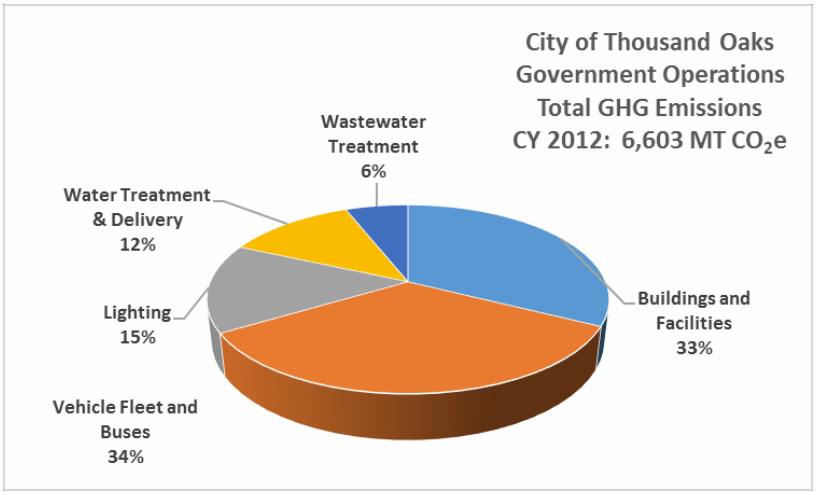
The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

The City of Thousand Oaks emissions varied significantly over the three years covered by this report, with significant reductions. Emissions from use of electricity in facilities were cut by 95%. In late 2010, the City Council made the commitment to purchase Green Power through a third party, which reduced emissions from the largest city facilities, beginning in 2011 The wastewater treatment plant has increased the production of solar power and constructed a second cogeneration power plant fueled by biofuels from the wastewater treatment process. The results with respect to emissions from electricity use are as follows:

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	2,322	87	131
Hill Canyon WWT Plant	754	892	396

Emissions from combustion of natural gas increased significantly after 2010, primarily because the City reached an agreement with Waste Management Inc. (WMI) to provide compressed natural gas to its fleet of waste haulers while WMI developed its own fueling station and because the city expanded its fleet of CNG buses during that time period. The City anticipates natural gas data for calendar years 2013 forward will demonstrate a return to historic levels.

Figure 3. 2012 GHG Emissions from City of Thousand Oaks Government Operations



Emissions from the Use of Electricity

Thousand Oaks purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Thousand Oaks Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	2,322	87	131
Streetlights and Traffic Signals	1,004	1,005	1,007
Water and Pumping	782	770	813
Wastewater Treatment	754	892	396
Total	**4,862**	**2,754**	**2,347**

Emissions from the Combustion of Natural Gas

The City of Thousand Oaks purchases natural gas from SCG for heating its facilities, operating boilers in its municipal buildings, converting to compressed natural gas used in vehicles and in the municipal buses powered with the fuel. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Thousand Oaks Government Operations

Year	MT CO_2e
2010	924
2011	1,363
2012	2,011

Emissions from City Owned and Operated Vehicles

The City of Thousand Oaks owns and operates both gasoline and diesel fueled vehicles and runs a City-owned public transit system, primarily composed of CNG-fueled buses, as noted above. Based on data provided by the City's Fleet manager (fuel usage and mileage), emissions from gasoline and diesel used in these vehicles is as follows:

Table 12. Emissions from City of Thousand Oaks Vehicle Fleet

Year	MT CO_2e
2010	2,211
2011	2,187
2012	2,245

Avoided Energy Emissions (City Operations)

In 2007, the City of Thousand Oaks recognized the potential for renewable power generation at the Hill Canyon Wastewater Treatment Plant. Its anaerobic digester produces methane gas and there was ample space for solar panels. The first cogeneration project (a power production technology) and photovoltaic (PV) array began full year operation in 2008. Mid-year 2011 another cogeneration unit came on line. The MWhs produced, and associated avoided emissions for CYs 2010 through 2012 are as follows:

Table 13. Avoided Emissions from City of Thousand Oaks Hill Canyon Wastewater Treatment Plant

	Cogeneration		Solar		Total
	MWhs	**MT CO_2e**	**MWhs**	**MT CO_2e**	**Total MT CO_2e**
2010	3,033	841	1,121	311	1,153
2011	2,667	740	1,129	313	1,053
2012	4,578	1,270	1,107	307	1,577

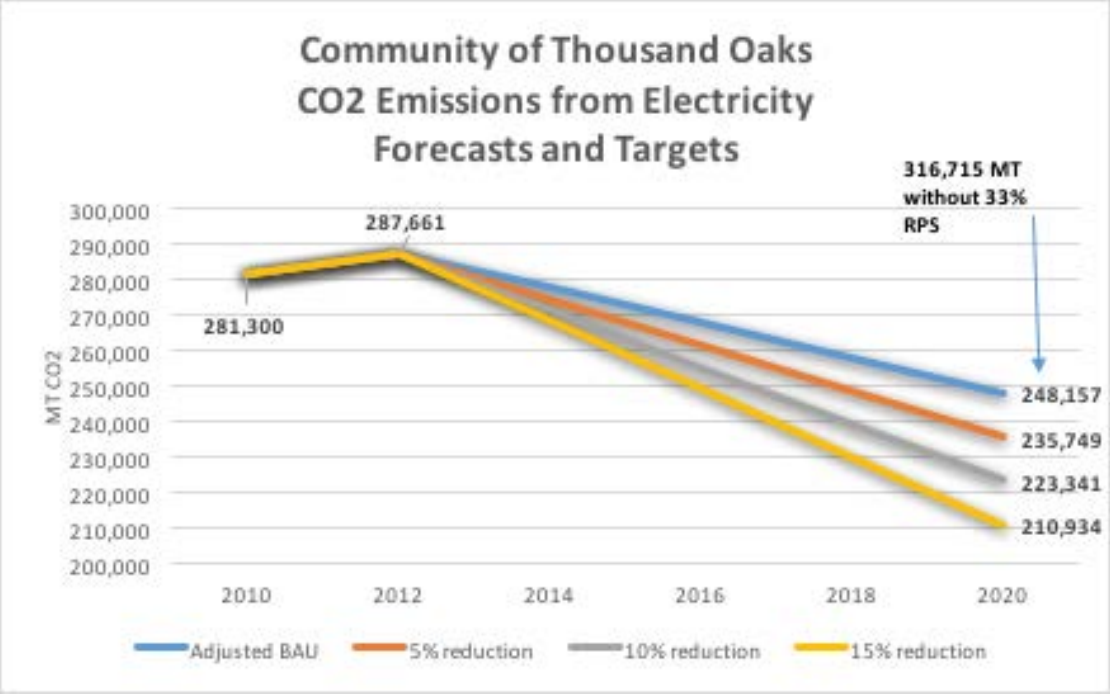
4 Thousand Oaks Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual (BAU) scenario where electricity use in 2020 in the SCE territory will increase by 1.21% over 2011 levels.[6] For the City of Thousand Oaks, a BAU scenario means that emissions would total 316,715 MT CO_2e in 2020, as compared to the 2010 levels of 281,300.[7] The adjusted BAU scenario projects 2020 emissions at 248,157 metric tons. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Thousand Oaks



[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

Based on this adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

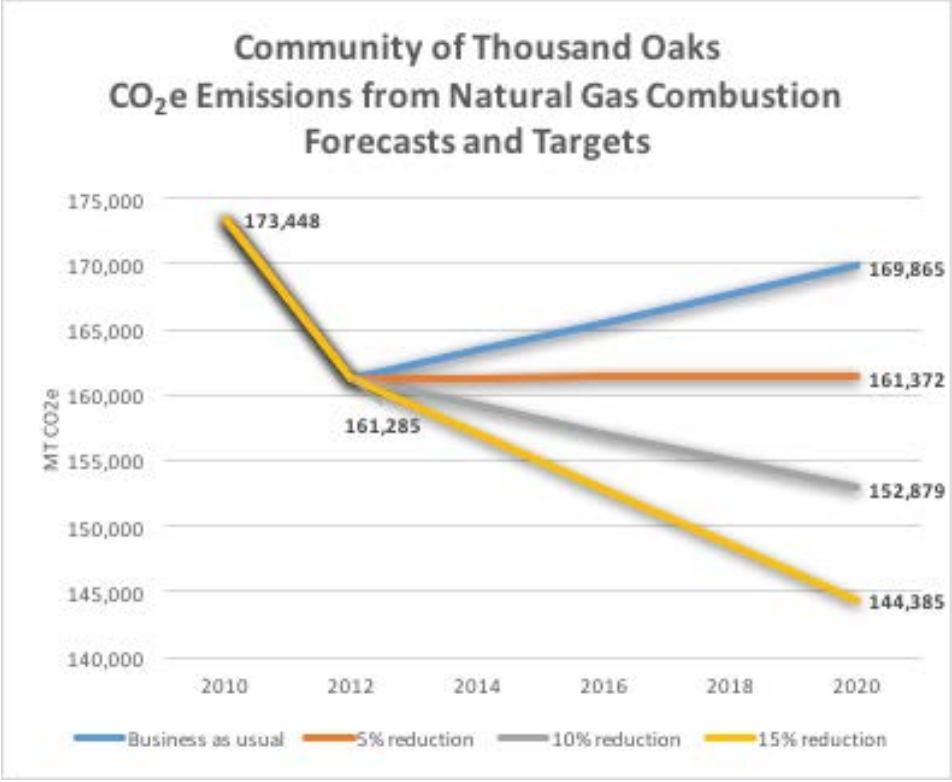
Table 14. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Thousand Oaks

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	14,065	51,912
10% reduction	28,130	64,319
15% reduction	42,195	76,727

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a BAU scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For Thousand Oaks, a BAU scenario means that emissions would total 169,865 MT CO_2e in 2020, compared to the 2010 levels of 173,448 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Thousand Oaks



