

JULY 2016

Climate Action 2020 and Beyond

Sonoma County
Regional Climate Action Plan

Climate Action 2020 and Beyond

July, 2016

The work upon which this publication is based was funded in whole or in part through a grant awarded by the Strategic Growth Council.

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More information: rcpa.ca.gov/climate-action-2020

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Climate Action 2020 and Beyond

Climate Action 2020 and Beyond (CA2020) is a collaborative effort among all nine cities and the County of Sonoma to reduce greenhouse gas (GHG) emissions and respond to the impacts of climate change. This effort would not be possible without countless contributions from members of our Sonoma County community – thank you all!

This Plan was prepared by:

The Sonoma County Regional Climate Protection Authority (RCPA)

On behalf of:

County of Sonoma

City of Cloverdale

City of Cotati

City of Healdsburg

City of Petaluma

City of Rohnert Park

City of Santa Rosa

City of Sebastopol

City of Sonoma

Town of Windsor

Acknowledgements

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The RCPA Board has representatives from all ten local jurisdictions in Sonoma County. The following elected officials oversaw the development of this plan from 2012-2016:

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Lead Consultants

Pete Parkinson, AICP served as lead editor of the CAP and provided local planning expertise that was essential to the preparation of the CAP document and appendices.

ICF International prepared all of the technical analysis for Climate Action 2020 and Beyond including preparation of all GHG inventories, backcasts, and forecasts and all GHG reduction analyses.

Staff Working Group

The Plan was developed by a group of local government staff from the RCPA, SCTA, and each of the ten local jurisdictions. This Staff Working Group was responsible for project management, data collection, policy research, community outreach, reviewing and editing draft plan language, and seeking and responding to direction from the RCPA Board, City/Town Councils, and the Board of Supervisors.

The RCPA would like to thank the following community members and organizations for their contributions in developing this Climate Action Plan:

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Sonoma Clean Power
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Sonoma County Water Agency
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Preface

How to Use This Plan

Given the wide audience and diverse interests in the community, Climate Action 2020 and Beyond (CA2020) is designed to be accessible and useful to a wide range of users. Readers will quickly notice that actions in CA2020 to reduce greenhouse gas (GHG) emissions and adapt to a changing climate are complex and touch on many aspects of everyday life in Sonoma County. Although most actions will be the responsibility of local governments and countywide agencies, Sonoma County's residents, businesses, and community groups must remain engaged in order to achieve the goal of reducing community-wide GHG emissions. This engagement may be action-oriented and contribute directly to accomplishing the actions envisioned in CA2020, or may be focused on ensuring that local representatives are accountable for specific commitments under CA2020.

A Readers' Guide

CA2020 is designed to allow users to dig in to a depth that best suits their interests and needs. References and technical appendices are provided for those who need the most detailed information. CA2020's overall structure provides users an opportunity to directly access the information that they need.

- Chapter 1 provides the overall context for CA2020, including the basics of climate change science and the essential Call to Action that is needed for community-wide action. Chapter 1 also describes the unique regional (countywide) approach that Sonoma County will use to reduce GHG emissions as well as an overview of plan implementation. Chapter 1 is the best place to start for most readers and provides important context for the rest of CA2020.
- Chapter 2 provides an inventory of GHG emissions in Sonoma County by sector (e.g., energy, land use and transportation) and by each city and the County. The inventory is not only the key benchmark for future GHG reductions, but it helps focus attention on the greatest opportunities for emission reductions.
- Chapter 3 lays out the overall strategy for reducing GHG emissions in each sector to meet CA2020's target of reducing emissions to 25% of 1990 levels by 2020 and provides the foundation for long-term success in reducing GHG emissions. These reduction measures are the basis for the specific actions identified in Chapter 5.
- Chapter 4 describes how CA2020 will be implemented, including coordination by the Regional Climate Protection Authority and a management and monitoring structure at each partner agency. Chapter 4 also includes a schedule for implementing the GHG reduction measures and describes ongoing monitoring, adaptive management, and community involvement.

- Chapter 5 contains the near-term action plans for each city and the unincorporated County. These are the specific GHG reduction measures that will be adopted and implemented by each community. This chapter also contains a GHG profile for each community and population, housing, and employment projections throughout the CA2020 planning period (i.e., to 2050).
- Chapter 6 describes Sonoma County’s “climate readiness,” highlighting each community’s vulnerability to the hazards of climate change (e.g., warmer temperatures, increased flooding risk, increased wildfire risk). Chapter 6 also describes goals to improve the resilience of Sonoma County communities to climate-related hazards.

A Community-Wide Plan

As a community-wide plan, CA2020 will have many different audiences, each with their own interests and needs. This section is intended to focus specific audiences on the aspects of CA2020 that will be of greatest interest and usefulness.

Local Governments

Cities and the County will want to be familiar with the overall CA2020 implementation structure described in Chapter 4. In addition, city and County decision makers and staff will also be interested in the sections in Chapter 5 that pertain to their respective jurisdictions. These sections provide detail on specific GHG reduction measures that each jurisdiction has identified for local implementation.

Regional Agencies

Regional (countywide) agencies (the Regional Climate Protection Authority, Sonoma County Transit, Sonoma Clean Power, etc.) have a critical role in reaching the 2020 GHG reduction target by providing countywide services and programs that would be difficult for local governments to provide on their own. Each agency will want to understand its responsibilities under CA2020, which are summarized in Chapter 3 and Appendix C. Agencies will also want to be familiar with the implementation framework in Chapter 4.

Community Groups

The interests of Sonoma County community organizations are extremely varied. Many groups will get the information they need from Chapter 1 and the list of GHG reduction measures in Chapter 3 and Appendix C. Groups with a specific focus will want to review the GHG reduction strategy for their sector of interest. For example, a community organization with a focus on renewable energy will want to carefully review the GHG reduction strategy for the Building Energy sector in Chapter 3 and the energy-related measures in Appendix C.

Residents and Businesses

The interests of individual Sonoma County residents and businesses are almost infinitely varied. As with community groups, many people will find more than enough information about CA2020 in Chapter 1 and can use that as a jumping-off place for more in-depth review of CA2020. Chapter 1 also describes the outreach and engagement associated with CA2020. Individuals interested in climate change actions of a specific city or the County will want to read that jurisdiction's section in Chapter 5. Those with a more countywide interest may want to focus on the bigger-picture GHG reduction strategies in Chapter 3. Lastly, all residents and businesses are encouraged to read the "How Can Sonoma County Residents Help?" section in Chapter 1 and the climate change adaptation goals in Chapter 6.

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List of Acronyms and Abbreviations

°F	degrees Fahrenheit
AB	Assembly Bill
ARB	California Air Resources Board
B2B Project	City of Petaluma’s Biomass-to-Biofuel Project
BAAQMD	Bay Area Air Quality Management District
BAU	business-as-usual
BCM	Basin Characterization Model
C&D	construction and demolition
CA2020	Climate Action 2020
CAP	Climate Action Plan
CCA	Community Choice Aggregation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH ₄	methane
CNG	compressed natural gas
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CWD	climatic water deficit
E3	Energy + Environmental Economics
ESD	Energy and Sustainability Division
EV	electric vehicle
FOG	fats, oils and grease
GBO	Green Building Ordinance
GGE	gallons gas equivalent
GHG	greenhouse gas
GWP	Global Warming Potential
HSW	high strength waste

IPCC	International Panel on Climate Change
kWh	kilowatt hours
LCFS	Low-Carbon Fuel Standard
LED	light-emitting diode
MMTCO ₂ e	million metric tons of carbon dioxide equivalent
MT	metric ton
MTC	Metropolitan Transportation Commission
MTCO ₂ e	metric tons of carbon dioxide equivalent
MUP	Multi-Use Path
N ₂ O	nitrous oxide
NBCAI	North Bay Climate Adaptation Initiative
NQ	not quantified
NSCAPCD	Northern Sonoma County Air Pollution Control District
PACE	Property Assessed Clean Energy
PAYS	Pay As You Save
PG&E	Pacific Gas & Electric Company
PPA	power purchase agreement
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PV	photovoltaic
PWRPA	Power and Water Resources Pooling Authority
RCPA	Regional Climate Protection Authority
RMDZ	Recycling Market Development Zone Program
RPS	Renewable Portfolio Standard
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCEIP	Sonoma County Energy Independence Program
SCEW	Sonoma County Energy Watch
SCP	Sonoma Clean Power

SCT	Sonoma County Transit
SCTA	Sonoma County Transportation Authority
SCWA	Sonoma County Water Agency
SCWMA	Sonoma County Waste Management Agency
SMART	Sonoma-Marín Area Rail Transit
SR	State Route
SSURGO	Soil Survey Geographic
SWG	Staff Working Group
TDM	Transportation Demand Management
TOD	transit-oriented development
TRO	trip reduction ordinance
UC	University of California
UGB	Urban Growth Boundary
VMT	vehicle miles traveled
WWTP	wastewater treatment plant

Glossary of Terms

Assembly Bill (AB) 32. Assembly Bill 32 is commonly known as the California Global Warming Solutions Act of 2006. The bill requires the California Air Resources Board to develop and enforce regulations for the reporting and verification of statewide greenhouse gas emissions and develop and implement measures to reduce greenhouse gas (GHG) measures. The heart of the bill is the requirement that statewide greenhouse gas emissions must be reduced to 1990 levels by the year 2020, or about 15% from today's levels.

Assembly Bill 32 Scoping Plan (AB 32 Scoping Plan). The AB 32 Scoping Plan outlines a range of greenhouse gas reduction actions for achieving the statewide emissions limit set forth by Assembly Bill 32. These strategies include direct regulations, compliance mechanisms, monetary and non-monetary incentives, voluntary actions, and market-based mechanisms such as a cap-and-trade system. The Scoping Plan presently includes measures to meet the 2020 target in AB 32. The most recent update (in 2013) described potential measures to reduce GHG emissions out to 2020. Executive Order S-15-30 requires ARB to update the Scoping Plan to meet the 40% below 1990 level by 2030.

Association of Bay Area Governments (ABAG). ABAG was created by local governments to meet their planning and research needs related to land use, environmental and water resource protection, disaster resilience, energy efficiency, and hazardous waste mitigation and to provide risk management, financial services, and staff training to local counties, cities, and towns.

Bay Area Air Quality Management District (BAAQMD). The Bay Area Air Quality Management District is the local agency responsible for managing and regulating air quality in the San Francisco Bay Area. It is made up of nine counties in California: San Mateo, San Francisco, Santa Clara, Alameda, Contra Costa, Marin, Napa, and portions of Solano and Sonoma. The District establishes emissions limits and provides guidance for evaluating air quality and climate change impacts of new development projects.

Bay Area Regional Energy Network (BAYREN). BayREN is a collaboration of the 9 counties that make up the San Francisco Bay Area. Led by ABAG, BayREN implements effective energy-saving programs on a regional level and draws on the expertise, experience, and proven track record of Bay Area local governments to develop and administer successful climate, resource, and sustainability programs. BayREN is funded by California utility ratepayers under the auspices of the California Public Utilities Commission. One of only two Regional Energy Networks in the state, BayREN represents 20% of the state's population.

Business-As-Usual (BAU). Business-as-usual represents a future scenario that does not consider the possible reduction of greenhouse emissions that may result from any legislation or regulation that would go into effect after the baseline year. The business-as-usual projections are estimates of future emissions based on current energy and carbon intensity in the existing economy without

considerations of any federal, state, or local reduction measures designed to reduce greenhouse gas emissions.

California Department of Transportation (Caltrans). Caltrans manages more than 50,000 miles of California’s highway and freeway lanes, provides inter-city rail services, permits more than 400 public-use airports and special-use hospital heliports, and works with local agencies. Caltrans carries out its mission of providing a safe, sustainable, integrated, and efficient transportation system to enhance California’s economy and livability, with six primary programs: Aeronautics, Highway Transportation, Mass Transportation, Transportation Planning, Administration, and the Equipment Service Center.

California Environmental Quality Act (CEQA). The California Environmental Quality Act is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

CEQA Document. Document required by the California Environmental Quality for all projects involving state or local agencies. The document discloses potential impacts that a proposed project may have on the natural and human environment. Some projects are categorically or statutorily exempt. There are two classes of environmental documents: negative declarations, and environment impact reports.

California Air Resources Board (ARB). The California Air Resources Board is a part of the California Environmental Protection Agency. Its mission is to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants, while recognizing and considering the effects on the economy of the state.

California Energy Commission (CEC). The California Energy Commission is the state’s primary energy policy and planning agency. Established by the Legislature in 1974 and located in Sacramento, seven core responsibilities guide the Energy Commission as it sets California energy policy:

1. Forecasting future energy needs;
2. Promoting energy efficiency and conservation by setting the state’s appliance and building energy efficiency standards;
3. Supporting energy research that advances energy science and technology through research, development and demonstration projects;
4. Developing renewable energy resources;
5. Advancing alternative and renewable transportation fuels and technologies;
6. Certifying thermal power plants 50 megawatts and larger; and
7. Planning for and directing state response to energy emergencies.

California Public Utilities Commission (CPUC). CPUC regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies. CPUC serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates, with a commitment to environmental enhancement and a healthy California economy. CPUC regulates utility services, stimulates innovation, and promotes competitive markets, where possible.

Carbon Dioxide Equivalents (CO₂e). A measure for quantifying the potential impact a greenhouse gas may have on global warming using the functionally equivalent amount or concentration of carbon dioxide as a reference.

Carbon Sequestration. Carbon sequestration is the process of increasing the carbon content of a reservoir other than the atmosphere.

Center for Climate Protection (CPC). Formerly known as the Climate Protection Campaign, the Center for Climate Protection's mission is to inspire, align, and mobilize action in response to the climate crisis. The Center for Climate Protection works with business, government, youth and the broader community to advance practical, science-based solutions for significant greenhouse gas emission reductions.

Community Choice Aggregation (CCA). CCA is a policy that enables local governments to aggregate electricity demand within their jurisdictions in order to procure alternative energy supplies while maintaining the existing electricity provider for transmission and distribution services.

Community Climate Action Plan (CAP). A community Climate Action Plan quantifies greenhouse emissions within a jurisdiction and outlines strategies for mitigating and avoiding future emissions under the influence of the local jurisdiction. In order for a CAP to qualify for tiering under State CEQA Guidelines Section 15185, it must be adopted through a public process and include a monitoring and reporting protocol.

Community Inventory. The community inventory includes greenhouse gas emissions occurring in association with the land uses within a jurisdictional boundary, and generally consists of sources of emissions that a community can influence or control. The inventory includes emissions that occur inside and outside the jurisdictional boundary, but only to the extent that such emissions are due to land uses within the jurisdiction.

County of Sonoma Energy and Sustainability Division (ESD). ESD is responsible for the planning, evaluating and administering the countywide Energy Management and Sustainability Program. Services include long- and short-range energy and green procurement strategies, effective and efficient energy use and sustainability practices, and County employee commute reduction planning.

County of Sonoma Permit & Resource Management Department (PRMD). PRMD's mission is to serve the people of Sonoma County by providing a customer-focused process for the orderly development of real property, balanced with resource stewardship under the general policy

direction of the Board of Supervisors, and to develop and maintain standards that protect the health and safety of the public.

County of Sonoma Agricultural Preservation & Open Space District. County department that uses a sales tax for the purchase of conservation easements to protect agricultural lands and preserve open space.

Cost Effectiveness Analysis. The cost effectiveness analysis examines the costs and savings of implementing individual greenhouse gas reduction measures. The analysis can assist jurisdictions in evaluating the financial requirements of a climate action plan. The analysis can also outline co-benefits and uncover additional consequences of implementing a particular reduction measure.

Global Warming. Global warming is a phenomenon created by rising atmospheric concentrations of GHGs in excess of natural levels. The additional GHG concentrations exacerbate the natural greenhouse gas effect (see below), resulting in increasing global surface temperatures.

Global Warming Potential (GWP). The Global Warming Potential, or GWP, is used to compare GHGs based on their potential to trap heat and remain in the atmosphere. Some gases can absorb more heat than others and thus have a greater impact on global warming. For example, CO₂ is considered to have a GWP of 1, whereas N₂O has a GWP of 265. This means that N₂O is 265 times more powerful than CO₂.

Emissions Type. Greenhouse gas emissions can be defined as either direct (emissions that occur at the end use location, such as natural gas combustion for building heating) or indirect (emissions that result from consumption at the end use location but occur at another location, such as emissions that occur at the power plant itself but result from residential electricity use of in - home appliances or other uses). The climate action plan addresses both types of emissions.

Greenhouse Gas (GHG). Greenhouse gases trap longwave infrared radiation emitted from the earth's surface, which would otherwise escape to space. This fundamental process causes the greenhouse gas effect. The primary greenhouse gases include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), halogenated chlorofluorocarbons (HCFCs), ozone (O₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).

Greenhouse Gas Effect. The greenhouse gas effect keeps the atmosphere near the Earth's surface warm enough for the successful habitation of humans and other life forms. It is created by sunlight that passes through the atmosphere, some of which is absorbed by the Earth and converted to heat, which warms the surface.

Greenhouse Gas Emissions Inventory. A greenhouse gas inventory is a quantification of greenhouse gas emissions and sinks within a selected physical and/or economic boundary over a specified time. Greenhouse gas inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a particular building or person).

Greenhouse Gas Emissions Reduction Goal. The greenhouse gas emissions reduction goal identifies a target for reducing greenhouse gas emissions by a particular date. For example, the California statewide emissions reduction goal is 1990 emissions levels by 2020.

High Global Warming Potential (GWP) GHGs. High global warming potential GHGs are primarily composed of three types of gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). These compounds are the most potent greenhouse gases and typically have extremely long atmospheric lifetimes, resulting in irreversible accumulation in the atmosphere once emitted.

Intergovernmental Panel on Climate Change (IPCC). The Intergovernmental Panel on Climate Change is the leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). Its primary function is to review and assess the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. The Intergovernmental Panel on Climate Change does not conduct any research nor does it monitor climate related data or parameters.

Metropolitan Transportation Commission (MTC). Created by the state Legislature in 1970, MTC is the transportation planning, coordinating, and financing agency for the nine-county San Francisco Bay Area. Over the years, the agency's scope has grown, and it is now three agencies in one, functioning as MTC as well as the Bay Area Toll Authority (BATA) and the Service Authority for Freeways and Expressways (SAFE).

National Resources Conservation Service (NRCS). NRCS helps America's farmers, ranchers, and forest landowners conserve the nation's soil, water, air, and other natural resources. All programs are voluntary and offer science-based solutions that benefit both the landowner and the environment.

North Bay Climate Adaptation Initiative (NBCAI). NBCAI is a coalition of natural resource managers, policy makers, and scientists committed to working together to create positive solutions to the problem of climate adaptation for the ecosystems and watersheds of Sonoma County. NBCAI implements effective climate adaptation strategies that sustain ecological and human communities of North San Francisco Bay watersheds. NBCAI's vision is that the San Francisco North Bay has resilient, biologically diverse natural systems that provide lasting ecosystem functions and services.

Northern Sonoma County Air Pollution Control District (NSCAPCD). The Northern Sonoma Air Pollution Control District is the local agency responsible for managing and regulating air quality in the northern and western parts of Sonoma County. The NSCAPCD establishes emissions limits and provides guidance for evaluating air quality and climate change impacts of new development projects.

Property Assessed Clean Energy (PACE). The PACE finance program is intended to finance energy and water improvements within a home or business through a land-secured financing, and funds are repaid through property assessments. Municipalities are authorized to designate areas

where property owners can enter into contractual assessments to receive long-term, low-interest financing for energy and water efficiency improvements and renewable energy installation on their property.

Pacific Gas & Electric Company (PG&E). PG&E is a utility providing electricity and natural gas service to Sonoma County. The company delivers natural gas and electric service to approximately 16 million people throughout a 70,000-square-mile service area in northern and central California.

Regional. This plan uses the term regional to refer to the county-wide approach that Sonoma County will use to reduce greenhouse gas emissions, except where noted. Regional entities are cross-jurisdictional agencies that can provide some services and resources on behalf of communities in the county, more efficiently than individual communities can on their own. Regional entities and programs may be operating through the county, but may not cover each jurisdiction. This plan highlights the approach that, by working together through regional initiatives, goals, and targets, Sonoma County's communities can achieve greater GHG reductions, and do it more efficiently than if each city and County acted on their own.

Regional Climate Protection Authority (RCPA). The Regional Climate Protection Authority was created in 2009 to improve coordination on climate change issues and establish a clearinghouse for efforts to reduce greenhouse gas emissions. The agency is made up of the same Board of Directors as the Sonoma County Transportation Agency and includes representatives from each of the nine cities in Sonoma County and the Board of Supervisors.

Regional Targets Advisory Committee (RTAC) “accounting rules”. The Regional Targets Advisory Committee was established to provide recommendations on factors to be considered and methodologies to be used in the target setting process, as required under Senate Bill 375. One of the “accounting rules” refer to a method for accounting the three following types of vehicle trips: 1) trips that originated and terminated within a jurisdiction; 2) trips that either originated or terminated (but not both) within a jurisdiction; and 3) trips that neither originated nor terminated within a jurisdiction. The “accounting rules” specify that trips of type 1, 2, and 3 should be weighted by 1, 0.5, and 0 respectively when developing estimates of jurisdiction-generated vehicle miles traveled.

Sonoma Resource Conservation District (Sonoma RCD). The Sonoma RCD is a grassroots conservation delivery system that identifies local conservation problems and guides solutions on a voluntary basis. The Sonoma RCD covers 919,000 acres, or over 85% of Sonoma County, and includes the Russian River, Petaluma River, Sonoma Creek, Stemple Creek, and Gualala River Watersheds.

Sonoma Clean Power (SCP). SCP is official electricity provider in Sonoma County, providing cleaner power at a competitive price from sources like solar, wind, geothermal and hydropower. SCP is a community choice aggregation non-for-profit agency, independently run by Sonoma County and the participating cities of Cloverdale, Cotati, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, unincorporated Sonoma County and the Town of Windsor. SCP will be the

lead for seeking to increase the renewable portfolio for electricity generated to serve the county. As SCP gathers momentum and capacity, the members will fund local energy efficiency programs as well as local renewables for CleanStart and EverGreen revenue.

Sonoma County Energy Independence Program (SCEIP). SCEIP is a County of Sonoma Energy and Sustainability Division program that serves county residents and businesses as a central clearinghouse of information about energy efficiency, water conservation, and renewable energy generation. The program is designed to assist property owners and tenants find the information, resources, rebates, contractors, and financing that fits their situation.

Sonoma County Energy Watch (SCEW). SCEW is a local government partnership between the County of Sonoma and PG&E designed to help save money and energy while reducing harmful impacts on the climate. SCEW provides energy efficiency services to local governments, nonprofit organizations, small businesses, and special districts in the County of Sonoma who are served by either PG&E or Sonoma Clean Power.

Sonoma County Transportation Authority (SCTA). The Sonoma County Transportation Authority serves as the coordinating and advocacy agency for transportation funding for Sonoma County. The SCTA prioritizes, coordinates, and maximizes funding available for transportation projects and provides comprehensive, county-wide planning.

Sonoma County Winegrowers (SCW). The Sonoma County Winegrape Commission, also known as Sonoma County Winegrowers (SCW), was established in 2006 as a marketing and educational organization dedicated to the promotion and preservation of Sonoma County as one of the world's premier grape growing regions. SCW has oversight by California Department of Food and Agriculture, which supports producer regions. With more than 1,800 growers, SCW's goal is to increase awareness and recognition of the quality and diversity of Sonoma County's grapes and wines through dynamic marketing and educational programs targeted to wine consumers around the world.

Sonoma County Water Agency (SCWA). The mission of the Sonoma County Water Agency is to effectively manage water resources for the benefit of people and the environment through resource and environmental stewardship, technical innovation, and responsible fiscal management. SCWA provides an array of services including, but not limited to, naturally filtered drinking water, flood protection services, distribution of recycled water, recreational opportunities, and wastewater treatment.

Sonoma County Waste Management Authority (SCWMA). The Sonoma County Waste Management Agency is a joint powers authority whose mission is to implement waste diversion programs as required by state law AB 939. SCWMA informs local residents and businesses of ways they can help reduce, reuse, and recycle their solid waste and properly dispose of hazardous materials.

Sustainable Communities Strategy (SCS). Under the Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008), ARB sets regional targets for GHG emissions reductions from passenger vehicle use. In 2010, ARB

established these targets for 2020 and 2035 for each region covered by one of the state's metropolitan planning organizations (MPO).

Each of California's MPOs must prepare a sustainable communities strategy as an integral part of its regional transportation plan (RTP). The SCS contains land use, housing, and transportation strategies that, if implemented, would allow the region to meet its GHG emission reduction targets. Once adopted by the MPO, the RTP/SCS guides the transportation policies and investments for the region.

Sonoma-Marín Area Rail Transit (SMART). Sonoma-Marín Area Rail Transit (SMART) is a passenger train and bicycle & pedestrian pathway project located in San Francisco's North Bay. SMART will provide rail service along 70 miles of the historic Northwestern Pacific Railroad alignment, connecting urban and rural residents of the two counties with jobs, education, and health care services in the region. The project revives the long-dormant but publicly owned railroad right-of-way, serving stations from Cloverdale in Sonoma County to the San Francisco-bound ferry terminal in Larkspur, Marin County.

Vehicle Miles Traveled (VMT). Total miles travelled on roads and highways by motor vehicles in a particular jurisdiction.

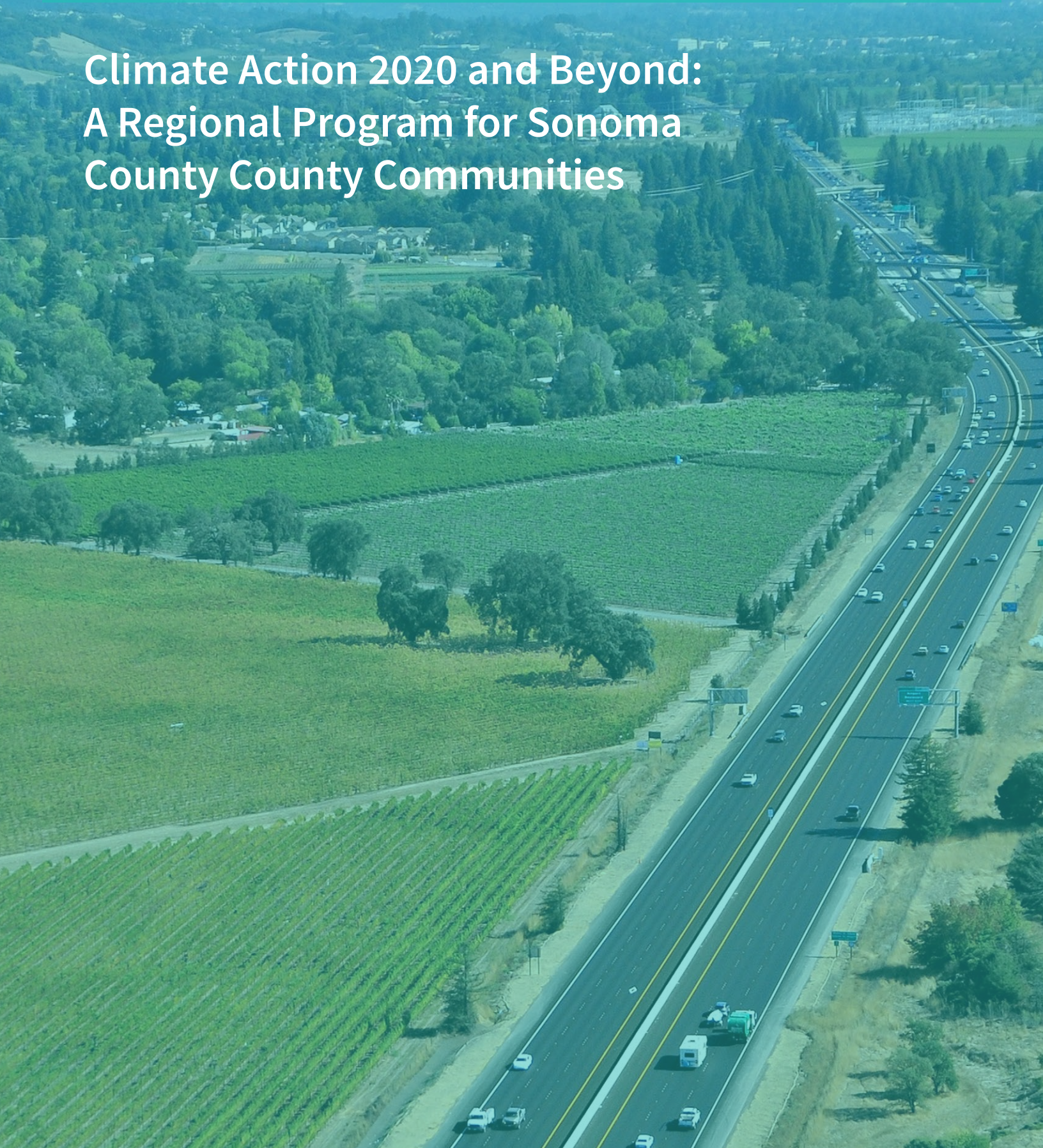
Waste-To-Energy (WTE). WTE is the process of generating energy in the form of electricity and/or heat from the primary treatment of waste. WTE is a form of energy recovery. Most WTE processes produce electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol, or synthetic fuels.

U.S. Environmental Protection Agency (USEPA). The mission of the USEPA is to protect human health and the environment by developing and enforcing regulations. The USEPA also gives grants to state environmental programs, non-profits, educational institutions, and others; studies environmental issues; and provides education on the environment.

Zero Net Energy. A zero net energy (ZNE) building is a building with zero net energy consumption, meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on the site. These buildings consequently do not increase the amount of greenhouse gases in the atmosphere.

Executive Summary

Climate Action 2020 and Beyond:
A Regional Program for Sonoma
County County Communities



Executive Summary

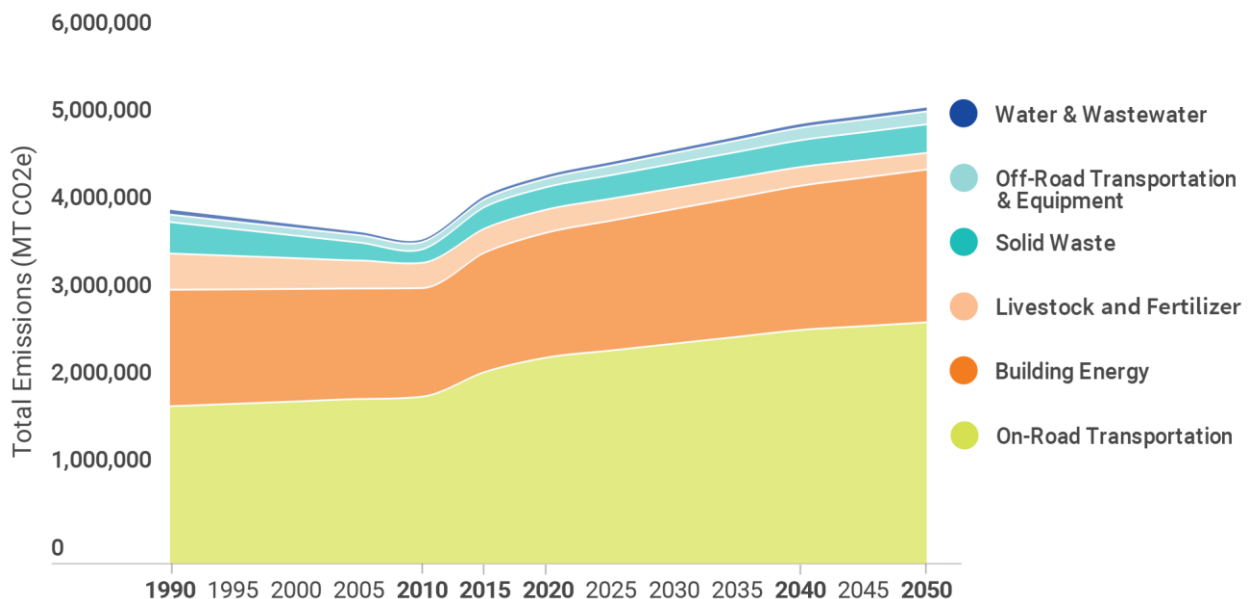
ES.1 Introduction

Human-induced climate change is a global challenge that demands action at every level, including local government. Sonoma County communities are established leaders in locally-based efforts to combat global climate change, and this Regional Climate Action Plan (CAP) takes another step forward as local governments and regional agencies commit to concrete actions that will further reduce countywide Greenhouse Gas (GHG) emissions and create a better future for Sonoma County.

ES.2 A Call to Action: Climate Change is a Serious Threat, But We Know What to Do

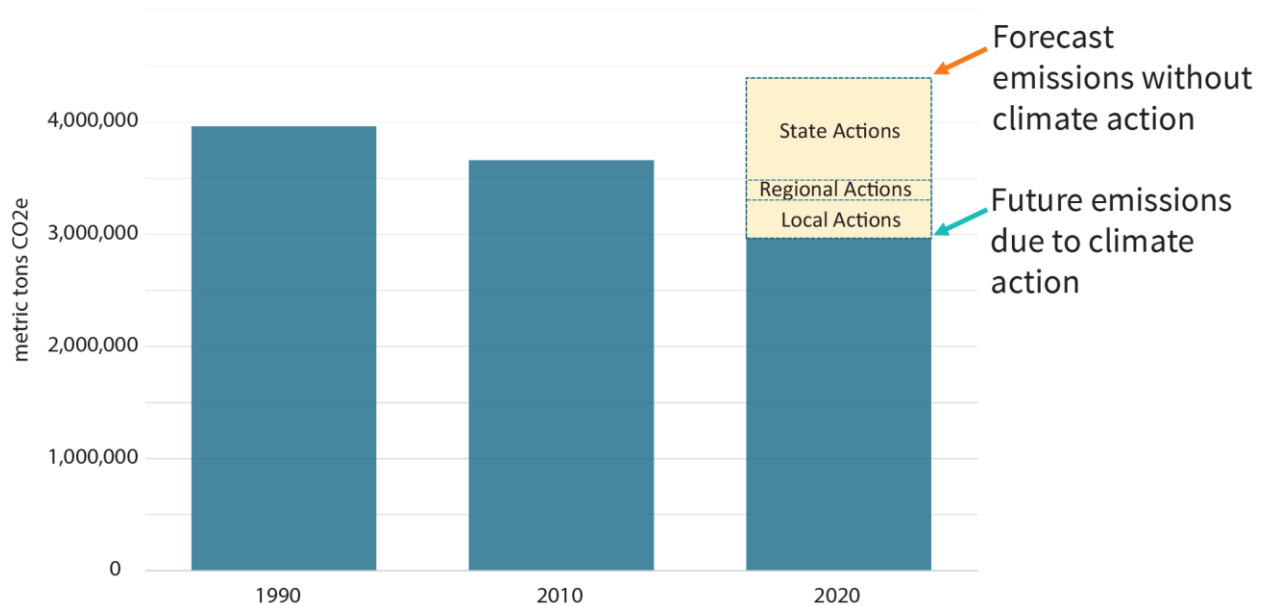
Given the magnitude of human-induced climate change and the projected catastrophic effects from continued global warming, reducing GHG emissions has become an environmental and societal imperative. This CAP is needed because, despite local and state leadership, GHG emissions in Sonoma County will continue to grow without additional action. The chart below shows how emissions from various GHG sources are forecast to increase if a “business-as-usual” approach is taken.

Figure ES-1. Countywide GHG Inventory and Forecast Results by Source and Year¹



¹ The 1990 emissions in this chart include Santa Rosa’s total 1990 emissions apportioned to each source using the 2010 inventory source distribution for the city (actual 1990 emissions by source are not available).







Climate Action 2020 begins a new phase of local climate action by focusing on near-term actions that will be implemented through 2020 to achieve a 25% reduction in countywide GHG emissions (compared to 1990 levels). The figure below shows 1990 emissions (known as a “backcast”), emissions from the 2010 inventory, and projected GHG increases if no action is taken (BAU), as well as the GHG reduction target under this CAP.



This CAP builds on earlier efforts to chart a future that will dramatically reduce countywide GHG emissions. These earlier efforts include the State of California’s adoption of AB 32 (2006), which requires statewide GHG emissions to be reduced to 1990 levels by 2020, and more recent executive orders that target even deeper GHG reductions in the future. Here in Sonoma County, community leaders and forward-thinking elected officials throughout Sonoma County worked together to adopt an ambitious GHG reduction target in 2005 and to create the nation’s first Regional Climate Protection Authority (RCPA), to coordinate countywide efforts to reduce GHG emissions. In 2008, a local non-profit, the Center Climate Protection (then called the Climate Protection Campaign) developed the *Sonoma County Community Climate Action Plan* to help inspire and guide local efforts.

In addition, the City of Santa Rosa adopted a Community Climate Action Plan in 2012 and a Municipal Climate Action Plan in 2013. These plans are referenced in this CAP, and their implementation will contribute substantially to regional GHG reductions. Although this CAP does not contain a chapter focused on Santa Rosa, data in the CAP include Santa Rosa to provide a county-wide picture and measure of future needed action.

Sonoma County’s regional GHG reduction target will be met by combining the new actions described in this CAP with ongoing efforts already underway to accomplish the following 20 goals, grouped together by GHG source:

Source	Key	Goals
Building Energy		<ol style="list-style-type: none"> 1. Increase building energy efficiency 2. Increase renewable energy use 3. Switch equipment from fossil fuel to electricity
Transportation & Land Use		<ol style="list-style-type: none"> 4. Reduce travel demand through focused growth 5. Encourage a shift toward low-carbon transportation options 6. Increase vehicle and equipment fuel efficiency 7. Encourage a shift toward low-carbon fuels in vehicles and equipment 8. Reduce idling
Solid Waste		<ol style="list-style-type: none"> 9. Increase solid waste diversion 10. Increase capture and use of methane from landfills
Water & Wastewater		<ol style="list-style-type: none"> 11. Reduce water consumption 12. Increase recycled water and greywater use 13. Increase water and wastewater infrastructure efficiency 14. Increase use of renewable energy in water and wastewater systems
Livestock & Fertilizer		<ol style="list-style-type: none"> 15. Reduce emissions from livestock operations 16. Reduce emissions from fertilizer use
Advanced Climate Initiatives		<ol style="list-style-type: none"> 17. Protect and enhance the value of open and working lands 18. Promote sustainable agriculture 19. Increase carbon sequestration 20. Reduce emissions from consumption of goods and services, including food

ES.3 A Regional Approach to Reducing GHG Emissions

If ever an issue called for coordinated, multi-partner effort, it is climate change; progress depends on Sonoma County communities working together. Although state programs will be essential to meeting Sonoma County's GHG reduction goal, long-term regional collaboration will be needed to meet long-term goals. A regional GHG reduction goal—as opposed to individual goals for each jurisdiction—recognizes the shared nature of the challenge as well as the fact that Sonoma County communities each have a different capacity to achieve GHG reductions. This CAP identifies 14 GHG reduction measures for local agency implementation. Each city and the County selected the specific measures to include in their jurisdiction's commitments.

This CAP also includes GHG reduction measures that will be implemented by regional entities that can provide some services and resources on behalf of *all* communities more efficiently than the individual jurisdictions can on their own, especially the smaller cities. Examples include the RCPA and Sonoma Clean Power, which provides affordable electricity with low carbon content.

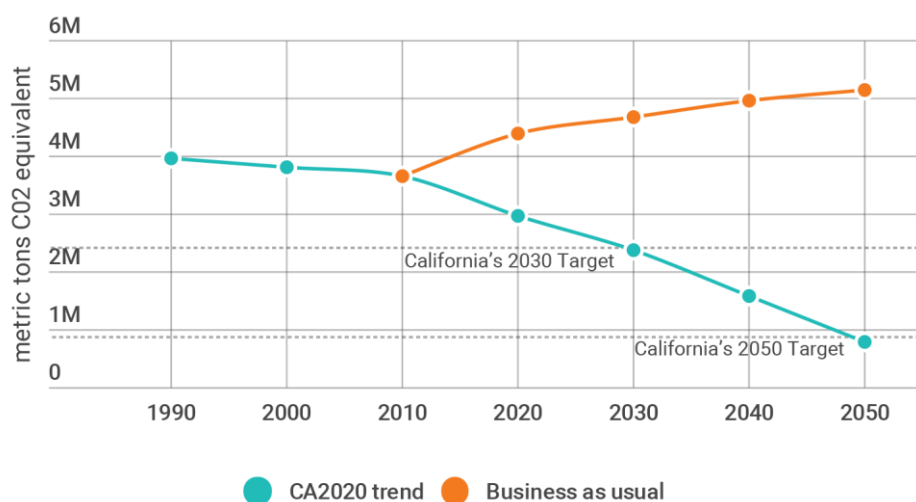
ES.4 Putting This Climate Action Plan to Work

Through this CAP, Sonoma County communities have set an ambitious target for GHG emissions reduction, one that will require decisive and timely action by the local partners. The RCPA will coordinate and facilitate implementation actions by the cities and the county, and regional agencies. Each city and the county will develop its own implementation team for the actions that will occur at the local government level.

Monitoring and Adaptive Management. To ensure that GHG reduction efforts are effective and to adapt to changing technologies, regulations, and community behavior, the CAP calls for ongoing monitoring and adaptive management. Two interim GHG emissions inventories will be completed before 2020 and the RCPA Board will conduct a mid-course review to identify changes or plan amendments that may be needed to stay on-target. Equally important, the results of the interim inventories and the mid-course review will be reported to the community.

This CAP is one part of a much longer term GHG reduction effort. Even with the ambitious GHG reduction goal in this CAP, further actions will be needed to meet longer-term goals. Thus, in adopting this CAP, the RCPA will also adopt goals to reduce GHG emissions by 40% (compared to 1990) by 2030, and by 80% by 2050, which will necessitate another phase of climate action planning after 2020. The good news is that the actions in this CAP will put the county on a solid trajectory for achieving the longer term goals.

Figure ES-2. Sonoma County Greenhouse Gas Emissions Pathways



ES.5 How Will This Plan Help Sonoma County Residents and Businesses?

Reducing GHG Emissions is Good Business. Reducing GHG emissions will save money for Sonoma County residents and business owners. Weatherizing or adding solar to existing homes, for example, creates construction jobs and cuts residents' utility bills. When businesses increase

energy efficiency or add on-site renewable energy generation, they reduce operating costs and employ electricians, engineers, builders and plumbers. Sonoma County businesses are already exporting the products and services they develop to respond to climate change. For example, Enphase Energy is a local business that designs and manufactures micro-inverters for solar photovoltaic systems. As the world moves to a low-carbon economy and invests in climate-ready communities, Sonoma County businesses will reap the rewards of their leadership.

Reducing GHG Emissions Supports Other Community Goals (Co-benefits). Implementing the CAP will result in environmental and community co-benefits that go beyond GHG emissions reductions. For example, many of the actions will improve public health by reducing air pollutants like ozone, carbon monoxide, and fine particulates. Reduction measures focused on reducing energy use in transportation and building energy can help lessen the impact of future energy cost increases.

Climate Action is Essential Risk Management. Even with strong action to reduce GHG emissions, climate-related changes to natural and human systems cannot be avoided entirely. Sonoma County is already experiencing some of these effects, including higher temperatures and more variable rainfall. In response, this CAP also establishes goals for improving climate resilience in three key community resource areas: people and social systems; built systems; and natural and working lands. Many of the strategies to reduce emissions will also help strengthen climate resilience too.

The measures in this CAP provide an opportunity to reduce carbon emissions and achieve a diverse range of community co-benefits, identified in the plan with these icons:



Energy Savings



Equity



Air Quality Improvements



Resource Conservation



Public Health Improvements



Cost Savings



Job Creation



Climate Resilience

ES.6 How Can Sonoma County Residents Help?

Learn about your household carbon footprint. The everyday activities of Sonoma County residents result in GHG emissions, including driving a vehicle, using fossil fuels to light and heat homes, and throwing away household garbage. This CAP focuses on actions that will be taken by cities and the County. Residents can help by supporting local adoption of these actions and participating in the programs that will result from this CAP (see below). In addition to municipal programs, residents can also learn about their household carbon footprint and ways to reduce GHG emissions through their own actions – such as driving an electric vehicle, installing solar or buying electricity from Sonoma Clean Power.

Participate in programs to reduce local emissions. The good news is that while human activities are a major climate change driver, we can also be part of the solution. Sonoma County residents can make impactful choices and changes in their daily lives such as changing lightbulbs to CFLs or LEDs, sealing and insulating their homes, replacing their lawn with drought tolerant plants, reusing and/or recycling materials that might otherwise be thrown away, and using water more efficiently. Residents can also choose to buy items made from local, renewable materials and make other low-carbon lifestyle choices, such as walking or biking, using public transportation, or eating less meat and more local vegetables. This CAP identifies some of the resources available to Sonoma County residents to help make these changes.

ES.7 Public Outreach and Community Engagement

This CAP was prepared with input from community members, elected officials, and staff from the partner agencies. Ten open house-style public workshops were held, including one in each city. These meetings solicited public input on the types of reduction measures that should be included in the CAP. The role of local governments in addressing climate change and reducing GHG emissions was also discussed. The community dialogue that has begun with preparation of this plan will continue throughout implementation of the GHG emissions reduction measures.

To help guide the CAP development process, the RCPA board of directors also selected a Stakeholder Advisory Group to represent a diversity of viewpoints and technical expertise from each jurisdiction. Three representatives from each city and two representatives from each county supervisorial district were selected; some representatives had input from city councils, though none were elected officials themselves. The Group met five times at key milestones during the project. All meetings were open to the public and each meeting included an opportunity for the public to provide comments.

1. Framework

The Framework for Sonoma County Climate Action



Chapter 1

The Framework for Sonoma County Climate Action

1.1 Introduction

Human-induced climate change is a global challenge that demands action at every level, including local government. Sonoma County communities are established leaders in locally based efforts to combat global climate change, and this Climate Action Plan takes another step forward as local governments and regional agencies commit to concrete actions that will further reduce countywide greenhouse gas (GHG) emissions and create a better future for Sonoma County. These local actions will combine with state and regional actions to reduce community GHG emissions to 25% below 1990 levels by 2020 and make substantial progress toward even greater reductions beyond 2020. These local actions will also advance many other community priorities such as economic resilience, public health, water efficiency, air quality, and overall quality of life.

1.2 A Call to Action

1.2.1 Climate Change Is a Serious Threat, But We Know What to Do

Sonoma County has long recognized the need for local action to help meet the global challenge of climate change. In 2008, the Climate Protection Campaign (now called the Center for Climate Protection) released the *Sonoma County Community Climate Action Plan* (also known as *Coolplan*), which outlined a package of solutions to meet a bold greenhouse gas (GHG) reduction target – 25% below 1990 levels by 2015. The plan was developed with the participation and support from local government, business, and community groups. Although *Coolplan* itself was not formally adopted, all nine cities and the County embraced the plan’s ambitious GHG reduction goal and local leaders took initial actions that have made real progress toward reducing countywide GHG emissions, including programs like Sonoma Clean Power (SCP) and the Sonoma County Energy Independence Program. *Climate Action 2020* (CA2020) begins a new phase of local climate action by updating the countywide GHG reduction goal and focusing on near-term actions that will be implemented through 2020. These actions will substantially reduce emissions in the short term and put Sonoma County on a solid trajectory to achieve deeper GHG reductions that will be needed to meet the goal of reducing emissions 40% by 2030 and 80% by 2050. After 2020, another phase of local climate action planning will be needed to continue and expand the actions in CA2020 and to explore new strategies to meet longer-term GHG reduction goals.