[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

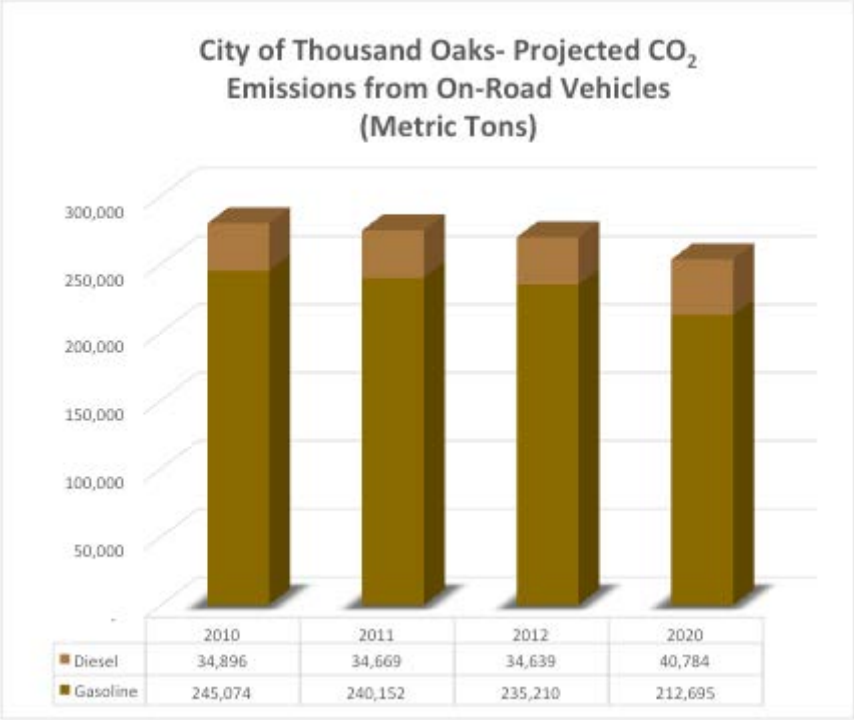
Table 15. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Thousand Oaks

Reductions required 2012 to 2020	Below 2012 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	8,672	-87
10% reduction	17,345	8,406
15% reduction	26,017	16,900

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, State and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Thousand Oaks, including additional support for alternative modes of transportation and its public transit system, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Thousand Oaks



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Thousand Oaks City Government Greenhouse Gas Forecasts and Reduction Targets

City of Thousand Oaks: Energy Action Plan

In 2012, the City of Thousand Oaks adopted an Energy Action Plan[9] that assessed the current energy use in municipal facilities, established goals and objectives, and associated commitments. The plan identified the Municipal Service Center, the Transportation Center, Senior Center and City Hall/Civic Arts Plaza as the highest energy users, normalized by using carbon intensity per square foot. It then established an overall goal of achieving a 10% reduction in greenhouse gas emissions at City facilities by 2017. The plan committed to:

1. Establishing a centralized energy policy
2. Establishing an energy management team
3. Committing to exploring sustainable sources of funding
4. Tracking and monitoring progress
5. Engaging community through outreach and education

[9] http://www.toaks.org/civica/filebank/blobdload.asp?BlobID=23478

6 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Thousand Oaks.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	14,065	51,912
10% reduction	28,130	64,319
15% reduction	42,195	76,727

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations, as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 20,736 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual (MT CO2e)	Cumulative (MT CO2e)	Annual (MT CO2e)	Cumulative (MT CO2e)	Annual (MT CO2e)	Cumulative (MT CO2e)
2010-2012	10,811	10,811	1,265	1,265	12,076	12,076
2013	3,528	14,339	1,015	2,280	4,543	16,619
2014	3,436	17,775	989	3,269	4,425	21,044

*Slight differences in totals due to rounding.

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion appeared to reduce significantly in 2012, with 2010, 2011 and 2012 totals of 173,447, 171,830 and 161,284 MT CO_2e, respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

Page Intentionally Left Blank

Appendix A.9

City of Ventura

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020. The City of San Buenaventura (Ventura) was founded in 1782 by Father Junipero Serra, the ninth of the California missions. He named it after the Italian St. Bonaventure, hence the nickname that Ventura is the "city of good fortune." The City is the county seat of Ventura County and has a population of approximately 108,000 residents according to the California Department of Finance.[1]

The majority of Ventura's GHG emissions are produced through the burning of fossil fuels. The City's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the City of Ventura's geographical boundaries (i.e. city limits) for calendar years 2010 through 2012. The City's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the City of Ventura were inventoried for the years 2010 through 2012. The City has not established a baseline year for its inventories.

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

2 Ventura's Community Inventory

The City of Ventura's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities within the city limits. Stationary combustion data was provided by Southern California Gas Company (SCG), for residential and non-residential sectors. Southern California Edison (SCE) provided electricity data for residential, commercial, and industrial sectors.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012 for the City of Ventura. Figure 1 illustrates on average each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (42%). On-road transportation associated with vehicle miles travelled on City roads (excluding State highways) was the second largest contributor to community emissions, accounting for about 34% of emissions each year.[2]

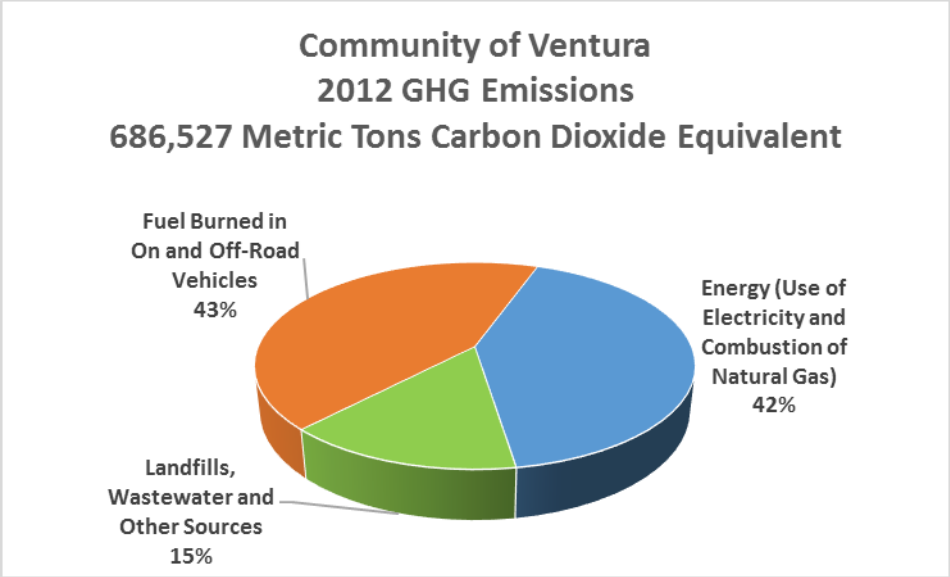
Table 1. Community GHG Emissions by Sector for the City of Ventura

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	243,674	238,959	234,223
Non-Residential Electricity Use	103,141	104,315	105,846
Other Emissions*	95,568	94,123	100,885
Residential Natural Gas Use	84,929	85,401	79,702
Off-Road Vehicle Use	64,716	65,504	63,180
Residential Electricity Use	60,919	61,060	59,483
Non-Residential Natural Gas Use	43,828	43,606	43,208
Total	**696,775**	**692,969**	**686,527**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
Values in this table and others may not add due to rounding.

[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Figure 1. 2012 Community GHG Emissions by Sector for the City of Ventura



As explained in the body of this report, emissions are categorized based on control of the process from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the reporter, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

The table below demonstrates that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the City of Ventura

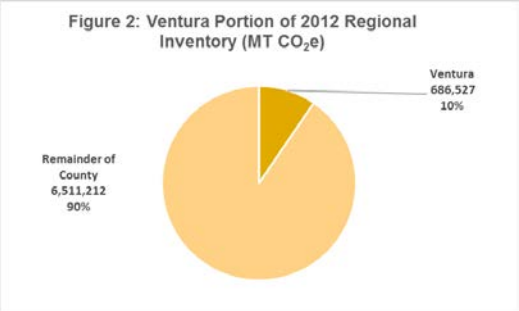
Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	532,715	527,594	521,197
Scope 2 (Indirect) emissions	164,060	165,375	165,329
Total	**696,775**	**692,969**	**686,527**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and nonresidential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.

GHG emissions in 2012 for the City of Ventura totaled 686,527 metric tons of carbon dioxide equivalent (MT CO_2e). Ventura is the fourth-largest incorporated city contributor in

terms of total County emissions. Electricity, natural gas, gasoline, and diesel consumption are the largest overall contributors to GHG emissions in the City of Ventura. .As shown in Figure 2., emissions from the City of Ventura in 2012 accounted for about 10% of overall GHG emissions for Ventura County. Ventura's 2012 per capita GHG emissions are 6.44 MT CO_2e, compared to countywide per capita emissions of 6.52 MT CO2e.



A discussion of the City of Ventura's GHG emissions for each major sector, focusing on calendar year (CY) 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the City of Ventura mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the City of Ventura

Year	MT CO_2e
2010	84,929
2011	85,401
2012	79,702

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the City of Ventura

Year	MT CO_2e
2010	60,919
2011	61,060
2012	59,483

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High Global Warming Potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part 1, Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-residential Emissions from Natural Gas for the City of Ventura

Year	MT CO_2e
2010	43,828
2011	43,606
2012	43,208

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-residential Emissions from Electricity for the City of Ventura

Year	MT CO_2e
2010	103,141
2011	104,315
2012	105,846

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHG emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB). There are no facilities in Ventura subject to this reporting requirement.

On-Road Transportation Emissions

Vehicle miles traveled on Ventura's roads accounted for approximately 7% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 234,223 MT CO_2e, which represents 34% of total City of Ventura community emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the City on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the City of Ventura in 2012 resulted in 63,180 MT CO_2e, which represents 9% of 2012 emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied. Based on these calculations, the City's total emissions associated with landfilled solid waste are:

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

Table 7. Emissions from Landfilled Solid Waste for the City of Ventura

Year	MT CO_2e
2010	47,682
2011	44,944
2012	47,228

There is no municipal solid waste landfill in Ventura. Waste generated in the City is transported to landfills outside the City boundaries.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for the City of Ventura totaled 2,273 MT CO_2e for the period, which represents 0.3% of overall emissions.

2012 GHG from domestic wastewater treatment for the City of Ventura totaled 5,385 MT CO_2e. Emissions from wastewater treatment include purchased electricity to operate treatment plants (2,273 MT CO_2e), and per capita emissions of CH_4 and N_2O (3,112 MT CO_2e) as calculated using the CARB's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector".

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as High GWP gases.[4]

Emissions from High GWP GHGs for the City of Ventura in 2012 totaled 50,546 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and related costs associated with residential and non-residential programs across the County of Ventura, including Ventura.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the City of Ventura

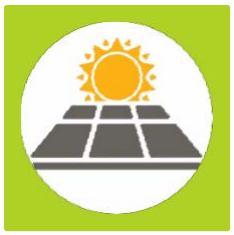
Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	18,316	5,100	$3,509,059
2010 to 2012 Residential	12,931	3,601	$1,052,530
2010 to 2012 Total	**17,423**	**4,851**	**$2,574,259**
2013 Non-Residential	9,445	2,630	$783,770
2013 Residential	1,559	434	$232,535
2013 Total	**11,004**	**3,064**	**$1,016,305**
2014 Non-Residential	5,742	1,599	$2,094,593
2014 Residential	1,123	313	$199,261
2014 Total	**6,865**	**1,912**	**$2,293,854**

*Slight differences in totals due to rounding.

Program data for the SCG was not available at the time this report was written.

[5] Detailed project data is available in Appendix C.

Rooftop Solar



Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the City, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in Ventura for CYs 2010 through 2014 as a result of solar energy production are:

Table 9. Avoided Emissions from Solar Production in the City of Ventura

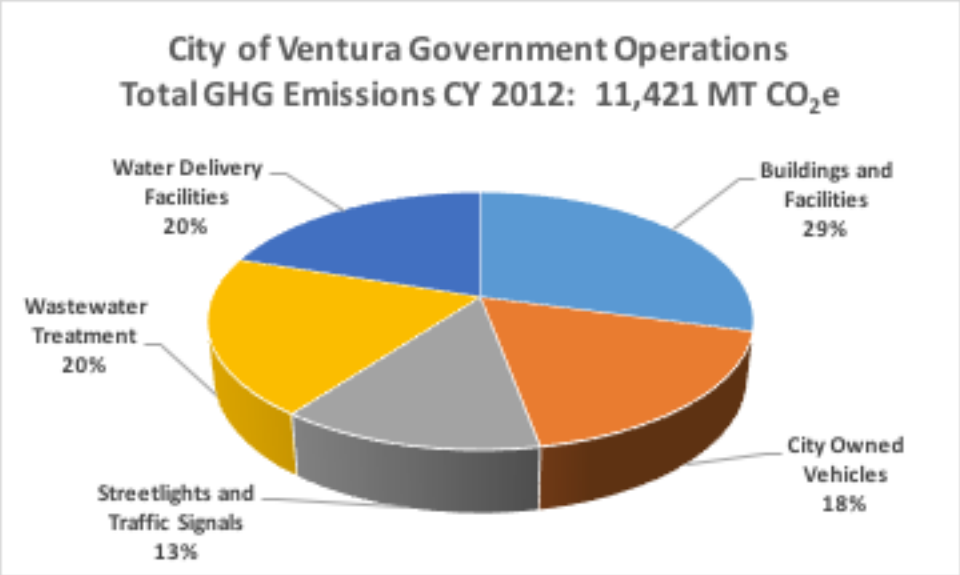
Year	MT CO_2e
2010	82
2011	132
2012	103
2013	373
2014	173

3 Ventura City Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping, and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from City government operations.

Figure 3. 2012 GHG Emissions from City of Ventura Government Operations



Emissions from the Use of Electricity

Ventura purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 10. Emissions from the Use of Electricity for City of Ventura Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	2,478	2,398	2,595
Wastewater Treatment	2,123	2,087	2,273
Water Treatment and Delivery	2,098	2,137	2,237
Streetlights and Traffic Signals	1,481	1,485	1,497
Total	**8,180**	**8,106**	**8,638**

Emissions from the Combustion of Natural Gas

The City of Ventura purchases natural gas from the SCG, for heating its facilities and for operating boilers in its municipal buildings and for converting to compressed natural gas used in vehicles and in the municipal buses powered with the fuel. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Combustion of Natural Gas for City of Ventura Government Operations

Year	MT CO_2e
2010	689
2011	737
2012	746

Emissions from City Owned and Operated Vehicles

The City of Ventura owns and operates both gasoline and diesel fueled vehicles. Based on data provided by the City's Environmental manager (fuel usage and mileage), emissions from these vehicles is as follows:

Table 12. Emissions from City of Ventura Vehicle Fleet

Year	MT CO_2e
2010	2,137
2011	2,065
2012	2,037

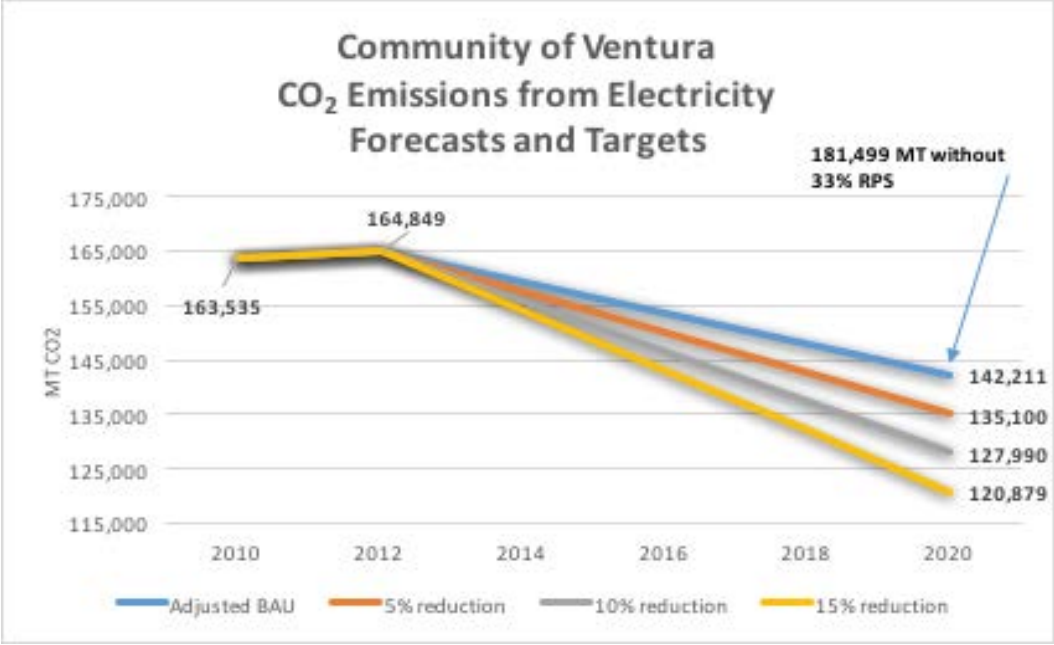
4 Ventura Community Greenhouse Gas Forecasts and Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction targets for the VCREA and its member local governments. Regional forecasts and reduction targets have been established for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual (BAU) scenario where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the City of Ventura, a BAU scenario means that emissions would total 181,499 MT CO_2e in 2020, as compared to the 2010 levels of 163,535 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 142,211 MT CO_2e. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the City of Ventura



Based on this adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

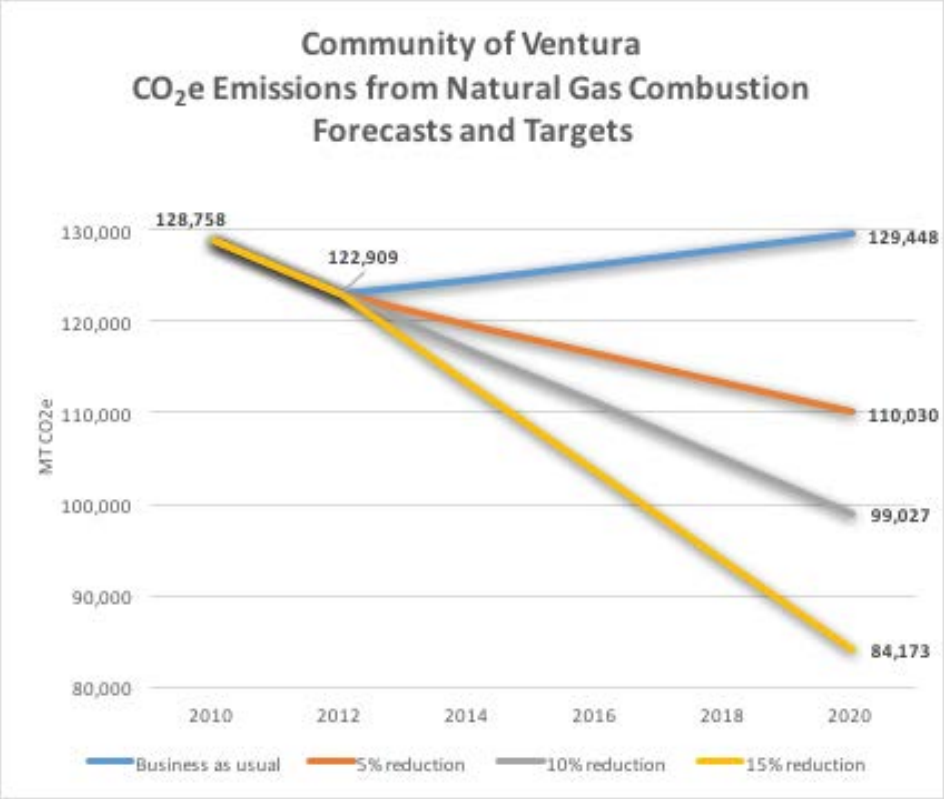
Table 13. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the City of Ventura