Climate Change Science: A Primer

Although changes in global climate have been recorded throughout history, there is strong consensus among the scientific community that recent changes are the result of GHG emissions created by the burning of fossil fuels and other human activity. The International Panel on Climate Change (IPCC), in its 2014 assessment, observed that human influence on the climate system is clear, and recent increases in GHGs emissions are the highest in history. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.

According to the IPCC:

Anthropogenic (man-made) greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane (CH₄), and nitrous oxide (N₂O) that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century.

Even a relatively small increase in global temperatures can dramatically affect human and natural systems. According to the IPCC, “an increase in the global average temperature of 2°C (3.6°F) above pre-industrial levels, which is only 1.1°C (2.0°F) above present levels, poses severe risks to natural systems and human health and wellbeing.” The warming climate is directly related to the amount of GHG in the atmosphere, typically expressed in terms of parts per million (ppm) of carbon dioxide equivalent (CO₂e). Many have called for stabilizing atmospheric GHG concentrations at 450 ppm CO₂e (California Air Resources Board 2014b). However, with GHG concentrations now at or above 479 ppm CO₂e, natural systems and human health and wellbeing are already at high risk (National Oceanic and Atmospheric Administration 2014). Here in Sonoma County, those risks include increased flooding, wild land fires, and economic disruption.

To have an even chance of stabilizing GHG concentrations at 450 ppm CO₂e, global GHG emissions would have to decline by about 50% (compared with 2000 levels) by 2050. Given a more limited capacity to reduce emissions in developing countries, stabilizing at 450 ppm CO₂e will require industrialized countries, including the United States, to reduce their emissions by approximately 80% below 1990 levels by 2050.

Strong action is needed to avoid serious damage to human wellbeing and natural systems. Individuals and communities need to determine how much and how fast they are willing to change energy use and implement other actions to achieve long-term GHG reductions.

Discussions about human-induced climate change often focus on the role of carbon. This is because carbon dioxide (CO₂) is the primary GHG emitted through human activities and accounts for about 82% of all U.S. GHG emissions. Therefore, terms like “atmospheric carbon,” “carbon-neutral,” or “low-carbon” are often heard in climate change discussions. However, human influence on the climate is actually driven by six primary gases, including CO₂. These gases each have different potential to trap heat and remain in the atmosphere (expressed as Global Warming Potential, or GWP). For example, whereas CO₂ has a GWP of 1, nitrous oxide (N₂O) has a GWP of

265. This means that, pound for pound, N₂O is 265 times more powerful as a global warming agent than CO₂. But because there are far more CO₂ emissions than N₂O emissions, CO₂ is still the greatest GHG concern overall. See Table 1.2-1 for a comparison of global warming potential from the six GHG gases.

Table 1.2-1. Principal GHG Emissions

Greenhouse Gas	Primary Emissions Sources	Global Warming Potential (GWP)^a	Atmospheric Lifetime (years)	Atmospheric Abundance
Carbon Dioxide (CO ₂)	Burning of fossil fuels Gas flaring Cement production Land use changes (reducing the amount of forested land or vegetated areas) Deforestation	1	50–200	394 ppm
Methane (CH ₄)	Agricultural practices Natural gas combustion Landfill outgassing	28	12.4	1,893 ppb
Nitrous Oxide (N ₂ O)	Agricultural practices Nylon production Gas-fired power plant operations Nitric acid production Vehicle emissions	265	121	326 ppb
Perfluorinated Carbons (CF ₄ , C ₂ F ₆)	Aluminum production Semiconductor manufacturing	6,630–11,100	10,000–50,000	4.2–79.0 ppt
Sulfur Hexafluoride (SF ₆)	Power distribution Semiconductor manufacturing Magnesium processing	23,500	3,200	7.8 ppt
Hydrofluorocarbons (HFC-23, HFC-134a, HFC-152a)	Consumer products (aerosol sprays, such as air fresheners, deodorants, hair products, etc.) Automobile air-conditioners Refrigerants	138–12,400	1.5–222	3.9–75 ppt

Notes:

^a GWPs listed here are 100-year values without carbon-climate feedbacks.

ppm = parts per million

ppb = parts per billion

ppt = parts per trillion

Sources: Intergovernmental Panel on Climate Change 2013; Blasing 2014.

To provide a consistent framework, GHG emissions are usually quantified in terms of metric tons (MT) of CO₂e per year, which accounts for the relative warming capacity of each gas. All GHGs in the emissions inventory and reduction measures are presented in terms of MTCO₂e. For more information on the latest climate science and IPCC research, visit <http://www.ipcc.ch>.

Sonoma County Must Reduce Greenhouse Gas Emissions

Based on projections from the 2010 GHG inventory, Sonoma County is not expected to meet the 2015 goal of 25% below 1990 levels. Furthermore, the county's population is projected to increase by 5% between 2010 and 2020, and employment is projected to increase by 13% over the same period. Population and economic growth are the main factors influencing the growth of GHG emissions.

Simply put, without additional actions, GHG emissions in 2020 and beyond will not be reduced and could increase because of continued population and economic growth.

Therefore, the primary goal of CA2020 is to grow smarter by **reducing** countywide GHG emissions to a level that is 25% below 1990 emissions by 2020, a target that is well beyond that established in current state law (Assembly Bill 32; see discussion of state regulatory framework in Section 1.2.2, below). This target will be met by combining the new actions described in this Climate Action Plan (CAP) with ongoing efforts already underway and working to achieve reductions in a thoughtful and coordinated manner.

In addition to the near-term emission-reduction goal for 2020, CA2020 also includes longer-term goals of reducing emissions by 40% (compared to 1990) by 2030 and by 80% by 2050, which will necessitate another phase of local climate action planning and implementation after 2020. Although the measures contained in this CAP will endure and continue to reduce emissions beyond 2020, even greater effort will be needed to reach the goals for 2030 and 2050. Specific actions needed after 2020 will be heavily influenced by the changes in technology, regulatory mandates, and behavior that will inevitably occur by 2020. An update to CA2020 is therefore included in the implementation plan.

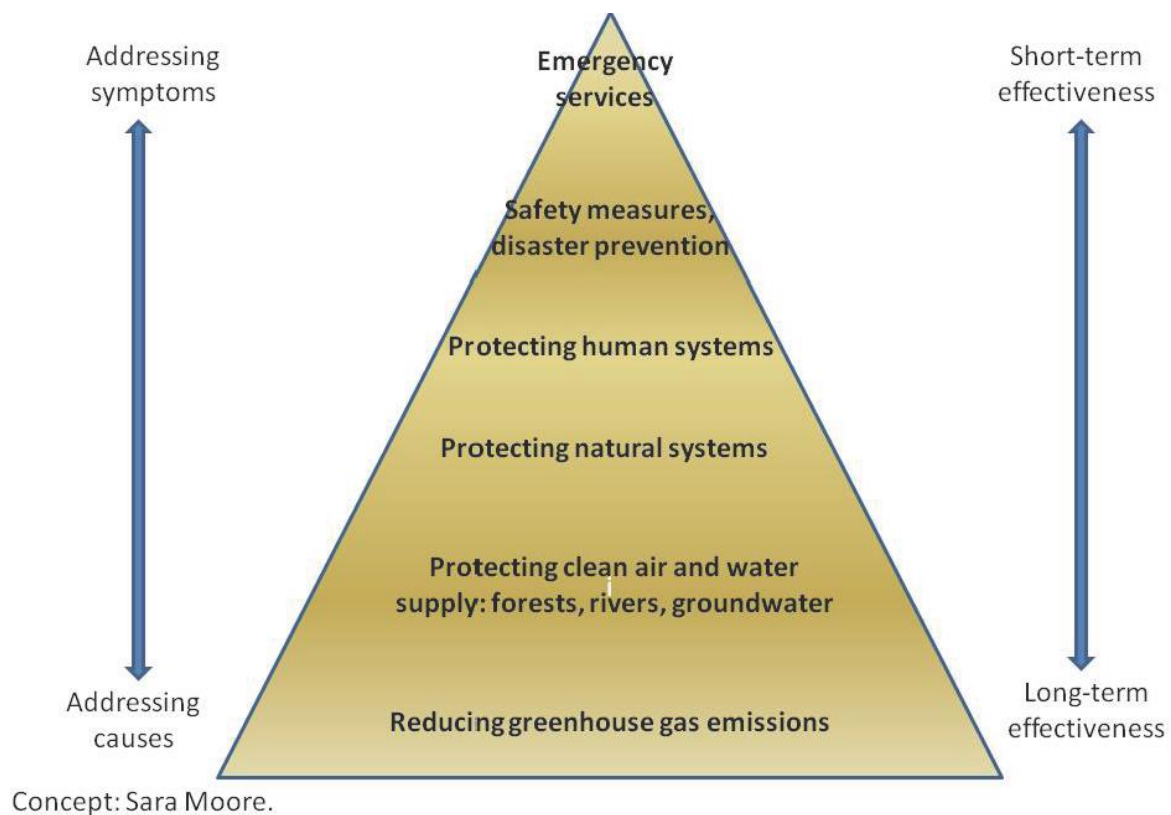
Adapting to Climate Change and Building Resilient Communities

Actions taken to reduce GHG emissions are commonly referred to as *climate mitigation* and are the foundation of climate change response; minimizing the extent of climate changes is the most certain way to ensure that communities can respond to them. However, climate-related changes to natural and human systems cannot be avoided entirely. Sonoma County is already experiencing some of these effects, including higher temperatures and more variable rainfall, which results in increased flooding in some years and drought in others. Actions that reduce the community's vulnerability to these and other climate change hazards are collectively referred to as *climate adaptation*. Adaptation is a fundamental part of the County's overall climate action program and necessary to build community resilience. While climate mitigation and adaptation have different objectives, many strategies can be used to simultaneously achieve both goals.

Chapter 6, *Sonoma County Climate Readiness*, provides a vulnerability assessment that screens potential climate hazard impacts on three key community resource areas: people and social systems, built systems, and natural and working lands. This analysis provides a starting point for a countywide discussion on climate impacts and vulnerabilities. Strategies already underway to prepare for climate change are also discussed, along with recommendations to increase local climate change resilience. While the focus of CA2020 is on reducing local contributions to climate change, many strategies to reduce emissions will also help strengthen climate resilience. Measures that advance local resilience to climate impacts are identified in Chapter 3, *Reducing Community Emissions*.

Figure 1.2-1 illustrates the building blocks of climate response. Again, stopping human contributions to climate change is the most important step to minimize the impact of climate change on communities.

Figure 1.2-1. Building Blocks of Climate Response



1.2.2 Building on Existing Climate Action Efforts

The State of California and Sonoma County communities recognized the challenge of climate change and have already taken action to meet the GHG reduction imperative. The challenge is enormous, but Sonoma County is not starting from scratch. CA2020 builds on earlier efforts to chart a future that will dramatically reduce countywide GHG emissions.

State Leadership

California is a global leader in addressing climate change and reducing GHG emissions.

- In 2005, Governor Schwarzenegger signed Executive Order S-03-05 establishing a long-term goal of reducing GHG emissions by 80% below 1990 levels by 2050.¹
- Enacted in 2006, Assembly Bill (AB) 32 requires statewide GHG emissions to be reduced to 1990 levels by 2020. The *AB 32 Scoping Plan* identifies specific measures for achieving this goal, including recommending that local governments establish GHG reduction goals for both their municipal operations and for the community, consistent with those of the state.
- In 2015, Governor Brown signed Executive Order B-30-15 establishing a medium-term goal of reducing GHG emissions by 40% below 1990 levels by 2030. The Governor's order requires the California Air Resources Board (ARB) to update its scoping plan to identify the measures needed to meet the 2030 target; that effort should be completed in late 2016.

In addition, the state has adopted key regulations that will help Sonoma County meet its regional emissions reduction goals.

- Renewables Portfolio Standard (RPS) – requires greater amounts of renewable energy in electricity generation throughout the state
- Pavley/Advanced Clean Car Program– requires higher gas mileage in new cars sold in California
- Low-Carbon Fuel Standard (LCFS) – requires a reduction in the GHG intensity in transportation fuels
- Cap-and-Trade Program – reduces overall emissions from electricity generation and transportation fuel

More information on these state regulations and their influence on Sonoma County emissions can be found in Chapter 3, *Reducing Community Emissions*, and in Appendix C.

Sonoma County Leadership

In Sonoma County, community leaders and forward-thinking elected officials in each city and in county government have worked together to establish strong action on climate change.

- **1990:** Voters approved a sales tax measure to create the Sonoma County Agricultural Preservation and Open Space District (SCAPOS) to preserve agricultural and open space lands throughout the county. Voters overwhelmingly reauthorized the sales tax measure in 2006.

¹ Executive orders are binding only on state departments, not on the private sector or local governments. However, pending legislation (Senate Bill 32) would, if approved by the legislature and signed by the governor, adopt the target for 2030 into state law and give the ARB authority to adopt binding long-term GHG targets.

- **2001:** All Sonoma County communities committed to the International Council for Local Environmental Initiatives campaign called *Cities for Climate Protection*, an international initiative to reduce GHGs through local government action.
- **2005:** The elected leadership in all Sonoma County communities adopted a countywide GHG emissions reduction target of 25% below 1990 levels by 2015. The City of Cotati adopted an even more aggressive goal of 30% below 1990 levels by 2015.
- **2008:** A local community non-profit group, the Climate Protection Campaign (now known as the Center for Climate Protection), developed the *Sonoma County Community Climate Action Plan*, which was the first community-wide examination of strategies to reduce community-wide GHG emissions.
- **2008:** Voters in Sonoma (and Marin) County approved a local sales tax measure to fund development of passenger rail service, Sonoma-Marin Area Rail Transit (SMART).
- **2009:** Sonoma County jurisdictions established the nation's first Regional Climate Protection Authority (RCPA), a multi-jurisdictional agency tasked with coordinating countywide efforts to reduce GHGs and become more resilient to climate change. RCPA member jurisdictions and their partners have created and successfully pioneered innovative approaches to climate solutions including Property Assessed Clean Energy (PACE) financing, Pay As You Save (PAYS) on-bill repayment for resource efficiency, community choice aggregation, carbon-free water, electric vehicle infrastructure deployment, climate action through conservation, adaptation planning, and more.
- **2012:** The City of Santa Rosa was the first local government in the county to adopt its own CAP and a new GHG emissions target of 25% below 1990 levels by 2020.

Community leadership has resulted in direct actions by the citizens, businesses, and communities in Sonoma County to reduce GHG emissions. For example:

- All communities in the county (except Healdsburg, which has its own electric utility) now participate in the local Community Choice Aggregation program, SCP, which provides electricity with a higher renewable energy content than otherwise available. Healdsburg's municipal utility has provided electricity with a large renewable portfolio for many years.
- The County established a PACE program known as the Sonoma County Energy Independence Program to help property owners finance energy and water efficiency improvements. This program has reduced GHG emissions equal to taking 3,000 cars off the road and generated enough clean energy to power nearly 6,000 homes for a year.
- RCPA and jurisdictions county-wide support energy-efficiency efforts and solar retrofits through a variety of programs. Waste minimization, recycling, and composting programs are already an essential part of resource conservation in the county.
- The Sonoma County Water Agency is a leader in innovating low-carbon methods for delivering water supplies and conserving water. Sonoma County Water Agency reached its

goal of a carbon-free water delivery system in 2015, and is also a prominent supporter of energy conservation financing.

- Sonoma County is a center for sustainable wine growing and other sustainable agricultural practices. The Resource Conservation Districts started a “carbon farming” program in 2015 to accelerate the rate at which carbon is sequestered from the atmosphere into soil and wood biomass.

By 2010, Sonoma County communities had reduced countywide GHG emissions to approximately 7% below 1990 levels, even while the county’s population grew by 25% and employment grew by 17% between 1990 and 2010. On a *per capita* basis, county GHG emissions declined approximately 26% over the same period.

CA2020 builds on these existing programs and proposes additional measures that Sonoma County communities can implement to achieve significant GHG emissions reductions in 2020 and beyond, eventually reaching the goal of an 80% emissions reduction by 2050.

For a list of strategies that have already been implemented by each community, please refer to Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*.

1.2.3 How Will this Plan Help Sonoma County Residents and Businesses?

Reducing GHG Emissions Is No Longer Optional

Given the magnitude of human-induced climate change and the projected catastrophic effects from continued global warming, reducing GHG emissions has become an environmental and societal imperative. In response, GHG reduction mandates from the state and, increasingly, from the federal government will require local government action. In California, state legislation (AB 32) with a mandate to reduce GHG emissions to 1990 levels by 2020 is only the beginning; much sharper GHG reductions are needed to protect our environment, our health, and our economy from the potentially catastrophic effects of increasing global temperatures. CA2020 is intended to help Sonoma County communities respond to the climate change imperative as well as legal mandates.

Reducing GHG Emissions Is Good Business

Reducing GHG emissions will make Sonoma County businesses more efficient and will save money for residents and business owners. Weatherizing or adding solar to existing homes, for example, creates construction jobs and cuts residents’ utility bills. When businesses increase energy efficiency or add on-site renewable energy generation, they reduce operating costs and employ electricians, engineers, builders, and plumbers. For example, a locally owned quarry (Mark West Quarry) recently hired a local solar energy company to install a solar array that will pay for itself in only seven years by cutting the company’s energy bills in half. The Sonoma County Green Business Program recognizes and promotes businesses that operate in an environmentally responsible way, including reducing their carbon footprints. Sonoma County businesses are

already exporting the products and services they develop to respond to climate change. For example, Petaluma-based Enphase has become a worldwide leader in micro-inverter technology used in solar photovoltaic systems. As the world moves to a low-carbon economy and invests in climate-ready communities, Sonoma County businesses will reap the rewards of their leadership.

As described in more detail in Section 1.5, CA2020 will also facilitate a more streamlined environmental review process for future development projects that incorporate its GHG reduction measures.

Reducing GHG Emissions Supports Other Community Goals

Implementing CA2020 will result in environmental and community “co-benefits” that go beyond GHG emissions reductions. For example, many of the actions will improve public health by reducing air pollutants like ozone, carbon monoxide, and fine particulates. Measures to improve mobility and alternative modes of transportation will increase walking and biking, activities that substantially lower the incidence of disease. These changes can also complement and encourage other sustainable modes of transportation, including public transit.

The GHG reduction measures in this CAP create community co-benefits in a variety of ways.

- GHG reduction measures for the Building Energy and Transportation sources will reduce electricity and gasoline usage, which can help lessen the impact of future energy cost increases on county businesses and residents.
- Reducing gasoline consumption also reduces dependence on foreign oil and the environmental impacts of oil exploration, production, and transportation.
- Recycling and waste diversion measures will also reduce material consumption and the need for landfill space.
- Water efficiency measures will reduce water use in a water-constrained future and adapts to the long-term hydrological effects of climate change.
- Land use measures in CA2020 will conserve natural resources and protect the long-term viability of natural and working landscapes in the county.
- Open space preservation also offers aesthetic and recreational benefits for community residents as well as habitat for native wildlife and plants.
- Sustainable agriculture and wine-making practices will help preserve agricultural soil fertility and protect water quality.

The measures in this CAP provide an opportunity to lower carbon emissions and achieve a diverse range of community co-benefits. Anticipated community co-benefits associated with CA2020 are listed in Table 1.2-2. Chapter 3, *Reducing Community Emissions*, provides additional information on the relevant co-benefits.

Table 1.2-2. Community Co-Benefits

Co-Benefit	Key	Description
Energy Savings		Measures to increase energy efficiency can reduce energy costs and lessen the impact of future energy price increases on county businesses and residents. Reducing petroleum and natural gas use through efficiency and fuel switching also reduce dependence on imported energy and the environmental impacts of fossil energy exploration, production, and transportation.
Air Quality Improvements		Measures to reduce or eliminate the combustion of fossil fuels can reduce local and regional air quality challenges caused by ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter. These air pollutants cause damage to people, ecosystems, and infrastructure.
Public Health Improvements		Measures that improve air quality create benefits for public health by reducing pollutants. Measures that increase use of active transportation and enhance public open spaces can improve health by encouraging walking, biking, and outdoor recreation. These co-benefits directly support the mission of Sonoma County <i>Health Action</i> , aimed at achieving equity and health for all in Sonoma County.
Job Creation		Measures to retrofit buildings, build and operate local and distributed renewable energy systems, increase transit use, increase waste diversion, and other strategies that rely on local labor can create opportunities for the workforce and retain dollars to be reinvested in the local economy.
Resource Conservation		Recycling and waste diversion measures reduce material consumption and the need for landfill space. Water efficiency measures reduce water demand and preserve water resources. Land use measures conserve natural resources and protect the long-term viability of natural and working landscapes in the county. Open space preservation also offers aesthetic and recreational benefits for community residents as well as habitat for native wildlife and plants. Sustainable agriculture practices will help preserve agricultural productivity and ecological health.
Cost Savings		Many strategies to reduce emissions reduce waste by increasing efficiency, therefore reducing the costs to receive the same service (be that light, heat, water, or transportation). Many measures offer downstream cost savings in addition to direct utility or fuel cost savings, such as reduced health care costs, reduced need to invest in marginal water or energy supply, lower maintenance costs, etc.
Climate Resilience		Many strategies to reduce emissions also help prepare communities for local climate impacts by advancing the climate resilience goals adopted by the RCPA Board (see Chapter 6).
Equity		Climate action is a broadly important strategy to promote equity because people with existing social vulnerabilities – lower levels of income, health, or education – are disproportionately affected by climate change impacts. Many measures that reduce GHGs can have equity benefits if designed to serve disadvantaged populations by lowering housing, transportation, and energy costs and improving health outcomes.

1.3 How Does This Plan Work?

1.3.1 A Regional Approach to Reducing GHG Emissions

Sonoma County communities have a long history of implementing and promoting initiatives to protect the environment and conserve natural resources. This tradition includes creation of the RCPA in 2009, the nation's first regional climate protection authority, in a move that recognized both the magnitude of the challenge and the cross-jurisdictional nature of climate change and GHG emissions. If ever an issue called for a coordinated, multi-partner effort, it is climate change; progress depends on Sonoma County communities working together. The approach in CA2020 calls for coordinated local actions to achieve a regional target—reduce countywide GHG emissions to 25% below 1990 levels by 2020—including leveraging initiatives already underway at the state and regional (Bay Area) level. The collaboration embodied in CA2020 will continue as the communities work to meet the RCPA's long-term GHG reduction goals of a 40% reduction by 2030 and an 80% reduction by 2050.

A regional GHG reduction goal—as opposed to individual goals for each community—recognizes the shared nature of the challenge as well as the fact that Sonoma County communities each have a different capacity to achieve GHG reductions; smaller communities typically have fewer opportunities to achieve substantial GHG reductions.

Statewide GHG Reduction Efforts Have Local Impact

Statewide programs to reduce GHG emissions are a fundamental part of CA2020 and will deliver over 50% of the GHG emissions reductions needed to achieve the 2020 target. For example, the state's RPS will reduce the carbon content of electricity throughout the state, including Sonoma County, yielding over 180,000 MTCO₂e in annual GHG reductions locally. The CAP reflects the impact of nine state measures that address issues related to building energy and transportation.

1. Title 24 Energy Efficiency Standards for Commercial and Residential Buildings (Title 24)
2. Lighting Efficiency and Toxics Reduction Act (AB 1109)
3. Industrial Boiler Efficiency
4. Renewables Portfolio Standard (RPS)
5. Residential Solar Water Heater Program (AB 1470)
6. Low Carbon Fuel Standard (LCFS)
7. Pavley Emissions Standards for Passenger Vehicles
8. Advanced Clean Cars
9. Vehicle Efficiency Measures in AB 32

Local Government and Regional Agency Action

Although state programs are essential to meeting Sonoma County's GHG reduction goal, they will not be enough to reach that goal by themselves. Action by local governments and regional agencies—the entities that control land use, infrastructure, and community services—is critical. It will take the full combined efforts of local governments and regional initiatives, together with state programs, to reach the County's GHG reduction goal. **Together, CA2020 measures will promote building energy efficiency and renewable energy production, support alternative modes of transportation, enhance open spaces, and help reduce water consumption and wasted materials.**

The GHG reduction measures in this CAP were selected after a comprehensive review of potential measures and after local community outreach meetings and workshops and consultation with a Stakeholder Advisory Group (see Section 1.4). A 2014 report titled *Proven and Promising Climate Measures from U.S. Communities for Possible Application in Sonoma County*, prepared by the Center for Climate Protection, was also used to develop GHG reduction measures in this plan. In addition, measures recommended by the California Attorney General and the California Air Pollution Control Officers Association were considered, as were measures from adopted CAPs throughout California. Each local community's general plan and local policies and programs, and comments collected at meetings in each community were also reviewed to develop the measures. Many of the measures in CA2020 build on local community initiatives that are already underway, including local measures required under state law, like implementation of the CalGreen building codes and adoption of local water-efficient landscape ordinances. Other measures provide new opportunities for addressing climate change. Existing policies and measures are summarized in Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*.

This CAP identifies 14 GHG reduction measures for local agency implementation (see Section 1.3.2). Each city and the County reviewed the local measures and selected those to include in their community's commitments. Thus, the specific combination of measures implemented in each community will vary. Although no community will implement all 14 local measures and sub-components, the individual commitments from each community combine into a comprehensive GHG emissions reduction program that will help the county achieve its countywide goal.

Some of the local measures include voluntary, incentive-based programs that will reduce emissions from both existing and new development in the communities. Other measures establish mandates for new development, either pursuant to state regulations or through existing programs. Local governments will also use CA2020 as a tool to communicate and solidify their priorities within their communities.

CA2020 also includes GHG reduction measures that will be implemented by regional entities that can provide some services and resources on behalf of *all* communities more efficiently than the individual communities can on their own, especially the smaller cities. These regional measures are a critical part of CA2020. For example, the Community Choice Aggregation measure encourages residents and businesses to participate in SCP, which provides electricity with lower

carbon content than the state's RPS. Other regional entities included in CA2020 are RCPA, Sonoma County Transportation Authority, Sonoma County Agricultural Preservation and Open Space District, and the Sonoma County Energy Independence Program. There are 16 regional measures to reduce GHG emissions, as discussed further in Chapter 3, *Reducing Community Emissions*.

Successful implementation of these actions will require commitment from regional agencies, all communities and their various departments, community groups, the development community, and residents and businesses. For this plan to be successful, RCPA, regional entities, and communities will adaptively manage implementation of CA2020 to ensure that the countywide GHG reduction target is met and that measures are implemented as efficiently as possible. Accordingly, RCPA and communities may revise measures or add new measures to ensure that the region achieves its 2020 reduction target. If adopted and implemented prior to 2020, new federal programs that achieve local GHG emissions reductions beyond state and local mandates may also be added to CA2020.

Source-based Emissions Reductions

GHG emissions inventories and reduction measures are grouped together under “sources” that enable an organized, countywide look at the human activities that contribute the most GHG emissions and help focus actions where they can have the greatest emissions reduction. CA2020 looks at the following five GHG sources.

- **Building Energy** includes emissions from electricity generation and combustion of natural gas and other fuels (e.g., propane, wood).
- **Transportation, Land Use, and Off-road Equipment** includes emissions from on-road vehicle fossil fuel combustion as well as emissions from equipment (e.g., construction equipment) and off-road vehicles.
- **Solid Waste** includes CH₄ emissions from decomposing organic matter in landfills.
- **Water and Wastewater** includes energy-related emissions from water supply pumping and CH₄ and N₂O emissions from the wastewater treatment process.
- **Livestock and Fertilizer** includes N₂O emissions from fossil-fuel based fertilizer and CH₄ and N₂O emissions from livestock and manure management. Other agriculture-related emissions are accounted for in the other GHG sources. For example, emissions from traffic related to wineries or grape growing are included in the Transportation source.

This source-based approach is the foundation for the analyses in Chapter 2, *Greenhouse Gas Emissions in Sonoma County*, and Chapter 3, *Reducing Community Emissions*. These sources are also the organizing principle in Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*.

1.3.2 Putting this Climate Action Plan to Work

Plan Adoption by RCPA, Cities, and County

CA2020 reflects an innovative, collaborative approach to responding to climate change. Individual cities and counties throughout the state have adopted CAPs specific to their communities, but CA2020 takes a truly regional (countywide) approach that coordinates the climate protection activities of all the cities and the County to achieve a shared GHG reduction goal. This approach recognizes that, by working together, Sonoma County's communities can achieve greater GHG reductions, and do it more efficiently than if each city and the County acted on their own.

The collaborative, regional approach also improves consistency among the participating local agencies. This similarity will help home and business owners who are planning projects or renovations in the cities and the county.

As the lead agency, RCPA will adopt the CAP first (including certification of the Environmental Impact Report prepared for CA2020). Following adoption by RCPA, each city and the County will adopt its portion of CA2020 (see Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*) in a form appropriate to that community. Local adoption could take the form of a General Plan amendment, ordinance adoption, resolution, or some combination thereof.

Once adopted, the cities, County, and regional agencies will implement the measures each has committed to in their respective CAP adoption processes.

Implementation Framework

Sonoma County communities have set an ambitious target for GHG emissions reduction, one that will require decisive and rapid action by the local partners. RCPA will coordinate and facilitate implementation actions by the cities and the County, and by regional agencies (e.g., transit, energy, waste). RCPA's role will include aggregating funding opportunities to leverage federal, state, and regional grants; providing technical assistance to local partners; developing shared tools and inter-community efficiencies; and accepting overall accountability for CA2020 implementation.

Each city and the County will develop its own implementation team for the actions that will occur at the local government level. This will include designating a CA2020 Coordinator for each community and an internal implementation structure scaled and organized appropriately to each local agency. Among other things, the local CA2020 Coordinator will serve as the liaison between the city/County and RCPA.

Given the immediacy of the 2020 GHG reduction target, timing is an important factor for plan implementation. The CA2020 implementation plan organizes GHG reduction measures into three groups, based on the lead time needed for each measure in order to achieve results by 2020.

Please refer to Chapter 4, *Implementation*, and Appendix C for additional information regarding implementation and the lead entities for each measure.

Monitoring and Adaptive Management

How will Sonoma County local governments, residents, and business know if their GHG reduction efforts are effective? How can the County adapt to changing technologies, regulations, state (or federal) policies, and community behavior changes? Not only will RCPA and local partners need to track implementation of the local and regional reduction measures called for in CA2020, but the comprehensive nature of CA2020 will require regular reassessment of community GHG emissions and the overall direction of CA2020. To accomplish this, CA2020 calls for two interim GHG emissions inventories before 2020: one based on 2015 emissions data and the other based on 2018 data. The RCPA Board will also conduct a mid-course review of overall CA2020 effectiveness to allow time for changes that may be needed to stay on target. Where program tracking and inventory updates indicate that CA2020's emissions-reduction strategies are not as effective as originally projected, RCPA will work with local partners to adaptively manage CAP implementation and stay on target, including updating or amending CA2020, if warranted.

Equally important, the RCPA and its members will report to the community on the results of the interim inventories and the mid-course review. Periodic public meetings and presentations to stakeholder groups will occur and other outreach activities, including a public website and email flyers, will be implemented to educate, engage, and empower the community.

Finally, CA2020 is part of a much longer-term effort that will be needed to reduce GHG emissions in Sonoma County. As noted earlier, CA2020 focuses on relatively short-term actions to reduce emissions by 2020 to a degree that is well beyond current state mandates (AB 32). However, even with the ambitious GHG reduction goal in CA2020, further actions will be needed to meet longer-term goals. Therefore, in adopting this CAP, RCPA will also adopt long-term goals to reduce GHG emissions by 40% (compared to 1990) by 2030 and by 80% by 2050. Although the measures in CA2020 will continue to achieve emissions reductions after 2020 and establish a trajectory for reaching longer-term goals, another phase of climate action planning will be needed to meet the goals for 2030 and 2050. This next phase will build on the measures in CA2020, informed by monitoring and adaptive management, and take advantage of new technologies and climate protection science that will be available in the future.

The Role of New Development in GHG Reduction

Sonoma County's population and economy will continue to grow between now and 2020, and beyond. Some of that growth will result in new development, either on land that is now vacant or as redevelopment with new or more intensive land uses. This new development will be a source of additional GHG emissions in 2020, although emissions related to existing development and activities will remain by far the largest source of GHG emissions. By 2020, new development will account for about 5% of total countywide GHG emissions; existing development and activities will account for 95% of countywide emissions. Emissions from new development are calculated as the growth in emissions from 2016 to 2020, based on socioeconomic forecasts and other emission projection methods (see Chapter 2). In other words, 2020 emissions are estimated to be 5% higher than 2016 emissions.

To ensure that regional GHG emissions are reduced to 25% below 1990 levels, CA2020 accounts for additional emissions from new development in the target inventory for 2020. Meeting the community-wide 2020 GHG reduction target requires new development to be consistent with climate goals by implementing measures that will minimize new GHG emissions. To accomplish this, a “New Development Checklist” (see Appendix A) can be used in the entitlement and permitting process at each jurisdiction that adopts the plan. New development projects that incorporate applicable checklist measures will not only have lower GHG emissions than similar projects had in the past, but they will also contribute to reaching the GHG reduction target set forth in CA2020 by ensuring that emissions from new development do not exceed the GHG “budget” allocated to new development in the 2020 target. Development projects consistent with this CAP may also take advantage of the permit streamlining available under the California Environmental Quality Act (CEQA) (see Section 1.5).

1.3.3 How Can Sonoma County Residents Help?

Learn about their Household Carbon Footprint

The everyday activities of Sonoma County residents, including driving a vehicle, using electricity and natural gas to light and heat their homes, and throwing away household garbage, result in GHG emissions. Many of these emissions are accounted for in the GHG inventory prepared for this CAP, while others occur elsewhere due to the consumption of goods and services in Sonoma County. Residents can learn about their household carbon footprint and how they can reduce GHG emissions through their own actions—such as driving an electric vehicle, installing solar, or buying electricity from SCP. Cool California (<http://www.coolcalifornia.org/>) offers a user-friendly tool that allows residents to calculate household emissions by answering questions relating to travel, housing, food, and shopping habits. After completing the questionnaire, residents receive a personal action plan with tips and actions to help reduce their household carbon footprint and save money.

Participate in Programs to Reduce Local Emissions

The good news is that while human activities are a major climate change driver, we can also be part of the solution. Once county residents take inventory of their household carbon footprints and better understand their contribution to climate change, they can start taking actions to reduce household GHG emissions and improve their economic picture, thereby helping to meet the countywide GHG reduction target. Sonoma County residents can make impactful choices and changes in their daily lives such as changing light bulbs to compact fluorescents or light-emitting diodes, buying energy-efficient (ENERGY STAR) appliances, heating and cooling smartly, sealing and insulating their homes, reusing and/or recycling materials that might otherwise be thrown away, using water more efficiently, composting food scraps, and purchasing clean power (for more information see <http://www3.epa.gov/climatechange/wycd/home.html>).

Some of these individual or household actions will be facilitated through the regional or local programs and strategies presented in CA2020. Other actions are based more on individual

commitment and choice. For example, individuals can learn about and make purchases that consider the carbon footprint and durability of household goods. This might include buying items made from local, renewable materials or that minimize packaging and shipping. Residents can also make low-carbon lifestyle choices, such as walking or biking, using public transportation, or eating less meat and more local vegetables.

Here are a few of the resources available to Sonoma County residents to help make these changes.

- The Energy Independence Program is a County of Sonoma Energy and Sustainability Division program that serves county residents and businesses as a central clearinghouse of information about energy efficiency, water conservation, and solar energy improvements. It offers tools to property owners and tenants to find the information, resources, rebates, contractors, and financing that fits their situation. See more at: <http://sonomacountyenergy.org/homepage/#sthash.3HWfDTmZ.dpuf>.
- Energy Upgrade California: Home Upgrade takes a “whole house” approach to addressing home energy waste through building science, pre- and post-project testing, and energy performance analysis to provide maximum energy efficiency results. More information can be found at (707) 565-6470 or <http://bayareaenergyupgrade.org>.
- Windsor Efficiency PAYS: Windsor residents and businesses can take advantage of the Windsor Efficiency PAYS program, which provides water- and energy-saving upgrades for Windsor residential properties that provide immediate utility bill savings, new water/energy saving appliances, and drought-resistant landscaping—with no upfront cost or debt. See more at: <http://sonomacountyenergy.org/residential-programs/#sthash.2VBjpMOi.dpuf>.
- SCP is Sonoma County’s official electricity provider, reducing costs and environmental impacts of energy use for customers throughout Sonoma County. By participating in CleanStart, SCP’s default service, participants receive 36% renewable power. If residents or businesses participate in EverGreen, they will receive 100% local renewable power for a premium price.

CA2020 also includes several *Advanced Climate Initiatives* that, among other things, will focus on working with Sonoma County residents to reduce consumption-based emissions. See Chapter 3 for more information on these Advanced Climate Initiatives.

1.4 Public Outreach and Community Engagement

CA2020 was prepared with input from community members, elected officials, and staff from the partner agencies. Ten open house-style public workshops were held, including one in each city. These meetings solicited public input on the types of reduction measures that should be included in CA2020. The role of local governments in addressing climate change and reducing GHG emissions was also discussed.

RCPA also provided an online survey that was distributed by email and social media. Additional focus groups and meetings were held with local businesses, agriculture, and service groups. Presentations and updates were given to city and town councils and the Board of Supervisors throughout the project development process, and regular updates were provided to the RCPA Board. The RCPA board held two public study sessions prior to development of CA2020.

The community dialogue that has begun with preparation of this plan will continue throughout implementation of the GHG emissions-reduction measures.

All comments received from the community and the Stakeholder Advisory Group (see below) are documented in Appendix F. Many of the comments support GHG reduction measures that are now included in CA2020. For example, enhanced transit service, expanded bike and pedestrian networks, and promotion of electric vehicles were strongly supported as part of the CA2020 strategy to reduce transportation emissions. Likewise, many comments supported building energy retrofits, distributed renewable energy generation, and sustainable agricultural practices.

The full range of GHG-reduction approaches suggested in public comments is, not surprisingly, extremely varied and generally very forward looking. For example, commenters suggested requiring point-of-sale energy audits, zero-net new water use in new developments, local government divestiture from fossil fuel investments, and greater focus on schools and youth. The measures included in CA2020 represent a subset of the ideas heard from the community. As noted throughout this plan, CA2020 is one step on a long-term path to dramatically reduced GHG emissions. Some of the suggestions gathered as part of the community outreach effort that are not included in CA2020 may very well find a place in future climate action planning in Sonoma County.

Lastly, it is important to acknowledge that a small but vocal segment of the community disagrees with the scientific consensus about the threat posed by global climate change and opposes governmental action to reduce emissions.

1.4.1 Stakeholder Advisory Group

To help guide the process, the RCPA Board of Directors selected a Stakeholder Advisory Group to represent a diversity of viewpoints and technical expertise from each community. The main role of the Advisory Group was to work with local agency staff to develop a CAP that will have broad community support for the GHG emissions-reduction programs and measures needed to meet Sonoma County's ambitious target. Three representatives from each city and two representatives from each county supervisorial district were selected; some representatives had input from city councils, though none were elected officials themselves.

The Stakeholder Advisory Group sought representation from a broad spectrum of interests, including renewable energy, agriculture, viticulture, business, community non-profits, the environment, transportation, social justice, environmental justice, real estate, health, economic development, education, open space, waste, water, and building efficiency.

The Stakeholder Advisory Group met five times at key milestones during the project. All meetings were open to the public and each meeting included an opportunity for the public to provide comments. Several ad hoc working groups from the Stakeholder Advisory Group were also convened during the development of the draft CAP to review detailed assumptions for certain GHG sources.

1.5 Relationship between the CAP and CEQA

The cities of Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, and Windsor and the County of Sonoma will use CA2020 to comply with project-level GHG impact analysis requirements under CEQA. Santa Rosa will continue to use its adopted CAP for this purpose.

The State CEQA Guidelines (Section 15183.5) allow the GHG impacts of future projects to be evaluated using an adopted plan for reduction of GHG emissions, like CA2020, provided that the plan meets specific requirements. The six requirements specified in the State CEQA Guidelines are listed below with CA2020's compliance described in *italics*.

1. Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area. *CA2020 quantifies GHG emissions from all primary sources within county jurisdictions for 1990, 2010, 2015, 2020, 2040, 2030, and 2050.*
2. Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable. *CA2020 establishes a countywide GHG emissions target of 25% below 1990 levels by 2020, a target that goes well beyond the requirements of AB 32 and puts Sonoma County on a trajectory to achieve the even greater GHG reductions needed in the future. CA2020 includes a GHG emissions budget for new development that will ensure that the countywide reduction target is met, even with projected population and economic growth. The GHG reduction measures in CA2020 will reduce project-specific emissions and thereby ensure that the new-development share of total future emissions is not exceeded. Reducing and limiting emissions from new development is part of an overall strategy that substantially reduces emissions countywide and, therefore, contributions from new development that is consistent with CA2020 would not be cumulatively considerable.*
3. Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area. *CA2020 analyzes community emissions, by source, for the partner communities, including emissions from projected growth and development expected by 2020 and beyond.*
4. Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level. *CA2020 includes specific measures to achieve the overall reduction target (see Chapter 3 and Appendix C).*

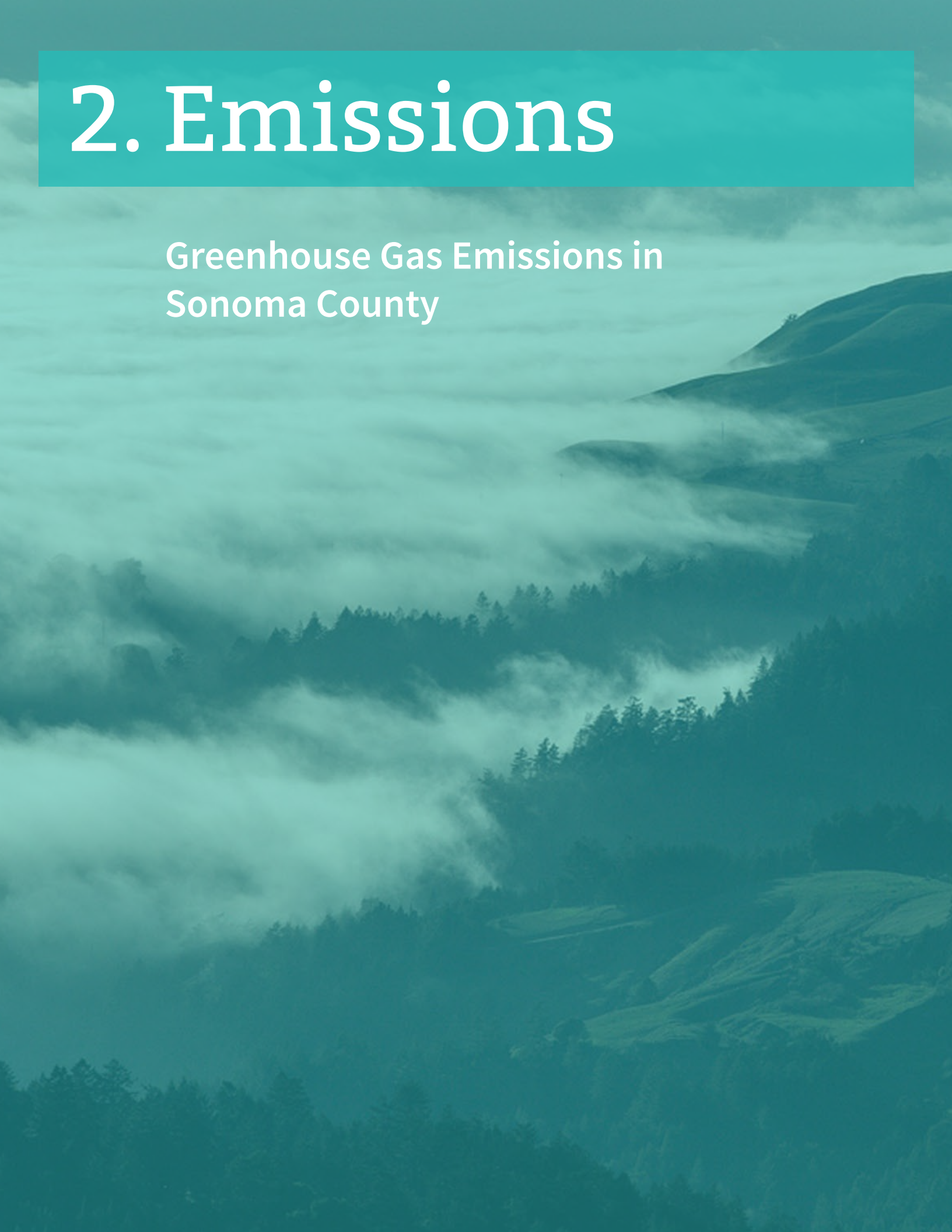
5. Establish a mechanism to monitor the plan's progress toward achieving the GHG emissions level and to require amendment if the plan is not achieving the specified level. *CA2020 includes periodic monitoring of plan progress and will be amended as needed to reach the reduction target (see Chapter 4).*
6. Adopt the GHG emissions reduction plan in a public process following environmental review. *As described in Section 1.3.2 above, a Programmatic Environmental Impact Report will be prepared for CA2020 and the CAP itself will be adopted first by RCPA, followed by adoption of community-specific portions by each local partner. The adoption process will include public outreach and public hearings.*

Once CA2020 is adopted, it may be used in the cumulative impacts analysis of later projects, a process known in CEQA as “tiering.” Tiering from the CAP potentially eliminates the need to prepare a quantitative assessment of GHG emissions on a project-by-project basis, which can help streamline the environmental review and permitting processes for these projects. To accomplish this, future project-specific environmental documents must include all applicable mandatory CA2020 measures and ensure that they are binding and enforceable by incorporating measures into the project design or identifying them as mitigation measures and conditions of approval. Future projects that incorporate mandatory CA2020 actions will not have a cumulatively considerable impact related to GHG emissions and climate change (unless substantial evidence warrants a more detailed review of project-level GHG emissions).

Appendix A provides a Climate Action Plan consistency checklist template to be adapted and modified for use by local agency planning staff to assist in determining a project's consistency with CA2020 for the purposes of CEQA tiering. Where the checklist demonstrates that a discretionary project includes all applicable mandatory local or regional measures in CA2020, local agencies can conclude that the project's impact related to GHG emissions would be less than significant under CEQA because the project is consistent with a qualified GHG reduction plan under State CEQA Guidelines Section 15183.5.

2. Emissions

Greenhouse Gas Emissions in Sonoma County



Chapter 2

Greenhouse Gas Emissions in Sonoma County

2.1 Introduction

Estimates of historic, current, and future greenhouse gas (GHG) emissions are essential to understanding local emissions sources that communities can influence to reduce local contributions to climate change. These estimates, referred to as *inventories*, help to define priorities for emissions reduction strategies and for tracking progress.

The activity-based inventory approach used in this CAP focuses on sources of emissions that a local jurisdiction can readily influence. At this time, it keeps separate two important ways in which actions taken in Sonoma County influence GHG emissions: goods consumption (i.e., emissions that result from local consumption of goods produced in other places) and biological carbon sequestration and emissions from the land base. Although not part of the activity-based inventory at this time, these important aspects of understanding local opportunities to reduce GHG emissions while engaging residents and the agriculture community are explored further in Section 2.4, below, and will be incorporated in the County's GHG goals in the future, as outlined in Chapter 3, *Reducing Community Emissions*.

Several GHG inventories were developed for this plan. The 1990 *backcast* estimates historic emissions levels and serves as the baseline for measuring future GHG reductions; the 2010 inventory measures existing emissions sources and forecasts future emissions in 2020, 2040, and 2050 under a business-as-usual (BAU) scenario (i.e., without implementation of climate action strategies). More details on data sources and specific methods used for each GHG source can be found in Appendix B.