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	8,177	29,749
10% reduction	16,354	36,859
15% reduction	24,530	43,970

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a BAU scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For the City of Ventura, a BAU scenario means that emissions would total 129,448 MT CO_2e in 2020, as compared to the 2010 levels of 128,758 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the City of Ventura



[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

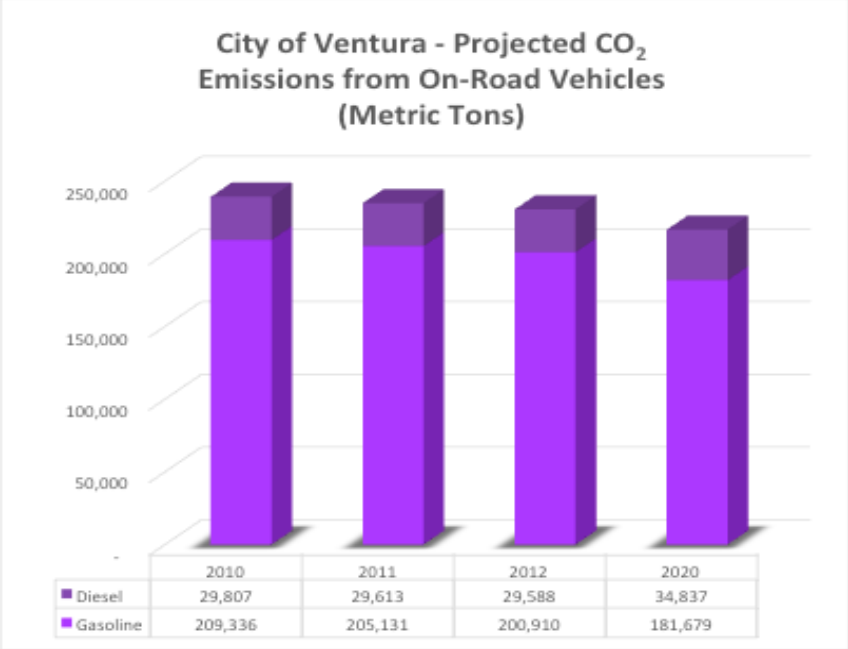
Table 14. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the City of Ventura

Reductions required 2012 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	6,438	12,879
10% reduction	12,876	23,882
15% reduction	19,314	38,736

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, state and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of Ventura, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the City of Ventura



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for Ventura.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	8,177	29,749
10% reduction	16,354	36,859
15% reduction	24,530	43,970

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 14,458 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	8,701	8,701	236	236	8,937	8,937
2013	3,064	11,765	373	609	3,437	12,374
2014	1,912	13,676	173	782	2,085	14,458

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion decreased approximately 5% between 2011 and 2012, totaling 128,758, 129,007 and 122,909 MT CO_2e in 2010, 2011 and 2012 respectively. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). New planning guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures.

Page Intentionally Left Blank

Appendix A.10

Unincorporated Area of the County of Ventura

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Target Options

Page Intentionally Left Blank

1 Introduction

The inventory described in detail in this chapter is the first step to reducing greenhouse gas (GHG) emissions. These efforts to reduce emissions are consistent with State policy as well as current regulation from Assembly Bill 32 (AB 32), which directs the State of California to reduce GHG emissions to 1990 levels by 2020.

The majority of the County of Ventura's unincorporated area GHG emissions are produced through the burning of fossil fuels. The unincorporated area's Community GHG Inventory includes GHG emissions from direct and indirect sources. A direct emission source is defined as an on-site source of emissions such as the combustion of fossil fuel in a vehicle engine or burning of natural gas for heating facilities. An indirect emission source is defined as an emissions source generated offsite, such as electricity generated by power plants that is used in facility operations.

GHG emissions were inventoried for sources within the unincorporated area's geographical boundaries for calendar years 2010 through 2012. The unincorporated area's Community GHG Inventory includes GHG emissions from residential, commercial, industrial, transportation, and waste sectors. The government GHG inventory is described separately, and is a subset of the Community GHG Inventory. The government analysis divides emissions among buildings, vehicle fleet, streetlights, water deliveries, wastewater/sewage, and waste sectors. A description of the methodologies used to estimate GHG emissions is provided in Appendix B, Methodological Considerations.

Government GHG emissions for the County of Ventura were taken from the County of Ventura's GHG Inventory, which has been compiled since calendar year (CY) 2005.

2 Unincorporated Area Community Inventory

The County of Ventura and its cities have followed a long standing policy, Guidelines for Orderly Development, which encourages development within city boundaries, maintaining green and agricultural spaces between them. There are exceptions, both in terms of residential and industrial development outside cities. This includes communities like Casa Conejo, Channel Islands Beach, El Rio, Meiners Oaks, Mira Monte, Oak Park, Oak View, Piru and smaller areas that are not large enough to meet the criteria for census defined places. As a whole, population in the unincorporated area totaled 96,147 in 2012, or approximately 6% of the County's total population according to the California Department of Finance.[1]

The unincorporated area's Community GHG Inventory encompasses emissions from residential, commercial, and industrial activities outside city limits. Stationary combustion data was provided by Southern California Gas Company (SCG), for residential and non-residential sectors. Southern California Edison (SCE) provided electricity data for residential, commercial, and industrial sectors.

Table 1 quantifies the contributions of each sector to total the community emissions generated during the period of 2010 through 2012 for the Unincorporated Area. Figure 1 illustrates each sector's contribution to total community emissions for the three-year period. Emissions from energy used (electricity and natural gas) constitute the largest source of GHGs for the community (57%). On-road transportation associated with vehicle miles travelled on roads maintained by the County Government (excluding State highways) was the second largest contributor to community emissions, accounting for about 20% of emissions each year.[2]

[1] http://www.dof.ca.gov/research/demographic/reports/estimates/e-4/2011-20/view.php

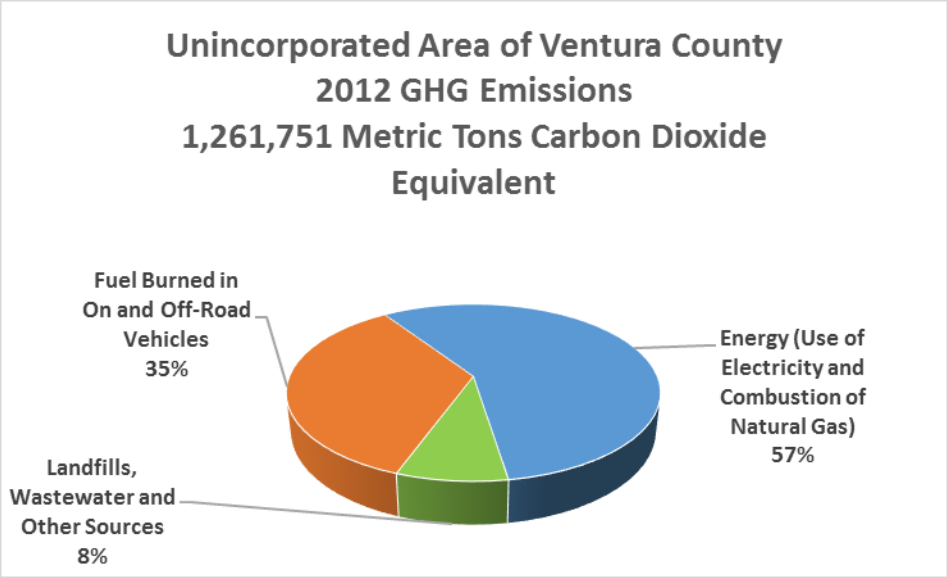
[2] Data related to emissions from State highways is presented in the Regional Report, Part I of Climate on the Move.

Table 1. Community GHG Emissions by Sector for the Unincorporated Area

Sector	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
On-Road Transportation	253,109	248,212	243,293
Non-Residential Electricity Use	466,607	481,878	484,394
Off-Road Vehicle Use	200,553	201,742	198,599
Other Emissions*	92,535	96,291	102,384
Residential Natural Gas Use	96,255	96,468	89,763
Non-Residential Natural Gas Use	48,934	75,483	78,429
Residential Electricity Use	61,571	61,910	64,889
Total	**1,219,561**	**1,261,983**	**1,261,751**

*Includes emissions from gases with high global warming potential, methane and nitrous oxide from wastewater treatment plants and landfills.
**Values in this table and others may not add due to rounding.

Figure 1. 2012 Community GHG Emissions for the Unincorporated Area



As explained in the body of this report, emissions are categorized based on control of the process from which they were generated. Direct emissions (also referred to as Scope 1 emissions) are generated on-site or directly by the organization, (e.g. using natural gas for heating, or burning gasoline in a vehicle), while indirect emissions (Scope 2 emissions) are generated off-site by a separate entity (e.g. purchased electricity or purchased heat). Purchased electricity is the most common form of Scope 2 emissions, and the only Scope 2 emissions type reported in the VCREA inventory.

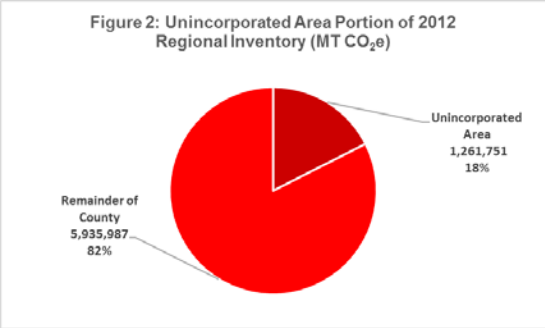
The table on the next page documents that both Scope 1 (direct) and Scope 2 (indirect) emissions source contributions remained relatively consistent through the three-year period.

Table 2. Direct and Indirect Emissions for the Unincorporated Area

Scope	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Scope 1 (Direct) emissions	687,834	714,232	708,166
Scope 2 (Indirect) emissions	531,728	547,752	553,585
Total	**1,219,561**	**1,261,983**	**1,261,751**

A detailed description of the calculation methodologies used to compile the community inventory can be found in Appendix B, Methodological Considerations.

Residential and non-residential emissions sources are described in the following sections. As there is little variation between years, 2012 data is used for discussion purposes because it is the most recent.



GHG emissions in 2012 for the unincorporated area totaled 1,261,751 metric tons of carbon dioxide equivalent (MT CO_2e.) Electricity, natural gas, gasoline, and diesel consumption are the largest overall contributors to GHG emissions in the unincorporated area. As shown in Figure 2, emissions from the unincorporated area in 2012 accounted for about 18% of overall GHG emissions for Ventura County. This relative contribution is disproportionate to the size of the population in the unincorporated area compared to some of the larger cities. The higher emissions are related to location of some large commercial and industrial sources outside city boundaries, including oil and gas drilling and support industries, agricultural and food processing facilities, a 24-hour County jail and other smaller sources.

A discussion of the unincorporated area's GHG emissions for each major sector, focusing on CY 2012, is presented below.

Emissions from the Residential Sector

Residential emissions for the unincorporated area mainly result from household use of electricity and natural gas. Residential emissions were calculated from electricity and natural gas consumption data provided by SCE and SCG. Residential combustion of natural gas, primarily in home heating, resulted in the following emissions:

Table 3. Residential Emissions from Natural Gas for the Unincorporated Area

Year	MT CO_2e
2010	96,255
2011	96,468
2012	89,763

Residential use of electricity provided by SCE produced GHGs as follows:

Table 4. Residential Emissions from Electricity for the Unincorporated Area

Year	MT CO_2e
2010	61,571
2011	61,910
2012	64,889

Residential use of self-generated energy through the consumption of wood, kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to lack of available data. It is expected that the GHG emissions from these sources are negligible. High global warming potential (GWP) gases partially originate from the residential sector but are included in a separate category below.

Emissions from the Non-Residential Sector

The non-residential sector includes emissions from commercial, industrial and agricultural operations. Because utilities are required to maintain confidentiality when they provide data to the public, including partnerships, disaggregation into the individual sectors can result in skewed results. This is discussed in more detail in Part I, Regional Inventory of this report. For that reason, the three non-residential sectors are combined and reported as one. The reader should be aware that there may still be under-reporting of non-residential emissions because utilities are required to redact specific facility data to protect confidentiality. Additional information on the implications of confidentiality and data reporting should be directed to SCE or SCG.

Energy generated through the commercial and industrial consumption of kerosene, propane, fuel oil, individual diesel generators, and bottled natural gas could not be quantified due to the difficulty and expense of collecting valid data.

Non-residential emissions associated with the combustion of natural gas, based on therms reported by the SCG, are as follows:

Table 5. Non-Residential Emissions from Natural Gas for the Unincorporated Area

Year	MT CO_2e
2010	48,931
2011	75,483
2012	78,429

Non-residential use of electricity provided by SCE produced GHGs as follows:

Table 6. Non-Residential Emissions from Electricity for the Unincorporated Area

Year	MT CO_2e
2010	466,607
2011	481,878
2012	484,394

California Air Resources Board – Mandatory Reporting

The California Global Warming Act and associated Mandatory Reporting Regulation requires facilities with 10,000 metric tons or more of GHGs emissions and/or all facilities in specific sectors to report those emissions to the California Air Resources Board (CARB).

The table below contains the facilities within the unincorporated area subject to GHG emissions reporting during the period 2010 through 2012, and reported emissions values for each facility.

Table 7. Industrial Facilities Subject to AB32 and their Reported Emissions (MT CO_2e)

Facility	2010 (MT CO_2e)	2011 (MT CO_2e)	2012 (MT CO_2e)
Aera Energy LLC, Ventura Avenue 93301 (Oil and Gas Production)	25,793	106,194	106,985
Aera Energy Ventura Basin	n/a	12,598	14,289
Aera Energy Ventura Gas Plant	n/a	7,567	7,869

On-Road Transportation Emissions

Vehicle miles traveled on unincorporated area roads accounted for approximately 7% of all travel in the County of Ventura. 2012 GHG emissions from that travel totaled 243,293 MT CO_2e, which represents 19% of total unincorporated area emissions. These emissions resulted from vehicles burning gasoline and diesel fuel. Note that 54% of all on-road emissions in Ventura County occur on State Highways, as discussed in Part 1, Section 3.3. A portion of those emissions would be attributable to vehicles used for travelling to and from the unincorporated area on those highways, particularly for commuting purposes. Without detailed traffic studies, the options for allocation of highway miles to particular cities within a region include by population, by registered vehicles or through economic indicators. Regardless of the method of allocation, mitigation of emissions from vehicle traffic on state highways is at least a regional issue. Focusing on where problems are best addressed, this report provides data and discusses on-road vehicle traffic on State roads in Part 1, Climate on the Move's Regional Inventory.

Off-Road Vehicle Emissions

Exhaust emissions from off-road vehicle use for the unincorporated area in 2012 resulted in 198,599 MT CO_2e, which represents 15.5% of emissions.

Emissions from Solid Waste

"Landfilling" is the main method for disposal of municipal and household solid wastes or refuse in the United States. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas (mostly methane but including carbon dioxide and nitrous oxide). With Californians disposing of more than 42 million tons of waste per year, the total amount of landfill gases produced in California is tremendous.[3]

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimate that there are approximately 0.4223 MT CO_2e resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provides individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric tons was applied. Based on these calculations, the unincorporated area's total emissions associated with landfilled solid waste are:

Table 8. Emissions from Landfilled Solid Waste for the Unincorporated Area

Year	MT CO_2e
2010	46,272
2011	47,878
2012	49,716

There is one landfill in the unincorporated area: Toland Road. A portion of the waste generated in the cities is taken to this landfill under contracts with waste haulers and the Ventura County Regional Sanitation District.

Water and Wastewater Treatment Emissions

GHG emissions from electricity consumption for water supply and irrigation infrastructure required for unincorporated Ventura County totaled 2,934 MT CO_2e for the period, which represents 0.2% of overall emissions.

2012 GHGs from domestic wastewater treatment in the unincorporated

[3] http://www.energy.ca.gov/biomass/landfill_gas.html

area of Ventura County totaled 4,173 MT CO_2e. Emissions from wastewater treatment include purchased electricity to operate treatment plants (1,368 MT CO_2e), and per capita emissions of CH_4 and N_2O (2,805 MT CO_2e) as calculated using the State of California Air Resources Board's methodology. Purchased electricity emissions are reported under "Emissions from the Non-Residential Sector".

High GWP GHG Emissions

Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydro chlorofluorocarbons, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High GWP gases.[4]

Emissions from High GWP GHGs for the unincorporated area in 2012 totaled 45,561 MT CO_2e. Emissions were calculated based on the CARB per capita estimate for California.

Avoided Energy Emissions (2010 through 2014)

Avoided emissions are those that result from projects specifically designed to reduce energy use or to source energy from renewable sources. In addition to economic benefits of energy efficiency (using less electricity, burning less natural gas costs less) and installation of photovoltaic systems, there are also GHG benefits from these projects. These GHG savings are the "costs" that would have been incurred if the measures had not been put in place. For example, if a company installs a 1 MW photovoltaic system generating approximately 1.7 MWhs of fossil-free electricity per year, its GHG savings are roughly equivalent to 473 MT CO_2e. That benefit accumulates, since every year that the project is in operation, an additional 473 MT CO_2e does not enter the atmosphere and the benefits accumulate. This highlights the persistence of GHGs in the environment and the importance of avoiding their emissions as a first strategy.

The tables below show avoided emissions for CYs 2010 through 2014. It is reasonable to assume that the avoided emissions for 2010 through 2012 are captured in the emission levels reported in the 2011 and 2012 inventories. Without these reductions, the 2010, 2011 and 2012 inventories would have been an equivalent number of MT CO_2e higher. The data for CYs 2013 and 2014 indicate reductions that have been made in those years, but does not account for growth that might offset those reductions.

Southern California Edison

Southern California Edison provided VCREA with a detailed list of MWh savings and

[4] http://www.epa.gov/climatechange/ghgemissions/gases.html

related costs associated with residential and non-residential programs across the County of Ventura, including the unincorporated area.[5]

Table 8. 2010-2014 Avoided Emissions from SCE Programs in the Unincorporated Area

Program	MWhs Avoided	MT CO_2e Avoided	Investment
2010 to 2012 Non-Residential	674	188	$63,329
2010 to 2012 Residential	237	66	$23,857
2010 to 2012 Total	**17,423**	**4,851**	**$2,574,259**
2013 Non-Residential	272	76	$22,569
2013 Residential	29	8	$3,480
2013 Total	**301**	**84**	**$26,049**
2014 Non-Residential	1,510	421	$168,671
2014 Residential	206	57	$90,591
2014 Total	**1,716**	**478**	**$259,263**

Program data for the SCG was not available at the time this report was written.

Rooftop Solar

Another way emissions are avoided is through the installation of rooftop solar panels on homes and businesses. Many of residents and small businesses who install these panels apply for incentives through the California Solar Initiative. When they do so, they provide data about their residence or business and about the solar system they are installing. That data is then made available to the public. It does not represent all of the photovoltaic installations in the unincorporated area, for example, it does not include the installation of large capacity production or self-financed units, but it provides a sense of the growing impact that this type of electricity generation can have on our carbon footprint and how our sense of energy production is on the move.