Roughly 3.9 million metric tons of carbon dioxide equivalent (MMTCO₂e) emissions were generated by activities in Sonoma County in 1990 (see Table 2-1). By 2010, emissions were 9% lower, at about 3.6 MMTCO₂e. However, in the absence of state and local climate action, emissions are projected to grow to 4.3 MMTCO₂e by 2020, largely driven by population and economic growth.

Table 2-1. Summary of Countywide Emissions

	Backcast	Inventory	Business-as-Usual Forecasts		
Key Climate Action Plan Indicators	1990	2010	2020	2040	2050
Countywide emissions (MTCO ₂ e)	3,944,000	3,601,000	4,343,000	4,923,000	5,113,000
Percent change from 1990	N/A	-9%	10%	25%	30%
Per capita emissions (MTCO ₂ e/person)	10.2	7.8	8.6	8.6	8.5
CA per capita emissions (MTCO ₂ e/person) ¹	14.5	12.1	12.5	12.9	13.8
Population (people)	388,222	459,973	507,727	573,489	601,140
Housing (housing units)	149,382	180,465	202,035	228,688	239,497
Employment (jobs)	172,064	195,121	230,151	247,051	254,428

¹ For details on how the California per capita emissions were estimated, please refer to Appendix C.

2.2 Measuring Emissions

2.2.1 What Is in the Inventories?

The inventories of community-wide GHG emissions in Sonoma County capture the primary sources of emissions that can be reduced through the actions of local governments and regional entities: energy use in our homes, businesses, vehicles, and off-road equipment; emissions from treating and delivering water; emissions from materials that are thrown away; and fertilizer and livestock operations. This approach is known as an “activity-based” inventory. It involves measuring or modeling the primary emissions-generating activities in Sonoma County and translating them into GHG emissions based on standard or locally specific emissions factors. Most sources included cause emissions within the county. However, some emissions that occur outside the county are also included but only to the extent that such emissions are the direct result of community activities that can be reduced through local actions. For example, GHG emissions from regional power plants that provide electricity to local homes and businesses are included, even though the power plants may not be located within the county.

Example: Estimating Building Energy Emissions

Here is a quick overview of how building energy GHG emissions are estimated:

Step 1: Determine which utilities supply electricity and natural gas to residents and businesses in the unincorporated areas.

Step 2: Obtain annual energy usage from the utilities. Electricity consumption is provided in terms of kilowatt hours, whereas natural gas usage is provided in terms of therms.

Step 3: Multiply electricity and natural gas quantities by GHG emission factors.

Step 4: Add emissions from electricity and natural gas to determine total GHG emissions from building energy use.

Local emissions-generating activities addressed in this plan are summarized in Table 2-2. The analysis of emissions includes carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Of these gases, CO₂ emissions contribute the most to global warming, both internationally and locally. For certain GHG sources (e.g., dairies and livestock, solid waste, wastewater treatment), CH₄ and N₂O play a more significant role. All three gases are expressed as metric tons of carbon dioxide equivalent (MTCO₂e), based on the global warming potential of these gasses relative to CO₂ (see Chapter 1).

Global Warming Potentials for Greenhouse Gases

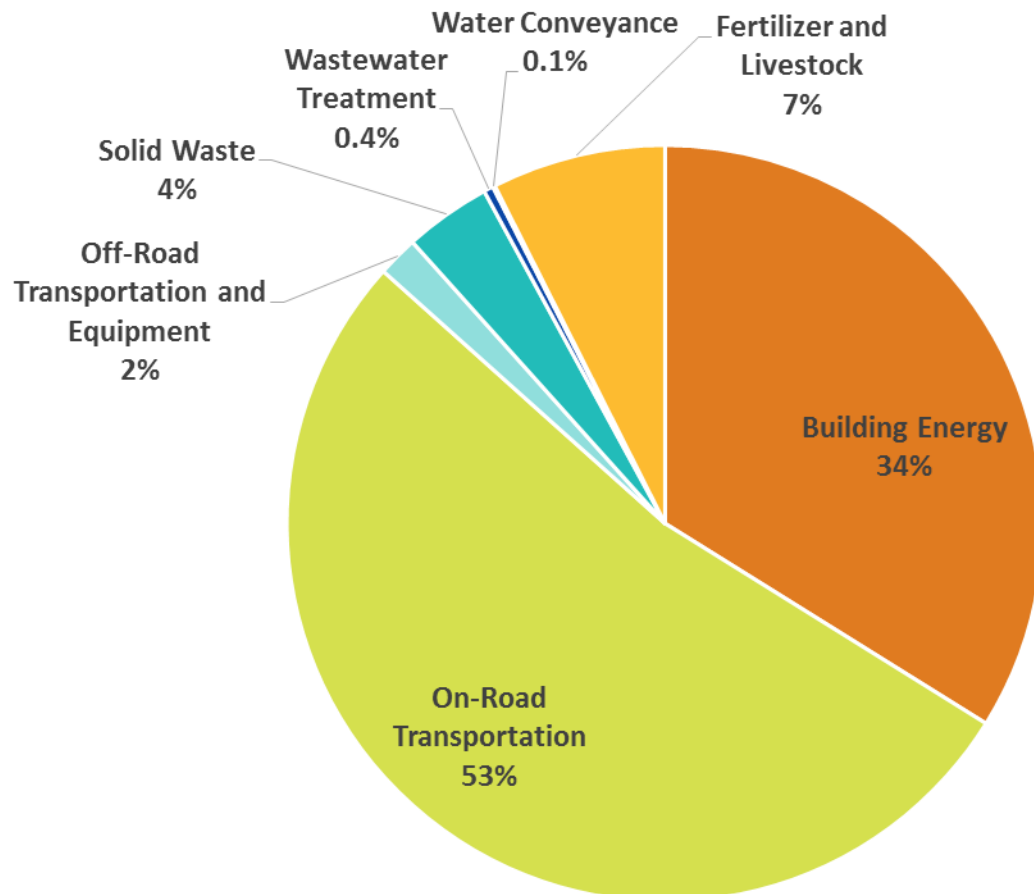
GHGs are not created equally. The Global Warming Potential, or GWP, is used to compare GHGs based on their potential to trap heat and remain in the atmosphere. Some gases can absorb more heat than others and thus have a greater impact on global warming. For example, CO₂ is considered to have a GWP of 1, whereas N₂O has a GWP of 265. This means that N₂O is 265 times more powerful than CO₂.

Table 2-2. Key Activity Data by GHG Source

Source	Primary Emissions Sources	Key Activity Data	Data Sources
Building Energy	<ul style="list-style-type: none"> • Production of electricity (emissions generated at power plants) • Combustion of natural gas • Combustion of other fuels (e.g., propane, fuel oil, wood) in residences 	<ul style="list-style-type: none"> • Total electricity use (megawatt hours) • Total natural gas use (therms) • Total fuel combustion for other fuels 	<ul style="list-style-type: none"> • Electric utilities: Pacific Gas & Electric (PG&E), City of Healdsburg, Sonoma Clean Power (in years after 2010) • Natural gas utilities: PG&E • Other fuels
On-Road Transportation	<ul style="list-style-type: none"> • Combustion of gasoline and diesel fuel in vehicles • Combustion of fuels in transit vehicles 	<ul style="list-style-type: none"> • Vehicle miles traveled • Fuel type and fuel economy of countywide vehicle fleet • Travel patterns 	<ul style="list-style-type: none"> • Sonoma County Transportation Authority • California Air Resources Board's (ARB) EMFAC2011 model
Off-Road Transportation and Equipment	<ul style="list-style-type: none"> • Combustion of fossil fuels in equipment (e.g., cranes, bulldozers, lawn mowers) • Combustion of fossil fuels in off-road vehicles (e.g., ATVs, boats) 	<ul style="list-style-type: none"> • Fuel consumption in off-road vehicles and equipment • Socioeconomic data 	<ul style="list-style-type: none"> • ARB's OFFROAD 2007 and OFFROAD2011 model
Solid Waste	<ul style="list-style-type: none"> • Methane emissions from decomposition of organic matter sent to landfills 	<ul style="list-style-type: none"> • Tons of waste (residential and commercial) sent to landfills • Profile of waste material for residential and commercial waste in each jurisdiction (e.g., 19% paper, 36% food waste) 	<ul style="list-style-type: none"> • Sonoma County Waste Management Agency
Wastewater Treatment	<ul style="list-style-type: none"> • Emissions of methane and nitrous oxide that occur during wastewater treatment 	<ul style="list-style-type: none"> • Population served by each wastewater treatment plant (WWTP) • Method of wastewater treatment at each WWTP • Amount of digester gas produced at each WWTP 	<ul style="list-style-type: none"> • Sonoma County Water Agency • Sanitation districts and jurisdictions that operate a WWTP
Water Conveyance	<ul style="list-style-type: none"> • Production of electricity associated with the pumping and movement of water from source to user (emissions generated at power plants) 	<ul style="list-style-type: none"> • Water consumption • Water supply sources (e.g., groundwater, Russian River) 	<ul style="list-style-type: none"> • Urban Water Management Plans for each jurisdiction • Sonoma County Water Agency
Livestock and Fertilizer	<ul style="list-style-type: none"> • Emissions of nitrous oxide from the application of fertilizer • Emissions of methane and nitrous oxide from livestock and manure management 	<ul style="list-style-type: none"> • Acres and types of crops grown in the county • Livestock population numbers 	<ul style="list-style-type: none"> • Sonoma County Agricultural Commissioner

The 2010 countywide inventory reveals that two activities are responsible for 87% of locally generated emissions: transportation and building energy use (see Figure 2-1). Livestock, fertilizer, solid waste, water, wastewater, and off-road equipment represent smaller sources in Sonoma County; however, these activities still hold opportunity for emissions reductions.

Figure 2-1. 2010 Countywide GHG Emissions by GHG Source



2.2.2 Which Years Were Measured?

Several GHG profiles were developed for Climate Action 2020 (CA2020):

1990 Backcast: An estimate of community-wide emissions levels in 1990 was developed to understand historic emissions levels in Sonoma County and provide a baseline for measuring future GHG reductions. This baseline year aligns with the statewide baseline in Assembly Bill 32, California’s climate action framework through 2020. Emissions data for 1990 are not available for all GHG sources to the degree they are available now; therefore, 1990 levels were estimated with available socioeconomic and source-specific data and emissions factors when possible, using the same protocol for the 2010 inventory and future forecasts.

2010 Inventory: The 2010 community inventory was developed by using actual activity data, such as kilowatt-hours and vehicle miles traveled, as reported by utilities and other local agencies. Emissions generated by community activities were analyzed using widely accepted methodologies and procedures recommended by federal, state, and local air quality management agencies. The primary protocol used was the *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (ICLEI – Local Governments for Sustainability 2012). In that protocol, 2010 was chosen with the input of the jurisdictions and other relevant stakeholders, taking into account data availability and completeness. A key consideration was the existence of highly reliable socioeconomic information from the 2010 U.S. Census.

Business-as-Usual (BAU) Forecast: GHG emissions forecasts for 2015, 2020, 2040, and 2050 were based on projected growth in population, employment, and households in the county (see Table 2-1). Forecasts for 2015 and 2020 were developed to evaluate the magnitude of the challenge in meeting the short-term target of 25% below 1990 levels. Forecasts even further into the future (2040 and 2050) were developed to help prepare the county to meet long-term GHG reduction goals. Data used for the BAU forecasts are predictions of community emissions that would occur in future years without accounting for federal, state, and local actions to reduce GHG emissions. Although Sonoma County’s GHG reduction target is based on a 1990 baseline, the BAU forecasts also help show the magnitude of the challenge to reach the target.

Analysis was done for each source within the inventory and for each jurisdiction in Sonoma County. Detailed methodologies for calculating emissions for each source, jurisdiction, and year are provided in Appendix B.

2.3 Inventory Results

2.3.1 GHG Emissions in Sonoma County by Source

This section begins with an overview of GHG emissions from all sources, calculated as outlined in Appendix B, followed by a more detailed description of existing emissions for each source (see Table 2-3 and Figure 2-2). These source-specific discussions provide a deeper exploration of the main factors that influence GHG emissions. This analysis was then used to identify the most effective emissions reduction opportunities, which are reflected in the reduction measures in Chapter 4.

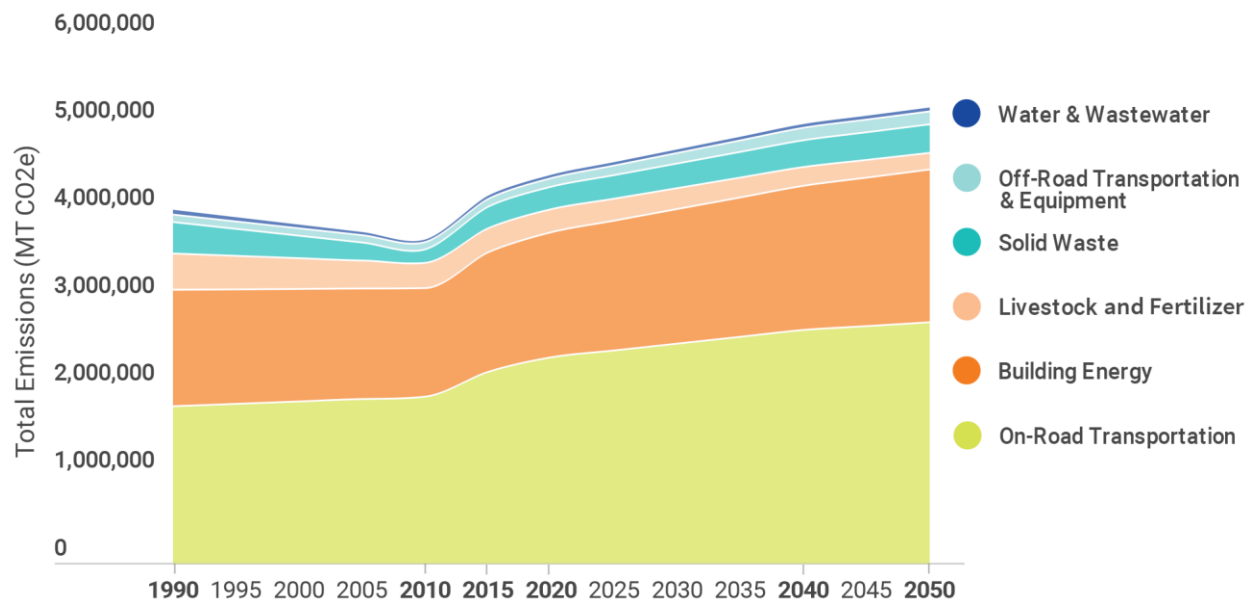
Table 2-3. GHG Inventory and Forecast Results by Source, and Year

Emission Source	Emissions (MTCO ₂ e)					
	Backcast	Inventory	BAU Forecasts			
	1990	2010	2015	2020	2040	2050
Building Energy	859,000	1,220,000	1,347,390	1,410,500	1,629,900	1,728,100
On-Road Transportation	1,203,000	1,899,000	2,183,420	2,349,500	2,661,500	2,749,400
Off-Road Equipment	43,000	62,000	68,470	77,300	121,600	126,600
Solid Waste	281,000	134,000	224,880	235,900	285,100	305,700
Wastewater Treatment	15,000	15,000	13,400	13,600	14,800	15,500
Water Conveyance	27,000	4,000	13,030	13,600	17,000	18,400
Fertilizer and Livestock	393,000	268,000	254,420	242,600	193,500	169,000
Santa Rosa 1990 Emissions ¹	1,123,100	—	—	—	—	—
Sonoma County Total	3,944,000	3,601,000	4,105,000	4,343,000	4,923,000	5,113,000

Notes:

¹ Santa Rosa's emissions in 1990 are not available from the city's Climate Action Plan (CAP); 1990 emissions were thus assumed to be equal to 15% below the baseline level of emissions, per the city's CAP. As a result, source emissions for Santa Rosa in 1990 are not available and are included as a separate line item. Santa Rosa emissions for all other years are disaggregated into each source.

Figure 2-2. Countywide GHG Inventory and Forecast Results by Source and Year¹



Transportation and building energy generate the vast majority of local GHG emissions and, without effective reduction measures, emissions from these sources will steadily increase as the county's population and employment increase. Fortunately, these two sources also present the greatest opportunities for GHG emission reductions. Emissions from solid waste and water conveyance decreased dramatically between 1990 and 2010 because of increased waste diversion efforts and more efficient water delivery methods. Emissions from wastewater treatment were approximately the same in 1990 and 2010 despite an increase in population, most likely due to a shift to less emissions-intensive wastewater treatment methods and a decline in per capita wastewater flows. Fertilizer and livestock emissions declined between 1990 and 2010 and will continue to do so in future years because of declining livestock-related agriculture and improved livestock manure management in the county.

Countywide GHG emissions decreased by 8.7% between 1990 and 2010 but will increase by 21% between 2010 and 2020 under BAU conditions, absent any GHG reduction effort. Most of the projected increase in BAU emissions between 2010 and 2020 is due to increases in emissions from building energy use and on-road transportation resulting from growth in population and housing. These GHG sources will also increase as a result of new development by 2020.

By 2050, BAU emissions are forecast to grow by 42% from 2010 levels to more than 5 million metric tons. Again, most of that growth will be driven by building energy use and transportation.

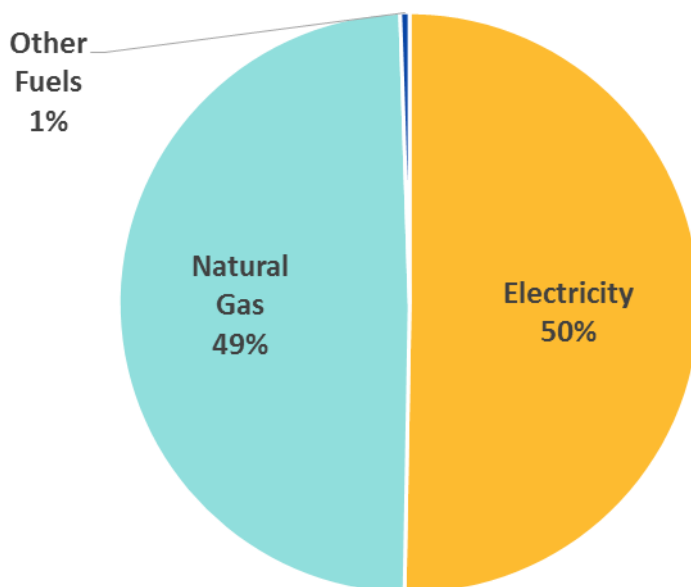
¹ The 1990 emissions in this chart include Santa Rosa's total 1990 emissions apportioned to each source using the 2010 inventory source distribution for the city (actual 1990 emissions by source are not available).

Existing Emissions from Building Energy

Electricity production and the direct combustion of natural gas in buildings generated more than **1.2 million MTCO₂e in 2010**, making building energy use the second-largest source of community emissions (about 34%), behind on-road transportation. Increases in population and employment, along with rising temperatures and cooling demands, will increase building energy use and associated GHG emissions in the future without further action.

Building Energy Emissions by Fuel. Roughly 50% of total building energy emissions come from electricity generation, and 49% comes from the combustion of natural gas (see Figure 2-3). A relatively small amount of other fuels—wood, propane, and kerosene—are used in buildings in Sonoma County, representing 1% of building energy emissions.² Building energy measures in CA2020 are focused on the two major fuels used in buildings, although measures that improve building energy efficiency will also reduce emissions related to other fuels.

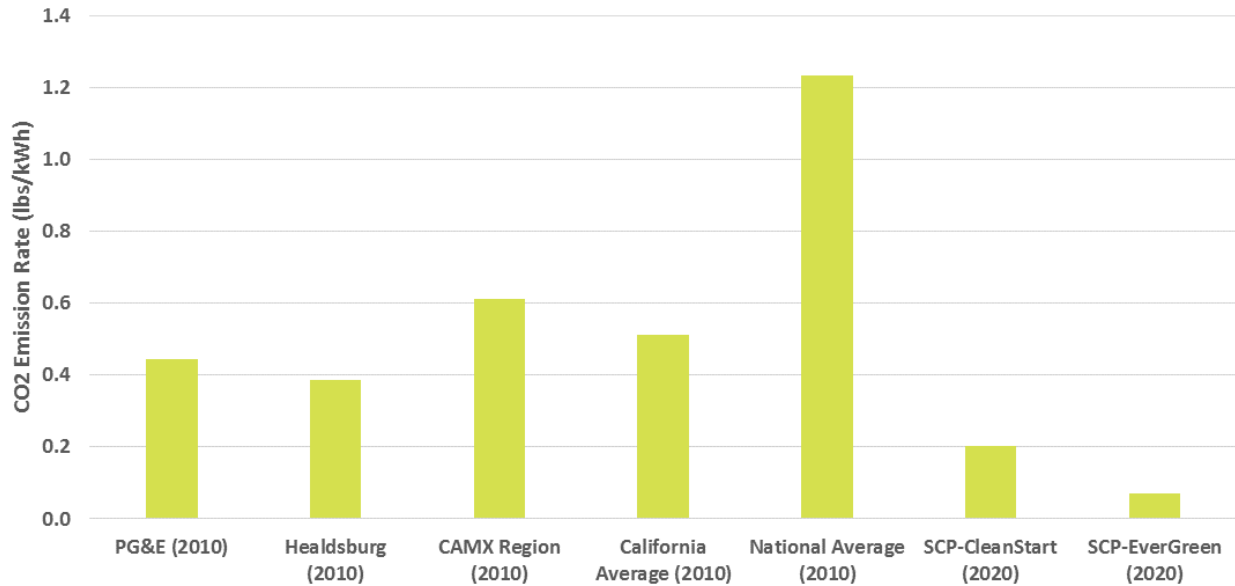
Figure 2-3. Building Emissions by Fuel



As shown in Figure 2-4, the electricity consumed in Sonoma County in 2010 was already relatively low in GHG intensity, compared to both U.S. and California averages. The two primary utilities serving the county in 2010—Pacific Gas & Electric Company (PG&E) and Healdsburg Electric—achieved lower emissions by procuring electricity generated by low-carbon and renewable sources, including hydropower, wind, solar, and geothermal.

² Approximately 6% of homes in the County use these fuels. GHG emissions represent only 1% of total building energy emissions because that source also includes electricity emissions and nonresidential emissions.

Figure 2-4. CO₂ Emissions Factor Comparison by Utility/Region



Continued pursuit of zero-carbon electricity sources presents a major opportunity to reduce emissions in Sonoma County. This includes both on-site electricity generation (such as rooftop solar) and reduced- or zero-carbon electricity generation portfolios provided by utilities. Sonoma Clean Power (SCP) was created in 2014 to offer low-carbon and zero-carbon electricity options for homes and businesses in Sonoma County. The predicted GHG intensity of SCP electricity in 2020 is also shown in Figure 2-4. Over time, both PG&E and SCP will pursue increasingly more renewable generation to comply with state climate and energy goals and ultimately surpass those state goals.

The 2014 power mixes for PG&E and SCP are shown in Figure 2-5.

Another opportunity to reduce emissions is presented by reducing or replacing natural gas with on-site photovoltaic (PV) electric generation. SCP, the County of Sonoma Energy and Sustainability Division, and the Northern Sonoma County Air Pollution Control District will be involved in creating the incentives to support this measure.

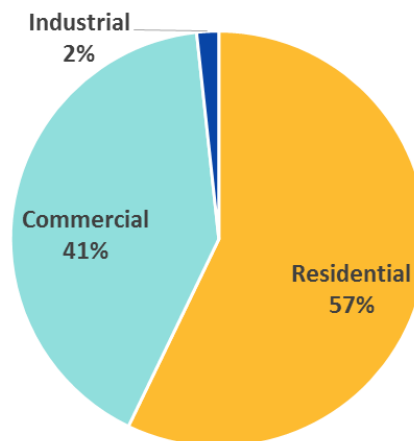
Figure 2-5. Comparison of PG&E and SCP 2014 Electric Power Generation Mixes

Electric Power Generation Mix*	PG&E	Sonoma Clean Power	
		CleanStart	EverGreen
Specific Purchases	Percent of Total Retail Sales (kWh)		
Renewable	27%	36%	100%
• Biomass & Biowaste	5%	3%	0%
• Geothermal	5%	12%	100%
• Eligible hydroelectric	1%	0%	0%
• Solar electric	9%	0%	0%
• Wind	7%	21%	0%
Coal	0%	0%	0%
Large hydroelectric	8%	44%	0%
Natural Gas	24%	0%	0%
Nuclear	21%	0%	0%
Other	0%	0%	0%
Unspecified Sources of Power	21%	20%	0%
TOTAL	100%	100%	100%

*The generation data represents 2014 and is provided in the "Annual Report to the California Energy Commission: Power Source Disclosure Program," excluding voluntary unbundled renewable energy credits. PG&E data is subject to an independent audit and verification that will not be completed until October 1, 2015.

Building Energy Emissions by End Use. Different building types use energy for different purposes, with different opportunities to reduce emissions (see Figure 2-6). In 2010, roughly 58% of building energy was used in homes, compared with 42% used in businesses, institutions, and other nonresidential settings.

Figure 2-6. Building Energy Emissions by End Use



Residential buildings consume energy for heating, cooling, hot water, lighting, and appliances. Policies and programs to reduce emissions from residential buildings must focus on reducing energy demand through conservation and improvements to building energy efficiency and meeting demand with low- or zero-carbon energy sources.

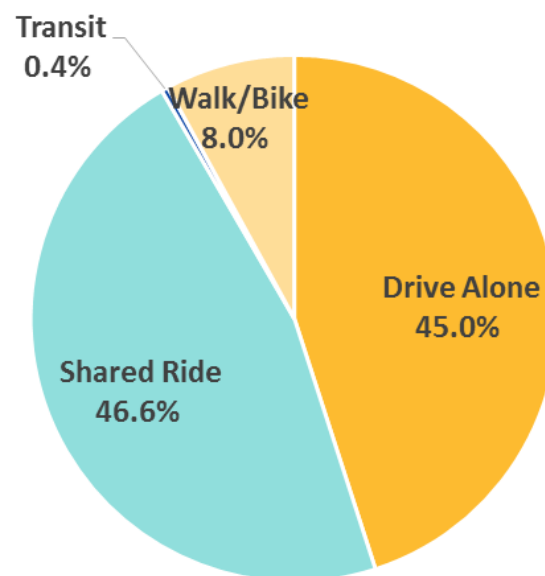
The energy needs of commercial buildings are more diverse. A retail building may have energy needs for lighting and air conditioning, while a hotel may have a very large demand for hot water. Measures to address emissions from nonresidential buildings must be designed with the unique needs of commercial and industrial buildings in mind.

Existing Emissions from Transportation

On-road transportation is the largest source of GHG emissions for the county; approximately 53% of total countywide emissions are from transportation, or nearly **2 million MTCO₂e**. Vehicle trips made by residents and employees within the county are expected to increase as the population and economy grow. Strategies to support alternative modes of transportation, improve transportation efficiency, and reduce vehicle miles traveled are therefore an essential part of CA2020.

Transportation Emissions by Mode. In 2010, motorists traveled more than 11 million vehicle miles in Sonoma County each day. These trips were taken primarily in passenger vehicles, with additional trips by commercial vehicles, transit vehicles, and other vehicle types. Figure 2-7 shows a breakdown of daily countywide trips by mode for 2010 for all trip purposes (e.g., home to work, home to school, nonresidential), as provided by the Sonoma County Transportation Authority.

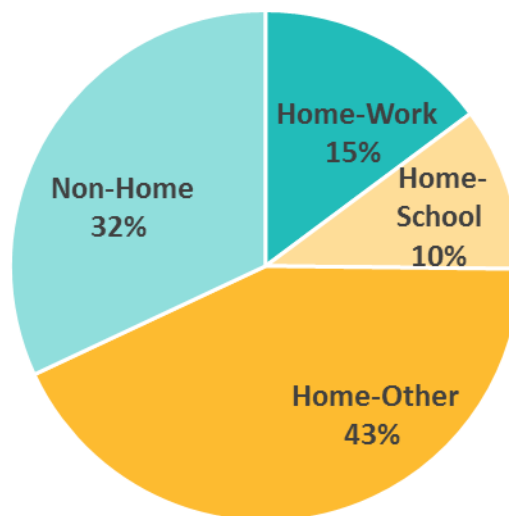
Figure 2-7. Sonoma County Daily Trips by Mode for 2010



Transportation Emissions by Purpose. Opportunities to reduce emissions from transportation must be based on an understanding of how, why, and where people travel in Sonoma County. The Sonoma County Transportation Authority’s Comprehensive Transportation Plan provides a 25-year transportation vision for Sonoma County. Comprehensive Transportation Plan goals include maintaining the current transportation system, reducing traffic congestion, reducing GHG emissions, improving safety and health, and promoting economic vitality. The plan includes bicycle and pedestrian projects, highway and local road infrastructure projects, technology projects (e.g., energy-efficient streetlights and signal timing), smart land use projects, and transit projects.

Most trips in Sonoma County (about 68%) are home-based trips. About two-thirds of these home-based trips are for purposes other than getting to/from work or school. Non-home trips include all trips that do not begin or end at home, including commercial or business-related trips. Figure 2-8 shows a breakdown of daily countywide trips by purpose for 2010, as provided by the Sonoma County Transportation Authority.

Figure 2-8. Sonoma County Daily Trips by Purpose for 2010

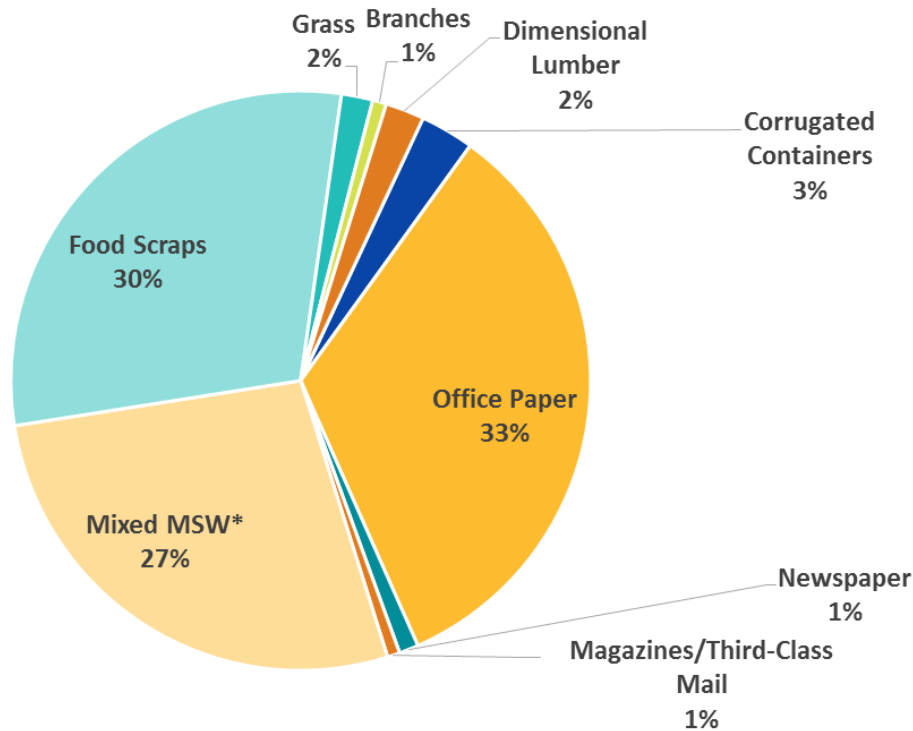


Existing Emissions from Solid Waste

In 2010, county residents and businesses generated an estimated 1.3 million tons of solid waste, 350,000 tons of which was landfilled, generating about **134,000 MTCO₂e** (about 4% of total 2010 emissions). About 58% of this waste comes from commercial sources and 42% from residential sources. Increasing population and employment means more solid waste and associated GHG emissions in the future without further action. Strategies to reduce waste generation, increase waste diversion from landfills (such as through recycling and composting), and increase methane capture are therefore essential parts of CA2020.

Waste landfilled in the county includes a variety of waste categories, such as paper, plastic, glass, and food. Figure 2-9 shows a breakdown of waste emissions by waste type for 2010.

Figure 2-9. Sonoma County Solid Waste Emissions by Waste Type for 2010



* "Municipal solid waste" or "MSW" means all solid wastes generated by residential, commercial, and industrial sources, and all solid waste generated at construction and demolition sites, at food-processing facilities, and at treatment works for water and waste water, which are collected and transported under the authorization of a jurisdiction or are self-hauled. Municipal solid waste does not include agricultural crop residues, animal manures, mining waste and fuel extraction waste, forestry wastes, and ash from industrial boilers, furnaces and incinerators (see: <http://www.calrecycle.ca.gov/laws/regulations/title14/ch9a3.htm>).

Existing Emissions from Water and Wastewater

In 2010, energy used to convey potable water and treat wastewater resulted in GHG emissions of more than **18,000 MTCO₂e** (about 0.5% of total 2010 emissions). County residents and businesses consumed more than 20 billion gallons of water in 2010 and are expected to consume nearly 27 billion gallons by 2020 under BAU conditions, an increase of 28%. This increased water use also means more wastewater generation, resulting in increased GHG emissions in the future without further action. Water resources, including surface and groundwater, are essential parts of the county community and economy. Given the potential for future reductions in water supplies as a result of climate change, water conservation and wastewater treatment are critical strategy areas for CA2020.

The water conveyance emissions include those from large municipal water providers including, but not limited to, the Sonoma County Water Agency (SCWA) wholesale water system, systems operated by SCWA's retail water contractors, and the smaller supplier-produced groundwater providers. Electricity use (and associated emissions) for private domestic and agricultural wells is accounted for in CA2020 under building energy.

Water Use by Source and End Use. Water conveyance resulted in approximately 3,600 MTCO₂e of emissions in the county in 2010. These emissions represent energy use for water supply and treatment activities and include SCWA operations, groundwater pumping, and recycled water use. SCWA is a water wholesaler that provides water to retail water contractors (primarily cities and water districts). The 2010 emissions from water conveyance are already lower than they would be otherwise because of SCWA's program to create a zero-carbon water system by 2015. SCWA water contractors provide about 56% of the water supply within the county. End uses of this water include residential, commercial, landscaping, and other uses. Single- and multi-family residential water use represents 68% of all water deliveries by retailers in the county.

Figure 2-10 shows a breakdown of water supply by source for 2010, while Figure 2-11 shows a breakdown of water use by sector for 2010

Figure 2-10. Sonoma County Water Supply by Source for 2010

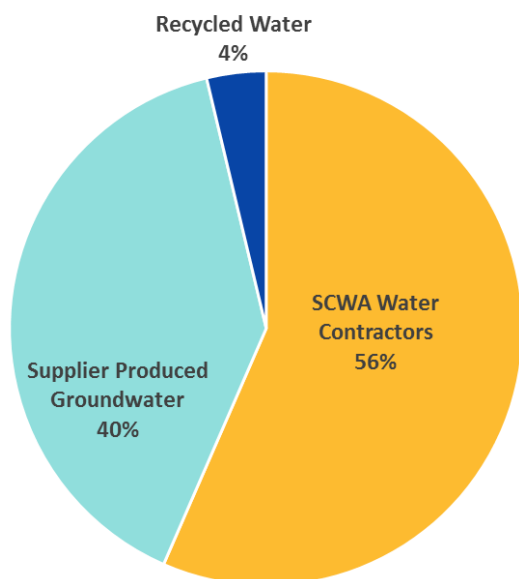
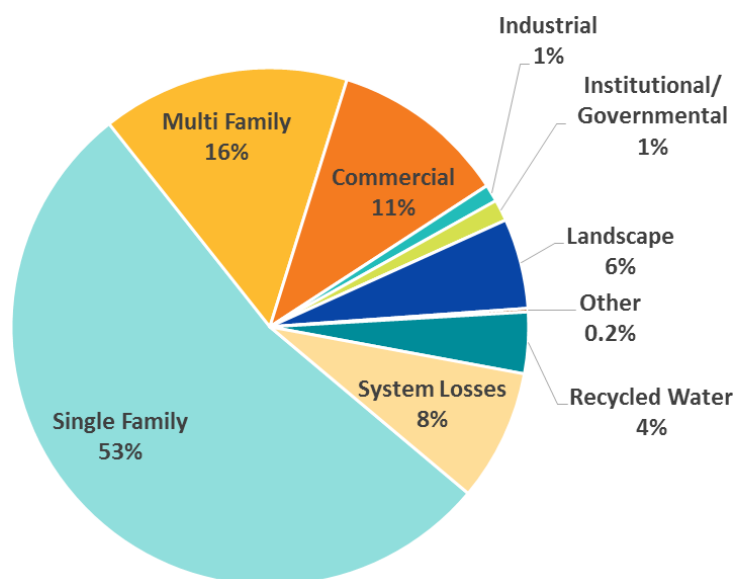


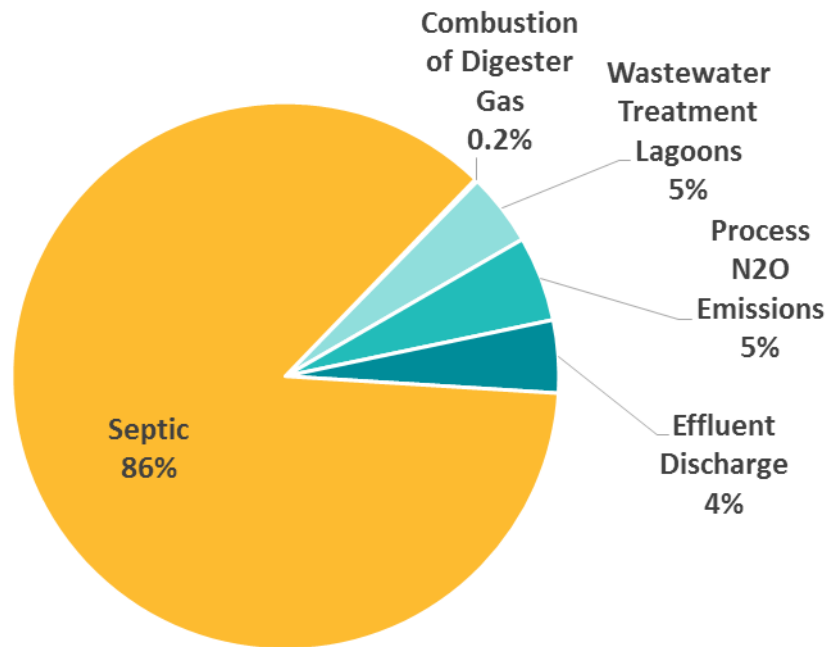
Figure 2-11. Sonoma County Water Use by Sector for 2010



Wastewater Emissions by Source. Wastewater treatment resulted in approximately 15,000 MTCO₂e of emissions in the county. Wastewater treatment includes a variety of different processes, each of which releases CH₄ and N₂O emissions. The majority (86%) of wastewater emissions in the county are from individual septic systems, which serve approximately 24% of the countywide population. Wastewater treatment plants (WWTPs) serve the remaining 76% of the county population, and emissions from WWTPs represent 13% of total wastewater treatment

emissions (WWTPs produce fewer emissions per person served than septic systems). Figure 2-12 shows a breakdown of wastewater emissions by source for 2010.

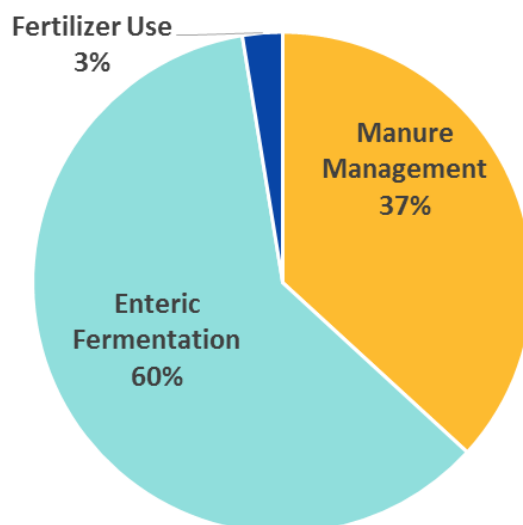
Figure 2-12. Sonoma County Wastewater Emissions by Source for 2010



Existing Emissions from Livestock and Fertilizer

Livestock and fertilizer emissions are the third-largest source of emissions in Sonoma County overall after transportation and building energy, accounting for just over **7% of emissions in 2010** (see Figure 2-13). The primary emissions are CH₄ generated by manure storage and enteric (digestive) fermentation and N₂O generated by fertilizer application.

Figure 2-13. Livestock and Fertilizer Emissions by Source



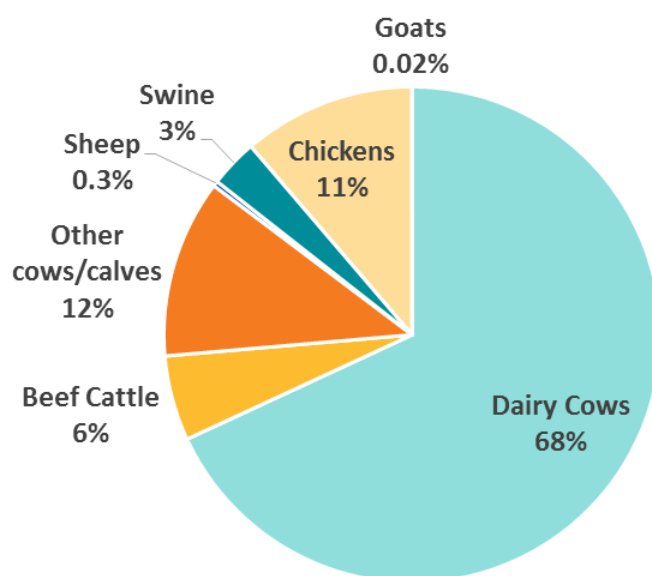
Methane and Nitrous Oxide from Livestock Operations. The majority (97%) of emissions from livestock and fertilizer come from livestock operations (mostly dairy cows) (see Figure 2-14). These emissions arise from the management of livestock manure and livestock enteric fermentation (digestion).

Manure creates both CH₄ and N₂O as it biodegrades. The amount of CH₄ generated varied considerably depending on the type of manure management used. Well-managed pasture systems and aerobic dry composting systems tend to have lower emissions, while anaerobic wet handling systems generate more CH₄.

Dairies in Sonoma County are now predominantly organic, which means that dairy cows must spend at least 1/3 of their time in pasture. This trend has reduced emissions from livestock manure. Dairy farmers are also growing more livestock feed on-site, rather than importing feed, which also reduces GHG emissions related to the transportation of imported feed.

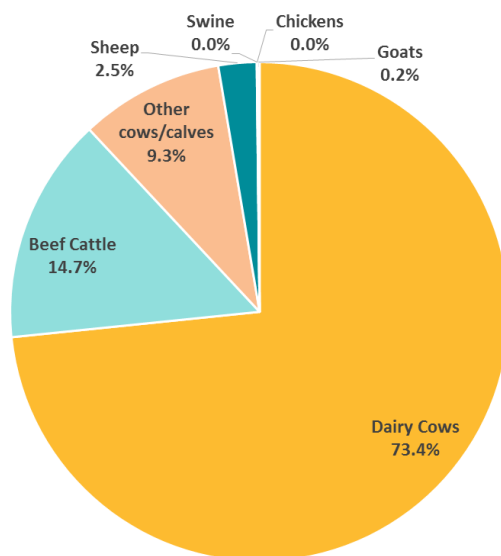
Nonetheless, significant opportunity exists to promote manure management practices that reduce emissions, including practices that rely on anaerobic digesters, dry composting, pasture management and waste-to-energy facilities.

Figure 2-14. Manure Management Emissions by Livestock Type



The other major emissions source is enteric fermentation, again mostly from dairy cows (see Figure 2-15). Enteric fermentation is the process of microbial fermentation that produces CH₄ during animal digestion (ICLEI – Local Governments for Sustainability 2012).

Figure 2-15. Enteric Fermentation Emissions by Livestock Type

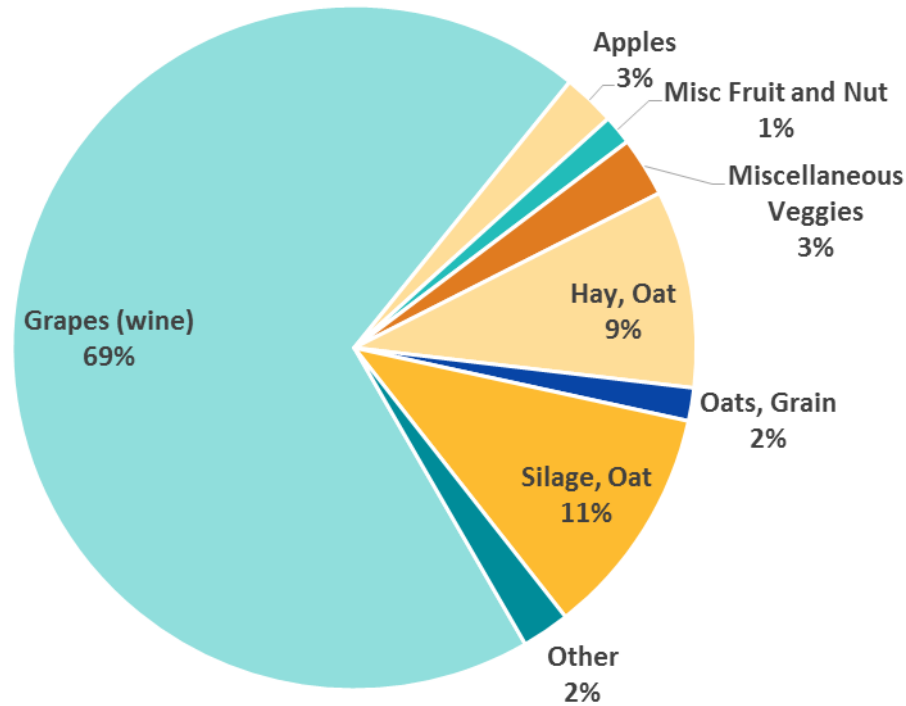


CH₄ emissions can be reduced through animal diets that create a digestive environment that is less conducive to methanogens, although opportunities to significantly reduce enteric emissions are currently limited. Such options include dietary oils (e.g., whole cottonseed oil, sunflower oil, coconut oil, palm oil), the use of corn or legume silage in place of grass silage, and the use of concentrate feeds, nitrates, ionophores, and tannins. Improving forage quality and overall efficiency in dietary nutrient use are other options.

Emissions from Fertilizer Use. The remainder (3%) of emissions from livestock and fertilizer is mainly from the application of nitrogen-based fertilizers (see Figure 2-15). N₂O is emitted when nitrogen is added to the soil through the use of synthetic fertilizers. Fertilizer application is the largest source of N₂O emissions in the U.S., accounting for about 74% of total U.S. N₂O emissions in 2013 (U.S. Environmental Protection Agency 2015). Different crops use fertilizer at different rates; therefore, the rate of emissions from fertilizers varies by crop type; soil management, including irrigation; and fertilizers used.

Despite having a relatively low rate of fertilizer use, wine grape production in the county is responsible for the majority of N₂O emissions associated with fertilizer use because of the total amount of acreage devoted to wine grapes (see Figure 2-16).

Figure 2-16. Total Fertilizer Emissions by Crop Type



Source: U.S. Department of Agriculture National, Agricultural Statistics Service. 2013. *QuickStats Ad-hoc Query Tool*. Available: <http://nassgeodata.gmu.edu/CropScape/>. Accessed: November 2013.

2.3.2 GHG Emissions in Sonoma County by Jurisdiction

Changes in emissions by jurisdiction over time are a product of a number of factors, including economic and population growth, annexations, urban growth boundaries, an emphasis on city-centered growth, and changes in efficiency, energy sources, and behavior (see Table 2-4).

Forecasts for future growth in emissions by jurisdiction are based on socioeconomic projections developed by each jurisdiction. More discussion of the factors that drive growth (or reductions) in emissions within in each jurisdiction's boundary over time is provided in Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*.