Some of the avoided emissions in the unincorporated area for CYs 2010 through 2012 as a result of solar energy production are:

Table 10. Avoided Emissions from Solar Production in the Unincorporated Area

Year	MT CO_2e
2010	134
2011	110
2012	315
2013	683
2014	846

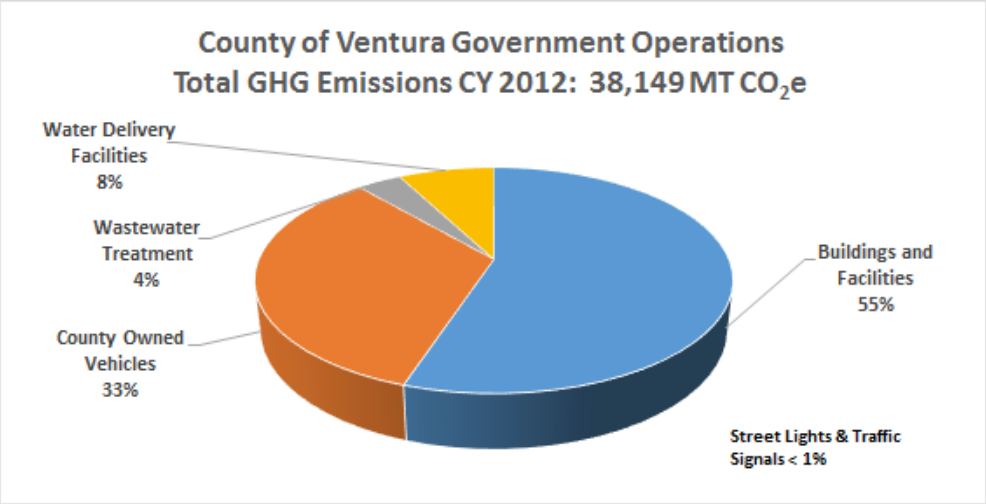
[5] Detailed project data is available in Appendix C.

3 County of Ventura Government Operations Inventory

The State of California's Air Resources Board and The Climate Registry have adopted a Local Government Operations Protocol (LGOP) that guides the reporting of GHG emissions by local governments. The LGOP defines the categories under which government operations are categorized, including facilities, lighting and traffic control, water and pumping and wastewater pumping.

Because there were no significant changes between 2010 and 2012, the following chart shows the relative contribution of various sources to GHG emissions from County government operations. More detailed information is available by contacting the County regarding its Climate Protection Plan and GHG Inventory.

Figure 3. 2012 GHG Emissions from County of Ventura Government Operations



Emissions from the Use of Electricity

The County of Ventura purchases its electricity from SCE. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 11. Emissions from the Use of Electricity for County of Ventura Government Operations

	2010 MT CO_2e	2011 MT CO_2e	2012 MT CO_2e
Buildings and Facilities	17,110	16,338	16,122
Wastewater Treatment	1,434	1,506	1,368
Water Treatment and Delivery	2,116	2,458	2,934
Streetlights and Traffic Signals	283	277	260
Total	**20,943**	**20,578**	**20,684**

Emissions from the Combustion of Natural Gas

The County of Ventura purchases natural gas from the SCG, primarily for heating its facilities and for operating boilers in its larger buildings. These purchases resulted in the following emissions for CYs 2010 through 2012.

Table 12. Emissions from the Combustion of Natural Gas for County of Ventura Government Operations

Year	MT CO_2e
2010	5,400
2011	4,603
2012	4,762

Emissions from County Owned and Operated Vehicles

The County of Ventura owns and operates both gasoline and diesel fueled vehicles. These vehicles include those used by the County Sheriff and Fire Department, Public Works heavy duty vehicles and off road equipment. Based on data in the County's Local Government GHG inventory, emissions from these vehicles is as follows:

Table 13. Emissions from County of Ventura Vehicle Fleet

Year	MT CO_2e
2010	12,906
2011	13,205
2012	12,703

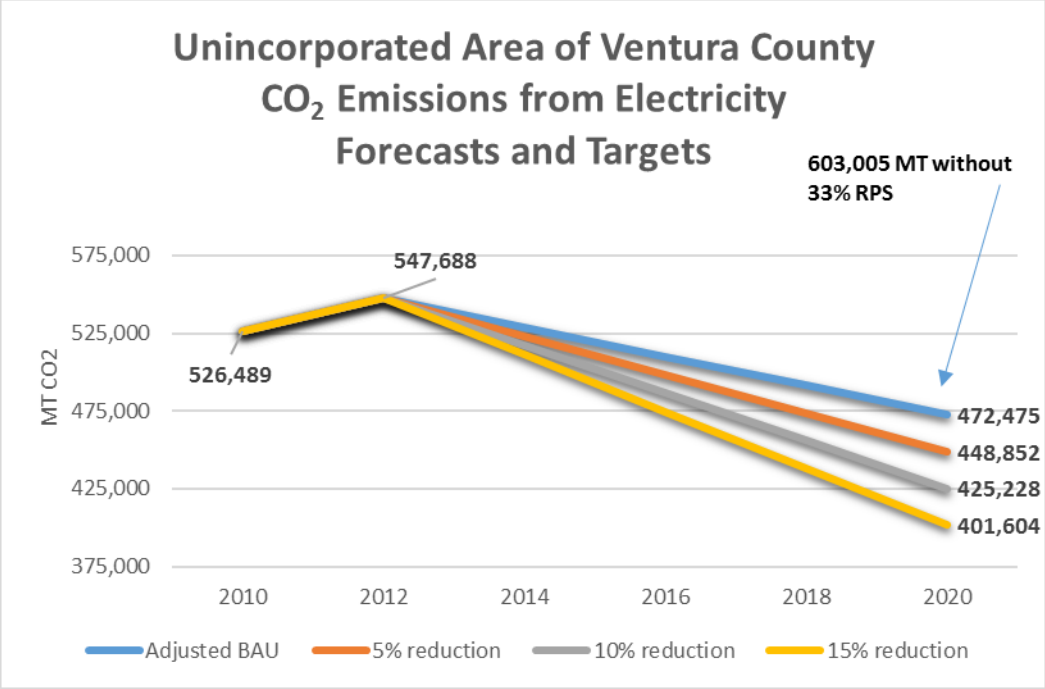
4 Unincorporated Area Greenhouse Gas Reduction Target Options

Part I of this report provides an overview of the approach to forecasting and reduction target options for the VCREA and its member local governments. Forecasts and reduction targets have been identified for energy use (electricity and natural gas) and for on-road vehicles.

Forecasted Emissions from and Targets for Electricity Use

The California Energy Commission has estimated a preliminary mid-range business as usual scenario (BAU) where electricity use in 2020 in the SCE territory will increase by 1.21% per year over 2011 levels.[6] For the unincorporated area, a BAU scenario means that emissions would total 603,005 MT CO_2 in 2020, as compared to the 2010 levels of 526,489 MT CO_2e.[7] The adjusted BAU scenario projects 2020 emissions at 472,475 MT CO_2. Associated reduction targets are shown below:

Figure 4. Emissions from Electricity Forecasts and Targets for the Unincorporated Area



Based on this Adjusted BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[6] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

[7] Forecasts for electricity are calculated for CO_2 only and do not include CH_4 and N_2O. These gases are relatively small contributors to overall emissions and can change over time depending upon power production technology.

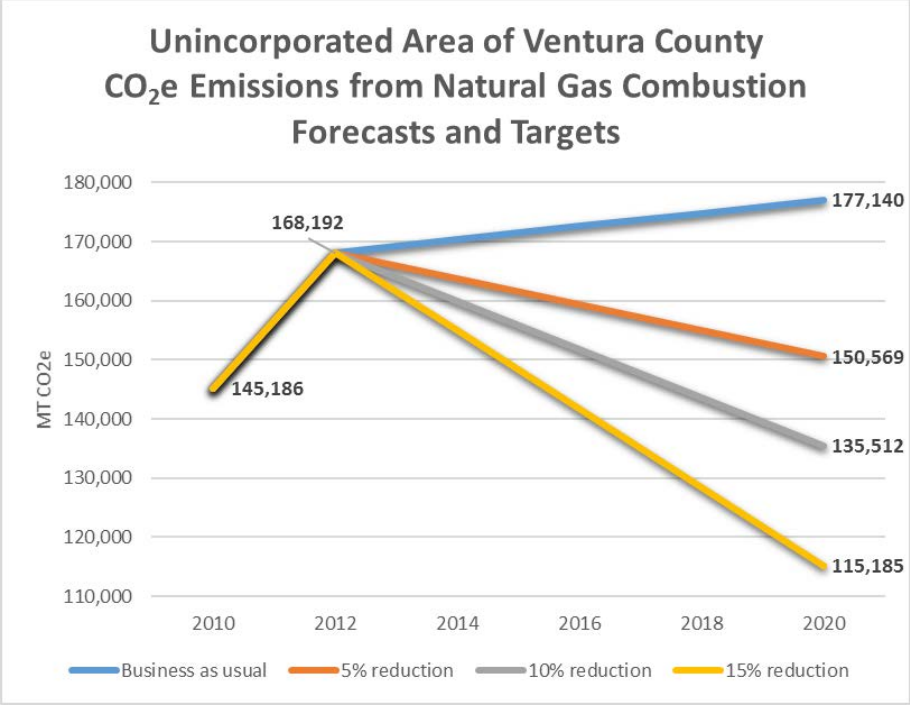
Table 14. Required Emissions Reductions from Electricity to Meet 5%, 10% and 15% Targets for the Unincorporated Area

Reductions required 2010 to 2020	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	26,324	98,836
10% reduction	52,649	122,460
15% reduction	78,973	146,084

Forecasted Emissions from and Targets for Combustion of Natural Gas

The California Energy Commission has also estimated a business as usual scenario where natural gas use in 2020 in the SCG territory will increase by 0.65% per year over 2011 levels.[8] For the unincorporated area, a BAU scenario means that emissions would total 177,190 MT CO_2e in 2020, as compared to the 2010 levels of 145,186 MT CO_2e. Associated reduction targets are shown below:

Figure 5. Emissions from the Combustion of Natural Gas Forecasts and Targets for the Unincorporated Area



Based on this BAU model, 5%, 10% and 15% targets would require the following reductions in emissions:

[8] http://www.energy.ca.gov/2011publications/CEC-200-2011-011/CEC-200-2011-011-SD.pdf