Table 2-4. GHG Inventory and Forecast Results by Jurisdiction and Year

Jurisdiction	Emissions (MTCO ₂ e)					
	Backcast	Inventory	BAU Forecasts			
	1990	2010	2015	2020	2040	2050
<i>Emissions by Jurisdiction</i>						
Cloverdale	57,300	59,000	69,300	73,300	93,200	93,800
Cotati	51,500	52,100	57,300	61,300	69,000	70,900
Healdsburg	93,500	108,800	117,000	121,000	123,700	121,100
Petaluma	387,000	441,900	505,000	543,000	580,900	588,600
Rohnert Park	291,300	264,300	317,400	372,700	371,800	378,600
Santa Rosa*	1,123,100	1,065,200	1,338,400	1,396,900	1,844,700	2,027,500
Sebastopol	73,200	76,300	85,300	93,000	96,500	97,100
Sonoma	96,900	103,400	117,400	122,200	132,500	131,200
Windsor	133,000	157,800	178,300	188,100	212,000	216,500
Unincorporated Sonoma County	1,244,300	1,004,500	1,065,300	1,128,800	1,205,600	1,218,300
<i>Emissions Not Assigned to Individual Communities</i>						
Fertilizer and Livestock	392,800	267,600	254,400	242,600	193,500	169,000
Sonoma County Total	3,944,000	3,601,000	4,105,000	4,343,000	4,923,000	5,113,000
* 2040 and 2050 forecasts for Santa Rosa were derived from the City's CAP. Emissions for each source for the years 2020 and 2035 were linearly extrapolated to 2040 and 2050.						

2.3.3 How Does This Analysis Differ from Previous Inventories?

The GHG inventories prepared for Climate Action 2020 are the most comprehensive look at community-wide GHG emissions in the county to date. This is the first time that a community-wide measurement for each jurisdiction has been completed across all seven sources. They are also based on the most current emissions factors and methodologies in use for community climate action planning in California. However, this is not the first time emissions have been measured in Sonoma County. Local governments and community-based organizations have been measuring

Municipal GHG Inventories in Sonoma County:

In 2002 and 2003, the Sonoma County jurisdictions prepared municipal GHG inventories, with assistance from the Climate Protection Campaign. The Climate Protection Campaign helped the jurisdictions track and reduce emissions from their municipal operations, using a variety of tools, and released annual GHG report cards.

GHG emissions since the early 2000s. Because of differences in protocols, datasets, and emissions factors used, past measurements cannot be compared directly against CA2020 measurements. Nonetheless, they are still important benchmarks in the history of climate action in Sonoma County. The community-wide inventories developed by the Center for Climate Protection (formerly the Climate Protection Campaign) reveal a trend over time that helps show how local climate leadership has influenced local emissions. The inventories prepared by the Center for Climate Protection can be found on its website (<http://climateprotection.org/our-work/reports/>).

The City of Santa Rosa adopted a community climate action plan in 2012. The inventory developed by Santa Rosa for its CAP was calculated by using the best available data and methodology at the time. Santa Rosa's 2007 baseline inventory provides a foundation for the City's adopted target to reduce emissions to 25% below 1990 levels by 2020 (the City's 1990 emissions estimate was calculated as 15% below the 2007 baseline inventory). Santa Rosa's inventory and estimated GHG reductions through measures in its CAP have been integrated into CA2020 through inclusion of the city's commitments in Chapter 3, *Reducing Community Emissions*, and Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*. An updated 2010 inventory for the City of Santa Rosa is included to give the city more information about progress toward its 2020 target and provide a consistent data set for all jurisdictions. Updated 2020, 2040, and 2050 BAU forecasts for Santa Rosa were not conducted; the forecast values in this document are derived from Santa Rosa's CAP. Emissions for each source for the years 2020 and 2035 were linearly extrapolated to 2040 and 2050.

2.4 Other Emissions Sources and Carbon Sinks

The activity-based GHG inventory approach outlined in Section 2.2 does not include all human activities in Sonoma County that drive an increase or decrease in atmospheric GHG emissions. CA2020 does not address every source of emissions; rather, it tries to move the needle on the largest emissions sources that can most directly be influenced by local government action.

- Several categories of emissions and potential emission reductions are separate from the community-wide GHG inventory. Carbon sinks through biological carbon sequestration
- Consumption of goods and services imported into Sonoma County
- Industrial and commercial stationary sources
- Air travel

These additional sources and sinks are explored in the following sections.

2.4.1 Biological Carbon Sequestration

Biological carbon sequestration is the process of removing carbon dioxide from the atmosphere and storing it as carbon (i.e., photosynthesis) in vegetation, such as trees, shrubs and grasses, and soil, thereby reducing atmospheric carbon. Various ecological processes transfer carbon between the atmosphere, vegetation, and the soil, including photosynthesis, respiration, and decomposition. This terrestrial, or biological, sequestration occurs on agricultural lands (including cropland and grazing land), non-agricultural rural lands (including forests and grasslands), and urban forests.

When disturbed through human activities or natural disturbances, stored carbon can be released to the atmosphere. Conversely, natural and working lands can be protected and managed in ways that actually increase carbon sequestration. Thus, sequestering and storing carbon on natural and working lands is essential to reducing carbon in the atmosphere.

Natural and working lands are also essential “green infrastructure” assets because of the many ecosystem services they provide as well as their essential role in a healthy county economy. Many climate readiness objectives are furthered through the preservation and enhancement of natural and working lands, including trees, vegetation, and soils, as outlined in Chapter 6, *Sonoma County Climate Readiness*.

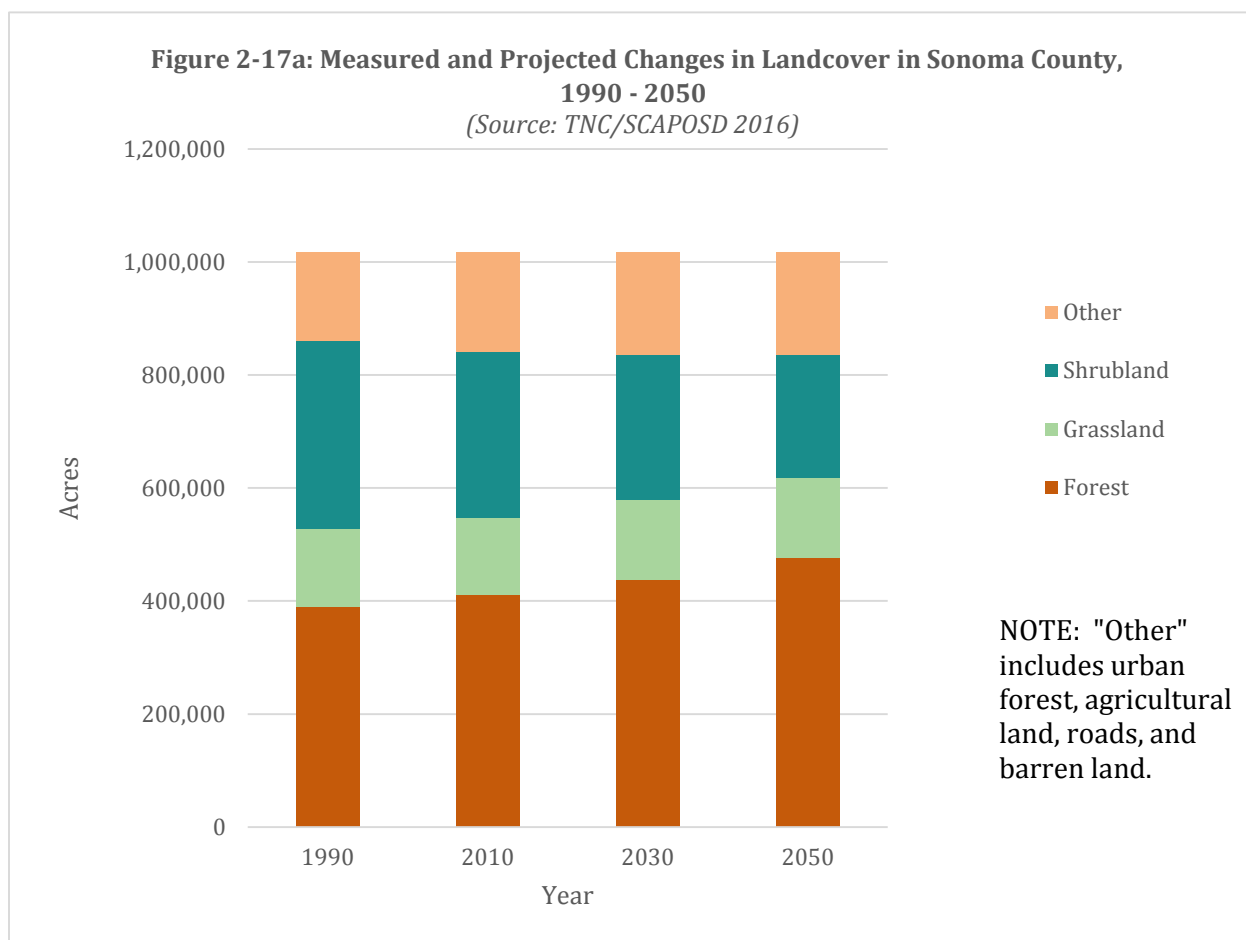
The ICLEI *U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions* recommends that emissions sinks (i.e., sequestered carbon) be disclosed but not combined with other emissions created by human activity in an emissions inventory. While estimates of carbon sequestration are not included in the CA2020 inventory, a new report titled *Conserving Landscapes, Protecting the Climate: The Climate Action Through Conservation Project* (CATC) describes a pilot project that, among other things, provides an estimate of carbon stocks in Sonoma County in various land cover categories. (The Nature Conservancy and Sonoma County Agricultural Preservation and Open Space District, 2015). Figures B5 and B6 from the CATC report (shown as Figure 2-17a and Figure 2-17b, below) show total acres by land cover as well as carbon storage estimates for 1990 and 2010 and projections for 2030 and 2050.

Green infrastructure is a “cost effective, resilient approach to managing wet weather impacts that provides many community benefits.”

Ecosystem services are “the many life sustaining benefits we receive from nature—clean air and water, fertile soil for crop production, pollination, and flood control.”

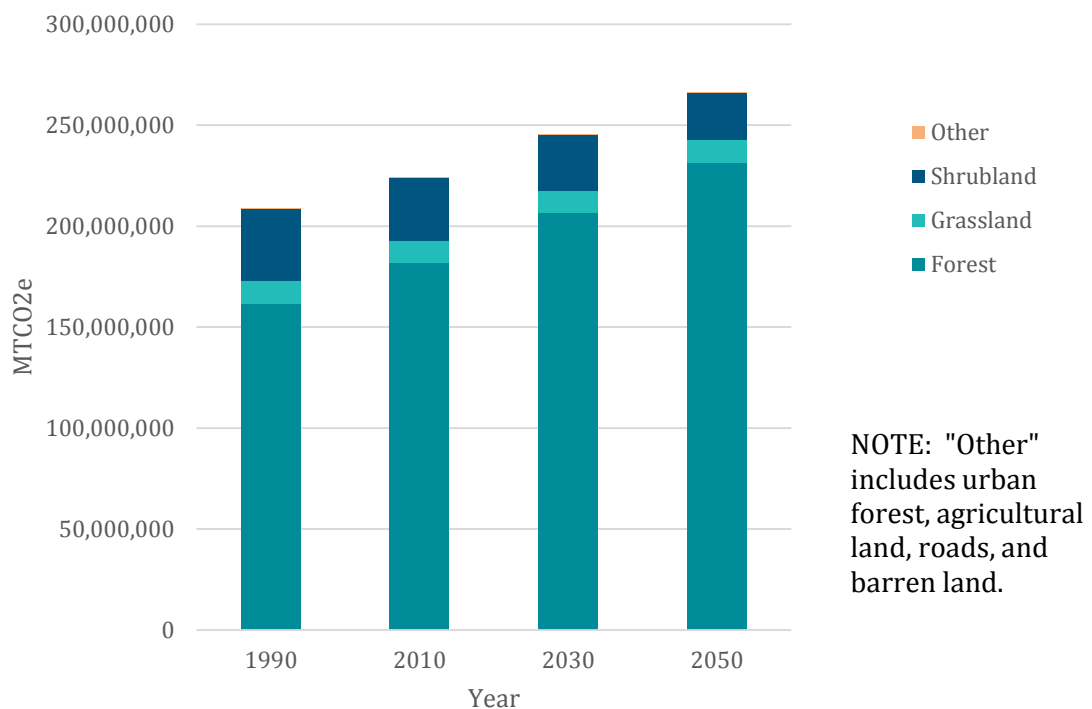
U.S. Environmental
Protection Agency

Figure 2-17. Projection of land cover and carbon storage (CO₂e) by cover class to 2050³



³ This figure is from the Climate Action Through Conservation Project report. This report can be found at the following link: http://scienceforconservation.org/dl/CATC_Final_Jan2016.pdf

Figure 2-17b: Measured and Projected Changes in Landscape Carbon Storage in Sonoma County, 1990 - 2050
(Source: TNC/SCAPOS 2016)



Although CA2020 focuses on reducing other sources of GHG emissions, Sonoma County is already taking steps to identify how human activities impact biological carbon emissions and support land management and conservation practices that reduce emissions and increase biological carbon sequestration. Indeed, improved baseline storage carbon storage estimates, such as those presented in the CATC pilot project, will ultimately become part of a framework to increase biological carbon sequestration through protection and management of open and working lands and sustainable agricultural practices. The CATC project also describes new tools for analyzing the carbon sequestration effects (positive or negative) of future land use and land management changes and for tracking these changes over time. These tools will ultimately enable land managers and decision makers to estimate the value of conserving natural and working lands in the county, as well as the potential to sequester more carbon through restoration and management. The CATC project will inform future steps that the RCPA and its partners will undertake to meet long-term climate protection goals. See Chapter 3, *Reducing Community Emissions*, for more discussion about how this will be addressed in CAP implementation.

Sonoma County Vegetation Mapping Project

The Sonoma County Vegetation & Habitat Mapping Project is a program of the Sonoma County Agricultural Preservation and Open Space District and Sonoma County Water Agency, with contributions from the National Aeronautics and Space Administration, California Department of Fish and Wildlife, United States Geologic Survey, Sonoma County Department of Transportation and Public Works, City of Petaluma, The Nature Conservancy, and the University of Maryland. Products include a fine scale vegetation map for the county, county wide LiDAR, as well as products and tools that document the amount of carbon sequestered in natural and working lands. Sonoma Veg Map (sonomavegmap.org) complements and supports another initiative known as Climate Action Through Conservation (CATC), which provides a way for Sonoma County, other local governments, land managers, and planners to understand the links between climate benefits and conservation values and incorporate that knowledge into decisions about land use and land management.

Many owners and managers of natural and working lands are already implementing practices that increase sequestration and storage of carbon. Examples of practices already being utilized locally include:

- Buffer or Filter Strips
- Compost Application
- Forest Stand Improvement
- Hedgerow or Shelterbelt Planting
- Mulching
- Nutrient/Manure Management
- Reduced or No-Till Farming
- Cover cropping
- Riparian Restoration
- Tree and Shrub Establishment- Windbreaks, Silvopastures
- Wetland Restoration
- Prescribed grazing

Carbon Farming

Land management is the second largest contributor to carbon dioxide emissions on planet earth. Agriculture is the one sector that has the ability to transform from a new emitter of CO₂ to a net sequesterer of CO₂ – there is no other human managed realm with this potential. Common agricultural practices, including driving a tractor, tilling the soil, over grazing, using fossil fuel based fertilizers, pesticides and herbicides result in significant CO₂ release. Alternatively, carbon can be stored long term (decades to centuries or more) beneficially in soils in a process called soil carbon sequestration. *Carbon farming* involves implementing practices that are known to improve the rate at which CO₂ is removed from the atmosphere and converted to plant material and/or soil organic matter. Carbon farming is successful when carbon gains resulting from enhanced land management and/or conservation practices exceed carbon losses. Preliminary analysis suggests that Carbon Farming can beneficially sequester an average of **over 65 metric tons of carbon per acre across 264,693 acres** of agricultural and grazing lands in Sonoma County, potentially resulting in **over 17 million metric tons of additional CO₂e removed from the atmosphere.**

Carbon Cycle Institute, 2016

2.4.2 Emissions from Consumption of Goods and Services

Consumption-based emissions are approximately double the emissions counted in an activity-based inventory, underscoring the importance of reducing consumption-based emissions to achieve long-term GHG reduction goals. Addressing consumption-based emissions also creates an opportunity to engage a wider range of community members and stakeholders who may not see their impact or their opportunity for action in a purely activity-based approach.

As discussed in the introduction to this Chapter, this CAP uses an activity-based inventory that calculates emissions from human activities within Sonoma County. It does not account for global carbon emissions that result from local consumption of goods and services that are produced outside Sonoma County, though it does include emissions associated with the production of goods that are grown or made in Sonoma County, including those consumed outside the county.

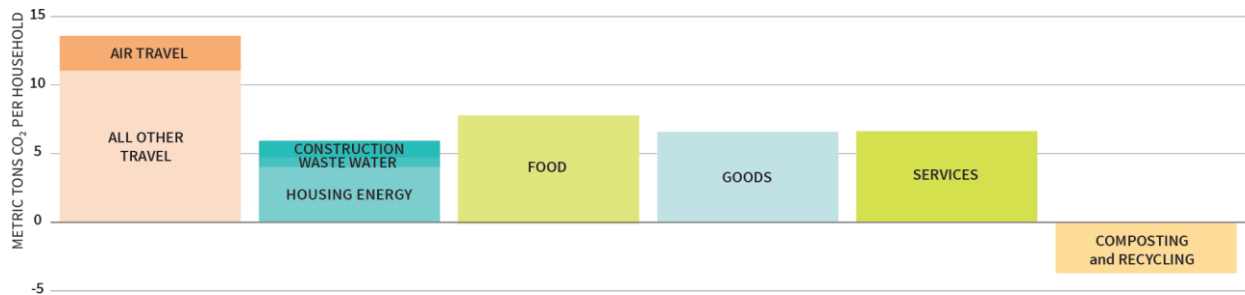
An alternative approach to quantifying GHG emissions is a so-called “consumption-based” inventory, which includes global lifecycle emissions associated with products (including food) and services used in a particular geographic location or population. These inventories include emissions from fuels and materials used in buildings, transportation, and the production of goods and services outside the local area, including food. A consumption-based approach also looks at total product lifecycle and supply chain emissions, including those associated with harvesting or mining raw materials, manufacturing and processing, and transportation to market. It also includes product use, disposal, and degradation. Most importantly for the purposes of this CAP, consumption-based inventories focus primarily on indirect emissions resulting from individual and household choices over which local communities have little direct control, whereas activity-based inventories, like the one included in this CAP, focus on those emissions that a local jurisdiction can more directly influence. While this CAP does not include a consumption-based inventory, Chapter 3 does include measures that will help reduce consumption based emissions in the future.

A recent study (Jones & Kammen, UC Berkeley, 2015) presented the first consumption-based inventory of San Francisco Bay Area neighborhoods, cities and counties. According to the study, consumption-based emissions in 2013 were 44.3 metric tons of CO₂e per household in the Bay Area, compared to 50 metric tons for the average U.S. household. Consumption-based emissions in Sonoma County communities were found to be generally lower than the Bay Area average, ranging from 37.4 to 44.7 metric tons per household. Countywide, consumption-based emissions are estimated at 40.4 metric tons per household, about 10% lower than the Bay Area average.

The consumption-based approach used in the UC Berkeley study accounts for much greater emissions from food, goods and services than the activity-based approach used in this CAP. For example, under the consumption-based approach, food generates 19% of all GHG emissions, roughly 3 times more emissions than household energy use. Likewise, goods and services contribute 18% of total emissions. Accordingly, total Sonoma County emissions under the consumption-based approach were 7.2 MMT CO₂e in 2013 (the inventory year in the UC Berkeley

study), compared to 3.7 MMT in the 2010 inventory based on the activity-based approach used in this CAP. Again, with consumption-based emissions approximately double the emissions counted in an activity-based inventory, reducing consumption-based emissions is essential to achieving long-term GHG reduction goals.

Figure 2-18. Average Household Carbon Footprint in Sonoma County⁴



Community-based programs like GoLocal Sonoma County already help reduce consumption-based emissions by promoting local goods and services purchases that typically have a smaller carbon footprint. Local communities also have “buy local” preferences for municipal purchases.

Many of the GHG reduction measures included in this CAP will also reduce consumption-based emissions. For example, moving toward 100% renewable electricity (including both utility-scale and distributed generation), combined with electrification of vehicles and heating, will dramatically reduce consumption-based emissions from transportation and building energy. Likewise, land use and transportation measures in this CAP that focus on higher density infill development near transit will also reduce household carbon footprints. In addition, the *Advanced Climate Initiatives* in Chapter 3 include strategies to reduce emissions related to the consumption of food, goods and services as well as land use and sustainable agriculture strategies that focus on retaining and increasing carbon sequestration in soils and vegetation.

Acknowledging that the activity-based approach alone is incomplete is an important step in understanding the underlying causes of global warming and defining opportunities to reduce our contributions.

2.4.3 Industrial and Commercial Stationary Sources

Emissions from existing industrial and commercial stationary sources (except for natural gas combustion) are not included in the GHG inventory because the County and cities have limited jurisdictional control over existing large stationary sources. Large, stationary point-source emissions are regulated by the State of California (under Assembly Bill 32 through cap and trade) and through the U.S. Environmental Protection Agency (under the Clean Air Act) for GHG emissions. New stationary source emissions that are also subject to local land use authority could be subject to additional emissions reductions mandated by a local entity. However, any such

⁴ 2015 University of California, Berkeley, study, A Consumption-Based Greenhouse Gas Inventory of San Francisco Bay Area Neighborhoods, Cities and Counties, by Christopher Jones and Daniel Kammen.

requirements would need to account for state and federal regulation of such sources before determining if additional reductions are needed. Such determinations are highly source specific, given the complexity of state and federal regulations. As such, the forecasts in CA2020 exclude new industrial and commercial stationary sources. These sources are not covered by CA2020 but would need to be addressed on a case-by-case basis if and when a local land use authority has jurisdiction over such new sources. These sources include combustion of fossil fuels of any type, *except* natural gas (such as diesel, fuel oil, propane, kerosene, wood, digester gas, etc.), and fugitive emissions from industrial processes for each jurisdiction.

Natural gas use from industrial and commercial sources is included as part of the inventory and forecasts for CA2020. Stationary fuel combustion and process emissions associated with fuels other than natural gas were not included because of data limitations as well as concern about duplication of state and federal regulation of such point sources.

2.4.4 Emissions from Air Travel

Emissions resulting from air travel are not included in the inventory because of the challenges in determining the origin and/or destination of flights and because Sonoma County communities do not have control over aircraft sources. Regulation of emissions from aircraft occurs at the federal level. Consequently, emissions from air travel are considered out of scope for this inventory.

Although emissions directly produced by aircraft are not included in the inventory, airport-related emissions (such as energy use in airport buildings) in the county are captured in the inventory and forecasts. Emissions from airport building energy and aircraft ground-support equipment are captured under building energy and off-road transportation and equipment, respectively.

3. Reductions

Reducing Community Emissions

Chapter 3

Reducing Community Emissions

3.1 Introduction

Climate Action 2020 (CA2020) identifies strategies that will reduce regional (countywide) greenhouse gas (GHG) emissions in the near term and put Sonoma County communities on track toward the long-term goals of reducing emissions by 40% below 1990 levels by 2030 and 80% below by 2050. The reduction measures identified in CA2020 support (and actually substantially exceed) the state's 2020 climate protection goals.

GHG reduction measures in CA2020 will be implemented at three levels.

- **State** measures adopted and implemented by state agencies, including statewide fuel efficiency standards and renewable portfolio standards for electricity generation.
- **Regional** measures implemented by cross-jurisdictional agencies like the Regional Climate Protection Authority (RCPA), Sonoma Clean Power (SCP), transit agencies, and waste management and water supply agencies.
- **Local** actions implemented by the cities and the County. These local measures include voluntary, incentive-based, and regulatory approaches.

This chapter explains how, through the implementation of more than 60 state, regional, and local reduction measures, Sonoma County communities can achieve the regional GHG reduction target of 25% below 1990 levels by 2020. Table 3-1 shows how this combination of state, regional, and local measures will meet the reduction target.

Table 3-1. Achieving Sonoma County's 2020 Greenhouse Gas Reduction Target—Summary

Parameter	Emissions (MTCO ₂ e)
2020 Business as Usual (BAU) GHG Emissions Forecast ¹	4,343,000
2020 Community Emissions Reduction Target (25% below 1990 levels)	2,957,900
Total₁ Reductions Needed to Reach Target	1,385,100
2020 Emissions Reductions from State Measures	744,100
2020 Emissions Reductions from Regional Measures	177,500
2020 Emissions Reductions from Local Measures (w/Santa Rosa CAP)	474,800
Total₂ Emissions Reductions Achieved by Climate Action Strategies	1,396,400
2020 Countywide Emissions under CA2020	2,946,600
<i>Emissions Reductions in Excess of Target (Total₂ minus Total₁)</i>	11,300
¹ 2020 BAU GHG emissions do not include stationary sources	

In addition to specific measures to achieve the GHG reduction target for 2020, this plan also includes longer-term goals to provide a foundation for even deeper GHG reductions beyond 2020 (see Section 3.2.2). Section 3.2.3 describes several advanced climate initiatives included in this plan to give Sonoma County a head start on achieving those goals.

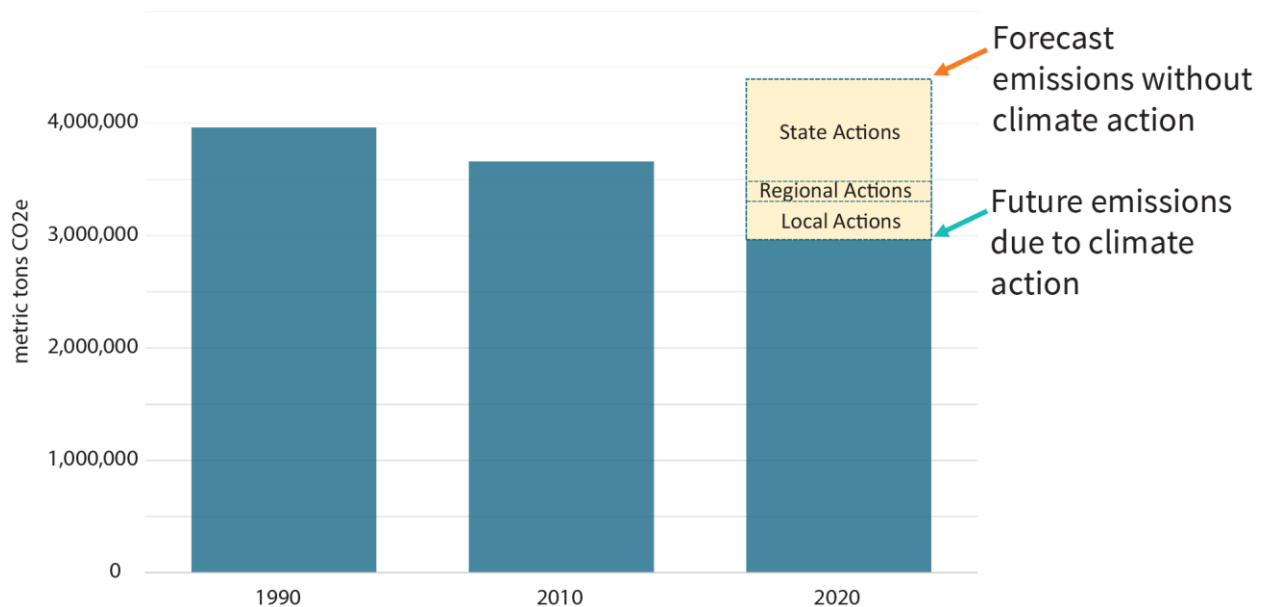
3.2 Greenhouse Gas Reduction Target and Goals

3.2.1 Climate Action 2020 Target

CA2020 was motivated by a need to identify specific near-term actions to reduce GHG emissions and to establish updated goals for 2020 and beyond. The year 2020 is an important milestone because of California's Global Warming Solutions Act (Assembly Bill [AB] 32), which seeks to reduce statewide GHG emissions down to 1990 levels by 2020. Sonoma County jurisdictions were significantly more ambitious than the state when, in 2006, they adopted a goal of 25% below 1990 levels by 2015. Even though no formal GHG reduction plan was adopted, that ambition has driven positive results: emissions in 2010 were already 7.5% lower than 1990 levels. However, the county is not expected to meet its goal of 25% below 1990 in 2015.

Therefore, Sonoma County jurisdictions have agreed to an updated countywide target of 25% below 1990 levels by 2020, illustrated in Figure 3-1. This goal is ambitious because it is significantly greater than the state's AB 32 2020 target, but it is also achievable through the state, regional, and local GHG reduction measures outlined in this chapter.

Figure 3-1. Achieving Sonoma County's 2020 Greenhouse Gas Reduction Target

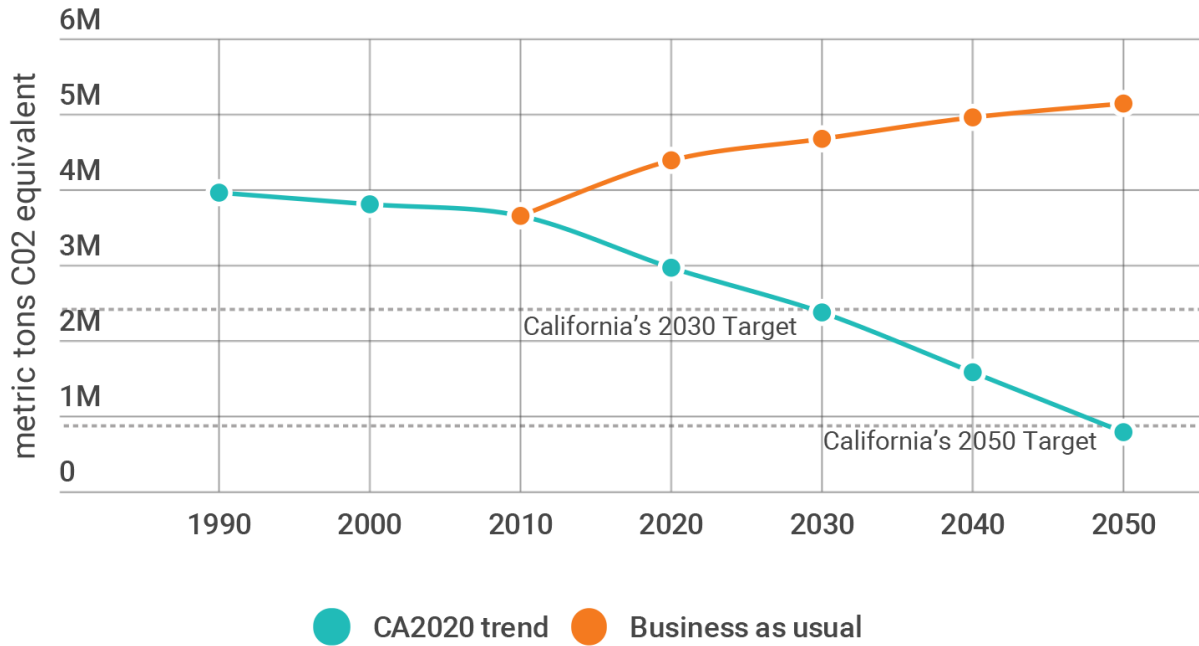


3.2.2 Long-Term Goals and Vision

As discussed in Chapter 1, *The Framework for Sonoma County Climate Action*, the scientific consensus about the long-term ramifications of unchecked human-induced climate change has already been integrated into state policy. Governor Schwarzenegger's 2005 Executive Order (EO S-03-05) sets a long-term statewide goal of 80% below 1990 emissions levels by 2050. In order to reach this target, the state will have to go well beyond the steps included in the AB 32 Scoping Plan for 2020. Accordingly, in April 2015, Governor Brown issued Executive Order EO B-30-15 establishing an interim reduction target of 40% below 1990 levels by 2030 and directing the California Air Resources Board to update the AB 32 Scoping Plan to reflect that target. The updated Scoping Plan is expected in late 2016. The state legislature is also considering Senate Bill (SB) 32, which, if adopted, would establish the 2030 goal as a legislative mandate, thus broadening its legal applicability.

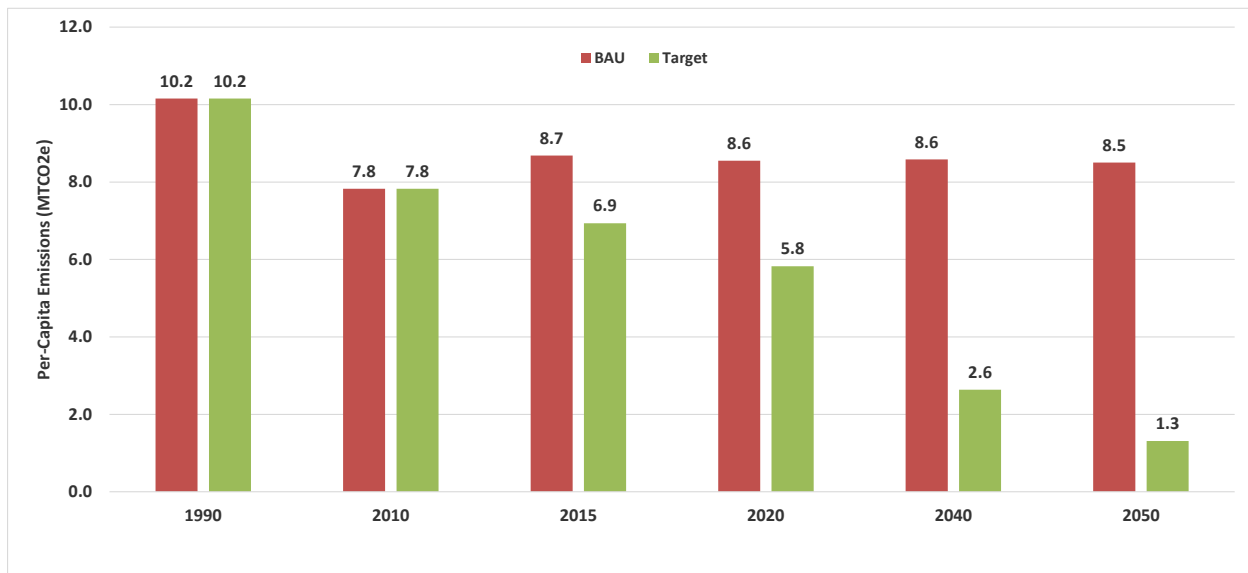
In adopting this CAP, RCPA will also adopt long-term goals to reduce GHG emissions by 40% by 2030 and by 80% by 2050. Although the specific path to reach these goals has not yet been determined—neither locally nor by the State of California—it is clear that pursuing the ambitious 2020 target puts the county on a solid trajectory toward meeting the long-term goals. Figure 3-2 shows that current state GHG reduction measures (e.g., vehicle fuel standards and renewable portfolio standards for electricity) will only achieve a portion of the reductions needed to meet long-term goals. While further state action to reduce emissions is anticipated, success will require scaling up existing local and regional strategies, including those in this Climate Action Plan (CAP), and developing new solutions.

Figure 3-2. Sonoma County 1990 to 2050 GHG Emissions Pathways



Another way to look at the long-term challenge is on a per capita basis. As shown in Figure 3-3, countywide GHG emissions were 7.8 metric tons of carbon dioxide equivalent (MTCO₂e) per person in 2010 and are forecast to increase to 8.7 MTCO₂e per person by 2015. Projected per-capita business-as-usual (BAU) emissions decrease slightly to 8.6 MTCO₂e in 2020 and beyond because population is projected to increase somewhat faster than emissions. Nonetheless, given projected population and economic growth, meeting the long-term reduction target requires that per capita emissions in 2050 not exceed 1.3 MTCO₂e, an even steeper decline than is needed for overall emissions reduction. The County's 2020 target is equivalent to 5.8 MTCO₂e per capita, further emphasizing the challenge of meeting the long-term goals and the importance of adopting an aggressive target of 25% below 1990 levels by 2020 to put the county on the right track to meet the long-term goals.

Figure 3-3. Sonoma County Per-Capita Emission Targets from 1990 to 2050



The state has begun evaluating the cost and feasibility of strategies to achieve the long-term targets. For example, in early 2014, the California Air Resources Board, California Energy Commission, California Public Utilities Commission and the state's Independent System Operator, initiated the California PATHWAYS Project to evaluate the feasibility and cost of strategies to meet interim targets on the way to achieving an 80% reduction in GHG emissions by 2050. The PATHWAYS model demonstrates that success is possible based on scaling up the primary strategies in this plan: resource efficiency, zero carbon electricity, and switching away from fossil fuels.

Implementing the local measures in CA2020 will complement state efforts and reduce GHG emissions well beyond 2020. In addition to specific GHG reduction measures, the RCPA and partner agencies will actively lobby state and federal government for programs and funding that to support long-term GHG reduction goals. State and federal support could include funding sources like cap & trade and carbon pricing.

The California PATHWAYS Project: Long term Greenhouse Gas Reduction Scenarios

To support the 2030 emissions target, the California Air Resources Board, Energy Commission, Public Utilities Commission, and the Independent System Operator commissioned Energy + Environmental Economics (E3) to evaluate the feasibility and cost of potential 2030 targets that would facilitate reaching the state's 2050 goal of 80% below 1990 levels. E3 developed eight emission reduction scenarios described below that demonstrate technically and economically viable scenarios to achieve the 2050 target. E3 conducted the analysis using its California PATHWAYS model, which encompasses the entire California economy with detailed representations of the buildings, industry, transportation, and electricity sectors. The following scenarios would achieve the 2050 target in different ways, with varying costs and benefits.

1. **Reference:** Current GHG policies continue through 2020 only.
2. **Straight Line:** Low carbon technologies including energy efficiency, building electrification, renewable electricity, zero emission vehicles, and renewable liquid fuels.
3. **Early Deployment:** Same technology focus as the Straight Line Scenario with faster deployment of renewable electricity and near term measures with air quality benefits, including zero emission vehicles and electric heat pumps.
4. **Slower Commercial Adoption:** Same technology focus as the Straight Line Scenario, but with delayed implementation of higher cost measures, primarily zero emission vehicles and electric heat pumps in the commercial sector; adoption is accelerated post 2030 to hit 2050 goal.
5. **Low Carbon Gas:** Focus on decarbonized pipeline gas, no renewable liquid fuels, and no building electrification.
6. **Distributed Energy:** Focus on distributed photovoltaic and grid storage.
7. **Carbon Capture and Non Biological Sequestration:** Phase in of natural gas carbon capture and sequestration in electricity generation and hydrogen production post 2030.
8. **High Battery Electric Vehicles:** Focus on battery electric vehicles instead of fuel cell vehicles.

These eight scenarios demonstrate a range of costs—from \$40 to \$60 billion by 2050—associated with achieving California's emissions goals, illustrating that success in mitigating climate change is possible at reasonable economic costs with proven technologies.

Source: Energy + Environmental Economics 2015

However, state action will not be enough by itself; further local action to reduce GHG emissions will also be needed. Future local actions will be guided in part by the state's framework for post-AB 32 climate protection, as well as by lessons learned through the adaptive management approach to implementing CA2020. As noted in Chapter 1, CA2020 is part of a much longer-term effort. To reach long-term goals, a new phase of climate action planning will be needed after 2020 to build upon the goals and strategies in this plan and take advantage of new technologies and climate protection science that are constantly evolving.

A long-term climate action strategy for Sonoma County will most likely include some or all of the following.

By 2030:

- Sonoma County buildings will be 100% carbon neutral to the maximum extent feasible.

- A fully integrated smart power grid will ensure maximum efficiency of energy use through load balancing will compensate when variable energy sources (such as wind and solar) are not available, advanced batteries and other storage, or fossil fuel generation with carbon capture.
- State, regional, and local strategies will drive a 50% improvement in building efficiency in both new and existing buildings.
- Building heating and cooking will shift away from natural gas in favor of renewable electricity sources.
- The California Energy Commission will implement its goals for Zero Net Energy in new residential buildings by 2020 and for new commercial buildings.
- Per capita vehicle miles traveled (VMT) are reduced beyond 2020 through focused growth, increasingly efficient and electrified public transit systems, active transportation, and other mobility strategies.
- State, regional, and local strategies will drive a 50% reduction in petroleum use.
- The widespread adoption of electric vehicles – on the order of 150,000 vehicles – will allow local utilities to meet or exceed the requirement of 50% of electric power to be provided from renewable sources.
- Institutional and technological capacity to integrate distributed energy resources will dramatically improve.

By 2050:

- Electric vehicles (EV) and alternative fuel vehicles will be in use across all vehicle types. Self-driving cars will reduce congestion and improve fuel efficiency.
- Implementation of Moving Forward 2040, the SCTA's Comprehensive Transportation Plan, will set up a countywide transportation system with 80% lower GHG emissions per capita compared to 1990 levels, the maximum feasible extent of carbon-free transportation. All commercial agricultural properties will be enrolled in certified programs that promote sustainability and natural resource conservation.
- Agricultural soil carbon levels will be substantially higher in 2050 through soil management practices supporting crop development and carbon sequestration.
- There will be zero waste through implementation of diversion, waste reduction, and green energy systems.
- Widespread use of recycled water, greywater, and rainwater catchment will further offset the demand for potable water. Agricultural water users will continue to pioneer lower water use strategies, which may include the use of different crops and/or varieties.
- All wastewater treatment plants will have biogas systems to capture nearly 100% of all methane generated from their operations.

- A consumption-based emissions inventory will be developed and used to guide the actions of public agencies, private businesses and non-governmental entities, and individual county residents to reduce emissions related to consumption of goods and services.

3.2.3 Advanced Climate Initiatives

In recognition of the challenges associated with meeting the longer-term GHG reduction goals, CA2020 also includes several Advanced Climate Initiatives that can be started in the near term, but will result in steadily increasing GHG reduction benefits after 2020. These advanced initiatives include reducing emissions related to the consumption of goods and services, including food, as well as land use and sustainable agriculture strategies that focus on retaining and increasing carbon sequestration in soils and vegetation. Although these strategies are known to have GHG benefits, implementation of these strategies will not directly affect the emissions inventoried in CA2020. Moreover, methods to quantify those benefits are still in development and implementation is more complex. For these reasons, CA2020 does not rely on emission reductions from Advanced Climate Initiatives to meet the GHG reduction goal for 2020, and emissions reductions from these initiatives are not quantified at this time. Nonetheless, these advanced initiatives are essential to long-term success and are therefore included in this CAP.

The measures to implement the Advanced Climate Initiatives are listed as Regional Measures in this CAP because regional agencies, like the RCPA, will lead implementation. Nonetheless, the local communities are likely to have an important supporting role with specific measures. For example, the County will likely be involved with measures related to open and working lands, carbon sequestration and sustainable agriculture. Likewise, all local jurisdictions will have a role to play in the measures aimed at reducing emissions from consumption of goods and services.

3.3 Overall Greenhouse Gas Reduction Strategy

The CA2020 planning process explored a variety of state, regional, and local measures to reduce GHG emissions to achieve the 2020 target and provide a strong foundation for meeting the 2030 and 2050 goals. Public meetings and online engagement tools were used to collect input on community priorities for climate action. In addition, a 2014 report titled *Proven and Promising Climate Measures from U.S. Communities for Possible Application in Sonoma County*, prepared by the Center for Climate Protection, was used to develop the measures included in CA2020.

The success of the regional GHG reduction strategy described in this chapter depends on committed implementation by the RCPA, other regional agencies and, most importantly, by the local government partners. This CAP identifies five core elements of plan implementation: coordination across many partners; securing funding; engaging the community; monitoring and reporting; and adaptive management. Please see Chapter 4: *Implementation* for detailed information about CAP implementation.

3.3.1 GHG Reduction Goals

As a starting point for developing specific GHG reduction measures, Table 3-2 identifies reduction goals for each GHG source. Table 3-3 shows the expected emissions reductions from measures adopted to advance each goal.

Table 3-2. Greenhouse Gas Reduction Goals







Source	Key	Goals
Building Energy		<ol style="list-style-type: none"> 1. Increase building energy efficiency 2. Increase renewable energy use 3. Switch equipment from fossil fuel to electricity
Transportation & Land Use		<ol style="list-style-type: none"> 4. Reduce travel demand through focused growth 5. Encourage a shift toward low-carbon transportation options 6. Increase vehicle and equipment fuel efficiency 7. Encourage a shift toward low-carbon fuels in vehicles and equipment 8. Reduce idling
Solid Waste		<ol style="list-style-type: none"> 9. Increase solid waste diversion 10. Increase capture and use of methane from landfills
Water & Wastewater		<ol style="list-style-type: none"> 11. Reduce water consumption 12. Increase recycled water and greywater use 13. Increase water and wastewater infrastructure efficiency 14. Increase use of renewable energy in water and wastewater systems
Livestock & Fertilizer		<ol style="list-style-type: none"> 15. Reduce emissions from livestock operations 16. Reduce emissions from fertilizer use
Advanced Climate Initiatives		<ol style="list-style-type: none"> 17. Protect and enhance the value of open and working lands 18. Promote sustainable agriculture 19. Increase carbon sequestration 20. Reduce emissions from consumption of goods and services, including food

Table 3-3. Achieving Sonoma County's 2020 Greenhouse Gas Reduction Target

GHG Source and Goal		GHG Emission Reductions (MTCO ₂ e)
Building Energy		322,500
1	Increase building energy efficiency	53,877
2	Increase renewable energy use	267,027
3	Switch equipment from fossil fuel to electricity	1,625
Transportation and Land Use		426,000
4	Reduce travel demand through focused growth	4,693
5	Encourage a shift toward low-carbon transportation options	43,058
6	Increase vehicle and equipment fuel efficiency	358,720
7	Encourage a shift toward low-carbon fuels in vehicles and equipment	19,413
8	Reduce idling	163
Solid Waste		65,400
9	Increase solid waste diversion	26,219
10	Increase capture and use of methane from landfills	39,140
Water and Wastewater		22,600
11	Reduce water consumption	19,217
12	Increase recycled water and greywater use	75
13	Increase water and wastewater infrastructure efficiency	759
14	Increase use of renewable energy in water and wastewater systems	2,556
Livestock and Fertilizer		1,800
15	Reduce emissions from livestock operations	NQ ¹
16	Reduce emissions from fertilizer use	1,759
Advanced Climate Initiatives		
17	Protect and enhance the value of open and working lands	NQ ¹
18	Promote sustainable agriculture	NQ ¹
19	Increase carbon sequestration	NQ ¹
20	Reduce emissions from consumption of goods and services	NQ ¹
Total CAP Reductions		838,300
Santa Rosa CAP Reductions (including applicable state and city reductions)		558,080
Total County 2020 GHG Reductions		1,396,380

¹ These measures were not quantified (NQ) for GHG reductions because they are qualitative supporting measures. Refer to Appendix C for more information.

These reductions will be achieved through a combination of existing programs (like Title 24 building energy efficiency standards and statewide clean fuel standards) and new local actions that will be taken by cities and the County. These *Local Measures* are the heart of this countywide CAP because they are the actions that Sonoma County jurisdictions can implement through local initiative.

The following sections describe the specific GHG reduction measures that will accomplish the goals outlined above, organized according to the entity taking action (i.e., state, regional, or local).

3.4 State GHG Reduction Measures

The Governor's latest Environmental Goals and Policy Report (2015) identifies the following five pillars to support the state's long-term reduction of climate pollution, protection of public health and stewardship the state's natural resources to support resilience and other environmental benefits:

1. Increasing the share of renewable energy in the State's energy mix to at least 50% by 2030
2. Reducing petroleum use by up to 50% by 2030
3. Increasing the energy efficiency of existing building by 50% by 2030
4. Reducing emissions of short-lived climate pollutants
5. Stewarding natural resources, including forests, working lands, and wetlands, to ensure that they store carbon, are resilient, and enhance other environmental benefits

These five pillars build on the Governor's 2015 executive order establishing a statewide goal of reducing GHG emissions by 40% (compared to 1990 levels) by 2030, and they are fully congruent with the climate protection goals established in this CAP. The first four pillars are focused on reducing GHG emissions related to energy use (transportation and buildings) and short-lived climate pollutants. The fifth pillar emphasizes the importance of natural and working lands, which are addressed as part of the Advanced Climate Initiatives contained in this CAP (see Regional Reduction Measures in Section 3.5). The Governor has also established the "Carbon-Rich, Healthy Soils Initiative" to support carbon sequestration through restoration of soil organic matter in agricultural soils through improved farming practices.

Specific measures implemented by the state of California will address CA2020 goals for two GHG sources: building energy and transportation and land use. State measures for these two sources are listed in Tables 3-4 and 3-5. These measures have already been adopted by state agencies and are under way. A full description of each measure, including the assumptions and methodology used to calculate GHG reductions, is included in Appendix C.

Table 3-4. State Measures to Reduce Building Energy Emissions

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 1: Increase building energy efficiency				
1-S1	Title 24 Standards for Commercial and Residential Buildings	Requires that new and remodeled buildings be designed to conserve energy and water.	<i>Developed by:</i> California Energy Commission (CEC); <i>Enforced by:</i> local building departments and the California Building Standards Commission	14,440
1-S2	Lighting Efficiency and Toxics Reduction Act (AB 1109)	Will decrease electricity used for lighting in new buildings through regulation and lighting standards.	<i>Developed by:</i> CEC <i>Enforced by:</i> CEC	21,085
1-S3	Industrial Boiler Efficiency	Requires an annual tuning of all boilers, or the installation of controls and systems to maximize efficiency.	<i>Developed by:</i> California Air Resources Board (ARB) <i>Enforced by:</i> ARB and local air districts	345
Goal 2: Increase renewable energy use				
2-S1	Renewables Portfolio Standard (RPS)	Requires electric utilities (including Pacific Gas & Electric Company [PG&E]), Healdsburg, and Sonoma Clean Power [SCP]) to procure an increasing amount of their electricity from eligible renewable sources up to 33% by 2020.	<i>Developed by:</i> California Public Utilities Commission (CPUC) <i>Enforced by:</i> CPUC	181,793
2-S2	Residential Solar Water Heater Program (AB 1470)	Provides incentives to encourage the installation of solar water heating systems.	<i>Developed by:</i> CPUC <i>Enforced by:</i> CPUC	800

Table 3-5. State Measures to Reduce On-Road Transportation and Off-Road Equipment Emissions

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 6: Increase vehicle and equipment fuel efficiency				
6-S1	Pavley Emissions Standards for Passenger Vehicles and the Low-Carbon Fuel Standard	Will increase the efficiency of automobiles and light-duty trucks by 30%, compared with 2002 efficiency, by 2016. This also includes the Low-Carbon Fuel Standard for on-road vehicles.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB, vehicle manufacturers, and fuel producers	333,030
6-S2	Advanced Clean Cars	Requires that vehicle manufacturers increase the average fuel efficiency of their new vehicles, beyond the Pavley requirements.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB and vehicle manufacturers	9,679
6-S3	AB 32 Vehicle Efficiency Measures	Increases the efficiency of vehicles through proper tire inflation, aerodynamic efficiency for heavy-duty vehicles, hybrid technology for heavy-duty vehicles, and other measures.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB, vehicle service facilities, and vehicle manufacturers	16,010
Goal 7: Encourage a shift toward low-carbon fuels				
7-S1	Low-Carbon Fuel Standard: Off-Road	Requires a minimum 10% reduction in the carbon intensity of transportation fuels sold in California by 2020.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB and fuel producers	5,182

3.5 Regional GHG Reduction Measures

Measures implemented by regional entities and programs will address CA2020 goals in four GHG sources: building energy, transportation and land use, solid waste, and water and wastewater. Regional measures for these four sources are listed below in Tables 3-6 through 3-9. Most of these measures have already been adopted by regional entities and are already underway; RCPA is expected to lead and support the development of any new or enhanced regional measures. A full description of each measure, including the assumptions and methodology used to calculate GHG reductions, is included in Appendix C.

The regional measures (cross jurisdictional efforts in Sonoma County) in this CAP also help support climate protection efforts in the larger Bay Area region, such as the *2016 Clean Air Plan/Regional Climate Protection Strategy* now underway at the Bay Area Air Quality Management District. The District's strategy prioritizes actions to: 1) reduce GHG emissions in agriculture through management of animal waste and improved soil management; and 2) preserve and maximize carbon sequestration on working lands in the Bay Area. The updated Clean Air Plan is expected to propose several "control measures" for agriculture and working lands, including support for carbon farming, carbon sequestration on working lands, and expand dairy digesters.

Regional measures also include measures focused on the four goals under the advanced climate initiatives (Goals 17 through 20) because the RCPA and other regional agencies are well-positioned to support innovation and pilot programs in these areas. However, as these measures are developed and implemented, the local jurisdictions will have opportunities to participate in and advance these goals. Table 3-10, below, presents the regional measures.

Table 3-6. Regional Measures to Reduce Building Energy Emissions

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 1: Increase building energy efficiency				
1-R1	Community Energy Efficiency Retrofits for Existing Buildings	Includes all existing programs to improve the energy efficiency of community buildings (including homes and businesses) through retrofits such as Energy Upgrade California, PACE Financing, utility incentives, and technical assistance.	<i>Implemented by:</i> Energy Independence Office, RCPA, SCP	3,954
1-R2	Expand Community Energy Efficiency Retrofits Program	Expand programs to promote energy efficiency in existing residential buildings and commercial buildings, and remove barriers for energy efficiency improvements. Includes accelerating participation in existing programs and pursuing innovation through efficiency efforts including: on-bill repayment programs like Windsor PAYS, energy disclosure programs like Home Energy Score, community based campaigns, and others.	<i>Implemented by:</i> Energy Independence Office, RCPA, SCP	12,394
Goal 2: Increase renewable energy use				
2-R1	Community Choice Aggregation	SCP is a community choice aggregation program and electricity provider that works with PG&E to provide their customers between 33% and 100% renewable energy. SCP also supports local renewable energy generation (e.g., solar or wind) through its <i>NetGreen</i> program.	<i>Implemented by:</i> SCP	47,995
Goal 3: Switch Equipment from fossil fuel to electricity				
3-R1	Stationary Fuel Switching Incentives	Will provide incentives and financing options for fuel switching from fossil fuel use to electricity.	<i>Implemented by:</i> SCP, Sonoma County Energy Independence Office, RCPA, Bay Area Air Quality Management District (BAAQMD), Northern Sonoma County Air Pollution Control District (NSCAPCD)	1,022

Table 3-7. Regional Measures to Reduce On-Road Transportation and Off-Road Equipment Emissions

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 5: Encourage a shift toward low-carbon transportation options				
5-R1	Improve and Increase Transit Service	Increase bus service, implement bus preferential treatments, implement bus rapid transit and/or express service, improve transit marketing, and improve transit amenities.	<i>Implemented by:</i> SCTA, Golden Gate Transit, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus	147
5-R2	Supporting Transit Measures	Implement measures designed to improve the county's transit system.	<i>Implemented by:</i> SCTA, Golden Gate Transit, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus	NQ ¹
5-R3	Sonoma-Marin Area Rail Transit (SMART)	Ensure policies support planned SMART corridor, such as transit-oriented development at planned SMART stations, future local transit planning for SMART, and pedestrian and bicycle facilities to connect to SMART stations.	<i>Implemented by:</i> SMART and local jurisdictions with SMART stations	NQ ¹
5-R4	Trip Reduction Ordinance (TRO)	Develop and implement a mandatory TRO for employers with 50+ employees by offering pre-tax transit expenses, transit or vanpool subsidy, free or low-cost shuttle, or an alternate trip reduction benefit. The TRO will also include a non-trip reduction alternative, in the form of purchase of an equivalent amount of GHG offsets, for employers choosing not to implement trip reductions.	<i>Implemented by:</i> SCTA	6,113
5-R5	Supporting Measures for the Transportation Demand Management (TDM) Program	Implement TDM measures to support the TRO.	<i>Implemented by:</i> SCTA	NQ ¹

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
5-R6	Reduced Cost Transit Passes	Provide reduced cost transit passes to encourage commuters to take transit. If this measure is made mandatory by a jurisdiction, then the measure will also include a non-trip reduction alternative in the form of purchase of an equivalent amount of GHG offsets.	<i>Implemented by:</i> SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus	5,660
5-R7	Alternative Travel Marketing and Optimize Online Service	Conduct countywide marketing efforts (and consistent community-wide efforts) to provide information on alternate travel modes.	<i>Implemented by:</i> SCTA, SMART, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus	4,528
5-R8	Safe Routes to School	Create safe routes to school programs for communities where they currently do not exist.	<i>Implemented by:</i> SCTA	14,234
5-R9	Car-sharing Program	Build on the work that the Sonoma County Spare-the-Air Resources Team has already conducted to implement a car-sharing program.	<i>Implemented by:</i> SCTA	NQ ¹
5-R10	Bike Sharing Program	Create a countywide Public Bike Share Program to encourage a shift from automobiles to bicycle use.	<i>Implemented by:</i> SCTA	NQ ¹
Goal 7: Encourage a shift toward low-carbon fuels in vehicles and equipment				
7-R1	Shift Sonoma County (Electric Vehicles [EV])	Countywide EV promotion program, in partnership with SCP.	<i>Implemented by:</i> RCPA, SCTA, and SCP	11,353
7-R2	Alternative Fuels for Transit Vehicles	Replace diesel and gasoline buses with hybrid buses, compressed natural gas buses, or electric buses.	<i>Implemented by:</i> SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus	40

¹ These measures were not quantified (NQ) for GHG reductions because they are either qualitative supporting measures (e.g., 5-R2) or they are already incorporated into the BAU forecasts (e.g., 5-R3). Refer to Appendix C for more information. Supporting measures are measures that cannot currently be quantified and included in the reduction analysis but are provided to strengthen the quantified measures. Although emissions reductions have not been quantified for these measures, they are still an important part of the CAP and ensure a comprehensive approach to climate action planning. Further development and implementation of these measures may result in sufficient data to quantify the GHG reductions in the future.

Table 3-8. Regional Measures to Reduce Solid Waste Emissions

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 9: Increase solid waste diversion				
9-R1	Waste Diversion Goal	Increase the diversion rate of the total waste stream.	<i>Implemented by:</i> Sonoma County Waste Management Agency (SCWMA) with cooperation from RCPA and local jurisdictions	26,217
Goal 10: Increase capture and use of methane from landfills				
10-R1	Increase Landfill Methane Capture and Use for Energy	Develop new waste-to-energy projects at landfills.	<i>Implemented by:</i> SCWMA, landfill owners/operators	39,140

Table 3-9. Regional Measures to Reduce Water and Wastewater Emissions

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 11: Reduce Water Consumption				
11-R1	Countywide Water Conservation Support and Incentives	Sonoma County Water Agency (SCWA) will continue to work with its water contractors and others to incentivize local water conservation and water-use efficiency measures.	<i>Implemented by:</i> SCWA, supported by local jurisdictions	NQ ¹
Goal 12: Increase recycled water and greywater use				
12-R1	Recycled Water	Use recycled water instead of potable water.	<i>Implemented by:</i> Water/wastewater service providers	48
Goal 13: Increase water and wastewater infrastructure efficiency				
13-R1	Infrastructure and Water Supply Improvements	Reduce energy demand from water supply infrastructure, investigate new water supply sources, and increase local water production.	<i>Implemented by:</i> SCWA and other water/wastewater service providers	230
13-R2	Wastewater Treatment Equipment Efficiency	Reduce energy demand from wastewater treatment operations.	<i>Implemented by:</i> Wastewater service providers	529
Goal 14: Increase use of renewable energy in water and wastewater systems				
14-R1	Sonoma County Water Agency Carbon-Free Water by 2015	SCWA has contracted to procure 100% of its electricity needs through renewable and carbon-free resources, thus achieving a carbon-neutral electricity supply.	<i>Implemented by:</i> SCWA	2,145

¹ These measures were not quantified (NQ) for GHG reductions because they are qualitative supporting measures. Refer to Appendix C for more information. Supporting measures are measures that cannot currently be quantified and included in the reduction analysis but are provided to strengthen the quantified measures. Although emissions reductions have not been quantified for these measures, they are still an important part of the CAP and ensure a comprehensive approach to climate action planning. Further development and implementation of these measures may result in sufficient data to quantify the GHG reductions in the future.

Table 3-10. Advanced Climate Initiative Measures

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
Goal 17: Protect and Enhance the Value of Open and Working Lands				
17-R1	Conserve Open Space and Working Lands	Preserve natural open space and working lands to prevent loss of carbon stock due to conversion of such lands to urban uses or other land use changes that also drive increased vehicle miles traveled.	<i>Implemented by:</i> Sonoma County Agricultural Preservation and Open Space District (SCAPOS) working with other agencies (including cities and the County) and non-governmental partners	NQ ¹
17-R2	Enhance Natural Resources on Open and Working Lands through Climate Beneficial Management Practices	Continue to work to enhance the natural resources of open and working lands, including agricultural and timber lands.	<i>Implemented by:</i> Resource Conservation Districts and partners	NQ ¹
Goal 18: Promote Sustainable Agriculture				
18-R1	Sustainable Agriculture Certification Programs	Support sustainable agriculture certification programs that reduce GHG emissions and/or enhance carbon stocks or increase sequestration.	<i>Implemented by:</i> Collaborative effort with agriculture groups, the County, and agriculture-related agencies	NQ ¹
18-R2	Promote Local, Sustainable Food and Ag Products	Support local farmer's markets to provide communities with sustainable local food.	<i>Implemented by:</i> jurisdictions with support from regional entities	NQ ¹

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
18-R3	Urban Agriculture	Amend zoning codes to allow urban farming and gardens in appropriate areas.	<i>Implemented by:</i> cities and the county with support from regional entities such as the University of California (UC) Cooperative Extension	NQ ¹
Goal 19: Increase Carbon Sequestration				
19-R1	Carbon Farming	Increase carbon sequestration on croplands and working rangelands by adding soil organic material and other measures. Support increasing availability of local compost.	<i>Implemented by:</i> The County, Resource Conservation Districts, Natural Resources Conservation Service, and the SCAPOSD	NQ ¹
19-R2	Establish a Target for Increased Carbon Sequestration	Work with local partners to establish short- and long-term targets for increasing carbon sequestration throughout the County.	<i>Implemented by:</i> RCPA, the County, Resource Conservation Districts, Natural Resources Conservation Service, the SCAPOSD, and partners	NQ ¹
Goal 20: Reduce Emissions from Consumption of Goods and Services				
20-R1	Measure and Track Consumption-based Emissions	Develop metrics and tools to analyze and track carbon intensity of goods and services consumed in Sonoma County.	<i>Implemented by:</i> RCPA with support from the SCWMA	NQ ¹
20-R2	Educate Consumers	Provide information to residents and businesses about the carbon content of goods and services consumed in Sonoma County with emphasis on options that will reduce GHG emissions.	<i>Implemented by:</i> RCPA with support from the SCWMA	NQ ¹

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO ₂ e/year)
20-R3	Encourage and Promote Sustainable Consumption	Develop and provide resources that help residents get the goods and services they need with the least full life-cycle GHG emissions.	<i>Implemented by:</i> RCPA	NQ ¹
20-R4	Reduce carbon intensity of product supply chains	Explore partnerships and seek opportunities to support local businesses reducing the carbon intensity of their supply chain.	<i>Implemented by:</i> RCPA	NQ ¹

¹ These measures were not quantified (NQ) for GHG reductions because they will not directly affect the emissions inventoried in CA2020. Refer to Appendix C for more information. Although emissions reductions have not been quantified for these measures, they are still an important part of the CAP and ensure a comprehensive approach to climate action planning. Further development and implementation of these measures may result in quantifying these GHG reductions in the future.

3.6 Local GHG Reduction Measures

The local GHG reduction measures are presented here in greater detail because these are the new and enhanced actions that Sonoma County local governments—the cities and the County—will contribute toward meeting the ambitious countywide GHG reduction target for 2020. Table 3-11 below provides an at-a-glance listing of all local measures, including which jurisdictions are implementing each measure and anticipated GHG reductions. Table 3-11 includes the City of Santa Rosa, which adopted their Climate Action Plan (CAP) in June 2012. Check marks indicate similar measures between CA2020 and Santa Rosa’s CAP, showing how well Santa Rosa’s CAP works with CA2020 and contributes to greenhouse gas emissions reductions to help meet local reduction targets. Following the table, the measures are organized by GHG source and presented in more detail, including implementation information, Key Progress Indicators, and community co-benefits.

Please see Chapter 5, *Community Greenhouse Gas Profiles and Emissions Reductions for 2020*, for additional information about existing actions, plans, and policies for each jurisdiction. A complete description of each measure, including the assumptions and methodology used to calculate GHG reductions, is included in Appendix C.

Table 3-11. Local GHG Reduction Measures

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
Goal 1. Increase building energy efficiency														
1-L1	Expand the Green Building Ordinance Energy Code	Require new residential and nonresidential development to exceed CALGreen Tier 1 voluntary standards by complying with CALGreen Tier 2 standards.	Points beyond Title 24	-	-	-	-	-	-	-	-	10	-	62
1-L2	Outdoor Lighting	Adopt outdoor lighting standards in the zoning ordinance to reduce electricity consumption above and beyond the requirements of AB 1109.	(% of outdoor lighting)	-	50%	80%	50%	50%	✓	25%	80%	25%	20%	1,550
1-L3	Shade-Tree Planting	Expand on current urban tree-planting policies and programs to establish a shade-tree planting goal for each jurisdiction.	(# of trees)	100	100	100	1,000	1,000	✓	400	50	500	1,000	45

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
1-L4	Co-Generation Facilities	Encourage co-generation facilities to supply a certain amount of energy in new commercial and industrial facilities greater than 100,000 square feet.	(MWh)	-	-	-	-	-	✓	-	-	-	10	1
Goal 2. Increase renewable energy use														
2-L1	Solar in New Residential Development	Implement solar energy installation requirements for new residential buildings to increase renewable energy generation.	% of new development	-	50%	8%	50%	15%	✓	100%	8%	25%	-	248
2-L2	Solar in Existing Residential Buildings	Incentivize solar energy installation for existing residential buildings to increase renewable energy generation.	% of existing homes	5%	15%	2%	15%	15%	✓	15%	11%	15%	15%	9,942
2-L3	Solar in New Nonresidential Developments	Implement solar energy installation requirements for new nonresidential development to increase renewable energy generation.	% of new nonresidential development	-	10%	2%	10%	10%	✓	75%	2%	5%	-	535

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
2-L4	Solar in Existing Nonresidential Buildings	Incentivize solar energy installation for existing nonresidential development to increase renewable energy generation.	% of existing nonresidential development	10%	15%	2%	20%	10%	✓	25%	2%	25%	25%	25,714
Goal 3. Switch equipment from fossil fuel to electricity														
3-L1	Convert Building Equipment to Electricity	Replace residential natural gas water and space heating equipment with high efficiency electric equipment.	% of households	-	-	1%	10%	5%	✓	10%	-	10%	-	603
Goal 4. Reduce travel demand through focused growth														
4-L1	Mixed-Use Development in City Centers and along Transit Corridors	Identify specific areas for transit-oriented, city-centered, mixed-use development, focusing on identified existing and planned transit corridors.	% of growth to result in mixed use	15%	70%	20%	60%	20%	✓	60%	50%	50%	20%	3,494

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
4-L2	Increase Transit Accessibility	Encourage new residential projects consisting of 25 units or more to be located within 0.5 mile of a transit node, shuttle service, or bus route with regularly scheduled daily service.	% of growth to be 25+ units	5%	15%	20%	15%	75%	✓	15%	15%	15%	-	1,057
4-L3	Supporting Land Use Measures	Undertake actions that will support transportation-related land use.	Yes/No	Yes	Yes	Yes	Yes	Yes	✓	Yes	Yes	Yes	Yes	NQ ¹
4-L4	Affordable Housing Linked to Transit	Provide affordable housing developments near transit corridors, transit hubs, and downtown cores.	% of new development to be affordable	15%	15%	15%	15%	15%	✓	20%	20%	15%	-	142

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
Goal 5. Encourage a shift toward low-carbon transportation options														
5-L1	Local Transportation Demand Management (TDM) Program	Implement support for voluntary TDM measures for employers with 49 employees or fewer, voluntary TDM measures for larger employers that are in excess of the TRO, and requirements for TDM measures in larger new residential projects.	% of employees eligible	38%	38%	20%	-	38%	✓	38%	-	-	38%	2,975
5-L2	Carpool Incentives and Ride-Sharing Program	Create or promote a countywide ride-sharing program and encourage participation by local employers through their TDM programs.	% of employees eligible	71%	78%	25%	-	78%	✓	78%	-	-	78%	5,709
5-L3	Guaranteed Ride Home	Create a guaranteed ride-home program to provide a free car-share, shuttle, or taxi ride home to employees in case of an emergency.	Yes/No	Yes	Yes	No	No	No	✓	Yes	No	No	Yes	NQ ¹

	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
5-L4	Supporting Bicycle/ Pedestrian Measures	Implement local actions to support bicycle use and pedestrians.	Yes/No	Yes	Yes	Yes	Yes	Yes	✓	Yes	Yes	Yes	Yes	NQ ¹
5-L5	Traffic Calming	Implement traffic-calming measures in downtown cores, accident hot-spot locations, near schools and libraries, etc.	% of trips affected	90%	100%	50%	100%	100%	✓	100%	80%	100%	100%	1,205
5-L6	Parking Policies	Implement additional parking policies to promote a reduction in single-occupancy vehicle travel.	% of area affected	10%	-	50%	-	-	✓	-	-	-	10%	2,489
5-L7	Supporting Parking Policy Measures	Implement actions to support parking policies, such as prioritized parking for EVs, carpools, and hybrids.	Yes/No	Yes	Yes	Yes	Yes	No	✓	Yes	Yes	Yes	Yes	NQ ¹
Goal 7. Encourage a shift toward low-carbon fuels in vehicles and equipment														
7-L1	Electric Vehicle (EV) Charging Station Program	Develop local charging stations to support EVs.	# of charging stations	2	5	20	5	5	✓	5	3	50	5	60

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
7-L2	Electrify Construction Equipment	Incentivize replacement of fossil-fuel construction equipment with alternatively fueled or electric equipment.	% of equipment	-	10%	10%	10%	-	✓	10%	5%	5%	-	386
7-L3	Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	Encourage use of more efficient equipment and support equipment conversion to alternative fuels with lower GHG intensity	Yes/No	Yes	Yes	Yes	Yes	Yes	✓	Yes	Yes	Yes	Yes	2,392
Goal 8. Reduce idling														
8-L1	Idling Ordinance	Limit idling of all commercial vehicles to 3 minutes, except as necessary for the loading or unloading of cargo within a period not to exceed 30 minutes.	Minutes below state law	2	2	2	2	2	✓	2	2	-	2	NQ ¹
8-L2	Idling Ordinance for Construction Equipment	Adopt an ordinance that limits idling time to 3 minutes for heavy-duty construction equipment.	Minutes below state law	-	-	-	2	2	✓	2	-	-	2	163

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
Goal 9. Increase solid waste diversion														
9-L1	Create Construction and Demolition Reuse and Recycling Ordinance	Implement goal for construction and demolition waste.	% beyond baseline	3%	3%	0%	3%	0%	✓	3%	0%	0%	3%	5
Goal 11. Reduce water consumption														
11-L1	SB X7-7 – Water Conservation Act of 2009	Meet or exceed water use reduction goal, as identified by SB X7-7 (20% reduction in urban per capita use by 2020).	Per capita water savings goal	20%	20%	20%	20%	37%	✓	20%	10%	15%	12%	16,540
11-L2	Water Conservation for New Construction	Require adoption of the voluntary CALGreen Tier 1 water efficiency measures for new residential and nonresidential construction.	% of new residential/ nonresidential development	0%/0%	0%/0%	0%/0%	100%/50%	100%/50%	✓	100%/50%	50%/50%	100%/50%	0%/0%	252

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
11-L3	Water Conservation for Existing Buildings	Incentivize renovation of existing buildings to achieve higher levels of water efficiency; encourage existing buildings to retrofit with CALGreen Tier 1 water efficiency measures.	% of new residential/nonresidential development	0%/0%	0%/0%	0%/0%	25%/50%	25%/50%	✓	25%/50%	25%/10%	25%/10%	0%/0%	2,425
Goal 12. Increase recycled water and greywater use														
12-L1	Greywater Use	Incentivize greywater use instead of potable water for residential non-potable uses.	% greywater goal	0%	0%	1%	2%	0%	✓	25%	2%	0%	10%	26
Goal 14. Increase use of renewable energy in water and wastewater systems														
14-L1	Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale	Healdsburg will use 100% renewable energy for a certain percentage of its water production and/or conveyance. Cloverdale has implemented solar energy arrays at the city water and wastewater plants.	Yes or N/A	Yes	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	412

#	Name	Description	Participation Rate Selection	In-place/Adopted by or Participation Rate										2020 GHG Reductions (MTCO ₂ e/yr)
				Cloverdale	Cotati	Healdsburg	Petaluma	Rohnert Park	Santa Rosa	Sebastopol	Sonoma	Windsor	County of Sonoma	
Goal 15. Reduce Emissions from Livestock Operations														
15-L1	Livestock Manure Management	Encourage voluntary manure management techniques that reduce emissions from the decomposition of manure at dairies	Yes or N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	NQ1
15-L2	Reduce Emissions from Enteric Fermentation	This voluntary measure would encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation.	Yes or N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	NQ1
Goal 16. Reduce Emissions from Fertilizer Use														
16-L1	Optimize Fertilizer Use	Encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer)	Yes or N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	1,759

¹ These measures were not quantified (NQ) for GHG reductions because they are qualitative supporting measures. Refer to Appendix C for more information. Supporting measures are measures that cannot currently be quantified and included in the reduction analysis but are provided to strengthen the quantified measures. Although emissions reductions have not been quantified for these measures, they are still an important part of the CAP and ensure a comprehensive approach to climate action planning. Further development and implementation of these measures may result in sufficient data to quantify the GHG reductions in the future.

Expand the Green Building Ordinance Energy Code

1-L1

Supports CA2020 Goal 1: Increase Building Energy Efficiency

GHG Reduction Potential: 62 MTCO₂e per year

Require new development to exceed CALGreen Title 24 standards through Tier 1 voluntary standards (15% reduction from 2010 Title 24 standards) or Tier 2 (30% reduction from 2010 Title 24 standards), or another percentage beyond Title 24. Extend this requirement to apply to future updates to the Title 24 code until zero net energy is achieved through state building standards. Incorporate green building principles and practices into the planning, design, construction, management, renovation, operations, and demolition of all new buildings.

Community Co-Benefits



Implementation:

Each jurisdiction would be responsible for developing and implementing a new Green Building Ordinance (GBO) consistent with the goals chosen as part of this measure.

Measure Commitments:

Each jurisdiction will adopt a percentage beyond Title 24 as part of an updated GBO.

Key Progress Indicators:

1. Energy consumption
 2. Energy savings
 3. The number of new homes and businesses compliant with new GBOs
-

Outdoor Lighting

1-L2

Supports CA2020 Goal 1: Increase Building Energy Efficiency

GHG Reduction Potential: 1,550 MTCO₂e per year

Adopt outdoor lighting standards to reduce electricity consumption above and beyond the requirements of AB 1109. Replace a certain percentage of incandescent outdoor lighting with light-emitting diode (LED) bulbs by 2020.

Community Co-Benefits



Implementation:

Implementation mechanisms will be chosen by each jurisdiction and may include developing a new ordinance requiring LED outdoor lighting for new development and/or providing incentives for bulb replacement in existing fixtures.

Measure Commitments:

Each jurisdiction will adopt a goal for the percent of outdoor lighting to be replaced with high efficiency LEDs, between 20% and 80%.

Key Progress Indicators:

1. Energy consumption
 2. Energy savings
 3. The number of LED outdoor lights installed/sold
-

Shade-Tree Planting

1-L3

Supports CA2020 Goal: 1 Increase Building Energy Efficiency

GHG Reduction Potential: 45 MTCO₂e per year

Expand on current urban tree planting policies and programs to establish a shade tree planting goal for each jurisdiction to help reduce building energy use. The communities already have different tree planting programs that vary by location. Urban tree planting (sometimes called “urban forestry”) also increases carbon sequestration by adding additional biomass, although this benefit is not quantified.

Community Co-Benefits



Implementation:

Implementation mechanisms may include:

- Establishing goals and funding sources for new trees planted on city/County property
- Implementing a requirement to account for trees removed and planted as part of new construction
- Requiring new development to plant shade trees (e.g., a certain number of new trees per dwelling unit, new resident, square footage of building, or size of lot)
- Providing rebates for the purchase of new trees and education about the benefits of shade trees and tree care for residents.

Measure Commitments:

Each jurisdiction will adopt a goal for the number of new trees planted by 2020, between 50 and 1,000.

Key Progress Indicators:

1. Energy consumption
 2. Energy savings
 3. The number of trees planted
-

Co-Generation Facilities

1-L4

Supports CA2020 Goal 1: Increase Building Energy Efficiency

GHG Reduction Potential: 1 MTCO₂e per year

Optimize the use of locally generated energy by encouraging, where feasible, co-generation facilities in new commercial and industrial facilities greater than 100,000 square feet. The jurisdictions will encourage co-generation facilities through a number of actions, such as amending ordinances, removing regulatory barriers, providing financial incentives, and providing outreach.

Community Co-Benefits



Implementation:

Implementation mechanisms in each jurisdiction could include developing new ordinances or offering incentives for co-generation facilities. For example, a GBO may include LEED certification credits (or other GBO compliance mechanisms) for the use of co-generation. The jurisdictions could offer financial incentives for combined heat and power system development by securing funding available through partnerships with utilities, state and federal government programs (e.g., tax credits, rebates, grants, low-interest loans), energy performance contracts, and non-profit organizations. The communities can also encourage cogeneration by removing any unintended regulatory barriers, such as standard interconnection requirements, net metering, and output-based regulations (U.S. Environmental Protection Agency 2014b). The communities would need to identify land uses that would be appropriate for this measure, and then conduct outreach efforts that explain new ordinances or incentives that are being offered.

Measure Commitments:

Each jurisdiction will adopt a goal for installation of new combined heat and power capacity.

Key Progress Indicators:

1. The number of co-generation projects
 2. The capacity (kilowatt) and generation (kilowatt-hours) for each new combined heat and power system facility
-

Solar in New Residential Development

2-L1

Supports CA2020 Goal 2: Increase Renewable Energy Use

GHG Reduction Potential: 248 MTCO₂e per year

Implement a requirement to install solar energy systems on new residential buildings to increase local renewable energy generation. Under this measure, the jurisdictions will also encourage or require solar installations on as many new multi-family developments as feasible.

Community Co-Benefits



Implementation:

This could be implemented through discretionary approvals and permitting for new projects. This program may also include streamlined permitting, providing information to homeowners for low-interest financing, assisting homeowners in purchasing solar photovoltaics through low-interest loans or property tax assessments, requiring that new development provide for solar access and build solar-ready features into buildings, and establishing guidelines for solar development. The jurisdictions may encourage solar installation by forming partnerships with Sonoma Clean Power, Pacific Gas & Electric Company (PG&E), and other private sector resources, or other solar lease or power purchase agreement (PPA) companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations. The actual market penetration rates that each jurisdiction will achieve will likely be influenced by how the community implements this measure. For example, adopting an ordinance to require solar in all new housing would result in a 100% participation rate. Alternatively, a jurisdiction may rely on voluntary solar installation using the technical resources, funding sources, and financing options discussed above. In this approach, participation rates would increase to the extent that funding is available, most likely resulting in less than a 100% participation rate.

Measure Commitments:

Each jurisdiction will adopt a goal for the percentage of new homes installing solar by 2020, between 8% and 100%.

Key Progress Indicators:

1. The number of residential photovoltaic (PV) installations
2. PV electric generation capacity
3. Actual PV electric generation

Solar in Existing Residential Buildings

2-L2

Supports CA2020 Goal: 2 Increase Renewable Energy Use

GHG Reduction Potential: 9,942 MTCO₂e per year

Incentivize solar energy installation on existing residential buildings to increase renewable energy generation.

Community Co-Benefits



Implementation:

This could be implemented through the permitting process for major remodels and through incentives for existing homes. The jurisdictions could require solar installation on all existing homes that undergo major remodels. This program may also include streamlined permitting, providing information to homeowners for low-interest financing, assisting homeowners in purchasing solar photovoltaics through low-interest loans or property tax assessments, and establishing guidelines for solar development. Funds may be provided through the Property Assessed Clean Energy (PACE) Financing Marketplace options available through the County of Sonoma. The jurisdictions may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The jurisdictions would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations.

Measure Commitments:

Each jurisdiction will adopt a goal for the percentage of existing homes installing solar by 2020, between 2% and 15%.

Key Progress Indicators:

1. The number of PV installations on existing homes
 2. PV electric generation capacity
 3. Actual PV electric generation
-

Solar in New Nonresidential Developments

2-L3

Supports CA2020 Goal: Increase Renewable Energy Use

GHG Reduction Potential: 535 MTCO₂e per year

Implement a requirement to install solar energy systems on new nonresidential development to increase local renewable energy generation. Under this measure, the jurisdictions will encourage or require solar installations on as many new nonresidential developments as feasible.

Community Co-Benefits



Implementation:

This could be implemented through discretionary approvals and permitting for new projects. This program may also include streamlined permitting, providing information to developers for low-interest financing, assisting developers in purchasing solar photovoltaics through low-interest loans or property tax assessments, requiring that new development provide for solar access and build solar-ready features into buildings, and establishing guidelines for solar development. The jurisdictions may encourage solar installation by forming partnerships with Sonoma Clean Power, PG&E and other private sector funding sources, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations. The actual market penetration rates that each community will achieve will likely be influenced by how the jurisdiction implements this measure. For example, adopting an ordinance to require solar in all new nonresidential development would result in a 100% participation rate. Alternatively, an ordinance with building-size thresholds, such as an ordinance that requires solar only for buildings greater than a certain square footage, would result in a lower participation rate.

Measure Commitments:

Each community will adopt a goal for the percentage of new nonresidential projects installing solar by 2020, between 2% and 75%.

Key Progress Indicators:

1. The number of nonresidential PV installations
2. PV electric generation capacity
3. Actual PV electric generation

Solar in Existing Nonresidential Buildings

2-L4

Supports CA2020 Goal 2: Increase Renewable Energy Use

GHG Reduction Potential: 25,714 MTCO₂e per year

Incentivize solar energy installation for existing nonresidential buildings to increase renewable energy generation.

Community Co-Benefits



Implementation:

This measure could be implemented through discretionary approvals and permitting for existing projects as well as incentives for nonresidential buildings outside the permitting process. The jurisdictions can require all existing buildings that undergo major remodels or renovations to install solar. This program may also include streamlined permitting, providing information to developers for low-interest financing, assisting developers in purchasing solar photovoltaics through low-interest loans or property tax assessments, and establishing guidelines for solar development. Funds may be provided through the Property Assessed Clean Energy (PACE) Financing Marketplace available through the County of Sonoma. The jurisdictions may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations.

Measure Commitments:

Each jurisdiction will adopt a goal for the percentage of existing nonresidential buildings installing solar by 2020, between 2% and 25%.

Key Progress Indicators:

1. The number of nonresidential PV installations
 2. PV electric generation capacity
 3. Actual PV electric generation
-

Convert to Building Equipment to Electricity

3-L1

Supports CA2020 Goal 3: Switch Equipment from Fossil Fuel to Electricity

GHG Reduction Potential: 603 MTCO₂e per year

Replace residential natural gas space and water heating equipment with high efficiency electric systems, such as air or ground source heat pumps. This measure shifts the energy source from a relatively high GHG-intensive source (natural gas) to a lower GHG-intensive source—clean electricity.

Community Co-Benefits



Implementation:

Implementation mechanisms in each jurisdiction could include developing ordinances to require high efficiency electric equipment for new development or implementing incentives for installing electric equipment in existing buildings. The communities would need to develop outreach efforts to increase community awareness about the status of electric equipment and the life cycle cost and efficiency benefits relative to older, inefficient resistance heating technologies.

Measure Commitments:

Each jurisdiction will adopt a goal for the percentage of homes replacing natural gas furnaces or water heaters with efficient electric systems, between 1% and 10%.

Key Progress Indicators:

1. Energy consumption
 2. Energy savings
 3. The number of electric heating systems installed
-

Mixed-Use Development in City Centers and along Transit Corridors 4-L1

Supports CA2020 Goal: **Reduce Travel Demand through Focused Growth**

GHG Reduction Potential: **3,494**

The jurisdictions would focus new residential and commercial development in their city centers and along existing and planned transit corridors. Mixed-use development (such as residential use above commercial uses) in such locations would improve the diversity of nearby land uses and facilitate easier access to retail and commercial destinations. Improving the jobs/housing balance would also facilitate access to work destinations. Development adjacent to transit centers and along active transit corridors (commonly called *transit-oriented development* or TOD) would increase the amount of trips that can be completed via transit instead of personal vehicles.

Community Co-Benefits



Implementation:

The jurisdictions will develop appropriate tools for cities and urbanized unincorporated areas to encourage mixed-use, infill, TOD, and economic development intended to serve local residents. The primary method will be through updated General Plans and Specific Plans and associated land use designations and site zoning. Policies could include updating zoning codes and improving transit and shuttle service in areas targeted for mixed-use development as well as supporting economic development geared toward local residents to reduce travel for goods and services. The communities would promote and apply existing policies and incentives to further encourage mixed-use, infill, and TOD. Potential incentives could include reduced parking requirements, reductions in building and permit fees, density increases, and other related items.

Measure Commitments:

Each community will set a goal for percentage of new development that results in mixed use, between 15% and 70%; reduces VMT by 4% to 19%.

Key Progress Indicators:

1. The percentage of growth resulting in mixed-use development
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales
-

Increase Transit Accessibility

4-L2

Supports CA2020 Goal 4: Reduce Travel Demand through Focused Growth

GHG Reduction Potential: 1,057 MTCO₂e per year

Encourage all new residential projects consisting of 25 units or more to be located within 0.5 mile of a transit node, shuttle service, or bus route with regularly scheduled, daily service. Consider requirements such as reduced parking, unbundled parking, subsidized public transportation passes, or ride-matching programs, based on site-specific review.

Community Co-Benefits



Implementation:

Each jurisdiction will identify potential areas for TOD and prepare policies and incentives to encourage development near high-quality transit service. Strategies include encouraging TOD in updated General Plans, Specific Plans, and zoning codes, and developing new ordinances requiring transit accessibility. Potential incentives could also include reduced parking requirements, reductions in building and permit fees, density increases, and other related items. The communities may also work with the RCPA/Sonoma County Transportation Authority (SCTA) and transit agencies on this measure.

Measure Commitments:

Reduce communitywide VMT by 0.4% to 5% by encouraging residential development near transit.

Key Progress Indicators:

1. The percentage of growth resulting in 25+ unit residential development located 0.5 mile from a transit station
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales
-

Supporting Land Use Measures

4-L3

Supports CA2020 Goal 4: Reduce Travel Demand through Focused Growth

GHG Reduction Potential: Not Quantified

Encourage new development to provide amenities to support transit and other modes of transportation, including transit stops, bicycle facilities, good pedestrian networks, car-sharing locations, and EV charging stations. Support voter-approved urban growth boundaries (UGBs) and community separators. Support conservation of lands outside UGBs.

Community Co-Benefits



Implementation:

Each jurisdiction will identify potential areas for TOD and develop policies and incentives to encourage development near high-quality transit service. Strategies include encouraging TOD in updated General Plans, Specific Plans, and zoning codes, and developing new ordinances requiring transit accessibility. Potential incentives could also include reduced parking requirements, reductions in building and permit fees, density increases, and other related items. The communities may also work with the RCPA/SCTA and transit agencies on this measure. The County is currently preparing a ballot measure to extend voter-approval protections for Community Separators and is considering additional areas for its community separators. The work of the Sonoma County Agricultural Preservation and Open Space District is also essential to the focused growth principles adopted by the County and each city by protecting lands outside UGBs and within community separators.

Measure Commitments:

Encourage new development to provide amenities to support transit and other modes, including transit stops, bicycle facilities, pedestrian networks, car-sharing, and EV charging

Key Progress Indicators:

1. VMT by transportation mode
 2. Transportation mode share percentages
 3. Gasoline/diesel fuel usage/sales
-

Affordable Housing Linked to Transit

4-L4

Supports CA2020 Goal 4: Reduce Travel Demand through Focused Growth

GHG Reduction Potential: 142 MTCO₂e per year

Encourage affordable housing developments to locate near transit corridors, transit hubs, and downtown cores.

Community Co-Benefits



Implementation:

Each jurisdiction would develop policies and incentives to encourage affordable housing development for cities and urbanized unincorporated county areas. The jurisdictions would draft new ordinances or offer incentives encouraging the affordable housing development near transit hubs and city centers. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density, and other related items. The communities may also work with RCPA/SCTA on this measure.

Measure Commitments:

Establish a goal for the percentage of housing developments greater than 5 units to be affordable and located near transit, between 15% and 23%; reduces VMT by 0.1% to 0.6%.

Key Progress Indicators:

1. The percentage of units that will be affordable housing units
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales
-

Local Transportation Demand Management Program

5-L1

Supports CA2020 Goal 5: Encourage a Shift toward Low-Carbon Transportation Options

GHG Reduction Potential: 2,975 MTCO₂e per year

This measure includes a mandatory trip reduction ordinance (TRO) for employers with 50 employees or more. The mandatory TRO will also provide a non-trip reduction alternative in the form of purchase of an equivalent amount of GHG offsets for employers who decide not to implement trip reductions. This measure also supports voluntary transportation demand management (TDM) measures for employers with fewer than 50 employees, additional voluntary TDM measures (beyond the minimum TRO requirements) for larger employers, and requirements for TDM measures in new large residential projects.

Community Co-Benefits



Implementation:

Each jurisdiction will define the threshold for application of the ordinance, the specific TDM measures to be implemented, and methods for monitoring employer compliance. The jurisdictions may require certain TDM strategies (beyond the minimum TRO requirements) through the permitting process for businesses with 50 or more employees. Incentives for voluntary TDM by employers with fewer than 50 employees may also be used, such as reduced parking requirements, reductions in fees, and other related items. The communities may also work with RCPA/SCTA. For mandatory aspects of the ordinance, a non-trip reduction alternative will be provided in the form of requirements to purchase an equivalent amount of GHG offsets.

Measure Commitments:

Support voluntary TDM measures for small employers (< 50); implement mandatory TRO for employers with 50 employees or more (would reduce communitywide VMT by 2%).

Key Progress Indicators:

1. Number of businesses or employees participating in the TDM program
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales (and GHG offsets for those selecting this option)
-

Carpool-Incentives and Ride-Sharing Program

5-L2

Supports CA2020 Goal 5: Encourage a Shift toward Low-Carbon Transportation Options

GHG Reduction Potential: 5,709 MTCO₂e per year

Create or promote a regional ride-sharing program and encourage participation by local employers through their TDM programs. Focus on large employers to create programs. Actively disseminate information to the community regarding the variety of ridesharing options from 511.org to private companies.

Community Co-Benefits



Implementation:

Each participating jurisdiction will develop a carpool incentive program attractive to employers, including managing the financial incentives for carpooling. For example, the City of Santa Rosa offers free parking in downtown garages and eligibility for monthly prize drawings to carpool commuters (and employers) registered in the City's Trip Reduction program. Similar incentives could be provided by other communities. Additional strategies include connecting commuters to formal carpool organizers. Jurisdictions can consider using 511 ridesharing forums, dynamic rideshare apps (e.g., Carma, Zimride, Ridejoy), or helping to facilitate communication among employers in the same geographic area. Communities can also designate convenient locations as casual carpool pickup spots/park-and-ride lots. Other possible strategies include making the requirements for ridesharing services less restrictive to reduce the barrier to entry, such as lowering age limits or eliminating affiliation requirements. Connecting vanpool organizers with commuters would also be beneficial.

Measure Commitments:

Develop a carpool incentive program with employee participation between 25% and 80%; reduce VMT by 1.3% to 3.9%.

Key Progress Indicators:

1. Number of businesses or employees participating in the program
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales
-

Guaranteed Ride Home

5-L3

Supports CA2020 Goal 5: Encourage a Shift toward Low-Carbon Transportation Options

GHG Reduction Potential: Not Quantified

Implement a guaranteed ride home program to provide a free car-share, shuttle, or taxi ride home in case of an emergency (illness, family crisis, unscheduled overtime) for employees who use an alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency. For example, the City of Santa Rosa has a guaranteed ride home program for employees (or employers) registered in the City's Trip Reduction Program.

Community Co-Benefits



Implementation:

Each jurisdiction would be responsible for implementing this measure. The jurisdictions may work with RCPA/SCTA to implement this program.

Measure Commitments:

Percentage participation in guaranteed ride home program.

Key Progress Indicators:

1. Number of businesses or employees participating in the guaranteed ride home program
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales
-

Supporting Bicycle/Pedestrian Measures

5-L4

Supports CA2020 Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options

GHG Reduction Potential: Not Quantified

This measure includes several local actions to support bicycle use and pedestrian travel.

- Identify bicycle/pedestrian route gaps including improving connections across community boundaries. Prioritize funding and construction of routes that close key gaps across community boundaries.
- Encourage implementation of city and County bike/pedestrian master plans. Identify common barriers to implementation of current plans.
- Update municipal codes to require pedestrian and bicycle facilities (if needed).
- Work with transit agencies to increase bike storage on buses, at bus stops, and at transit hubs and ferry terminals.
- Require bicycle facilities at all park-and-ride lots and transit stations.
- Consider implementing bike-sharing programs.

Community Co-Benefits



Implementation:

SCTA will work with the cities and county transit agencies to coordinate the identification and implementation of cross-jurisdictional bicycle and pedestrian corridor projects. Each jurisdiction will update municipal codes and prepare or update their bike/pedestrian master plans, as needed. As discussed above, the jurisdictions will need to identify route gaps and coordinate with the County and SCTA on routes that are cross-jurisdictional. The bike and pedestrian master plans will outline needed improvements and the areas identified for expansion. Communities will also coordinate with transit agencies to improve the bike-transit facilities.

Measure Commitments:

Percentage participation in program.

Key Progress Indicators:

1. Number of businesses or employees participating in the program
2. VMT by transportation mode
3. Transportation mode share percentages
4. Gasoline/diesel fuel usage/sales

Traffic Calming

5-L5

Supports CA2020 Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options

GHG Reduction Potential: 1,205 MTCO₂e per year

Implement traffic-calming measures in downtown cores, accident hotspot locations, near schools and libraries, etc. Project design will include pedestrian/bicycle safety and other traffic-calming measures that exceed current jurisdiction requirements. Traffic-calming measures reduce motor vehicle speeds and encourage pedestrian and bicycle trips. Specific measures may include: marked crosswalks, countdown signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.

Community Co-Benefits



Implementation:

Each jurisdiction will develop a strategy to implement this measure appropriate to its community setting. Implementation may include holding public meetings to identify areas of concern for the community, conducting traffic studies to determine where traffic calming is needed, and securing funding to construct traffic-calming features. Traffic-calming measures can be made a condition of new development approvals where appropriate and can be incorporated in General Plans and Specific Plans. Jurisdictions will select specific measures to implement based on the issues and characteristics of each area. The communities may also work with SCTA.