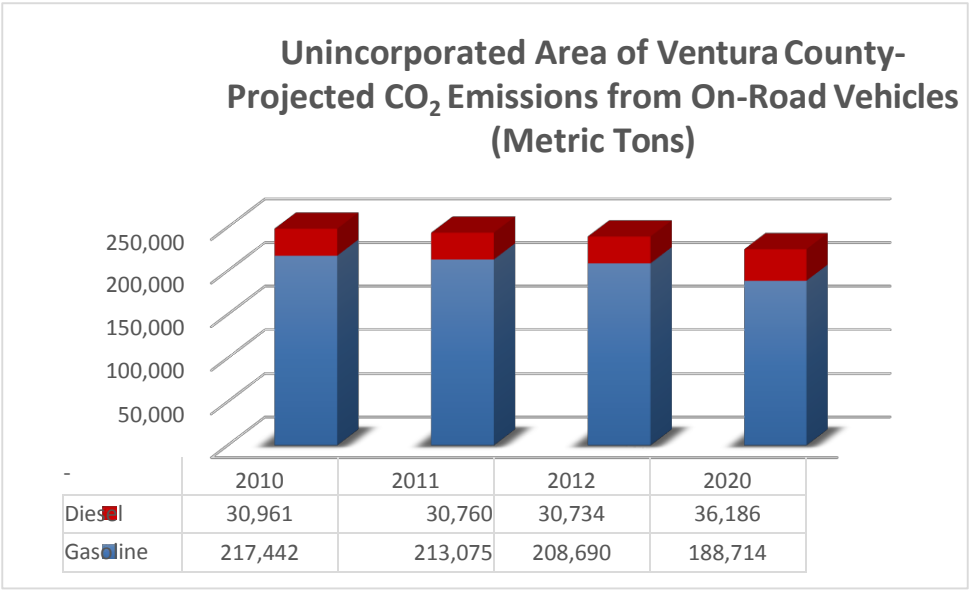
Table 15. Required Emissions Reductions from Natural Gas to Meet 5%, 10% and 15% Targets for the Unincorporated Area

Reductions required 2010 to 2020	Below 2010 Levels ($MT CO_2e$)	Below BAU 2020 Levels ($MT CO_2e$)
5% reduction	7,259	17,623
10% reduction	14,519	32,680
15% reduction	21,778	53,007

Forecasted Emissions from and Targets for On Road Transportation

As noted in Part I of this report, State and federal regulations related to fuel and vehicle efficiency will lead to significant GHG reductions by the year 2020, by which time they will be **9% lower than in 2010**. Any additional activities on the part of the Board of Supervisors of the County of Ventura, including support for alternative modes of transportation, behavioral change, regional cooperation, etc. could increase the reductions resulting from State actions. Note that these emissions and projections do not include emissions from travel on State highways, which would include commuting and inter-city travel. Following is an estimate of forecasted emissions:

Figure 6. Projected Emissions from On-Road Vehicles for the Unincorporated Area



*Note that there are small differences between 2010 through 2012 emissions reported here and those for the GHG inventory reported earlier. Inventory includes CH_4 and N_2O, forecasts are based on CO_2 only.

5 County of Ventura Government Greenhouse Gas Forecasts and Reduction Targets

County of Ventura: Climate Protection Plan

In 2011, the County Board of Supervisors established a GHG reduction target of 15% by 2020, with a 2005 baseline.

County of Ventura: Energy Efficiency Action Plan

In 2013, the County of Ventura's Board of Supervisors adopted an energy efficiency action plan. The plan identified the County's highest energy using facilities/buildings (2011) as the Government Center, Medical Center, Todd Road Jail, Juvenile Justice Complex and Santa Paula Hospital. The plan established a 15% reduction in building energy use over a 2005 baseline by 2020.

6 Progress Since 2010

Reductions in Emissions from Electricity Use

Below is a summary of the reductions required to meet the 5%, 10% and 15% targets proposed for the unincorporated area of the County of Ventura.

Reductions required 2010 to 2020 (electricity)	Below 2010 Levels (MT CO_2e)	Below BAU 2020 Levels (MT CO_2e)
5% reduction	26,324	98,836
10% reduction	52,649	122,460
15% reduction	78,973	146,084

There are two readily available sources of information on reductions in emissions from electricity use for the period 2010 through 2014: avoided emissions as a result of SCE projects and rooftop solar installations as reported by the California Solar Initiative.

As of December 31, 2014, these two types of energy projects have resulted in cumulative annual reductions of 2,770 MT CO_2e as follows:

	SCE Projects		PV Installations		Total	
Year	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2010-2012	254	254	426	426	680	680
2013	84	338	683	1,109	767	1,447
2014	478	815	846	1,955	1,324	2,770

Reductions in Emissions from Combustion of Natural Gas

Emissions from natural gas combustion increased significantly in the unincorporated area, with 145,188, 171,952 and 168,192 MT CO_2e in 2010, 2011 and 2012 respectively. There is nothing in the data on mandatory reporting to the State of California to explain the significant increase between 2010 and 2011. SB 350 specifically recognized the importance of increasing energy efficiency in existing buildings, one of the major sources of emissions from the combustion of natural gas.

Reductions in Emissions from On-Road Vehicles

The State of California predicts a steady decrease in emissions from on-road vehicles (although as noted earlier, diesel emissions are expected to increase slightly between now and 2020 unless additional measures are introduced). With new, aggressive GHG reduction targets proposed by SB 32 and the Governor, the State will be looking to local governments to take a leading role in implementing that vision. Additionally, new planning

guidelines are expected in the near future with specific focus on climate change. These should be taken into consideration in considering ways of meeting reduction targets above those that passively occur through State measures. In order to meet a 10% target below 2010 levels, on-road emissions in the unincorporated area would need to be cut by an additional 1,337 MT CO_2 and to meet the 15% target, an additional 13,757 MT CO_2.

Page Intentionally Left Blank

Appendix B
Methodological Considerations

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance

2015

2010-2012 Greenhouse Gas Inventories
2020 Forecasts
And Reduction Targets2020 Forecasts

Page Intentionally Left Blank

Introduction

This appendix describes the process of calculating greenhouse gas (GHG) emissions and their future forecasts for the Ventura County Regional Energy Alliance (VCREA).

Stationary Combustion (Scope 1)

Emissions from stationary combustion were estimated based on natural gas use only. Other small stationary source fuels, like propane, oil, wood, and biofuels are considered to have very little impact on the overall carbon footprint for the region. Natural gas is generally measured in therms or MMBTus. For this report, the emission factors for pipeline quality natural gas are:

- 53.02 kg CO_2/MMBTu
- 5 g CH_4/MMBTu
- g N_2O/MMBTu

The global warming factor for CH_4 and N_2O are 25 and 298 respectively.

As noted in the body of this report, there are some discrepancies in the reporting of natural gas volumes in Ventura County. There are three major sources of data for natural gas combustion in Ventura County – two of which are “all in” and one of which reports on large emission sources only. The two “all-in” sources are data provided by the Southern California Gas Company (SCG) in response to a VCREA request, and data reported to the California Energy Commission (CEC) in the California Energy Almanac. CEC data is available on a countywide basis only, while SCG provided VCREA with data on a city-by-city basis. Both report gas use in therms, and both categorize fuel use as residential or non-residential. In some cases, depending upon the size of the customer basis, SCG was able to provide additional data on separate commercial and industrial use of natural gas.

Electricity Use (Scope 2)

All electricity use data was provided by Southern California Edison (SCE), by city and unincorporated area. The emission factors were those published by The Climate Registry, and the Emissions and Generation Resource Integrated Database (eGRID), a comprehensive inventory of environmental attributes of electric power systems.

For the California region, the default emission factors for the time period covered by this report were:

- 610.82 lbs. CO_2/MWh
- 28.49 lbs. CH_4/GWh
- 6.03 lbs. N_2O/GWh

Mobile Emissions

On-Road

Emissions from on-road vehicle use, including heavy duty trucks and buses were quantified as follows:

- Average annual vehicle miles traveled (VMT) were determined for Ventura County, including all cities, the unincorporated area, and other jurisdictions like the Department of Defense, State Highways, National Park Service and U.S. Navy. VMT data for 2010, 2011 and 2012 was obtained from the California Department of Transportation (Caltrans) Highway Performance Monitoring System (HPMS) public road data. Each local government in the VCREA partnership was then assigned a percentage of VMTs. For projections, the percentages for 2012 were carried forward to 2020 and 2030.

- Total vehicle GHG emissions for Ventura County for all vehicle types for all model years were calculated for CYs 2010, 2011 and 2012, for gasoline and diesel fuels, using EMFAC 2014. The Emission FACtors (EMFAC) model is used to calculate emission rates from all motor vehicles, such as passenger cars to heavy duty trucks, operating on highways, freeways and local roads in California. It was also used to project emissions into the future.

- This report includes information on emissions that occur on all roads in Ventura County, including those maintained by the cities and the County, the Department of Defense, the National Park Service, State Highways, State Park Service, U.S. Navy or US Forest Service. The largest percentage of vehicle emissions (54%) are associated with travel on State highways like the 101, 118, and 123 freeways. Using EMFAC and CalTrans data is a geographic approach, incorporating emissions from travel that begins and ends inside Ventura County and emissions from vehicles that travel through the County on State highways. This approach does not take into account the realities of travel, where people often live, work and shop in different locations. It also aggregates all city-to-city travel within the County into a single “travel on State highways” category. In the absence of a local travel demand model with detailed information on land use data and roadway networks, aggregated State highway data was reported separately under the regional section of this report and emissions related to travel on City roads only was presented for each jurisdiction.

Off-road

Emissions were calculated using the California Air Resources Board (CARB) OFFROAD 2007 air quality model. OFFROAD 2007 considers emissions from off-road equipment including recreational boats, recreational vehicles, industrial equipment, construction equipment, and lawn and garden equipment, as well as equipment dealing with airport ground support, military, agriculture, rail operation, and more (CARB 2006). County-wide emissions were apportioned by population to each of the local government areas using California Department of Finance data.