Measure Commitments:

Implement traffic-calming measures in downtown core and near schools, yields communitywide VMT reduction of 0.1%.

Key Progress Indicators:

1. Percentage implementation of traffic-calming measures
 2. VMT by transportation mode
 3. Transportation mode share percentages
 4. Gasoline/diesel fuel usage/sales
-

Parking Policies

5-L6

Supports CA2020 Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options

GHG Reduction Potential: 2,489 MTCO₂e per year

Implement additional parking policies to promote reduction in single-occupancy vehicle travel, such as on-street market pricing in downtown core areas. Consider reduced parking requirements, shared parking, and in-lieu fees, in combination with providing transit and bicycle facilities, in appropriate areas.

Community Co-Benefits



Implementation:

Each jurisdiction would be responsible for implementing this measure. The communities may also work with SCTA. Staff would select parking pricing policies appropriate for their community and develop a process for implementation and management, which may include updating municipal codes. The jurisdictions would draft new ordinances and/or General Plan policies, or offer incentives encouraging reduced parking requirements and increased transit or bicycle facilities. Potential incentives could include tax breaks or deductions, or other rebates.

Measure Commitments:

Percentage increase in parking prices and the percentage of area subject to pricing.

Key Progress Indicators:

1. Percentage increase in parking pricing
 2. Percentage of applicable area subject to parking pricing
 3. VMT by transportation mode
 4. Transportation mode share percentages
 5. Gasoline/diesel fuel usage/sales
-

Supporting Parking Policy Measures

5-L7

Supports CA2020 Goal: 5 Encourage a Shift Toward Low-Carbon Transportation Options

GHG Reduction Potential: Not Quantified

Offer prioritized parking for hybrid/EV cars, carpools, vanpools at city-center corridors, new developments, public parking areas, and municipal facilities. Consider amending zoning code to require new parking lots to provide prioritized parking for carpools, vanpools, hybrids, and EVs, and provide charging facilities.

Community Co-Benefits



Implementation:

The jurisdictions will identify supporting parking policy strategies appropriate for their community and develop specific policies and guidelines to implement and monitor them. Implementation could include new ordinances and/or General Plan policies, zoning code amendments, or incentives encouraging prioritized parking requirements for alternatively fueled vehicles or carpools. Potential incentives could include tax breaks or deductions, or other rebates. The jurisdictions may also work with RCPA/SCTA.

Measure Commitments:

Provide priority parking for low emission vehicles, carpools, vanpools.

Key Progress Indicators:

1. VMT by transportation mode
 2. Transportation mode share percentages
 3. Gasoline/diesel fuel usage/sales
-

Electric Vehicle Charging Station Program

7-L1

Supports CA2020 Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment

GHG Reduction Potential: 60 MTCO₂e per year

Develop local charging stations to support EVs. This measure is in addition to the regional Measure 7-R1.

Community Co-Benefits



Implementation:

The jurisdictions would work with PG&E and SCP to identify grants and other funding sources to help finance the installation of charging stations throughout the county. In addition, SCP, ESD (through available PACE financing options) and Northern Sonoma County Air Pollution Control District (NSCAPCD) would create a package to install and finance charging stations.

Measure Commitments:

Install 100 Level I and II charging stations.

Key Progress Indicators:

1. The number of EVs registered
 2. The number of EV charging stations installed
 3. The amount of electricity distributed/sold by the charging stations
 4. The number of Clean Vehicle Rebate Project rebates issued
 5. Gasoline/diesel fuel usage/sales
-

Electrify Construction Equipment

7-L2

Supports CA2020 Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment

GHG Reduction Potential: 386 MTCO₂e per year

Establish a goal for a percentage of construction equipment to use alternative fuels or electricity in place of diesel and gasoline. Equipment could include electric or hybrid-electric dozers, excavators, or loaders, all of which are on the market. Construction equipment powered by other alternative fuels, such as compressed natural gas (CNG), is also available. New development would be required to provide a construction equipment management plan that meets the local community requirements for use of alternatively fueled equipment (including electrical equipment) during project construction.

Community Co-Benefits



Implementation:

Each jurisdiction would work in close cooperation with the appropriate air district to draft an ordinance and develop outreach programs to be consistent with current air district rules and California Environmental Quality Act (CEQA) guidelines. The air district sets air quality related requirements on construction vehicles and also provides mitigation options related to construction vehicles through Voluntary Emission Reduction Agreement programs that may overlap with this measure.

This measure could be implemented through discretionary approvals and permitting for new projects. Communities could provide incentives for electric and more efficient construction equipment to developers and contractors, such as rebates and subsidies and information on financing for this equipment. Encourage the use of alternative fuels for construction equipment on site, where feasible, such as CNG, liquefied natural gas, propane, or biodiesel. Require a certain percentage of all construction equipment on new development projects to be electrically powered as a condition of approval; this could be incorporated into the construction contracts.

Measure Commitments:

Electrify 5% to 10% of construction equipment.

Key Progress Indicators:

1. Electric equipment purchases
 2. Construction equipment fuel use
-

Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching

7-L3

Supports CA2020 Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment

GHG Reduction Potential: *2,392 MTCO₂e per year*

This local measure has two elements: First, it is a voluntary measure to support farmers wanting to convert equipment to fuels with lower GHG intensity. Second, the City of Petaluma has received a grant for a Biomass to Biofuel Project, which is expected to result the quantified reduction.

Farmers can reduce fossil fuel use in agricultural equipment by converting equipment currently using gasoline, diesel, or liquefied petroleum gas to alternative fuels with lower GHG intensity (such as natural gas, biofuels, or solar electricity) as feasible, keeping equipment maintained and in good working order, replacing old equipment with newer and more efficient equipment, and using global positioning systems (GPS) to optimize equipment operation.

The City of Petaluma has received a grant to partner with the California Energy Commission on a project to capture gas released by wastewater solids and food waste generated in the City and reuse it for fuel for the City's municipal fleet (transit and waste collection vehicles).

Community Co-Benefits



Implementation:

Encourage farmers to participate in the California Air Resources Board's (ARB) Carl Moyer Program, which provides incentives for engines that beat emissions standards. A particular focus may be expanding renewable energy use for water pumps and wind machines. The City of Petaluma will implement its biofuels project in accordance with the state grant.

Measure Commitments:

Support owners of agricultural and other off-road equipment in switching to cleaner fuels and keeping equipment in good working order; goal of 10% reduction in GHG. The City of Petaluma will implement its biofuels project.

Key Progress Indicators:

1. Alternative fuel equipment purchases
 2. Equipment fuel use
-

Idling Ordinance

8-L1

Supports CA2020 Goal 8: Reduce Idling

GHG Reduction Potential: Not quantified

Limit idling of all commercial vehicles to 3 minutes except as necessary for the loading or unloading of cargo within a period not to exceed 30 minutes.

Community Co-Benefits



Implementation:

Each jurisdiction would adopt and implement a new commercial vehicle idling ordinance. The communities could also work with RCPA and/or Bay Area Air Quality Management District (BAAQMD) and NSCAPCD to implement the ordinance.

Measure Commitments:

Limiting idling of commercial vehicles to 3 minutes will save 2% of commercial vehicle fuel.

Key Progress Indicators:

1. Adoption of idling limit ordinances
 2. Diesel fuel usage/sales
-

Idling Ordinance for Construction Equipment

8-L2

Supports CA2020 Goal 8: Reduce Idling

GHG Reduction Potential: 163 MTCO₂e per year

Adopt an ordinance limiting idling time for heavy-duty construction equipment beyond ARB or local air district regulations and if not already required as part of CEQA mitigation. The California Air Pollution Control Officers Association (2010) recommends a 3-minute idling limit. Encourage contractors as part of permitting requirements or city contracts to submit a construction vehicle management plan that may include idling time requirements, hour meters on equipment, and/or documenting the horsepower, age, and fuel of all on-site equipment. California state law currently requires all off-road equipment fleets to limit idling to no more than 5 minutes.

Community Co-Benefits



Implementation:

Each jurisdiction would adopt and implement a new commercial vehicle idling ordinance. The jurisdictions could also work with RCPA and/or BAAQMD and NSCAPCD to implement the ordinance.

Measure Commitments:

Reduce idling time for construction equipment to 3 minutes (beyond state requirement of 5 minutes).

Key Progress Indicators:

1. Adoption of idling limit ordinances
 2. Diesel fuel usage/sales
-

Create Construction and Demolition Reuse and Recycling Ordinance

9-L1

Supports CA2020 Goal 9: Increase Solid Waste Diversion

GHG Reduction Potential: 3 MTCO₂e per year

Implement consistent countywide goals for recycling and reuse of construction and demolition (C&D) waste. This could follow the Petaluma model, which requires development projects to have a Construction Phase Recycling Plan that addresses the reuse and recycling of major waste materials, creates a minimum diversion rate for C&D waste on all projects (such as 75%), and requires an inventory of usable materials prior to any demolition.

Community Co-Benefits



Implementation:

Each jurisdiction will implement this measure through a C&D ordinance, with assistance from the Sonoma County Waste Management Agency (SCWMA). SCWMA or the RCPA could assist by drafting a model ordinance for use/adaptation by local jurisdictions.

Measure Commitments:

Implement consistent countywide goals for C&D waste to establish goal and procedures. Increase C&D diversion to 72% to 75% by 2020.

Key Progress Indicators:

1. C&D waste diversion rate
 2. Tonnage of C&D waste sent to landfills
 3. Tonnage of C&D waste recycled
 4. Tonnage of C&D waste composted
 5. Tonnage of C&D waste diverted to other ends
-

Senate Bill SB X7-7 – Water Conservation Act of 2009

11-L1

Supports CA2020 Goal 11: Reduce Water Consumption

GHG Reduction Potential: 16,540 MTCO₂e per year

Meet (or exceed) the state’s per-capita water use reduction goal for 2020 as established by SB X7-7 (2009). This statute requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per-capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the “20X2020 goal”). Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target (in terms of gallons per capita per day) to meet this goal. Specific per-capita water use reduction goals vary by water agency.

Community Co-Benefits



Implementation:

Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target to meet this goal and is responsible for implementing this measure. The jurisdictions would also need to work with the water retailers to implement water-saving measures at the local level. Water cutbacks would require the communities to engage and encourage residents and businesses to find ways to save water. The jurisdictions will use the Energy Watch partnership and work with SCP and PG&E to help implement this measure. The jurisdictions will also encourage “pay as you save” programs for energy and water efficiency.

Measure Commitments:

Meet or exceed state goal (20% reduction in per capita use).

Key Progress Indicators:

1. Per-capita water use for each water retailer/community
 2. Gallons of water saved
 3. Water consumption
-

Water Conservation for New Construction

11-L2

Supports CA2020 Goal 11: Reduce Water Consumption

GHG Reduction Potential: 252 MTCO₂e per year

Implement a water-reduction target for new development that exceeds the SB X7-7 20% reduction target, such as a 30% reduction in water use for each community. To satisfy this goal, require adoption of the Voluntary CALGreen Tier 1 water-efficiency measures for new residential and nonresidential construction. CALGreen voluntary measures recommend use of water-efficient appliances and plumbing and irrigation systems, as well as more aggressive water savings targets.

Community Co-Benefits



Implementation:

The jurisdictions will update building codes for new buildings to require use of voluntary CALGreen Tier 1 water-efficiency measures, including:

- Use of low-water irrigation systems
- Installation of rainwater systems
- Installation of water-efficient appliances and plumbing fixtures
- A 30% to 40% reduction over baseline indoor water use, and a 55% to 60% reduction in outdoor potable water use (CALGreen Tier 1 or 2).

Communities could apply for State Water Resources Control Board grant money for the water-energy “standard offer” pilot project.

Measure Commitments:

Require Voluntary CALGreen Tier 1 water-efficiency measures for 0% to 50% of new residential and 0–100% of new residential and nonresidential construction.

Key Progress Indicators:

1. Gallons of water saved
 2. Water consumption
 3. Energy savings associated with water usage
 4. Total energy consumption associated with water usage
-

Water Conservation for Existing Buildings

11-L3

Supports CA2020 Goal 11: Reduce Water Consumption

GHG Reduction Potential: 2,425 MTCO₂e per year

Achieve a water-reduction target for existing development that exceeds the SB X7-7 20% reduction target, such as a 30% reduction in water use by implementing a program to retrofit existing buildings to achieve higher levels of water efficiency. Encourage existing buildings (constructed before 2015) to use voluntary CALGreen Tier 1 water-efficiency measures.

Community Co-Benefits



Implementation:

The jurisdictions could require water conservation upgrades for all existing buildings that undergo major remodels or renovations and/or incentivize water-efficiency upgrades outside the permitting process. Education and outreach programs will help educate residents and businesses about the importance of water efficiency and how to reduce water use. Rebate programs will help promote installation of water-efficient plumbing fixtures. The program could include:

- A Water Audit Program in collaboration with local water purveyors that offer free water audits
- Development plans to ensure water conservation techniques are used (e.g., rain catchment systems, drought tolerant landscape)
- Requirements for water-efficiency upgrades when permitting renovations or additions of existing buildings
- Use of water conservation pricing (e.g., tiered rate structures) to the extent allowed by law to encourage efficient water use
- Incentives for projects that demonstrate significant water conservation through use of innovative technologies

The jurisdictions will use the Energy Watch partnership and work with SCP and PG&E to help implement this measure. The communities will also encourage “pay as you save” programs for energy and water efficiency.

Measure Commitments:

Install water-efficiency measures in 0% to 25% of existing residential and 0% to 50% of existing nonresidential.

Key Progress Indicators:

1. Gallons of water saved
2. Water consumption
3. Energy savings associated with water usage
4. Total energy consumption associated with water usage

Greywater Use

12-L1

Supports CA2020 Goal 12: Increase Recycled Water and Greywater Use

GHG Reduction Potential: 26 MTCO₂e per year

Establish a goal to replace a certain percentage of potable water used for residential non-potable uses (landscaping, toilet flushing, etc.) with greywater.

Community Co-Benefits



Implementation:

Each participating jurisdiction will establish a greywater goal for this measure and will work with water providers to assess progress toward the goals.

Measure Commitments:

Replace 1% to 50% of potable water currently used for non-potable uses with greywater.

Key Progress Indicators:

1. Percentage of greywater water used for residential non-potable water uses
 2. Gallons of greywater used
 3. Gallons of potable water saved
 4. Total potable water consumption
-

Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale

14-L1

Supports CA2020 Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems

GHG Reduction Potential: 412 MTCO₂e per year

Healdsburg would use green energy (100% renewable) sources for a certain percentage of its water production and/or conveyance. Cloverdale has implemented solar energy arrays at the city water and wastewater plants.

Community Co-Benefits



Implementation:

Healdsburg will be responsible for implementing green energy projects at its water production and wastewater processing facilities. Cloverdale has already implemented solar arrays at its water and wastewater plants and will be responsible for continuing to ensure that the arrays are used to their maximum potential

Measure Commitments:

Provide increasing amount of renewable energy for water supply and wastewater treatment in the two cities.

Key Progress Indicators:

1. Solar electric generation capacity
 2. Electricity generation
 3. Renewable portfolio for Healdsburg's electricity
 4. Healdsburg electricity emission factor
-

Livestock Manure Management

15-L1

Supports CA2020 Goal 15: Reduce Emissions from Livestock Operations

GHG Reduction Potential: Not quantified

This voluntary measure would encourage manure management techniques that reduce emissions from the decomposition of manure at dairies. Strategies include on-site management approaches that reduce methane emissions, like dry composting or pasturing, as well as opportunities to convert methane to fuel using some form of methane digestion.

Community Co-Benefits



Implementation:

Under this measure, the County would work with local partners, like the Resource Conservation Districts, and with dairies to discuss relevant incentives and the feasibility of alternative manure management strategies, including installing methane capture equipment.

Measure Commitments:

Pursue manure management practices that reduce or capture methane that would otherwise be released to the atmosphere.

Key Progress Indicators:

1. Percentage of dairies (and dairy cows) using a low-methane manure management practice
 2. Number and capacity of methane digester(s) installed
-

Reduce Emissions from Enteric Fermentation

15-L2

Supports CA2020 Goal 15: Reduce Emissions from Livestock Operations

GHG Reduction Potential: Not Quantified

This voluntary measure would encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation (methane and nitrous oxide). One method for reducing these emissions would be changing animal diets to inhibit GHG production. Options include dietary oils (such as whole cottonseed oil, sunflower oil, coconut oil, and palm oil), the use of corn or legume silage in place of grass silage, use of concentrate feeds, nitrates, ionophores, and tannins, and improvement of forage quality and the overall efficiency of dietary nutrient use. Potential use of pomace from winemaking should also be explored. The primary challenge is the limited availability of alternative feed materials that both reduce enteric fermentation and allow dairies to maintain their organic certification; 80% to 90% of Sonoma County dairies are organic.

Community Co-Benefits



Implementation:

Under this measure, the County would work with dairy and livestock operators to test feasible and cost-effective approaches suitable for application at organic dairies in Sonoma County. The County would help to identify grant sources to fund demonstration projects with voluntary dairy/livestock operator participation.

Measure Commitments:

Pursue best practices for animal diets to minimize enteric fermentation.

Key Progress Indicators:

1. Animal diet best practices
-

Optimize Fertilizer Use

16-L1

Supports CA2020 Goal 16: Reduce Emissions from Fertilizer Use

GHG Reduction Potential: 1,759 MTCO₂e per year

Encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer). Work with growers to provide incentives for organic fertilizers as an alternative. Create an outreach program to help growers optimize nitrogen application rates, decrease overall fertilizer inputs and cost, maintain current crop yields, and reduce emissions of nitrous oxide.

Community Co-Benefits



Implementation:

The County would lead this measure, given that the vast majority of agricultural activity is in the unincorporated area. Cities with agricultural activities (including urban farming and community gardens) could collaborate with the County to implement this measure. The County would develop voluntary policies that encourage alternatives to synthetic fertilizers. The County would need to work with growers to discuss which incentives would be relevant and the levels of reduction that would be feasible.

Measure Commitments:

Develop incentives and tools to reduce fossil fuel-based fertilizer use by 20%.

Key Progress Indicators:

1. The amount and type of fossil fuel-based fertilizer applied to crops
-

4. Implementation



Chapter 4

Implementation

4.1 Introduction

Development of this plan by the Regional Climate Protection Authority (RCPA) and its member governments is another step in Sonoma County's ongoing local climate leadership. Coordinated efforts to translate this leadership into action are essential to realize the greenhouse gas (GHG) reductions and community co-benefits identified in Chapter 3.

This chapter describes five core elements of plan implementation:

1. Coordinating implementation across many entities
2. Securing funding and facilitating financing for plan implementation
3. Engaging the community and encouraging broad participation
4. Monitoring and reporting on progress
5. Adaptively managing plan implementation and updates

In this discussion of implementation it is important to acknowledge the regional, multi-jurisdictional nature of Climate Action 2020 (CA2020). While RCPA has led the development of CA2020 and will remain in that leadership role through implementation, specific details about implementation of the local GHG reduction measures will be determined by the city (and town) councils and the County Board of Supervisors. City- and county-level implementation will need to reflect local conditions and priorities and additional input from the local community. Therefore, the local measures in CA2020 may be implemented in different ways in different jurisdictions. The cities and the County are committed to the local GHG reduction measures they have identified in CA2020, including a commitment to develop the necessary implementation details to achieve key progress indicators, with support from RCPA and others.

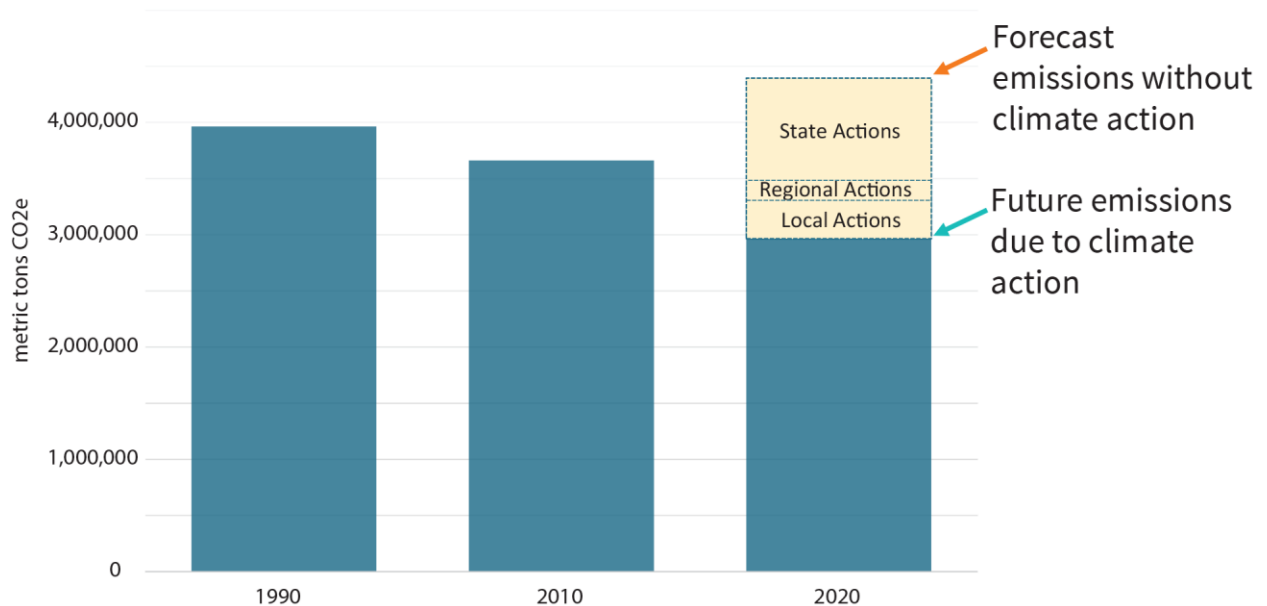
As noted elsewhere in CA2020, the City of Santa Rosa adopted its community CAP in 2012. The City will continue to implement the measures in its plan and those measures will contribute to regional (countywide) GHG reductions.

4.2 Coordinated Implementation

If ever an issue called for coordinated, multi-partner effort, it is climate change; progress depends on communities working together. CA2020 reflects an innovative, collaborative approach to responding to climate change across multiple local communities. By working together, Sonoma County's jurisdictions can achieve greater GHG reductions, and do it more efficiently than if each jurisdiction acted on its own.

CA2020 includes a regional (countywide) goal that will be achieved through the combined impact of local, regional, and state measures implemented in a coordinated manner as a comprehensive GHG emissions-reduction program. With the local commitments identified in this CAP for implementation by 2020, Sonoma County will achieve its regional target of 25% below 1990 levels and be well on the way toward the RCPA’s long-term goals of 40% below 1990 levels by 2030 and 80% below by 2050 (Figure 4-1).

Figure 4-1. Countywide 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



CA2020 commits local governments to implementing a suite of measures appropriate for each community based on their prior efforts, development and economic trends, and community priorities. In Chapter 3, 39 GHG reduction measures are identified that are unique to local government authorities and from which RCPA member jurisdictions have selected. Specific commitments are outlined by jurisdiction in Chapter 5.

Success in achieving CA2020 goals will also rely on GHG reduction measures implemented by state and regional entities that can provide services and resources on behalf of *all* communities more efficiently than individual jurisdictions on their own. These state and regional measures, most of which are already in place or underway, are a critical part of CA2020 and provide a foundation from which local measures can build. State and regional measures are also outlined in Chapter 3.

4.2.1 The Role of RCPA

RCPA is a local government agency created in 2009 to coordinate a regional response to climate change. It is overseen by a Board of elected officials from each of the nine cities and the county, the same Board that oversees the Sonoma County Transportation Authority (SCTA). RCPA builds from SCTA capacity to support, expand, and replicate successful programs already underway at member jurisdictions and partner agencies, and to fill gaps in local climate response. The regional

structure provided by RCPA helps ensure that all jurisdictions participate in achieving the countywide GHG reduction goals.

RCPA led development of this plan and is committed to its implementation by securing funding, managing pilots and programs, developing research and best practices, and supporting members and regional partners in coordinated implementation. Principles that drive collaboration are embedded in RCPA's approach.

- **Consistency:** Policies and programs developed and deployed through regional collaboration minimize gaps in service so all residents benefit from climate action. Inter-jurisdiction consistency also creates more transparency for residents and businesses in the county.
- **Efficiency:** By pooling resources the jurisdictions of Sonoma County are able to aggregate and align human and financial resources, across partners large and small.
- **Integration:** Collaborative structures bring individual agency or community efforts together for a common purpose, aligning related projects toward common goals.
- **Multi-benefit impact:** When agencies work toward a shared vision, both common and distinct goals are served; success is more likely with more invested partners.

The RCPA Board provides a venue for local governments in Sonoma County to participate in establishing priorities, and to direct RCPA staff in the implementation of pilots and programs. The Board oversees climate action programs that serve the entire county, including those offered by the Bay Area Regional Energy Network, long range planning including CA2020, the Shift Sonoma County transportation plan, the Climate Ready North Bay vulnerability assessment, and community engagement related to climate change, such as the Sonoma County Climate Adaptation Forums.

To carry out the priorities of the Board, RCPA staff work with staff from member agencies to develop and manage programs to the benefit of the entire county. Staff collaboration includes a Staff Working Group (SWG) used to develop CA2020. The SWG will continue to provide ongoing coordination of CA2020 implementation. RCPA staff also support individual jurisdictions and agency partners to integrate the implementation of specific programs into a cohesive strategy.

As the lead agency, RCPA will adopt CA2020 first (including certification of the Environmental Impact Report). In addition to the 2020 GHG emissions reduction goal, the RCPA will also adopt longer-term reduction goals for 2030 and 2050. Following adoption by RCPA, each city and the County will adopt its portion of CA2020 (see Chapter 5) in a form appropriate to that jurisdiction. Once adopted, the cities,

In 2014, RCPA was identified by the White House as one of 16 local government Climate Action Champions from around the United States, in recognition of the successes achieved via the collaborative model in place in Sonoma County.



county, and regional agencies will implement the measures each has committed to in their respective CA2020 adoption processes.

RCPA will coordinate and facilitate implementation actions by aggregating funding opportunities to leverage federal, state, and regional grants; providing technical assistance to local partners; developing shared tools (such as case studies, model policy language, and new development consistency checklists); promoting inter-jurisdiction efficiencies through communication and collaboration; and promoting accountability for CAP implementation through measurement and reporting.

RCPA will also directly implement certain measures on behalf of its members as it has since its inception. Examples include Windsor Efficiency Pay As You Save, Energy Upgrade California, Climate Ready North Bay, and Shift Sonoma County.

4.2.2 The Role of RCPA Members

While the coordinating role of RCPA is critical, the ambitious countywide GHG reduction target cannot be achieved without strong leadership and commitment to action from RCPA member jurisdictions. RCPA can help ensure that the actions of individual jurisdictions are greater than the sum of its parts, but local action is essential.

As a part of the implementation process, each jurisdiction will participate in the CA2020 SWG and may also identify additional staff as needed to bring specific expertise to the CA2020 implementation effort. Each jurisdiction's SWG representative will be responsible for participating in RCPA efforts to support implementation, and for organizing, monitoring, and reporting on implementation in their community. RCPA will provide as many resources as possible on behalf of SWG members in order to maximize efficiency.

SWG members will also coordinate and lead the implementation of measures specific to their communities, as well as local actions to support regional GHG reduction measures, including Advanced Climate Initiatives, with the support from RCPA and one another. Local governments will also use CA2020 as a tool to communicate and solidify their priorities within their communities.

RCPA member jurisdictions will continue to pool resources essential to the success of RCPA, staff participation in coordination meetings and processes (such as data collection and status reporting), collaboration on grant applications, and active participation in other aspects of plan implementation. Given the breadth of measures, success will require engagement from key departments that oversee different GHG reduction strategies such as planning, engineering, public works, fleet management, facilities management, police, fire and emergency services, and parks and recreation.

The regional approach to CA2020 recognizes that the cost of implementation would be higher if each jurisdiction developed and implemented measures on their own. RCPA staff contributions can help ensure that city- or county-specific investments can be most efficient and effective, and leveraged across multiple local governments.

As noted elsewhere, the City of Santa Rosa adopted its own CAP in 2012. The City will continue to implement the measures in its plan and may coordinate and collaborate with RCPA and other cities throughout the implementation process.

4.2.3 The Role of Regional Entities

RCPA is not the only local agency that provides services and support to communities in reducing GHG emissions and preparing for climate change. CA2020 also includes GHG reduction measures that will be implemented by agencies under local governance that provide services and resources on behalf of *all* (or multiple) jurisdictions more efficiently than the individual communities can on their own, especially the smaller cities.

These regional measures are a critical part of CA2020 (as outlined in Chapter 3). Other local public agencies are also already working regionally to advance local climate action goals in support of CA2020, including the following.

- **Northern Sonoma County Air Pollution Control District (NSCAPCD)** is the regional agency responsible for developing and implementing air quality plans for the northern part of Sonoma County. NSCAPCD also sponsors various air quality programs that can support implementation of several energy-efficiency, transportation, and renewable energy strategies.
- **Sonoma Clean Power (SCP)** is the community choice aggregator in Sonoma County and will be the lead for expanding participation rates over time and increasing the renewable portfolio for electricity generated to serve the county. SCP may also offer incentives and rebate programs to encourage energy efficiency, distributed and community-scale renewable energy, and use of electric vehicles.
- **Sonoma County Agricultural Preservation and Open Space District** permanently protects the diverse agricultural, natural resource, and scenic open space lands of Sonoma County for future generations. Conserving and improving the management of natural and working landscapes reduces net GHG emissions and delivers multiple other benefits. A healthy forest, for instance, sequesters carbon while also storing and filtering water, providing habitat for wildlife, and building resilience to climate change.
- **Sonoma County Energy Independence Office:** The County's Energy and Sustainability Division was created in 2006 to promote and deliver solutions necessary to mitigate environmental impacts and prepare for climate change. As the community-facing office of the Energy and Sustainability Division of the County of Sonoma, the Energy Independence Office serves as a community clearinghouse of information, tools, services, programs, and resources for the general public, contractors, and other public entities engaged in pursuing energy efficiency, water conservation, and renewable energy. It also manages the PACE programs throughout the County. Although the office is part of the County of Sonoma, it provides services countywide and is therefore listed among the regional agencies.
- **Sonoma County Waste Management Agency (SCWMA):** Sonoma County jurisdictions (except Petaluma) contract all solid waste collection and recycling services through SCWMA.

The jurisdictions will work with the agency to increase waste reduction, recycling, and composting, consistent with the solid waste measures in CA2020. The cities/County and SCWMA may also be able to share facilities, programs, and incentives to help ensure that waste diversion goals are achieved by 2020.

- **Sonoma County Transportation Authority (SCTA):** To implement the local transportation strategies fully, collaboration with regional transportation agencies is necessary. It is essential that the cities, the County, SCTA, and the various transit agencies establish a shared vision for how transportation and land use planning can support sustainable growth. SCTA's Comprehensive Transportation Plan is the primary platform for coordinated, countywide planning for transportation measures.
- **Sonoma County Water Agency (SCWA)** is the primary water wholesaler in the county. SCWA has been implementing numerous measures to reduce the carbon footprint of providing water and integrating renewable energy into its system. SCWA also operates several water conservation and educational programs. The jurisdictions can work with SCWA to promote water conservation in the future.

Essentially, there are already many partners with tools in place and underway to achieve GHG reductions. This plan leverages those tools and encourages their use at larger scales.

4.2.4 The Role of the Community

As described in Chapter 1, CA2020 was developed with extensive community input and builds on earlier community-based efforts to address climate change, such as the Community Climate Action Plan developed by the Center for Climate Protection (formerly the Climate Protection Campaign). Continued community involvement is no less important for implementation of CA2020, particularly given that many strategies depend on voluntary commitment, creativity, and participation. Efforts like the Community Resilience Challenge led by Daily Acts demonstrate the power of collective action to advance the goals of CA2020.

Community Resilience Challenge

The Community Resilience Challenge is an annual campaign that inspires citizens, leaders and groups to take action to save water, grow food, conserve energy, reduce waste and build community. From 2010 to 2016, more than 5,000 people registered over 28,000 resilience building actions in Sonoma County. Nearly double this number of actions and projects have been registered through regional and national partners. The campaign encourages individuals, schools, organizations, municipalities and businesses to take practical actions to create more resilient homes, schools, workplaces and communities. The Challenge inspires action, collaboration and civic engagement, strengthening both relationships and networks for lasting change.

In addition to the individual actions that Sonoma County residents and businesses can take to reduce their own carbon footprint (see Chapter 1, Section 1.3.3), community members will also participate in the public process at individual cities and the County to help shape the details of local measure implementation. Support from the community will be essential to this local decision-making process if Sonoma County is going to achieve its ambitious GHG reduction target. Local non-governmental organizations will likewise play a key role in this process, not only supporting the local implementation actions, but also providing key expertise to inform CA2020 implementation and ongoing adaptive management.

The community—including residents, businesses, and non-governmental organizations—will also play an important role in holding local governmental entities accountable for successful plan implementation. RCPA and local government partners are committed to transparent reporting and implementation and to collaborating with local businesses, community groups, residents, developers, and property owners to establish partnerships and encourage active involvement in CA2020. However, as with most governmental initiatives, that commitment will only be successful if the community reciprocates with active engagement and participation in CA2020 implementation.

4.2.5 Implementation Strategy

RCPA will coordinate with the SWG to accomplish the following general implementation steps:

- **Develop Implementation Plans for Each Emissions-reduction Measure.** RCPA will develop implementation plans that will include milestones, deadlines, funding opportunities, partners, programs, and other details, as necessary, to support implementation.
- **Estimate Project-Specific Costs.** The estimated costs/savings for certain emissions-reduction strategies are provided in Appendix C, *Reduction Measure Methods*. Wherever possible, RCPA will develop more detailed project-specific costs and savings estimates to provide a more accurate assessment of up-front costs and potential returns to communities.
- **Review New Development for Consistency with the Plan.** As described in Chapter 1, meeting the countywide GHG reduction target for 2020 requires new development to be consistent with climate goals by implementing measures that will minimize new GHG emissions. To accomplish this, RCPA member agencies will use the checklist in Appendix A to determine future project consistency with the applicable measures CA2020.
- **Draft Ordinances and/or Codes.** RCPA will support efforts of member agencies to amend their municipal codes where needed to implement certain emissions-reduction measures. Implementation tools may include examples from existing models in other communities, draft policy or model code language, and working with member agency staff to address questions and opportunities for consistency.

- **Establish Partnerships.** Some of the emissions-reduction measures will require new program partnerships that will be internal to each jurisdiction, among the participating communities, and with external agencies.
- **Pursue Funding Sources and Facilitate Investment in Solutions at Scale.** RCPA will lead and support the pursuit of funding from state and federal agencies to support the implementation of emissions-reduction measures. RCPA will also pursue strategies to expand private investment in climate solutions. RCPA member jurisdictions will continue to participate in RCPA-led grant efforts, but will also consider internal funding sources such as facility master plan programs, enterprise budgets, and capital improvement programs.
- **Create Monitoring/Tracking Processes and Indicators.** RCPA will lead emissions tracking and monitoring of program progress, particularly to identify and remedy shortfalls or ineffective programs.
- **Engage the Community and Stakeholders.** RCPA and partners will engage and educate the public and stakeholder groups regarding the implementation of emissions-reduction measures.
- **Lobby for State and Federal Action.** RCPA and partners will identify and lobby for state and federal actions that will help Sonoma County reach its emissions reduction and adaptation goals. State and federal actions that could help fund local climate change programs include cap and trade and carbon pricing.

The specific steps for implementing CA2020 measures will vary, but an illustration of how the RCPA will support member jurisdictions is provided in Table 4.2-1.

Table 4.2-1. Sample process for RCPA supported implementation of local measures

Implementation Process: Measure 2-L1 Solar in New Residential Development	Responsible Party
Research current status of solar energy requirements in jurisdictions	RCPA
Assemble examples of solar installation requirements for new residential buildings are identified and researched	RCPA
Convene ad hoc solar and building industry meeting to discuss current and potential future practice	RCPA
Develop draft measure tool materials (background information, cost estimates, case studies, resources, best practices, FAQs, incentives & rebates) and model policy language	RCPA
Present draft measure tool materials and model policy language to Staff Working Group (SWG)	RCPA
Review and comment on draft measure tool materials and model policy language	SWG
Refine measure tool materials and model policy language based on feedback and further research as needed	RCPA
Assemble and deliver customized final measure tool materials, including a draft model policy and supporting analysis to be used in jurisdiction staff reports to propose measure implementation	RCPA
Provide direction on jurisdiction specific requirements	Individual Jurisdictions
Refine model policy to reflect jurisdiction specific needs and opportunities	SWG
Adopt requirements for solar energy installation	Individual Jurisdictions

4.2.6 Implementation Schedule

Implementation of the emissions-reduction strategies will occur following adoption of CA2020 to ensure that all measures are in place as planned by 2020. RCPA and member agencies will initially pursue strategies based on the grouping outlined below and summarized in Figure 4-2.

- Group 1 strategies are those that need to be developed early and/or require long lead times to achieve reduction targets by 2020.
- Group 2 strategies are those that do not need to be online immediately but need time for development to meet 2020 reduction targets.
- Group 3 strategies are those that need only to be online by 2020 and can be started later in the decade.

These groupings were proposed based on expected GHG reductions, cost and availability of funding, co-benefits, consistency with existing programs, implementation effort, and the timing necessary to support meeting the 2020 target. However, measures may be implemented in a different order depending on funding or policy opportunities.

Figure 4-2. Implementation Timeline for the GHG Reduction Measures

2016	2016	2017-2018	2019	2019-2020	Post-2020
<ul style="list-style-type: none"> • Adopt the CAP • Identify funding mechanisms 	<ul style="list-style-type: none"> • Implement Group 1 strategies • Develop protocols for monitoring, reporting, and responding to CAP progress 	<ul style="list-style-type: none"> • Implement Group 2 strategies • Update emissions inventories • Examine CAP progress 	<ul style="list-style-type: none"> • Implement Group 3 strategies 	<ul style="list-style-type: none"> • Update emissions inventories • Examine CAP progress • Consider post-2020 targets 	<ul style="list-style-type: none"> • Update emissions inventories • Report on CAP success • Adopt post-2020 targets

Implementation of the individual emissions-reduction strategies will be led by the specific city/County divisions shown in Table 4.2-2, with support from RCPA and other local agency staff as appropriate. Other regional entities (e.g., SCP) will be responsible for implementing regional measures and may also support local measures. The primary entities responsible for implementation of each measure are also shown in Table 4.2-2.

Table 4.2-2. Implementation Timeline for the GHG Reduction Measures

Measure	Responsible Entities
Group 1 – Continuation or start of implementation, 2016	
Regional Measures	
1-R1. Community Energy Efficiency Retrofits for Existing Buildings	Sonoma County Energy Independence Program, RCPA, Sonoma Clean Power (SCP)
1-R2. Expand Community Energy Efficiency Retrofits Program	Sonoma County Energy Independence Program, RCPA, SCP
2-R1. Community Choice Aggregation	SCP
5-R1. Improve and Increase Transit Service	Sonoma County Transportation Authority, Golden Gate Transit, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus
5-R2. Supporting Transit Measures	SCTA, Golden Gate Transit, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus
5-R3. Sonoma-Marin Area Rail Transit (SMART)	SMART and local jurisdictions with SMART stations
9-R1. Waste Diversion Goal	Sonoma County Waste Management Authority with cooperation from RCPA and local jurisdictions
14-R1. Sonoma County Water Agency Carbon-Free Water by 2015	Sonoma County Water Agency, supported by local jurisdictions

Measure	Responsible Entities
17-R1. Conserve Open Space and Working Lands	Sonoma County Agricultural Preservation and Open Space District working with other agencies (including cities and the County) and non-governmental partners
17-R2. Enhance Natural Resources on Open and Working Lands through Climate Beneficial Management Practices	Resource Conservation Districts (RCDs) and partners
18-R1. Sustainable Agriculture Certification Programs	Winemakers/winegrowers, the County
18-R2. Promote the Sale of Local, Sustainable, and Organically Grown Foods and/or Products	Farmers, ranchers, cities/County
19-R1. Carbon Farming	The County, RCDs, Natural Resources Conservation Service (NRCS), Sonoma County Agricultural Preservation and Open Space District
19-R2. Establish a Target for Increased Carbon Sequestration	RCPA, the County, RCDs, NRCS, Sonoma County Agricultural Preservation and Open Space District, and partners
Local Measures	
1-L1. Expand the Green Building Ordinance Energy Code	Windsor
1-L2. Outdoor Lighting	Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
1-L3. Shade Tree Planting	Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
1-L4. Co-Generation Facilities	Petaluma and the County
2-L1. Solar in New Residential Development	Pacific Gas & Electric (PG&E), SCP, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Windsor
2-L2. Solar in Existing Residential Buildings	PG&E, SCP, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
2-L3. Solar in New Nonresidential Developments	PG&E, SCP, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Windsor
2-L4. Solar in Existing Nonresidential Buildings	PG&E, SCP, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Windsor, the County
4-L1. Mixed-Use Development in City Centers and along Transit Corridors	Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
4-L2. Increase Transit Accessibility	SCTA, Sonoma County Transit, Petaluma Transit, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor

Measure	Responsible Entities
4-L3. Supporting Land Use Measures	SCTA, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
4-L4. Affordable Housing Linked to Transit	SCTA, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor
5-L1. Local Transportation Demand Management (TDM) Program	SCTA, Sonoma County Transit, Petaluma Transit, Cloverdale, Cotati, Healdsburg, Rohnert Park, Sebastopol, the County
5-L2. Carpool Incentives and Ride-Sharing Program	SCTA, Sonoma County Transit, Petaluma Transit, Cloverdale, Cotati, Healdsburg, Rohnert Park, Sebastopol, the County
5-L3. Guaranteed Ride Home	SCTA, Sonoma County Transit, Petaluma Transit, Cloverdale, Cotati, Sebastopol, the County
5-L4. Supporting Bicycle/ Pedestrian Measures	SCTA, Sonoma County Transit, Petaluma Transit, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
5-L5. Traffic Calming	SCTA, Sonoma County Transit, Petaluma Transit, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
9-L1. Create Construction and Demolition Reuse and Recycling Ordinance	Sonoma County Waste Management Authority (SCWMA), Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
14-L1. Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale	Healdsburg, Cloverdale
Group 2 – Implementation to start by 2018	
Regional Measures	
3-R1. Stationary Fuel Switching Incentives	SCP, Sonoma County Energy Independence Office, RCPA, Bay Area Air Quality Management District (BAAQMD), NSCAPCD
7-R1. Shift Sonoma County (Electric Vehicles)	SCP, Sonoma County Energy Independence Office, RCPA, BAAQMD, NSCAPCD
7-R2. Alternative Fuels for Transit Vehicles	SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus
5-R4. Trip Reduction Ordinance (TRO)	SCTA, transit agencies, cities/County
5-R5. Supporting Measures for the Transportation Demand Management (TDM) Program	SCTA, transit agencies, cities/County
5-R6. Reduced Cost Transit Passes	SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus
5-R7. Alternative Travel Marketing and Optimize Online Service	SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa City Bus

Measure	Responsible Entities
5-R8. Safe Routes to School	SCTA, cities/County
5-R9. Car-sharing Program	SCTA, cities/County
5-R10. Bike Sharing Program	SCTA, cities/County
10-R1. Increase Landfill Methane Capture and Use for Energy	SCWMA, landfill owners/operators
11-R1. Countywide Water Conservation Support and Incentives	SCWA, supported by local jurisdictions
12-R1. Recycled Water	Water/wastewater service providers
13-R1. Infrastructure and Water Supply Improvements	SCWA, other water/wastewater service providers
Local Measures	
3-L1. Convert to Electric Water Heating	Pacific Gas & Electric, SCP, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Windsor
7-L1. Electric Vehicle Charging Station Program	Pacific Gas & Electric, SCP, NSCAPCD, BAAQMD, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
On-Road-3. Neighborhood/Site Enhancement Strategies	Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
5-L6. Parking Policies	Cloverdale, Healdsburg, Sebastopol, the County
5-L7. Supporting Parking Policy Measures	Cloverdale, Cotati, Healdsburg, Petaluma, Sebastopol, Sonoma, Windsor, the County
8-L1. Idling Ordinance	Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, the County
11-L1. SB X7-7 – Water Conservation Act of 2009	SCWA, Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, Windsor, the County
11-L2. Water Conservation for New Construction	SCWA, Petaluma, Rohnert Park, Sebastopol, Windsor
11-L3. Water Conservation for Existing Buildings	SCWA, Petaluma, Rohnert Park, Sebastopol, Windsor
12-L1. Greywater Use	SCWA, Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Windsor, the County
Group 3 – Implementation to start by end 2019	
Regional Measures	
13-R2. Wastewater Treatment Equipment Efficiency	Wastewater service providers: Cloverdale, Healdsburg, Petaluma, Santa Rosa, Windsor, Sonoma County Water Agency
18-R3. Urban Agriculture	Cities/County

Measure	Responsible Entities
20-R1. Measure and Track Consumption-based Emissions	Farmers, ranchers, RCPA, the County
20-R2. Educate Consumers	Farmers, ranchers, RCPA, the County
20-R3. Encourage Sustainable Consumption	Farmers, ranchers, RCPA, the County
20-R4. Reduce carbon intensity of product supply chains	Farmers, ranchers, RCPA, the County
Local Measures	
7-L2. Electrify Construction Equipment	BAAQMD, NSCAPCD, Cotati, Healdsburg, Petaluma, Sebastopol, Windsor
8-L2. Idling Ordinance for Construction Equipment	BAAQMD, NSCAPCD, Petaluma, Rohnert Park, Sebastopol, , the County

4.3 Funding and Financing

4.3.1 Plan Implementation Costs and Benefits

Responding to climate change will require public and private investment (costs). These costs are at least partially offset through direct economic benefits (like lower fuel cost) and through avoidance of future costs associated with unmitigated climate change impacts. Most GHG reduction measures in this CAP have a net positive economic result where savings exceed costs, especially in the long term.

Local governments will incur some costs by taking a leading role in responding to climate change. Costs will include staff time, community engagement, and direct investment for some measures (e.g., municipal infrastructure, energy purchases, and program administration).

The private sector – residents and businesses – will also incur costs associated with the implementation of this plan, mainly due to individual choices about how to participate in climate mitigation. Examples include costs to retrofit buildings and equipment, purchase new vehicles, install rooftop solar, or provide employee commute programs.

Public and private entities will also benefit financially by implementing climate action strategies. For many climate action measures, the financial benefits exceed the costs and generate a positive return on investment. These benefits can include reduced fuel, utility, and maintenance costs, higher property values, tax incentives, and rebates. There are many less direct benefits that are more difficult to evaluate financially including employee recruitment and retention, marketing and branding, building occupant health and productivity, and the other co-benefits introduced in Chapter 3.

Of course, looking exclusively at the traditional economic bottom line is insufficient when it comes to climate change. The full value of co-benefits derived from an individual measure is very difficult to quantify. Even more challenging, the full social cost of inaction is impossible to quantify for an individual community. As Chapter 6 illustrates, climate change is generating local impacts with real economic implications. Flooding, fire, drought, and heat will create many economic risks: damage to buildings and infrastructure, impacts to human health and safety, rising health care and emergency services costs, pressure on food and water supply, rising energy costs, and unpredictable agricultural productivity.

Assessing specific measure costs and benefits – to the extent possible – will be an important step in implementing this climate action plan. It will be equally important to acknowledge that there are costs, benefits, challenges, and opportunities associated with mitigating and adapting to climate change, but they are costs and challenges that local and regional agencies can confidently confront head on, knowing that they are essential to the long-term economic well-being and safety of communities.

In confronting the costs of climate action, the RCPA and local governments will work to minimize costs and maximize local economic benefits by pursuing funding for implementation and facilitating financing tools to support regional investment.

4.3.2 Government Funding Strategies

Implementation of CA2020 will require considerable investment from multiple entities. RCPA will continue to strive for an overall funding approach that ensures that the emissions-reduction strategies will be funded and implemented efficiently and quickly by:

- Pursuing funding for strategies concurrently, whenever possible, to use funds most efficiently
- Leveraging federal, state, and regional grants and other funding sources
- Partnering with other communities and regional entities to administer joint programs, and partnering with the private sector on measure implementation
- Reducing barriers to private investment in climate solutions and supporting strategies to direct investments in energy, buildings, transportation, water, and other GHG sources toward low-carbon options
- Seeking long-term strategies to increase the amount of funding available for local climate action

Various funding options are available to support RCPA and local governments with implementation of emissions-reduction strategies. These options can provide initial capital, reduce overall program costs, and support long-term measure implementation. Appendix D provides information on specific funding and financing options that are currently available to the jurisdictions and that RCPA will pursue to support implementation.

Local jurisdictions are able to obtain funding from the California cap-and-trade program to support certain GHG emissions-reduction measures in CA2020. RCPA is continually monitoring the availability of funding from the sale of cap-and-trade proceeds and the applicability to local GHG emissions-reduction measures along with other sources that may be in development.

4.3.3 Private Sector Financing

Implementation of the emissions-reduction measures in CA2020 will result in costs *and* savings for residents, businesses, and other members of the community (please refer to Appendix C for a cost-effectiveness analysis for certain measures). In fact, most measures have a net positive economic result where savings exceed costs, especially in the long term. Financing tools can help offset the up-front costs of some cost-effective measures. An important role for RCPA and member agencies will be to facilitate sound investments in GHG reduction strategies that will maximize the overall economic return for residents, businesses, and the communities themselves.

For voluntary CA2020 measures (such as energy efficiency and solar retrofits for existing buildings), the private sector will incur associated costs and savings only for those strategies they choose to implement. Some of the measures, however, will be mandatory and will impose costs on public and private parties. The private-sector incentives and rebates identified in Chapter 3 and Appendix D can significantly improve the economics of individual projects. It is also important to note that the entity making the up-front investment may not be the same one that realizes the savings. For example, developers may invest in energy efficiency measures during construction, but it is the subsequent homeowners who will receive lower utility bills (although, with better energy disclosure requirements, buyers may be willing to pay more for an energy-efficient home).

4.4 Community Engagement

To help facilitate the community involvement described in Section 4.2.4, periodic public updates will provide information and inform each community regarding progress toward attaining the countywide 2020 emissions reduction target. These updates will provide opportunities for collaboration and an opportunity for the cities and the County to receive feedback on potential improvements or changes to the emissions-reduction measures. Other outreach activities, including online and social media, community presentations, event participation, and other strategies, will also be pursued to engage the public and solicit input, suggestions, and participation.

4.5 Evaluation and Monitoring

Regular monitoring is important to ensure that programs are functioning as they were originally intended and the desired GHG reduction outcome is achieved. CA2020 also will provide CEQA streamlining, which requires monitoring of the plan's progress towards achieving the adopted targets.

Early identification of effective strategies and potential issues will help the jurisdictions adapt and make informed decisions regarding priorities, funding, and scheduling.

RCPA will lead periodic updates of countywide emissions inventories and provide an annual report to document progress. The first inventory update will occur in 2016 based on data for calendar year 2015. Future inventory updates will be completed in 2018 and 2020 to inform further refinements to near- and long-term climate action strategies. These updated inventories will be presented to the RCPA Board and provided to the public in the annual report. SWG members will present the information to their governing boards. These updates are essential to understanding how successful existing efforts have been in reducing emissions, and how to further prioritize actions included in CA2020.

RCPA will also develop key program indicators that track specific reduction measures to evaluate how well local government strategies are working. To streamline this effort, RCPA will develop a custom tool to track the progress of the GHG reduction measures. This tool will contain the GHG reduction measures along with metrics, checklists, benchmarks, timelines, goals, key performance indicators, and other items identified by the RCPA Board and its member agencies as essential to the monitoring process. Possible tools for communicating the results of monitoring to the community include RCPA website dashboards and other tools that support local government reporting, such as the Statewide Energy Efficiency Collaborative ClearPath tool and existing community social media accounts.

4.6 Adaptive Management

4.6.1 Learning from What Works and What Doesn't

Despite substantial progress in the past decade, climate action planning is still in its relative infancy. Technology, behavior, and mandates are constantly changing and not every new idea works as planned. Therefore, where program tracking, inventory updates, or other information indicates that the emissions-reduction measures are not being implemented or are not as effective as was originally anticipated, RCPA, the SWG, and the participating agencies will adaptively manage CA2020. The goal of adaptive management is to identify and correct ineffective measures quickly, make necessary corrections, and stay on track both toward the countywide GHG reduction target, and toward successful achievement of the level of GHG reduction agreed to by each participating agency through their adoption of reduction measures described in Chapter 5 of this plan. If the current reduction measures are inadequate to meet the reduction targets, they will be amended.

In order to be utilized for CEQA streamlining, CEQA Guideline 15183.5 requires that this plan “Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels.” In addition to the monitoring described in the previous section, RCPA will conduct a 2-year review of overall CA2020 effectiveness as part of its annual reporting in 2018. The review will include measure status and impact data updates

and adjustments and amendments to the plan as necessary to meet the individual and countywide targets.

Ultimately, the purpose of monitoring and adaptive management is to ensure that the plan achieves the reduction target for the County as a whole as well as the level of GHG reduction targeted in each participating jurisdiction. If the current implementation measures are inadequate to meet the reduction targets, the plan will be amended to revise or add implementation measures.

4.6.2 Implementation Beyond 2020

CA2020 is critical local step toward a long-term future with drastically lower GHG emissions. The jurisdictions of Sonoma County are on the leading edge of promoting lower GHG emissions by pursuing a target of 25% below 1990 levels by 2020. This target is consistent with (and far exceeds) the goals and milestones outlined in Assembly Bill 32. Nonetheless, as 2020 approaches, statewide focus will shift to emissions reductions beyond 2020. This trend has been observed elsewhere through the United States, with New York City recently releasing a plan to reduce GHG emissions to 80% below 1990 levels by 2050. California Executive Order S-03-05, issued in 2005, articulates a similar long-term goal for the state. California Executive Order B-30-15, issued in April 2015, establishes an interim goal for the state to reduce GHG emissions to 40% below 1990 levels by 2030.

As part of CA2020 adoption, the RCPA will also adopt long-term goals consistent with those identified in the Executive Orders. The measures implemented by 2020 as part of this CAP put the county on a trajectory to meet these longer-term goals, and CA2020 measures will be the foundation for future climate action planning.

As noted in Chapter 3, a new phase of climate action planning will be needed after 2020 to expand and build upon the goals and strategies in CA2020 and take advantage of new technologies and climate protection science that are constantly evolving. RCPA and Sonoma County jurisdictions will need to develop plans for the future that build on the measures put in place under CA2020. The region will also most likely rely on further state and federal action to achieve post-2020 targets.

5. Community

Community Greenhouse Gas
Profiles and Emissions Reductions
for 2020



Chapter 5

Community Greenhouse Gas Profiles and Emissions Reductions for 2020

This Chapter contains separate sections for each jurisdiction in a form that can be easily excerpted for use in the local adoption process. These sections provide key information about each jurisdiction, including demographic and socioeconomic data and forecasts, as well as a greenhouse gas (GHG) emissions profile for each.

The GHG emissions profile includes detail on each jurisdiction's main sources of emissions in the form of a "backcast" for 1990 emissions, a 2010 emissions inventory and emissions forecasts for 2015, 2020, 2040 and 2050 under business-as-usual (BAU) scenario (i.e., with no state, regional or local GHG reduction measures). The actions that each jurisdiction has already taken to reduce GHG emissions are also described.

Most importantly, these jurisdiction-specific sections show the local GHG reduction measures that each community will implement, and the expected GHG reductions that will be achieved by 2020. Together with state and regional GHG reduction measures, these local measures will achieve the regional target of a 25% emissions reduction (compared to 1990 levels) by 2020.

It should be noted that the City of Santa Rosa's section in this chapter incorporates by reference the previously adopted Climate Action Plan (2012) that will contribute significantly to reaching the regional CAP target for 2020.

Jurisdiction-specific sections are included as follows:

- 5.1 City of Cloverdale
- 5.2 City of Cotati
- 5.3 City of Healdsburg
- 5.4 City of Petaluma
- 5.5 City of Rohnert Park
- 5.6 City of Santa Rosa
- 5.7 City of Sebastopol
- 5.8 City of Sonoma
- 5.9 Town of Windsor
- 5.10 County of Sonoma

Cloverdale

Commitments to meeting
community greenhouse
gas reduction goals.



5.1 Cloverdale

This section presents the community greenhouse gas (GHG) emissions profile specific to Cloverdale and the measures that the City of Cloverdale will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.1.1 Community Summary

The City of Cloverdale is an attractive small town community that is home to many small local businesses, a thriving performing arts center, the annual Cloverdale Citrus Fair, and ample recreational opportunities. Cloverdale is the northernmost city in Sonoma County, located approximately 3 miles south of the Mendocino County-Sonoma County border and 30 miles north of Santa Rosa. The City's location along the major transportation corridors of Highway 101 and Highway 128 offers local economic development opportunities set in the picturesque Alexander Valley wine region. With proximity to urban centers (Santa Rosa, San Francisco, and Arcata/Eureka), Cloverdale is evolving as a smart-growth city with small town charm.

Demographics

The City spans 2.7 square miles and had a population of 8,618 as of the 2010 census. By 2020 the population is expected to increase over 9% to 9,425, while employment is expected to increase by 8%. Cloverdale's demographic composition in 2010 was 75% White, 0.6% African American, 1.1% Native American, 1.1% Asian, 0.1% Pacific Islander, 17.8% from other races, and 4% from two or more races. Persons of Hispanic or Latino origin composed 33% of the population in 2010.

As shown in Table 5.1-1, Cloverdale is expected to experience steady growth in population, housing, and jobs in the future.

Table 5.1-1. Cloverdale Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	4,924	8,618	9,015	9,425	10,952	11,651
Housing	1,868	3,249	3,432	3,625	4,230	4,495
Employment	2,455	3,012	3,624	3,928	4,324	4,492

Socioeconomic data were derived from the Sonoma County Transportation Authority travel demand model and incorporate input from the City based on its internal planning forecasts.

According to 2010 Census data, the majority of housing in the City of Cloverdale is owner-occupied with 66% of all housing units owned, and about 34% of housing units renter-occupied.

Energy and Water Use

Compared to households in the county as a whole, Cloverdale households use less electricity but more natural gas and water. They also use less electricity, natural gas, and water than households statewide.

Table 5.1-2. Cloverdale, County, and State 2010 Average Energy and Water Use (per household, per year)

	Cloverdale	County	State
Electricity (kWh)	6,652	7,042	9,320
Natural Gas (Therms)	441	413	512
Water Use (Gallons)	88,256	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the City of Cloverdale (water).

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

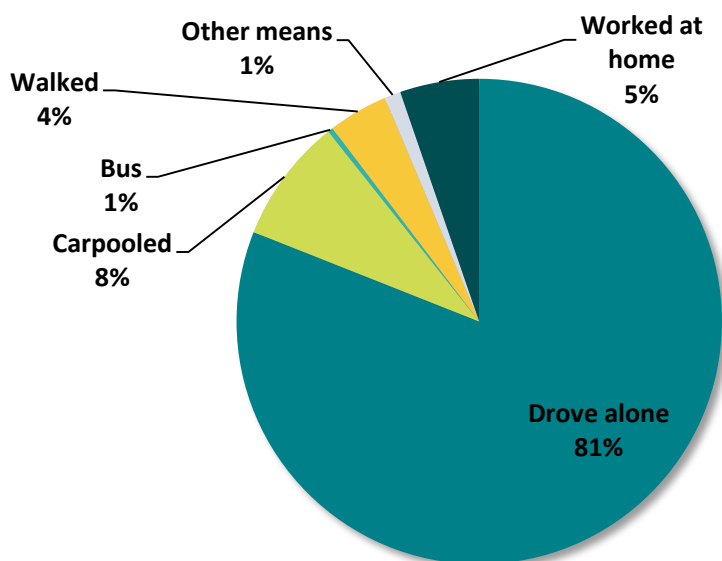
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, most Cloverdale residents (81%) drove alone to work, with only 8% carpooling. This is typical and similar to the other communities in Sonoma County. Cloverdale is the northernmost city in the county and many people have to drive out of the City to work in Santa Rosa to the south, Ukiah to the north, or elsewhere in or out of the county. With the average trip to work for residents of Cloverdale taking 25.2 minutes, riding a bus is not a viable option due to time constraints as well as limited access and routes (U.S. Census Bureau 2014).

Figure 5.1-1. Modes to Work in Cloverdale in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.1.2 Cloverdale's Existing Actions to Reduce Greenhouse Gas Emissions

Cloverdale has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have been helping to reduce greenhouse gas (GHG) emissions. The City has adopted the following ordinances and General Plan policies that help to reduce GHG emissions and will support implementation of the GHG reduction measures in CA2020.

- **Building Energy**
 - The City has adopted the California Green Building Standards Code, making the Tier 1 Voluntary measures for residential and non-residential structures mandatory requirements.
 - General Plan Policy 8-2: Use, support, and encourage energy and resource efficient methods in private construction. Study and develop ordinances and incentives to encourage energy efficient transportation, locally generated solar and alternative energy power sources, and green building methods for private buildings and projects. The City of Cloverdale Building Department has ongoing efforts to support solar power projects, locally generated solar and alternative energy power sources, and green building methods for private buildings and projects.
 - General Plan Policy CDO 8-1: Use energy and resource efficient methods in daily City operation. Where feasible, use energy efficient transportation, locally generated solar and alternative power sources, and green building methods for City buildings. This policy is ongoing. The City has not constructed or remodeled any City buildings.
- **Land Use and Transportation**
 - General Plan Policy LU 3-1: Develop an Urban Growth Boundary [UGB]. Protects important farmlands and open space from urban development (UGB Ordinance). City voters adopted Cloverdale's Urban Growth Boundary in 2010.
 - General Plan Policy CE 4-3: Support local, countywide, and regional bus service. Maintain and encourage use of the Cloverdale City bus by maintaining schedules that serve the community and by use of distinctive vehicles to bring visibility to the service. The City continues to support the use of public transportation in Cloverdale. Sonoma County Transit operates a shuttle bus that is accessible to all residents of the City.
 - General Plan Policy CE 3-1: Pedestrian and bike pathways. Provide an extensive network of pedestrian and bicycle pathways to support community health and provide a safe alternative to automobile use. Integrate routes with transit stops. The Sonoma County Transportation Authority (SCTA), in conjunction with the City, created a pedestrian and bike master plan for Cloverdale.
 - General Plan Policy CE 4-1: Participate in efforts to establish rail service on the SMART right of way. Encourage passage of rail bonds and develop appropriate land uses that will support rail ridership. The City supported the passage of the ballot measures to support

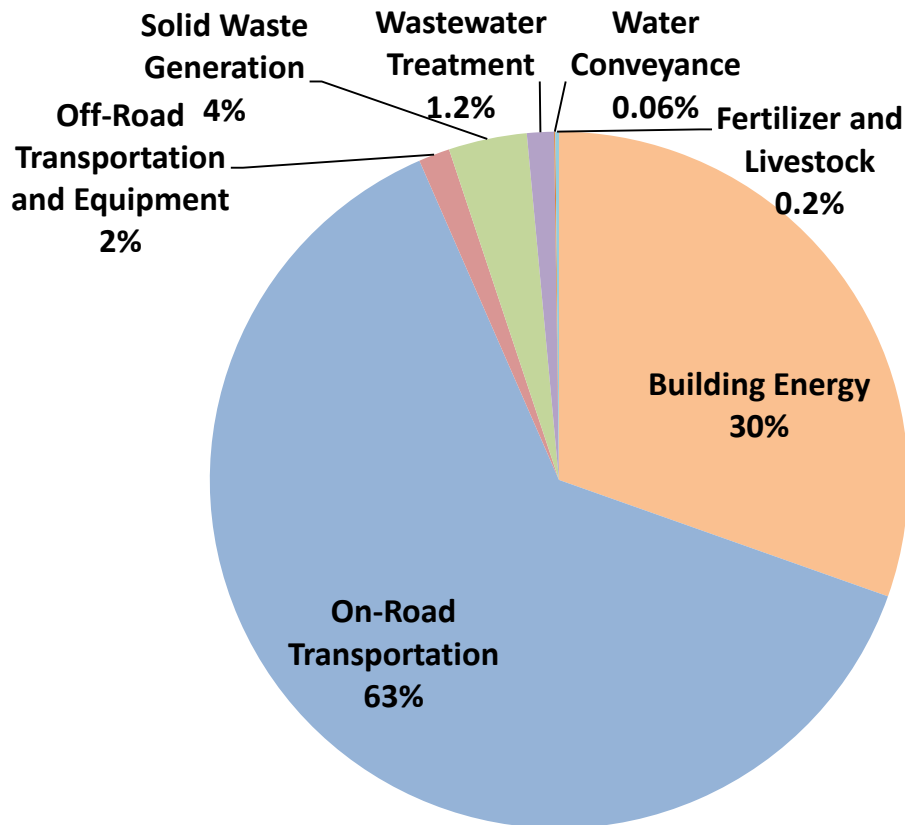
the SMART Train. In anticipation of the SMART Train having a stop in Cloverdale, properties around the train station have been zoned for Transit Oriented Development.

- General Plan Policy CDO 3-8: SMART station area plan. Develop Transit Oriented Development design plan before or concurrent with the Transit Oriented Development Specific Plan. The City adopted a Station Area Plan in 2010 that focuses on development around the SMART Train Station.
- Trip Reduction Ordinance: Municipal Code Chapter 10.54. Requires employers within the City with 100 or more employees at individual job sites to disseminate trip reduction information on alternative transportation in addition to telecommuting, compressed work weeks, and flexible hours.
- General Plan Policy CE-4-4: Encourage ridesharing to reduce commute trips. Coordinate with regional ridesharing plans. The City has worked with regional ridesharing plans to encourage residents and employees to use these programs.
- Waste Minimization and Recycling
 - Recycled Products Purchasing: Municipal Code Chapter 3.08.090.
 - General Plan Policy LU 9-1: Maintain waste management contracts and participation in countywide waste disposal facilities to accommodate household waste and to meet or exceed state and countywide recycling goals.
- Water and Wastewater Efficiency
 - General Plan Policy LU 6-1: Ensure adequate water and waste water capacities. Upgrade the City Wastewater Treatment Plant to provide tertiary treatment so that tertiary treated water can be distributed to new development, open space parks and other uses. Promote water conservation and encourage water conserving landscaping.
 - Water Efficient Landscape Ordinance: Municipal Code Chapter 15.30
- Agriculture
 - General Plan Policy LU 3-3: Protect Prime Farmland, Unique Farmland, and Farmland of Statewide Importance from urban development. Retain these farmland designations as Conservation Features under the Urban Growth Boundary Ordinance. City voters adopted the Urban Growth Boundary in 2010.
- Urban Forestry and Natural Areas
 - General Plan Policy CDO 6-2: Protect distinctive natural vegetation. Develop and urban forest/plan street tree plan with a management strategy for maintaining existing and newly planted trees, including best practice provisions for installation, maintenance, and succession planning.
 - General Plan Policy CDO 6-6: Prepare and urban forest/street tree plan. Design a program for new trees to be installed with development and a plan for retrofit in areas where development or streets were installed without trees.

- General Plan Policy CDO 6-1: Maintain and expand the tree canopy within and outside the developed areas of the City. Develop and urban forest/plan street tree plan with a management strategy for maintaining existing and newly planted trees, including best practice provisions for installation, maintenance, and succession planning.
- General
 - General Plan Policy CDO 8-3: Inventory and Reduce Greenhouse Gas Emissions. Work with the Northern Sonoma County Air Pollution Control District and California Air Resources Board to prepare a Climate Action Plan inventorying current GHG emissions, emissions from 1990, and projected emissions for 2020.

5.1.3 Greenhouse Gas Inventory and Forecast

Figure 5.1-2. Cloverdale 2010 Community GHG Inventory by Source



Cloverdale's inventory is similar to other cities in the county and state. The majority of the GHG emissions are from transportation, from the combustion of fossil fuels in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy consumed for heating, cooling, lighting, and cooking in the residential, commercial, and industrial sectors. Residential uses account for most (69%) of the building energy emissions in Cloverdale.

Commercial uses account for 31% of building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In Cloverdale, total GHG emissions generated by community activities in 2010 were 59,040 metric tons of carbon dioxide equivalent (MTCO₂e), which is approximately 2% of total countywide GHG emissions in the same year.¹ This is a 3% increase from estimated 1990 emissions, which were 57,330 MTCO₂e. Table 5.1-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the City of Cloverdale.

¹ Sonoma County total GHG emissions in 2010 were 2.6 million metric tons of CO₂e.

Table 5.1-3. Cloverdale Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	12,920	23%	17,990	30%	20,880	30%	22,250	30%	25,450	27%	26,840	29%
On-road Transportation	36,510	64%	37,270	63%	44,160	64%	46,380	63%	61,310	66%	60,200	64%
Off-road Transportation and Equipment	610	1%	860	1%	1,090	2%	1,320	2%	2,560	3%	2,690	3%
Solid Waste	6,550	11%	2,140	4%	2,390	3%	2,540	3%	2,880	3%	3,030	3%
Wastewater Treatment	420	1%	740	1.3%	770	1%	810	1%	940	1%	1,000	1%
Water Conveyance	320	1%	30	0.1%	40	0%	40	0%	40	0%	50	0%
Total	57,330	100%	59,040	100%	69,320	100%	73,340	100%	93,170	100%	93,790	100%
Per-Capita Emissions	11.6		6.9		7.7		7.8		8.5		8.1	

5.1.4 Greenhouse Gas Reduction Goal and Measures

The City of Cloverdale joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 20 local greenhouse gas reduction measures. The City's GHG emissions under 2020 business-as-usual (BAU) conditions (in absence of state, regional, and local reduction measures) would be approximately 73,340 MTCO₂e. The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 50,530 MTCO₂e, which would be a reduction of approximately 31% compared to 2020 BAU conditions. The City will achieve these reductions through a combination of state (72%), regional (21%), and local measures (7%) that are technologically feasible and cost-effective per Assembly Bill (AB) 32. With the reduction measures in CA2020, per-capita emissions in Cloverdale will be 5.4 MTCO₂e per person, a 54% reduction in per capita emissions compared to 1990.

Table 5.1-4. Cloverdale 2020 GHG BAU Emissions, Reductions, and CAP Emissions

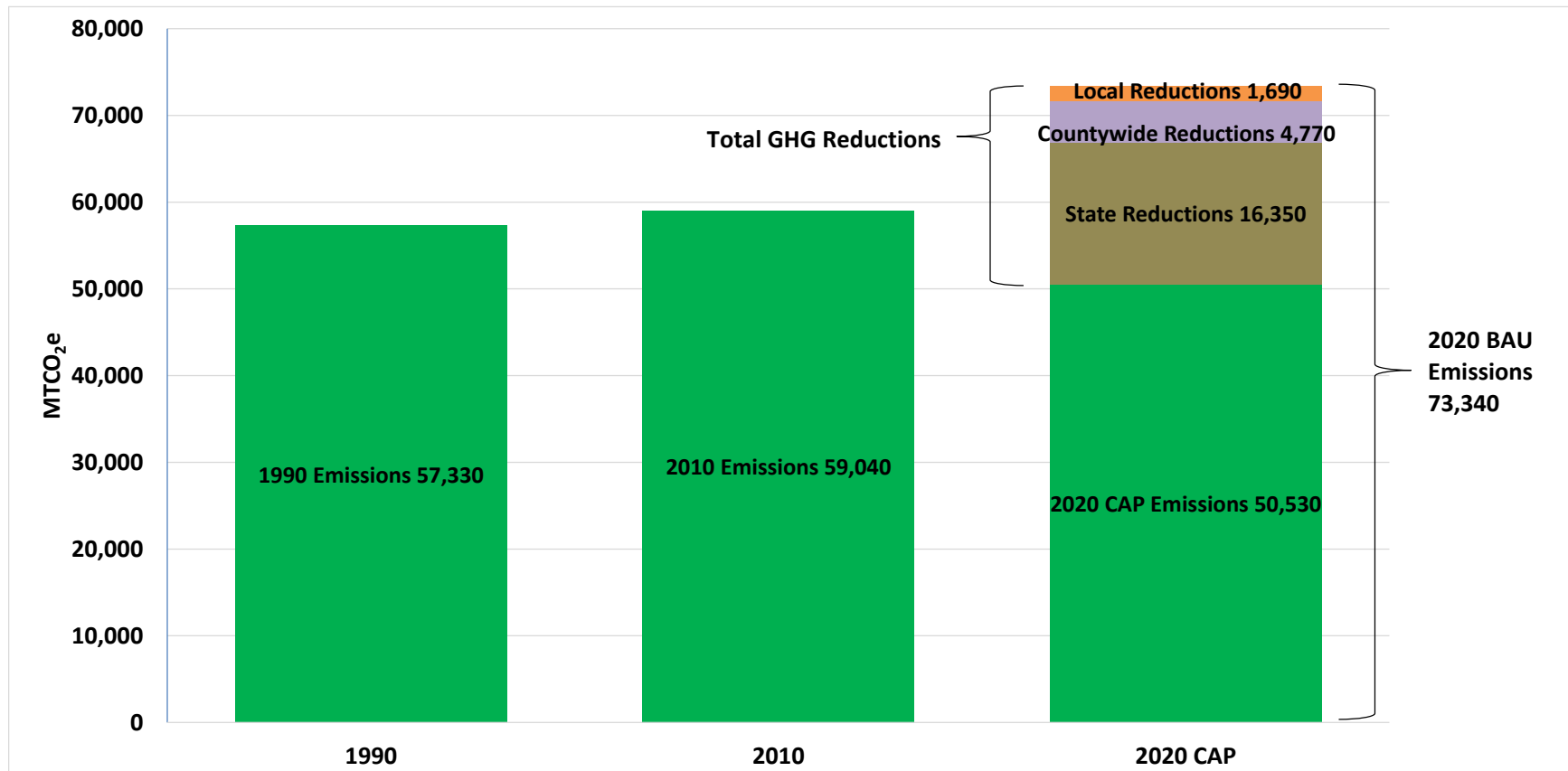
Source	2020 BAU	2020 Reductions				2020 CAP Emissions	% Reduction from BAU
	Forecast	State	County-wide	Local	Total		
Building Energy	22,250	5,290	1,610	370	7,270	14,980	33%
On-road Transportation	46,380	10,940	1,230	560	12,730	33,650	27%
Off-road Transportation and Equipment	1,320	120	-	-	120	1,210	9%
Solid Waste	2,540	-	1,920	-	1,920	620	75%
Water Conveyance	40	-	10	750	760	- ¹	100%
Wastewater Treatment	810	-	10	-	10	790	2%
Total Emissions	73,340	16,350	4,770	1,680	22,810	50,530	31%
		72%	21%	7%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.1-3 shows Cloverdale's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Cloverdale benefits greatly from the work the state and regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.1-3. Cloverdale 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

As shown in Table 5.1-5, the City of Cloverdale will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g., Title 24 energy efficiency measures). State measure reductions total 16,350 MTCO₂e, including the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the Renewables Portfolio Standard (RPS).

Regional measures will reduce emissions by 4,770 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy and Sustainability Division (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 1,690 MTCO₂e will be achieved through locally adopted measures relevant to the City of Cloverdale. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Cloverdale are, in order of importance, Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009), Measure 2-L4 (Solar in Existing Non-Residential Buildings), and Measure 5-L2 (Carpool-Incentives & Ride-Sharing Program). These three measures, in addition to reducing GHG emissions, will save energy, improve air quality and public health in the City, and conserve natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact include the Community Choice Aggregation (CCA) measure and the waste-to-energy measure.

Table 5.1-5 presents the individual GHG reduction measures that Cloverdale has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

Solar Water and Wastewater Treatment Plants in Cloverdale

In 2014, Cloverdale approved a Power Purchase Agreement to finance solar panel arrays at the City's water and wastewater treatment plants. The City expects that the water and wastewater treatment plants will be supplied by 100% solar energy when the project is fully up and running.

Table 5.1-5. Cloverdale 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	1,364	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	540	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	452	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	41	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	331	N/A
Goal 2: Increase Renewable Energy Use	5,532	
Measure 2-S1: Renewables Portfolio Standard	4,272	N/A
Measure 2-S2: Solar Water Heaters	24	N/A
Measure 2-R1: Community Choice Aggregation	1,237	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	891	
Measure 5-R1: Improve and Increase Transit Service	3	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marin Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	185	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	171	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	137	N/A
Measure 5-R8: Safe Routes to School	394	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	10,944	
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	10,205	N/A
Measure 6-S2: Advanced Clean Cars	329	N/A
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	410	N/A
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	452	-
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	117	N/A
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	335	N/A
Goal 9: Increase Solid Waste Diversion	739	
Measure 9-R1: Waste Diversion Goal	739	N/A
Goal 10: Increase Capture and Use of Methane from Landfills	1,176	
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	1,176	N/A
Goal 11: Reduce Water Consumption		
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	NQ
Goal 12: Increase Recycled Water and Greywater Use	<1	
Measure 12-R1: Recycled Water*	<1	N/A
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	24	-
Measure 13-R1: Infrastructure and Water Supply Improvement	10	N/A
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	14	N/A
Local Measures		
Goal 1: Increase Building Energy Efficiency	1	
Measure 1-L3: Shade Tree Planting	1	100 trees planted

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 2: Increase Renewable Energy Use	373		
Measure 2-L2: Solar in Existing Residential Building	107	5%	of existing homes with solar
Measure 2-L4: Solar in Existing Non-Residential Buildings	267	10%	of existing non-residential development with solar
Goal 4: Reduce Travel Demand Through Focused Growth	36		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	29	15%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	3	5%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	4	15%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	525		
Measure 5-L1: Local Transportation Demand Management Program	137	38%	of employees eligible
Measure 5-L2: Carpool-Incentives & Ride-Sharing Program	247	71%	of employees eligible
Measure 5-L3: Guaranteed Ride Home	NQ	Yes	
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	35	90%	of trips affected
Measure 5-L6: Parking Policies	106	10%	of area affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	1		
Measure 7-L1: Electric Vehicle Charging Station Program	1	2	charging stations installed
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 8: Reduce Idling			
Measure 8-L1: Idling Ordinance	NQ	2	minutes below state law
Goal 9: Increase Solid Waste Diversion			
Measure 9-L1: Create Construction and Demolition Reuse and Recycling Ordinance	<1	3%	beyond baseline
Goal 11: Reduce Water Consumption			
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	522	20%	Reduction in per capita water use
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems			
Measure 14-L1: Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale*	227	Yes	
State Measure Reductions in Cloverdale	16,350		
Regional Measure Reductions in Cloverdale	4,770		
Local Measure Reductions in Cloverdale	1,680		
Grand Total Emissions Reductions in Cloverdale	22,810		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.1.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Cloverdale has recognized the need to reduce GHG emissions from municipal operations. The City has existing programs in place for green municipal buildings and alternative fuels for its municipal fleet. Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Cloverdale and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Cotati

Commitments to meeting
community greenhouse
gas reduction goals.



5.2 Cotati

This section presents the community greenhouse gas (GHG) emissions profile specific to Cotati and the measures that the City of Cotati will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.2.1 Community Summary

Located at the crossroads of Highways 101 and 116, the City of Cotati's early history as a trade center for surrounding agricultural lands, has earned its nickname, "The Hub." Cotati has a wide spectrum of housing types which accommodate a variety of lifestyles from large lot, animal-friendly rural living, to suburban neighborhoods with easy access to shopping, to dense, compact, and walkable urban living. The City has an energetic and involved business community that offers the full array of goods and services and a small but vibrant downtown. Cotati is home to a clean light-industrial area and is proud of its focus on infill development and "green" priorities for new building. Sonoma State University is nearby, and with initiation of service, SMART trains will stop at the City's newly completed train depot and transit hub.

The heart of Cotati is La Plaza Park, located within the historic hexagonal plaza, a designated state historical landmark. La Plaza Park hosts a number of annual events throughout the year including the annual Kids' Day Parade and Festival, the summertime Farmers' Market, the Cotati Jazz Festival, Oktoberfest, and the annual Holiday Tree Lighting Celebration. The annual Cotati Accordion Festival is the largest accordion festival in California.

Demographics

Cotati spans 1.9 square miles and had a population of 7,265 as of the 2010 census. In 2020 its population is expected to be 7,777, an increase of 7% over 2010. Employment in the area is expected to increase by 15%. Cotati's demographic composition in 2010 was 82% White, 2% African American, 1% Native American, 4% Asian, 0.4% Pacific Islander, 6% from other races, and 5% from two or more races. Persons of Hispanic or Latino origin were 17%.

As shown in Table 5.2-1, the City is expected to experience steady growth in population, housing, and jobs in the future.

Table 5.2-1. Cotati Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	5,714	7,265	7,483	7,777	8,809	9,404
Housing	2,281	3,041	3,162	3,321	3,777	4,028
Employment	2,940	3,217	3,413	3,714	4,302	4,502

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the City based on its internal planning forecasts.

According to the 2010 US Census, City of Cotati housing is majority owner-occupied with 59% of housing units owned and 41% rented.

Energy and Water Use

Compared to households in the county as a whole, Cotati households use less electricity, natural gas, and water. They also use less electricity, natural gas, and water than households statewide.

Table 5.2-2. Cotati, County, and State 2010 Average Energy and Water Use (per household, per year)

	Cotati	County	State
Electricity (kWh)	6,051	7,042	9,320
Natural Gas (Therms)	395	413	512
Water Use (Gallons)	60,624	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the City of Cotati Urban Water Management Plan.

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

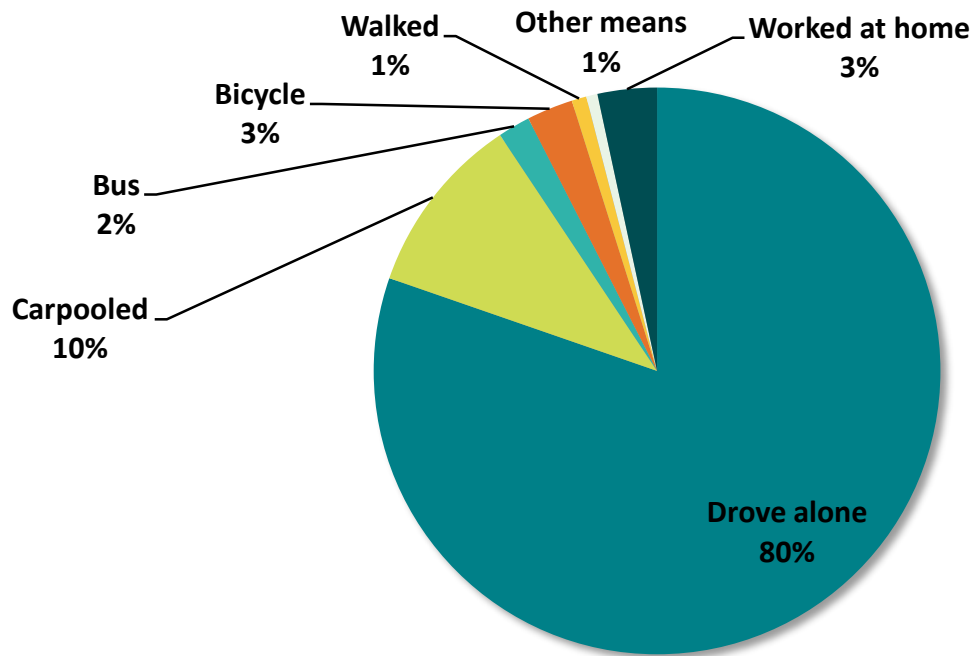
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, most Cotati residents drove alone to work, and about 10% carpoolled. For many residents of Cotati, alternative transportation options are not available for their commute trip. With the average trip to work for residents of Cotati taking 26.9 minutes, and limited bus service, riding a bus is not a viable option for many Cotati residents (U.S. Census Bureau 2014).

Figure 5.2-1. Modes to Work in Cotati in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.2.2 Cotati's Existing Actions to Reduce GHG Emissions

Cotati has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have been helping to reduce GHG emissions.

- Building Energy
 - Residential Retrofits: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Residential Appliance Upgrades: Programs through Pacific Gas & Electric Company (PG&E) and other agencies.
 - Solar Installations at Residences: Energy Upgrade California in Sonoma County – Whole House Upgrade Program. Streamlined permitting through Building Department.
 - Solar Sonoma County program.
- Land Use and Transportation
 - Focus on Infill Development: The General Plan update in 2015 includes several tools to incentivize new development in areas of the City that are along or near major transportation corridors. In addition, both the Downtown and Santero Way Specific Plans call for walkable, mixed use development with a combination of jobs and housing.
 - Traffic Signal Synchronization: Synchronization occurs with new development when installation of a new signal is required.

- Increased Transit Infrastructure: Installation of three electric vehicle charging stations in 2012 at City Hall. In addition to the SMART service mentioned below, additional infrastructure such as a train depot, SCTA Park-n-Ride facility, new sidewalks, expanded bicycle parking, and bus turnouts are all being provided adjacent to the rail service line.
- Increased Transit Service: Coordination of construction of SMART Train facilities at Santero Way and East Cotati Avenue. Facilities include construction of depot building, SCTA Park-n-Ride, and Smart Train service.
- Bicycle and Pedestrian Master Plan: Long range bicycle and pedestrian planning goals and policies.
- Solid Waste
 - Methane capture occurs at the Santa Rosa Sub-regional Treatment Plant, which serves Cotati.
- Water and Wastewater Efficiency
 - Efficiency Upgrades: One of the goals of the City's water conservation program is to reduce wastewater generation by increasing indoor water conservation. Initiation of efforts to increase efficiency of waste collection system which reduces pumping—installation of more energy efficient pumps, and installation of a new Supervisory Control and Data Acquisition (SCADA) system, which enables off-peak pumping times.
 - Water Fixture Retrofits: Higher efficiency requirements (low flow toilets, showers, and faucets) required at the time of new development or significant remodel of existing. City coordinates water audit (performed by City of Santa Rosa and paid for out of water use fees).
 - Greywater or Recycled Water: Greywater retrofit parts/equipment provided, along with informational seminars provided by Daily Acts and paid for by the City.

The City has adopted the following ordinances and General Plan policies that also help to reduce GHG emissions and would support the implementation of the formal GHG reduction measures presented herein.

- Building Energy
 - Alternative Energy – General Plan Policy: Chapter 5 – Policy 3.3. Promote the use of alternative energy in new development.
 - CALGreen Building Code: Municipal Code Chapter 14.04.130. Makes Tier 1 mandatory for new residential and non-residential structures.
 - Green Building – General Plan Policy: Chapter 7 – Policy LU 1.5. Use sustainable best management practices (BMPs) in green building, stormwater management, and conservation to mitigate infrastructure impacts, while minimizing effects on water, sewer, and energy.

- Green Building BMPs – General Plan Policy: Chapter 5 – Policy CON 3.2. Support innovative green building practices and encourage development to exceed CALGreen Tier 1 standards.
- Heating Devices – General Plan Policy: Chapter 5 – Policy CON 2.4. Require new development to install only fireplaces, stoves, and/or heaters to meet current Bay Area Air Quality Management District (BAAQMD) standards.
- Land Use and Transportation
 - Improve air quality through managed growth – General Plan Policy: Chapter 5 – Policy CON 2.1. Focus City growth in and around existing urbanized areas, locating new housing near employment, encouraging alternative transportation, and requiring developers to mitigate air quality impacts.
 - Development Layout and Design – General Plan Policy: Chapter 5 – Policy CON 3.10. Ensure new development and significant remodels encourage the use of alternative transportation modes.
 - Transportation Demand Management – General Plan Policy: Chapter 2 – Policy CI 3.3. Work with local employers and institutions to implement Transportation Demand Management (TDM) programs such as subsidized transit passes, carpool matching, telecommuting, and car-sharing, etc.
 - Transit Oriented Development. All street classifications above residential alley, include provisions for bicycle and pedestrian facilities (Chapter 17.26 of Land Use Code). The Santero Way Specific Plan is a transit oriented plan for the area of East Cotati Avenue adjacent to the rail tracks. Future development will comprise a mix of uses and will utilize design standards to further the goals of reducing vehicle miles traveled.
 - Parking Policies: Mandatory bike parking for all multi-family and non-residential development. Chapter 17.36 of Muni Code.
 - Sonoma State Traffic Reduction – General Plan Policy: Chapter 2 – Policy CI 3.4. Coordinate with Sonoma State University to minimize traffic impacts.
 - Idling Ordinance. Restrictions are placed on idling of construction vehicles as mitigation measures to new projects.
 - Alternative Transportation – General Plan Policy: Chapter 5 – Policy CON 2.12. Minimize single passenger motor vehicle use. Encourage alternative modes and services.
 - Park-And-Ride Lots – General Plan Policy: Chapter 2 – Policy CI 3.2. Increase the number of trips made by transit and carpooling by identifying locations for park-and-ride lots.
 - Street Design – General Policy: Chapter 5 – Policy CON 3.6. Street design and layout should reduce the use of pavement where possible to reduce cooling energy needs.
- Waste Minimization and Recycling

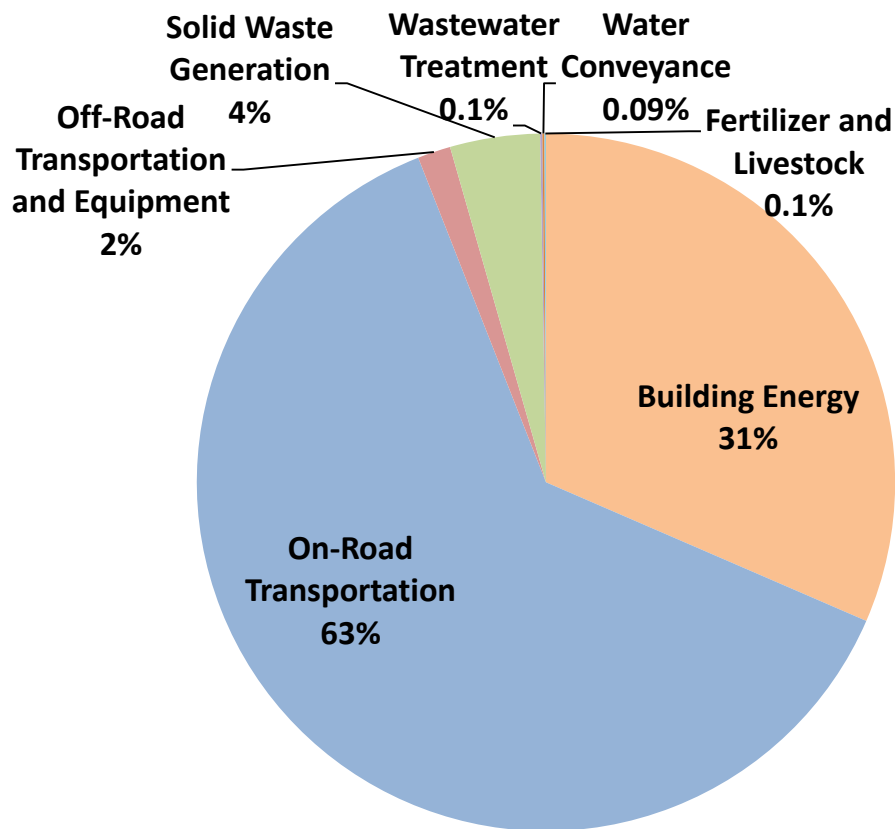
- Waste and Recycling Services – General Plan Policy: Chapter 4 – Policy CSF 3.1. Provide adequate waste disposal, recycling and reuse services.
- Solid Waste Reduction – General Plan Policy: Chapter 4 – Policy CSF 3.2. Reduce solid waste and increase reduction, reuse, and/or recycling in Compliance with Countywide Integrated Waste Management Plan.
- Resource Recovery – General Plan Policy: Chapter 4 – Policy CSF 3.4. Require and/or support the operation of resource recovery facilities by the City waste hauler.
- City Operations – General Plan Policy: Chapter 4 – Policy CSF 3.5. City operations should use recycled materials whenever feasible.
- Green Waste – General Plan Policy: Chapter 4 – Policy CSF 3.8. Require new or significantly remodeled development to incorporate sufficient, attractive and convenient interior and exterior storage for recyclables and green waste.
- Re-use of materials – General Plan Policy: Chapter 4 – Policy CSF 3.6. Support programs that re-use recycled materials and solid waste, such as the use of biomass waste for energy production.
- Solid Waste – General Plan Policy: Chapter 5 – Policy CON 3.12. Continue efforts to reduce solid waste.
- Water and Wastewater Efficiency
 - Funding – General Plan Policy: Chapter 4 – Policy CSF 2.20. Ensure adequate funding is available to improve wastewater conveyance infrastructure to reduce storm water infiltration.
 - Recycled Water – General Plan Policy: Chapter 4 – Policy CSF 2.12. Use recycled water for landscaping irrigation at City parks and City facilities.
 - Wastewater Procurement – General Plan Policy: Chapter 4 – Policy CSF 2.11. Procure recycled water supplies from the Santa Rosa Subregional Wastewater Treatment and Reclamation System where economically feasible. Water Efficient Landscaping Standards: Establishes requirements for landscaping to control soil erosion, conserve water, improve soil quality, enhance the appearance of development projects, screen potentially incompatible land uses, preserve the integrity of neighborhoods, improve pedestrian and vehicular traffic and safety, improve ecosystem services, water infiltration, and air quality, and reduce heat and glare.
 - Water Conservation Toilet Retrofit Ordinance for Non-Residential Customers: Municipal Code Chapters 13.72 and 13.73. Requires the installation of Water Sense toilets at the time of any change in water service by residential and nonresidential customers, respectively.
 - Drought Tolerance – General Plan Policy: Chapter 5 – Policy CON 3.9. Require the use of drought-tolerant and regionally native plants in landscaping.

- Conservation – General Plan Policy: Chapter 5 – Policy CON 3.8. Promote water conservation among water users.
- Agriculture
 - Urban Agriculture – General Plan Policy: Chapter 3 – Policy CHW 3.3. Recognize that urban agriculture has the potential to reduce overall energy consumption and lower food costs. Land Use Code Animal Keeping regulations are very generous; chicken keeping is allowed in most residential zones.
- Urban Forestry and Natural Areas
 - Open Space Conservation: Several General Plan policies call for preservation and provision of active parks.
 - Tree Planting: Chapter 17.54 of the Land Use Code requires a permit to remove all trees over 12 inches in diameter. Removal must be for good cause and typically requires replacement at a ratio of at least 1:1.
 - Watercourse and Riparian Resource Protection: Municipal Code Chapter 17.50. Provides standards for the protection of watercourse and riparian resources within the City, including provisions for adequate buffer areas between watercourses and adjacent development, to retain the watercourses as valuable natural, scenic, and recreational amenities as appropriate.
 - Required Plantings: Municipal Code Chapter 11.10.030. Every new project for which a building or other City permit is required, and/or where construction of gutter and sidewalk is necessary, shall include full street-tree planting.
 - Deciduous Trees – General Plan Policy: Chapter 5 – Policy CON 3.15. Plant and maintain deciduous native trees on Old Redwood Hwy to provide a street canopy.
 - Tree Planting for Climate Protection – General Plan Policy: Chapter 5 – Policy CON 3.7. Encourage tree planting as wind breaks and as a way of reducing summer temperatures.
 - Carbon Sequestration – General Plan Policy: Chapter 5 – Policy CON 2.11. Preserve, protect and enhance the City’s carbon sequestration resources to improve air quality.
- General
 - Resource Conservation: Municipal Code Chapter 17.51. Standards for all proposed development and new land uses to reduce per capita energy consumption and its contributions to global greenhouse gas production, potable water consumption and resulting wastewater production, and solid waste production.
 - GHG and Businesses – General Plan Policy: Chapter 5 – Policy CON 2.10. Encourage local businesses and industries to reduce GHG and energy consumption.
 - City Facilities – General Plan Policy: Chapter 5 – Policy CON 2.6. Reduce GHG emissions from City facilities to 30% below 1990 levels by 2015 consistent with 2008 GHG Emissions Reduction Action Plan.