Emissions associated with solid waste and landfill gas

A 2008 California Integrated Waste Management Board Study identified the components of waste in California landfills. The authors applied that characterization to an EPA model for estimating GHG emissions from landfills (WARM), and estimated that there are approximately 0.4223 metric tons of carbon dioxide (MT CO_2e) resulting from every short ton of landfilled waste in Ventura County. CALRecycle data provided individual city and unincorporated area diversion and disposal rates for solid waste against which the 0.4223 metric was applied.

	Short Tons Landfilled Waste		
	2010	2011	2012
Camarillo	43,760	43,260	47,898
Fillmore	11,435	10,681	10,861
Moorpark	22,299	21,864	22,131
Ojai	9,316	8,944	8,612
Oxnard	230,235	239,490	228,729
Port Hueneme	15,143	14,429	14,884
Santa Paula	19,736	19,465	19,149
Simi Valley	91,070	88,584	88,397
Thousand Oaks	104,666	103,234	104,424
Ventura	112,910	106,426	111,834
Unincorporated	109,571	113,374	117,727

Wastewater Emissions

To estimate the emissions associated with wastewater treatment, the authors used The State of California's documentation for its GHG

Inventory.[1] The assumption is that the majority of wastewater treatment is centralized and anaerobic. An emission factor of 11.3 kg. of CO_2e per person was applied to Census Bureau population figures for VCREA local government population numbers.

High Global Warming Potential Gases

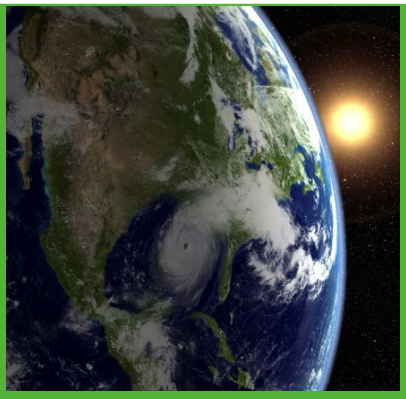
Emissions from high Global Warming Potential (GWP) GHGs are primarily in the form of hydrofluorocarbons (HFCs). They include refrigeration and space conditioning equipment, solvents, foams, etc. They also include sulfur hexafluoride (SF_6), an insulator used in high power transmission lines. The California GHG Emissions Inventory Summary provides annual data on high GWP emissions for the State as a whole. These emissions were then apportioned to the VCREA participants on a population percentage basis.

[1]http://www.arb.ca.gov/cc/inventory/doc/docs4/4d1_wastewatertreatment_domesticwastewater_centralizedanaerobic_californiapopulation_ch4_2011.htm

Appendix C
Data Limitations:
Calendar Years 2010 to 2014

CLIMATE ON THE MOVE

Ventura County Regional Energy Alliance



2015

2010-2012 Greenhouse Gas Inventories

2020 Forecasts

And Reduction Target Options

Page Intentionally Left Blank

Introduction

This appendix describes the limitations on energy consumption data provided to Ventura Regional Energy Alliance (VCREA) by Southern California Edison (SCE) and the Southern California Gas Company (SCG). These limitations affect both the reliability of the greenhouse gas (GHG) emissions in the inventory and the validity of projections into the future.

The data limitations apply to the calendar years covered by this report (2010 through 2012) and two subsequent years. VCREA requested additional data from the utilities with the intent of calculating energy-related emissions for calendar years 2013 and 2014. The anomalies with each utility's data are addressed separately below.

Natural Gas Consumption (Scope 1)

There are three major sources of data for natural gas combustion in Ventura County – two of which are "all in" and one of which reports on large emission sources only. The two "all-in" sources are data provided by the SCG in response to a VCREA request[1], and data reported to the California Energy Commission (CEC) in the California Energy Almanac.[2] CEC data is available on a countywide basis only, while SCG provided VCREA with data on a city-by-city basis. Both report gas use in therms, and both categorize fuel use as residential or non-residential. In some cases, depending upon the size of the customer basis, SCG was able to provide additional data on separate commercial and industrial use of natural gas.

Table 1: Million Therms of Natural Gas Consumed in Ventura County

	SCG			CEC – California Energy Consumption Database		
	Residential	Non-residential	**Total**	Residential	Non-residential	**Total**
2010	122.79	50.38	**173.16**	122.78	78.20	**200.80**
2011	124.38	55.53	**179.91**	124.34	74.97	**199.32**
2012	114.04	56.31	**170.35**	113.99	71.69	**185.16**
2013	117.40	57.89	**175.29**	117.51	57.41	**175.92**
2014	93.43	49.85	**143.28**	93.51	55.09	**148.0**

For calendar years 2010 through 2012, there is a notable difference between the two sources, primarily related to non-residential gas usage. The CEC's Energy Consumption database[3] indicates that about 60% of natural gas usage is residential, while the SCG

[1] Southern California Gas provided data on natural gas combustion in stationary sources for commercial, industrial, single-family residential and multi-family residential categories.
[2] http://www.ecdms.energy.ca.gov/
[3] http://www.ecdms.energy.ca.gov

data is closer to 70%. When asked about the discrepancy, SCG representatives pointed to their compliance with the California Public Utility Commission's (CPUC) directive that utilities maintain customer confidentiality[4]. The confidentiality requirement and the number of large natural gas customers in each city sometimes results in the removal of data for larger customers, thus reducing the overall reported gas use for the commercial and industrial sectors. Therefore, this Climate Action Plan assumes that CEC data for non-residential purposes are more valid. However, the CEC database does not provide data at the city level. Because the data anomalies, although not as large, continued in years 2013 and 2014, VCREA's consultant pursued the differences with the CEC and received a further explanation:

- For natural gas consumption, CEC collects data on 5 non-residential sectors: Agriculture with water pump, Commercial, Industrial, Mining and Transportation, Communication and Utility (TCU).

- When the CEC Energy Specialist, Cam Nguyen, removed all non-residential sectors except Commercial and Industrial, the large differences noted between ECDMS and SCG data were significantly reduced:

- Because it appears that agriculture with pumps, mining and TCU consumption were not included in data provided to VCREA, non-residential emissions may have been under-reported by an average of 27%.

GHG emissions, based on the CEC's database, reported in metric tons of carbon dioxide equivalent are as follows:

Table 2: Emissions from Natural Gas Based on California Energy Commission Database

	Residential	Non-Residential	Total
	MT CO_2e	MT CO_2e	MT CO_2e
2010	606,166	397,003	1,003,169
2011	661,175	412,530	1,073,706
2012	652,880	414,657	1,067,537
2013	624,857	305,277	930,134
2014	497,238	292,940	790,178

[4] Under the California Public Utilities' Commission Rulemaking 08-12-009 and related guidance, utilities are required to protect the confidentiality of client data, either through aggregation or by redacting data related to energy usage for customers with large percentages of an area's some market share. With respect to VCREA cities, this results in a situation where SCG removed non-residential data for customers, in some years, and not in others.

Electricity Use (Scope 2)

Residential use of electricity accounted for 30% of total electricity in each year. The remaining 70% is a combination of commercial and industrial use. As was the case with SCG, SCE is also subject to data confidentiality rules established by the CPUC. The availability of separate data on industrial and commercial consumption of electricity depends upon the size of the community and the nature of its commercial and industrial sources. In some cases, industrial and commercial use is aggregated and reported as a combined category. Separate industrial and commercial data is available for the following local areas in Ventura County:

- Camarillo
- Oxnard
- Simi Valley
- City of Ventura
- Unincorporated Area

Again, there are significant gigawatt hours (GWh) differences between the two reporting sources.

Table 3: Electricity Consumption From SCE and CEC Database

	SCE			CEC – California Energy Consumption Database		
	Residential	Non-residential	**Total**	Residential	Non-residential	**Total**
2010	1,829.49	4,241.57	**6,071.06**	1,789.78	3,672.34	**5,462.13**
2011	1,838.92	4,290.68	**6,129.60**	1,801.56	3,677.59	**5,479.14**
2012	1,861.05	4,325.24	**6,186.29**	1,919.53	3,610.65	**5,530.19**
2013	1,770.31	,439.03	**4,209.33**	1,901.94	3,503.03	**5,404.97**
2014	1,759.76	2,533.35	**4.293.11**	1,907.47	3,585.50	**5,492.97**

VCREA's consultant reviewed these differences with CEC staff and received the following explanation:

- For electricity consumption, SCE data provided to VCREA appears to include bundled retail sales only. The data that SCE provides to the CEC includes these sales as well as self-generated electricity (rooftop solar, onsite commercial or industrial generation, as examples) and direct access electricity, purchased through third parties. Steven Mac, Energy Commission Specialist indicated that direct access usage alone accounted for approximately 20% of all non-residential consumption in Ventura County in 2013 and 2014.

- For each of those years, approximately 1,045 GWhs of energy use (equivalent to 25% of bundled energy sales) were not included in the SCE report to VCREA and therefore not in the County inventory.

GHG emissions, based on the CEC's database, reported in metric tons of carbon dioxide equivalent (MT CO_2e) are as follows:

Table 4: Emissions from Electricity Consumption Based on California Energy Commission Database

	Residential	Non-Residential	Total
	MT CO_2e	MT CO_2e	MT CO_2e
2010	497,920	1,021,651	1,519,571
2011	501,197	1,023,112	1,524,309
2012	534,017	1,004,489	1,538,506
2013	529,123	974,549	1,503,672
2014	530,662	997,492	1,528,154

Conclusions and Implications

- Total County emissions have been underreported, particularly in the non-residential sector.

- CEC data are available at the County level only and do not allow for additional analysis at the City and unincorporated area level.

- Projections of emissions from energy consumption have been based on data made available to VCREA. The validity of those projections is dependent upon the validity of the utility data. Because of the anomalies noted in this appendix, any projections should be seen as estimates only, and subject to the same levels of uncertainty as the data itself.

- Because of the consistent and in some cases increasing inconsistency between CEC data and that provided to VCREA by the utilities, 2013 and 2014 inventories would be misleading. While there are validity issues in years 2010 through 2012, this is exacerbated in 2013 and 2014 by the differences between SCE and CEC totals.