- Climate Action Plan – General Plan Policy: Chapter 5 – Policy CON 2.8. Support development and implementation of a Climate Action Plan.
- Regional Coordination of GHGs – General Plan Policy: Chapter 5 – Policy CON 2.9. Consolidate efforts with other jurisdictions to reduce countywide GHGs.
- Support for Climate Action 2020 – General Plan Policy: Chapter 2 – Policy CI 3.1. Actively support RCPA in its goals for Climate Action 2020.

5.2.3 Greenhouse Gas Inventory and Forecast

Figure 5.2-2. Cotati 2010 Community GHG Inventory by Source



Cotati's inventory is similar to other cities in the county and state. The majority of the GHG emissions result from fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes and businesses in Cotati. Residential uses account for most (64%) of the building energy emissions in Cotati. Commercial uses account for 36% of total building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In Cotati, total GHG emissions generated by community activities in 2010 were 52,060 MTCO₂e, which is approximately 1% of countywide GHG emissions in the same year. This is a 1% increase from estimated 1990 emissions, which were 51,480 MTCO₂e.

Table 5.2-3. Cotati Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	14,650	28%	16,410	32%	18,160	32%	19,330	32%	22,130	32%	23,430	33%
On-Road Transportation	29,840	58%	32,570	63%	35,790	62%	38,320	62%	41,650	60%	41,980	59%
Off-Road Transportation and Equipment	710	1%	800	2%	950	2%	1,160	2%	2,290	3%	2,420	3%
Solid Waste	5,640	11%	2,170	4%	2,270	4%	2,410	4%	2,760	4%	2,920	4%
Wastewater Treatment	40	0%	50	0.1%	60	0%	60	0%	60	0%	70	0%
Water Conveyance	600	1%	50	0.1%	60	0%	60	0%	80	0%	80	0%
Total	51,480	100%	52,060	100%	57,280	100%	61,350	100%	68,980	100%	70,900	100%
Per-Capita Emissions	9.0		7.2		7.7		7.9		7.8		7.5	

5.2.4 Greenhouse Gas Reduction Goal and Measures

The City of Cotati joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 22 local GHG reduction measures. The City's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local reduction measures) would be approximately 61,350 MTCO₂e. The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 42,010 MTCO₂e, which would be a reduction of approximately 32% compared to 2020 BAU conditions. The City will achieve these reductions through a combination of state (71%), regional (21%), and local measures (8%) that are technologically feasible and cost-effective per AB 32. With the reduction measures in CA2020, per-capita emissions in Cotati will be 5.4 MTCO₂e per person, a 40% reduction in per capita emissions compared to 1990.

Table 5.2-4. Cotati 2020 GHG BAU Emissions, Reductions, and CAP Emissions

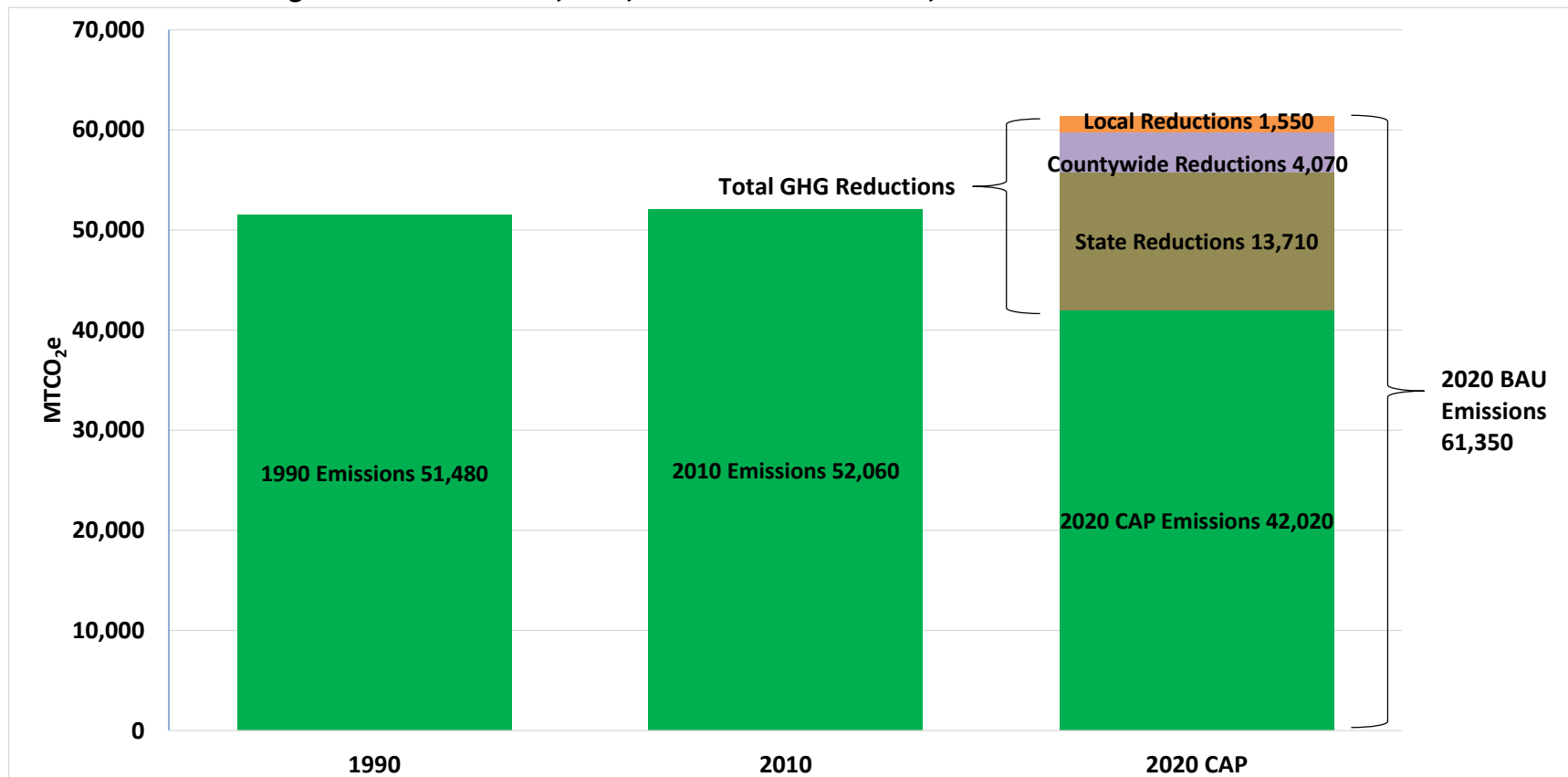
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction From BAU
		State	County-wide	Local	Total		
Building Energy	19,330	4,710	1,380	660	6,740	12,580	35%
On-Road Transportation	38,320	8,900	820	460	10,170	28,150	27%
Off-Road Transportation and Equipment	1,160	100	-	20	130	1,040	11%
Solid Waste	2,410	-	1,820		1,820	590	75%
Water Conveyance	60	-	50	410	460	⁻¹	100%
Wastewater Treatment	60	-	10	-	10	50	17%
Total Emissions	61,350	13,710	4,070	1,550	19,330	42,010	32%
		71%	21%	8%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.2-3 shows Cotati's 1990 and 2010 GHG emissions total, 2020 BAU emission forecast total, and total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emission reductions achieved in 2020. Like the other jurisdictions, Cotati benefits greatly from the work the state and regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.2-3. Cotati 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

To help reach the community goals, Cotati will adopt a set of reduction measures through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g., Title 24 energy efficiency measures). State measure reductions total 13,710 MTCO₂e, which include the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS. These will reduce GHG emissions from Cotati's on-road, off-road, and building energy sources in 2020.

Regional measures will reduce emissions by 4,070 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 1,550 MTCO₂e will be achieved through locally adopted measures specific to the City of Cotati. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Cotati are, in order of importance, Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009), Measure 2-L4 (Solar in Existing Non-Residential Buildings), and Measure 2-L2 (Solar in Existing Residential Building). These three measures, in addition to reducing GHG emissions, will save energy and conserve natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact include the Community Choice Aggregation (CCA) measure and the waste-to-energy measure.

Table 5.2-5 presents the individual GHG reduction measures that Cotati has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

City of Cotati Sustainable Building Program

Since 2004, the City of Cotati has had a sustainable building program that is mandatory for new residential and commercial buildings, and for certain additions and remodels to existing buildings. Though now superseded by the CalGreen program, the City has been requiring more efficient energy and other building standards as well as lower water use.

Table 5.2-5. Cotati 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	1,037	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	308	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	442	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	46	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	240	N/A
Goal 2: Increase Renewable Energy Use	5,048	
Measure 2-S1: Renewables Portfolio Standard	3,936	N/A
Measure 2-S2: Solar Water Heaters	22	N/A
Measure 2-R1: Community Choice Aggregation	1,091	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	537	
Measure 5-R1: Improve and Increase Transit Service	<1	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	119	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	110	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	88	N/A
Measure 5-R8: Safe Routes to School	222	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	8,901		
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	8,293	N/A	
Measure 6-S2: Advanced Clean Cars	260	N/A	
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	349	N/A	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	382	-	
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	103	N/A	
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	279	N/A	
Goal 9: Increase Solid Waste Diversion	709		
Measure 9-R1: Waste Diversion Goal	709	N/A	
Goal 10: Increase Capture and Use of Methane from Landfills	1,111		
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	1,111	N/A	
Goal 11: Reduce Water Consumption			
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A	
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	13	-	
Measure 13-R1: Infrastructure and Water Supply Improvement	3	N/A	
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	10	N/A	
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	45		
Measure 14-R1: Sonoma County Water Agency Carbon Free Water by 2015	45	N/A	
Local Measures			
Goal 1: Increase Building Energy Efficiency	48		
Measure 1-L2: Outdoor Lighting	47	50%	of outdoor lighting to participate

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 1-L3: Shade Tree Planting	1	100	trees planted
Goal 2: Increase Renewable Energy Use	611		
Measure 2-L1: Solar in New Residential Development	17	50%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	176	15%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	12	10%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	405	15%	of existing non-residential development with solar
Goal 4: Reduce Travel Demand Through Focused Growth	163		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	145	70%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	12	15%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	6	15%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	289		
Measure 5-L1: Local Transportation Demand Management Program	88	38%	of employees eligible
Measure 5-L2: Carpool-Incentives & Ride-Sharing Program	172	78%	of employees eligible
Measure 5-L3: Guaranteed Ride Home	NQ	Yes	
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	29	100%	of trips affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	26		
Measure 7-L1: Electric Vehicle Charging Station Program	3	5	charging stations installed
Measure 7-L2: Electrify Construction Equipment	23	10%	of equipment
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 8: Reduce Idling			
Measure 8-L1: Idling Ordinance	NQ	2	Minutes below state law
Goal 9: Increase Solid Waste Diversion	<1		
Measure 9-L1: Create Construction and Demolition Reuse and Recycling Ordinance	<1	3%	beyond baseline
Goal 11: Reduce Water Consumption	414		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	414	20%	Reduction in per capita water use
State Measure Reductions in Cotati	13,710		
Regional Measure Reductions in Cotati	4,070		
Local Measure Reductions in Cotati	1,550		
Grand Total Emissions Reductions in Cotati	19,330		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.2.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Cotati has recognized the need to reduce GHG emissions from municipal operations. The City has existing programs in place for green municipal buildings and alternative fuels for its municipal fleet. Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Cotati and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Healdsburg

Commitments to meeting
community greenhouse
gas reduction goals.



5.3 Healdsburg

This section presents the community greenhouse gas (GHG) emissions profile specific to Healdsburg and the measures that the City of Healdsburg will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.3.1 Community Summary

Healdsburg is a historic, small town centered on a 19th-century plaza. Located approximately 22 miles inland and 12 miles north of Santa Rosa, Healdsburg is situated among three important wine-producing regions: Russian River, Dry Creek, and Alexander Valley American Viticultural Areas. Composed of small and globally-recognized businesses, renowned restaurants, local hotels and bed and breakfasts, as well as outdoor recreation; Healdsburg welcomes guests year-round to enjoy small town charm, beautiful natural scenery, and wine country hospitality. Healdsburg has been recognized as one of the top 10 smallest towns in America and was most recently recognized as one of the best towns for the holidays.

Healdsburg, its residents, and community are dedicated to preserving the City's rich history and ensure a healthy future for generations to come. In order to achieve these goals, the City of Healdsburg adopted a 5-year strategic plan called "Pathway to Sustainability." The first strategic initiative of this plan, Quality of Life, identifies Promoting Environmental Sustainability as one of its priorities.

Unique to Healdsburg as a member of the Sonoma County CAP is the City's electric utility. Since 1899, the City of Healdsburg has owned and operated its own Electric Utility. Over the last 100 plus years, the City has moved from a small hydro generation plant in the Black Mountains to owning generation plants throughout northern California, maintaining over 60 miles of high voltage distribution lines with safety and reliability ratings well exceeding statewide averages.

Through the City's ownership of geothermal power plants at the Geysers and hydro-electric plants in Calaveras County, the City provides a high level of renewable and carbon-free energy to its customers. The City regularly surpasses the state's Renewable Portfolio Standard (RPS) requirements (20% by December 31, 2013; 25% by December 31, 2016; and 33% by 2020) and is well positioned to meet new RPS requirements proposed in SB 350 (50% by 2030). In most years, the City's electricity ranges from 50 to 60% carbon free, with over 43% of that energy coming from renewable energy provided by the Geysers. In addition, the City offers a Green Electric Rate, which allows customers to use 100% renewable energy. The City of Healdsburg's commitment to highly renewable and carbon-free sources of power reflect the importance of, and our community's commitment to, environmental stewardship and climate change mitigation.

Demographics

The City of Healdsburg spans 4.5 square miles and had a population of 11,254 as of the 2010 census. In 2020 the population of Healdsburg is expected to be 11,402, an increase of 1.3% over

2010. Employment in the area is expected to increase by 1%. Healdsburg's demographic composition in 2010 was 74% White, 0.5% African American, 2% Native American, 1% Asian, 0.2% Pacific Islander, 19% from other races, and 3% from two or more races. Persons of Hispanic or Latino origin were 34%.

As shown in Table 5.3-1, growth in population, housing, and jobs in the City is expected to occur slowly.

Table 5.3-1. Healdsburg Socioeconomic Data

	Actual		Projected			
	1990	2010	2015	2020	2040	2050
Population	9,469	11,254	11,285	11,402	11,799	12,002
Housing	3,613	4,471	4,483	4,530	4,687	4,768
Employment	6,926	7,351	7,399	7,447	7,447	7,447

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the City based on its internal planning forecasts.

According to the 2010 Census, most housing in Healdsburg is owner-occupied (58%) with the remaining 42% renter-occupied.

Energy and Water Use

Compared to county averages, Healdsburg households use less electricity but more natural gas and water. Compared to statewide averages, Healdsburg households use less electricity, natural gas, and water.

Table 5.3-2. Healdsburg, County, and State 2010 Average Energy and Water Use (per household, per year)

	Healdsburg	County	State
Electricity (kWh)	6,331	7,042	9,320
Natural Gas (Therms)	500	413	512
Water Use (Gallons)	90,362	75,810	107,869

Sources:

City Data: provided by the City of Healdsburg (electricity & water) and by PG&E (natural gas).

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

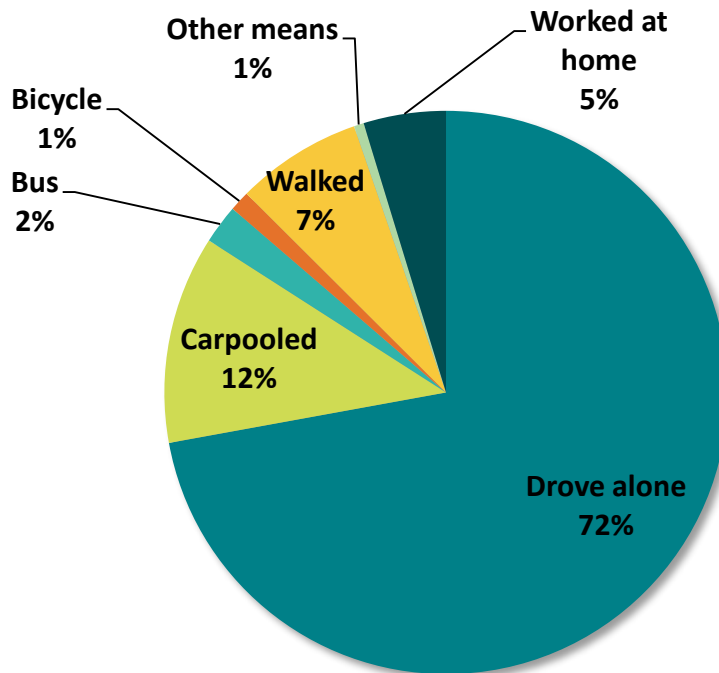
kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, Healdsburg had the highest rate in the county of residents walking to work although, in general, most residents drive alone to work. The City is working to increase

alternative options with the transportation measures adopted through this plan. According to 2010 Census data, the average trip to work takes about 20.6 minutes, which is shorter than the county average of 25.3 minutes (U.S. Census Bureau 2014).

Figure 5.3-1. Modes to Work in Healdsburg in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.3.2 Healdsburg's Existing Actions to Reduce GHG Emissions

Healdsburg has already taken a number of steps to reduce energy use, promote renewable energy use, as well as other actions that have been helping to reduce GHG emissions. These actions include ordinances and General Plan policies that will support the implementation of the formal GHG reduction measures in this CAP.

- Building Energy
 - Residential Retrofits: The City's Utility Department offers a free home energy audit to identify retrofit potential.
 - Residential Retrofits – Residential Weatherization & Sealing: Program offering rebates for home insulation, replacement windows and treatments, HVAC repair, duct insulation and sealing, blower-door tests, roof radian barrier, and cool roof.
 - Residential Retrofits - Lighting: Program offering rebates for light-emitting diode (LED) bulbs and holiday light strings.

- Residential Appliance Upgrades: Program offering rebates for Energy Star® refrigerators as well as dishwashers and clothes washers (when the household has an electric hot water heater).
- Residential Appliance Upgrades: Program offering rebates for energy efficient heat pumps, HVAC units, and electric hot water heaters.
- Residential Pool Pumps: Program offering a rebate for upgrading current pool pumps to an energy efficient variable-speed pump.
- Solar Installations at Residences: Per CA SB-1, Healdsburg residents may be eligible to offset part or all of their electric usage with a solar photovoltaic (PV) system. Tax credits may also be available to help with the installation of a PV system.
- Commercial Energy Efficiency Program: The City offers a customizable commercial rebate program that pays customers based on the first year's energy savings and peak demand reduction.
- City Electric Department's commitment to renewable energy: Clean resource mix exceeds state-mandated requirements. Much of energy used from geothermal and hydro.
- Green Building Program: Municipal Code Chapter 15.16 requires California Green Building Code compliance above and beyond the State Building Standards when any of the following are triggered:
 - Reconstruction of residential buildings of any size - Mandatory Measures.
 - New residential construction over 3,000 sqft - Tier 1 Residential.
 - Reconstruction of nonresidential buildings containing 5,000 sqft or more - Mandatory Measures.
 - New nonresidential construction over 10,000 sqft - Tier 1 Nonresidential.
- Compliance with accepted GHG reduction goals: General Plan Policy NR-E-3. The City will comply with California's Publicly Owned Utilities' Principles Addressing Greenhouse Gas Reduction Goals.
- Sustainable building practices: General Plan Policy NR-E-4. The City will support sustainable development and building practices and lead by example in municipal projects.
- Land Use and Transportation
 - Bicycle and Pedestrian Master Plan: Detailed citywide non-motorized transportation plan.
 - Foss Creek Pathway Plan: 4.1 mile bike path running north-south through Healdsburg. Connects to Old Redwood Highway and Windsor.
 - Transit Oriented Development: General Plan Policy NR-F-2. The City will promote land use patterns that support the use of transit systems and pedestrian and bicycle facilities.

- Land use surrounding transit: General Plan Policy LU-F-1. Land uses adjacent to transit facilities should derive maximum benefit from transit facilities and may include retail, office, employment and higher-density residential uses.
- Mixed-use development: General Plan Policy LU-F-2. The City shall encourage mixed use development around the historic railroad depot to support transit use.
- Bicycle-Transit Accommodations: Healdsburg Bicycle and Pedestrian Master Plan Policy 3.3 - Encourage regional transit providers to accommodate bicyclists on transit vehicles and plan for the need for additional bicycle storage capacity.
- Safe-Routes-To-Transit Program: Healdsburg Bicycle and Pedestrian Master Plan Policy 3.1 - Develop and implement a safe-routes-to-transit program that places a high priority on pedestrian and bike access to transit stops and centers.
- Bicycle Detection: Healdsburg Bicycle and Pedestrian Master Plan Policy 2.2. Where feasible, ensure that new and rehabilitated signalized intersections include bicycle detection and are properly marked and operational for use by bicyclists.
- Maintain transit service: General Plan Policy T-E-3 - The City shall encourage Sonoma County Transit (SCT) to maintain, at a minimum, present level of service.
- Coordinate transit infrastructure: General Plan Policy T-E-6 - The City shall work with SCT to coordinate stop locations and bus schedules for easy transfers.
- Multi-modal integration: General Plan Policy T-D-5 - The City shall promote and facilitate the use of bikes with other transportation modes.
- Support alternative transportation: General Plan Policy T-D-1 and T-D-3 - Encourage alternative transportation modes by establishing a bike and pedestrian network interconnecting residential areas with recreation, shopping, employment, commuting and local transportation.
- Traffic calming: General Plan Policy T-B-4 - Traffic calming measures will be considered to maintain reasonable speeds on City streets and improve pedestrian and bicycle safety.
- Support communitywide transit operation: General Plan Policy NR-F-1 - The City will encourage the use of transit systems and other alternatives to automobile use.
- Running of engines while stopped: Municipal Code Chapter 10.28.160 - Emitting vehicles shall be turned off while stopped. Ord. 1005 § 2, 2003. Code 1964 § 12.32.130.
- Trip Reduction Ordinance: All employers within the City of Healdsburg with 100 or more employees at an individual job site shall disseminate trip reduction information regarding transportation alternatives including carpools, vanpools, transit and bicycling, and other methods of reducing trips such as telecommuting, compressed work week, and flexible work hours annually to each employee and to all new employees as they are hired.
- Water and Wastewater Efficiency Resolution No. 58-2013: Stage 1 Voluntary Water Conservation Measures. Seeks a 20% reduction in water consumption from 2012.

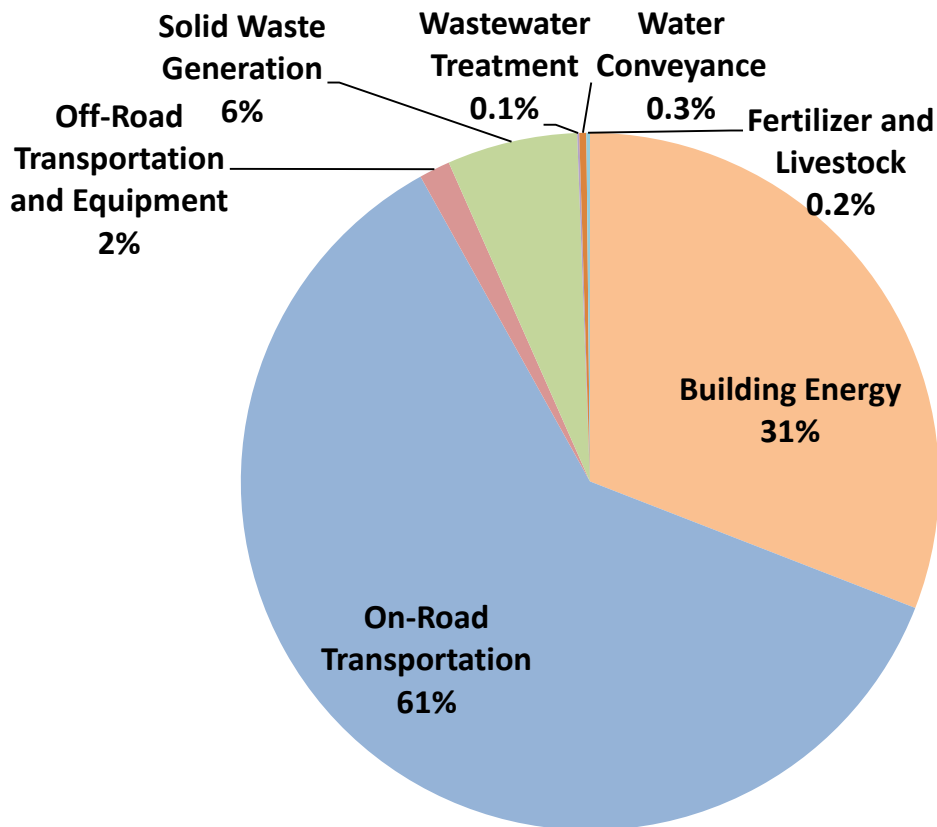
- Ordinance No. 1077: Water Shortage Emergency Plan. City adopts Water Conservation Measures to be implemented in times of critical shortage.
- Water Shortage Emergency Declaration Resolution No. 8-2014: Stage 2 Mandatory Water Conservation Measures – Requires implementation of Water Conservation Measures identified in the Water Shortage Emergency Plan.
- Water Efficient Landscape Ordinance No. 1091: The ordinance promotes the efficient design and installation of water-efficient landscapes in Healdsburg associated with new construction and substantial alterations of existing development where landscapes are proposed.
- Agriculture
 - Agricultural uses outside UGB: General Plan Policy NR-D-2 - The City will encourage the County to retain agricultural uses on lands surrounding the Urban Service Area.
 - Sustainable agriculture: General Plan Policy NR-D-4 - The City will promote the sustainability of local agriculture.
- Urban Forestry and Natural Areas
 - Protect natural features: General Plan Policy NR-C-1 - New development shall not be allowed to breach the Urban Growth Boundary except under the exceptional circumstances allowed by this General Plan.
 - Open space acquisition: General Plan Policy NR-B-5 - The City will work with Sonoma County Agricultural Preservation and Open Space District, the Sonoma Land Trust and other non-profit conservation organizations and agencies in acquiring and maintaining key open space and habitat areas where such an arrangement would benefit both the City and the property owner.
 - Maximize tree protection: General Plan Policy NR-B-3 - New development shall be sited to maximize the protection of native tree species, riparian vegetation, important concentrations of native plants, and important wildlife habitat.
 - Encourage tree planting: General Plan Policy NR-E-5 - The City will encourage the use of large-scale trees in new development to lessen heat build-up from solar radiation.
 - Open Space Preservation Growth Control Measures: Municipal Code Chapter 17.24 – limit the construction of new residential units within the incorporated boundaries of the City to an average of 30 units per year.
 - Open Space Preservation: Riparian Setbacks: Municipal Code Title 20 – Article III Chapter 20.24.085. Riparian setbacks have been established to protect rivers, creeks and streams from encroachment by urban uses and to protect riparian habitats.
 - Heritage Tree Protection: Municipal Code Title 20 – Article II Chapter 20.24.035. Protect certain trees in order to improve air quality, assist in abating soil and slope erosion and

preserve and enhance property values, thus promoting the public health, safety and welfare.

- General
 - Reduce GHG emissions: General Plan Policy NR-E-1 - The City will reduce GHG emissions produced communitywide.
 - Municipal GHG emissions: General Plan Policy NR-E-2 - The City will reduce GHG emissions produced by internal municipal operations.
 - Enforce state climate protection goals: General Plan Policy NR-E-6 - The City will comply with state climate protection goals and programs to the maximum extent allowed by the City's jurisdictional authority.

5.3.3 Greenhouse Gas Inventory and Forecast

Figure 5.3-2. Healdsburg 2010 Community GHG Inventory by Source



Healdsburg's inventory is similar to other cities in the county and the region. The majority of GHG emissions are from transportation due mostly to fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat homes and businesses in Healdsburg. Residential uses account for most (52%) of the

building energy emissions in Healdsburg. Commercial uses account for 44% of building energy emissions. Emissions resulting from energy consumed for industrial purposes are a small fraction (4%) of total energy use emissions in the community. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

Total GHG emissions generated by community activities in 2010 were 108,760 MTCO₂e, which is approximately 3% of countywide GHG emissions in the same year. This is a 16% increase from estimated 1990 emissions, which were 93,500 MTCO₂e. Table 5.3-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the City of Healdsburg.

Table 5.3-3. Healdsburg Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	21,310	23%	33,670	31%	33,890	29%	34,150	28%	34,690	28%	34,950	29%
On-Road Transportation	60,180	64%	66,470	61%	74,180	63%	77,630	64%	78,080	63%	75,090	62%
Off-Road Transportation and Equipment	1,570	2%	1,570	1%	1,810	2%	2,100	2%	3,640	3%	3,680	3%
Solid Waste	10,260	11%	6,580	6%	6,620	6%	6,670	6%	6,750	5%	6,790	6%
Wastewater Treatment	90	0%	110	0.1%	110	0%	110	0%	110	0%	110	0%
Water Conveyance	90	0%	350	0.3%	370	0%	400	0%	460	0%	510	0%
Total	93,500	100%	108,760	100%	116,970	100%	121,040	100%	123,730	100%	121,130	100%
Per-Capita Emissions	9.9		9.7		10.4		10.6		10.5		10.1	

5.3.4 Greenhouse Gas Reduction Goal and Measures

The City of Healdsburg joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 24 local GHG reduction measures. The City's GHG emissions under 2020 BAU (business as usual) conditions would be approximately 121,040 MTCO₂e (in absence of state, regional, and local reduction measures). The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 87,180 MTCO₂e, which would be a reduction of approximately 27% compared to 2020 BAU conditions. The City will achieve these reductions through a combination of state (66%), regional (24%), and local (10%) measures that are technologically feasible and cost-effective per AB 32. Per-capita reductions in Healdsburg in 2020 would be 3.0 MTCO₂e per person. With the reduction measures in CA2020, per-capita emissions in Healdsburg will be 7.7 MTCO₂e per person, a 22% reduction in per capita emissions compared to 1990.

Table 5.3-4. Healdsburg 2020 GHG BAU Emissions, Reductions, and CAP Emissions

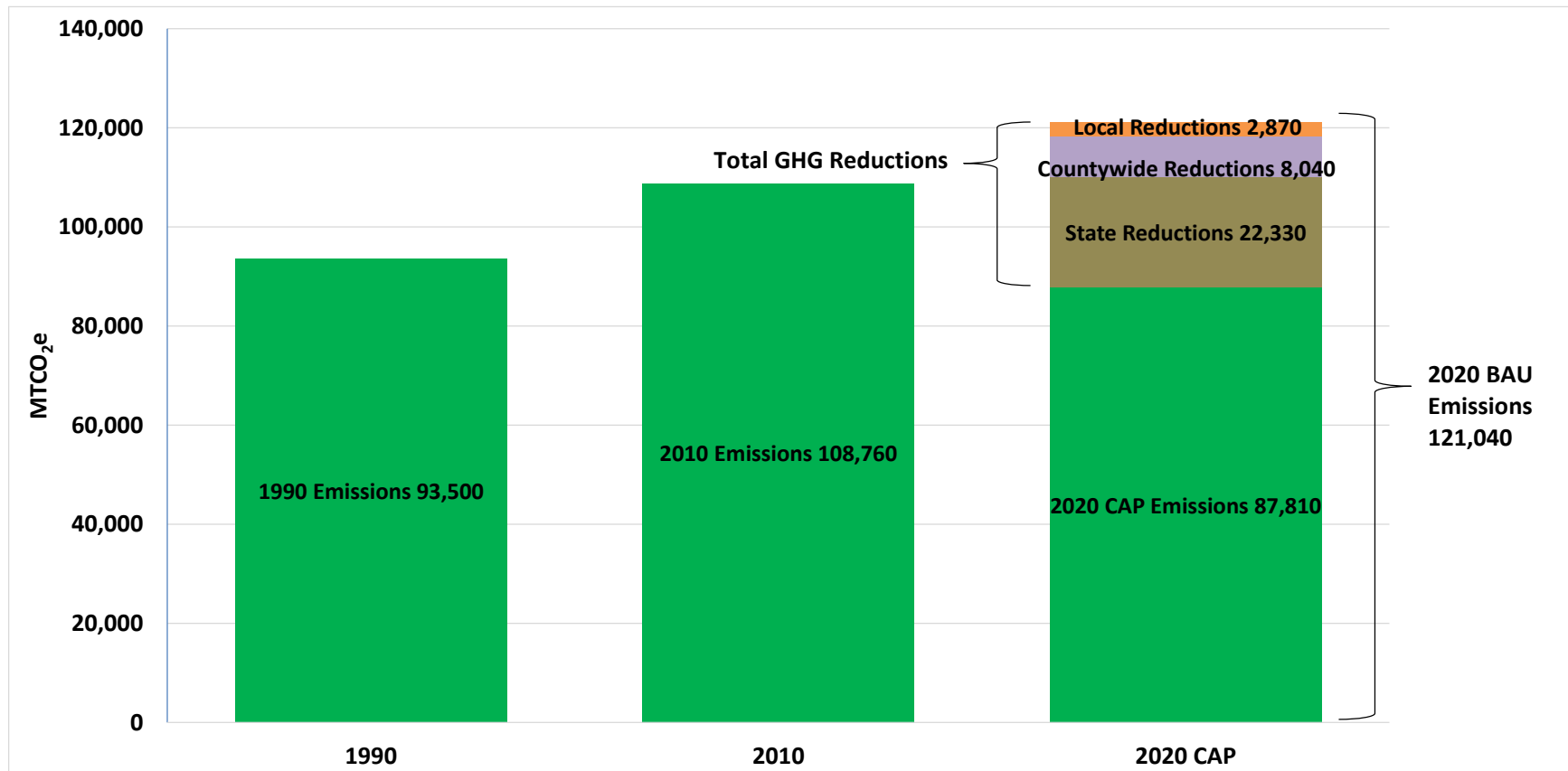
Source	2020 BAU	Reductions				2020 CAP Emissions	% Reduction from BAU
	Projection	State	County-wide	Local	Total		
Building Energy	34,150	3,980	800	360	5,140	29,010	15%
On-Road Transportation	77,630	18,160	2,080	1,220	21,470	56,160	28%
Off-Road Transportation and Equipment	2,100	190	-	50	230	1,860	11%
Solid Waste	6,670	-	5,000	-	5,000	1,670	75%
Water Conveyance	400	-	80	1,240	1,320	⁻¹	100%
Wastewater Treatment	110	-	80	-	80	20	79%
Total Emissions	121,040	22,330	8,040	2,870	33,230	87,810	27%
		66%	24%	10%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.3-3 shows Healdsburg's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Healdsburg benefits greatly from the work the state and regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.3-3. Healdsburg 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

As shown in Table 5.3-5, the City of Healdsburg will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g., Title 24 energy efficiency measures).

State measure reductions total 22,330 MTCO₂e, which include the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS.

Regional measures will reduce emissions by 8,040 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 2,870 MTCO₂e will be achieved through locally adopted measures. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that Healdsburg can take directly. The City of Healdsburg has local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Healdsburg are, in order of importance, Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009), Measure 5-L6 (Parking Policies), and Measure 14-L1 (Green Energy for Water Production & Wastewater Processing). These three measures, in addition to reducing GHG emissions, will conserve water and other natural resources and improve air quality and public health in the City. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

Emissions sources with the greatest percentage reduction are water conveyance and solid waste. While these sources achieve a large percentage reduction compared to their BAU emission levels, their CO₂e reduction in metric tons is relatively small compared to other sources, especially building energy and on-road transportation.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact are the waste-to-energy and waste diversion measures.

Table 5.3-5 presents the individual GHG reduction measures that Healdsburg has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

Green Water Production in the City of Healdsburg

While SCWA has adopted a carbon free water goal, the City of Healdsburg, which is not served by SCWA, has taken its own steps to deliver water supplied by green energy. By 2020, the City expects that 100% of water deliveries will be from green, non emitting energy. The reductions from this action by the City are captured in Measure 11 R2.

Table 5.3-5. Healdsburg 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	1,851	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	93	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	959	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	28	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	770	N/A
Goal 2: Increase Renewable Energy Use	2,924	
Measure 2-S1: Renewables Portfolio Standard	2,894	N/A
Measure 2-S2: Solar Water Heaters	30	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	1,567	
Measure 5-R1: Improve and Increase Transit Service	< 1	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	302	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
Measure 5-R6: Reduced Transit Passes	280	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	224	N/A
Measure 5-R8: Safe Routes to School	761	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	18,164	
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	16,928	N/A
Measure 6-S2: Advanced Clean Cars	539	N/A
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	697	N/A
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	703	
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	186	N/A
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	515	N/A
Measure 7-R2: Alternative Fuel for Transit Vehicles	2	N/A
Goal 9: Increase Solid Waste Diversion	1,973	
Measure 9-R1: Waste Diversion Goal	1,973	N/A
Goal 10: Increase Capture and Use of Methane from Landfills	3,025	
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	3,025	N/A
Goal 11: Reduce Water Consumption		
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	NQ

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 12: Increase Recycled Water and Greywater Use	47		
Measure 12-R1: Recycled Water*	47	N/A	
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	114		
Measure 13-R1: Infrastructure and Water Supply Improvement	77	N/A	
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	37	N/A	
Local Measures			
Goal 1: Increase Building Energy Efficiency	165		
Measure 1-L2: Outdoor Lighting	163	80%	of outdoor lighting to participate
Measure 1-L3: Shade Tree Planting	1	100	trees planted
Goal 2: Increase Renewable Energy Use	192		
Measure 2-L1: Solar in New Residential Development	2	8%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	57	2%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	1	2%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	133	2%	of existing non-residential development with solar
Goal 3: Switch Equipment from Fossil Fuel to Electricity	5		
Measure 3-L1: Convert to Electric Water Heating	5	1%	of households
Goal 4: Reduce Travel Demand Through Focused Growth	89		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	71	20%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	17	20%	of growth to be 25+ units

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	1	15%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	1,117		
Measure 5-L1: Local Transportation Demand Management Program	112	20%	of employees eligible
Measure 5-L2: Carpool-Incentives & Ride-Sharing Program	146	25%	of employees eligible
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	30	50%	of trips affected
Measure 5-L6: Parking Policies	830	50%	of area affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	58		
Measure 7-L1: Electric Vehicle Charging Station Program	11	20	charging stations installed
Measure 7-L2: Electrify Construction Equipment	47	10%	of equipment
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	
Goal 8: Reduce Idling			
Measure 8-L1: Idling Ordinance	NQ	2	Minutes below state law
Goal 11: Reduce Water Consumption	1,054		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	1,054	20%	Reduction in per capita water use
Goal 12: Increase Recycled Water and Greywater Use	< 1		
Measure 12-L1: Greywater Use	< 1	1%	greywater goal

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	185	
Measure 14-L1: Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale*	185	Yes
State Measure Reductions in Healdsburg	22,330	
Regional Measure Reductions in Healdsburg	8,040	
Local Measure Reductions in Healdsburg	2,870	
Grand Total Emissions Reductions in Healdsburg	33,230	

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.3.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Healdsburg has recognized the need to reduce GHG emissions from municipal operations. The City has existing programs in place for green municipal buildings and alternative fuels for its municipal fleet. Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Healdsburg and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Petaluma

Commitments to meeting
community greenhouse
gas reduction goals.



5.4 Petaluma

This section presents the community greenhouse gas (GHG) emissions profile specific to Petaluma and the measures that the City of Petaluma will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.4.1 Community Summary

Petaluma serves as the southern gateway to Sonoma County, located 3 miles north of the Marin County-Sonoma County border and less than 20 miles south of Santa Rosa. Petaluma is known for its thriving historic downtown district, rich agricultural heritage, and as a growing hub for food and beverage processing, information communications technology, green services and construction, diversified manufacturing, consumer products, health & wellness, tourism, and recreation. Home to a diverse range of housing types, award-winning schools, and over 40 annual events and festivals, Petaluma is a family-oriented community with a strong sense of place with easy access to wine country, the coast, and San Francisco.

Demographics

Petaluma spans 14.5 square miles and had a population of 57,941 as of the 2010 census. In 2020 the population of Petaluma is expected to be 61,122, an increase of 5% over 2010. Employment in the area is expected to increase by 13%. Petaluma's demographic composition in 2010 was 81% White, 1% African American, 0.6% Native American, 5% Asian, 0.2% Pacific Islander, 9% from other races, and 4% from two or more races. Persons of Hispanic or Latino origin were 22%.

As shown in Table 5.4-1, the City is expected to experience steady growth in population, housing, and jobs in the future.

Table 5.4-1. Petaluma Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	43,184	57,941	59,440	61,122	68,542	71,980
Housing	16,062	22,198	22,862	23,508	26,362	27,670
Employment	26,145	31,537	33,644	35,738	38,488	39,897

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the City based on its internal planning forecasts.

According to the 2010 Census data, Petaluma housing is majority owner-occupied with 65% of all housing units owned and 35% rented.

Energy and Water Use

Compared to households in the county as a whole, Petaluma households use less electricity and water but more natural gas. They also use less electricity, natural gas, and water than households statewide.

Table 5.4-2. Petaluma, County, and State 2010 Average Energy and Water Use (per household, per year)

	Petaluma	County	State
Electricity (kWh)	6,000	7,042	9,320
Natural Gas (Therms)	493	413	512
Water Use (Gallons)	73,268	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the City of Petaluma Urban Water Management Plan.

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

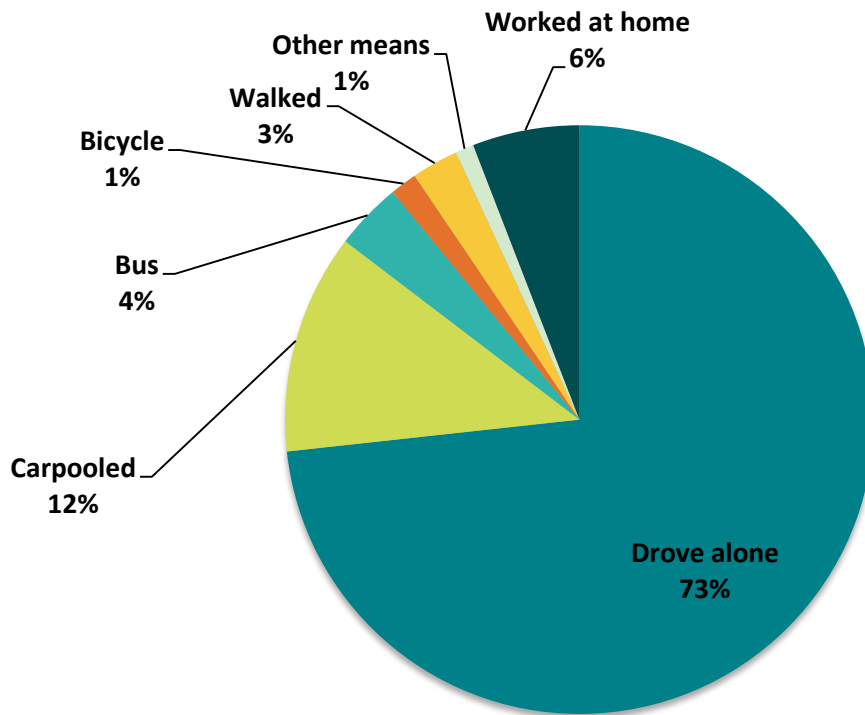
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, most Petaluma residents (73%) drove alone to work. The average work trip for a resident of Petaluma is 29.3 minutes, higher than the county average of 25.3 minutes (U.S. Census Bureau 2014).

Figure 5.4-1. Modes to Work in Petaluma in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.4.2 Petaluma's Existing Actions to Reduce GHG Emissions

Petaluma has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have already been helping to reduce GHG emissions. The City has adopted the following programs, ordinances, and General Plan policies that help to reduce GHG emissions and will support the implementation of the formal GHG reduction measures in this CAP.

- **Building Energy**
 - Residential Retrofits: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Residential Appliance Upgrades: Programs through PG&E and other agencies.
 - Solar Installations at Residences: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Solar Sonoma County program.
 - Community Choice Aggregation – General Plan Policy: Chapter 4 – Policy 4-P-28. Prepare a feasibility report for the City of Petaluma forming a Community Choice Aggregation as a way of supplying renewable energy to the community. (Petaluma joined SCP in 2014).
 - Solar Subsidy – General Plan Policy: Chapter 4 – Policy 4-P-32. Investigate the feasibility of developing a City sponsored program to subsidize or assist homeowners in purchasing

solar water heating or passive solar systems, or other forms of renewable energy, through low-interest loans or property tax assessments. (Petaluma participates in the Sonoma County Energy Independence Program and Property Assessed Clean Energy [PACE] Financing Marketplace).

- Green Building Guidelines – General Plan Policy: Chapter 2 – Policy 2-P-118B. Prepare and adopt green street standards, and incorporate these practices in design of City streets.
- Green Building Guidelines – General Plan Policy: Chapter 2 – Policy 2-P-118C. Prepare a salvage ordinance that requires an inventory of usable materials prior to demolition.
- Incorporation – General Plan Policy: Chapter 2 – Policy 2-P-119. Incorporate green building principles and practices into the planning, design, construction, management, renovation, operations, and demolition of all facilities that are constructed, owned, managed or financed by the City.
- Evaluation and Implementation – General Plan Policy: Chapter 2 – Policy 2-P-121. Evaluate the success of the voluntary green program and develop and implement a mandatory program for new residential, commercial and municipal development and remodels.
- CALGreen Building Standards Code: Municipal Code Chapter 17.04.010 – Part 11. CALGreen Tier 1 adopted as mandatory for residential and non-residential buildings.
- Energy Standards – General Plan Policy: Chapter 4 – Policy 4-P-18. Develop and adopt local energy standards that would result in less energy consumption than standards set by the California Energy Commission’s (CEC) Title 24 or updates thereto.
- Land Use and Transportation
 - Bicycle and Pedestrian Master Plan adopted May 2008.
 - Multiple Modes – General plan Policy: Chapter 5 – Policy 5-P-1. Develop an interconnected mobility system that allows travel on multiple routes by multiple modes.
 - Increased Transit Service – General Plan Policy: Chapter 5 – Policy 5-G-42. Expand the bus transit system so that it is convenient and provides frequent, regular service along major City corridors serving education, shopping, and employment destinations, and SMART park-and-ride lots.
 - Subsidized Fares – General Plan Policy: Chapter 5 – Policy 5-P-44. Maintain a transit system of nominal cost, or no cost, to riders.
 - Support Transit Oriented Development – General Plan Policy: Chapter 5 – Policy 5-P-43. Support efforts for transit oriented development around the Petaluma Depot and along the Washington Street, Petaluma Boulevard, McDowell Boulevard, Lakeville Street, and other transit corridors. (Petaluma SMART Rail Station Areas: TOD Master Plan adopted June 2013)

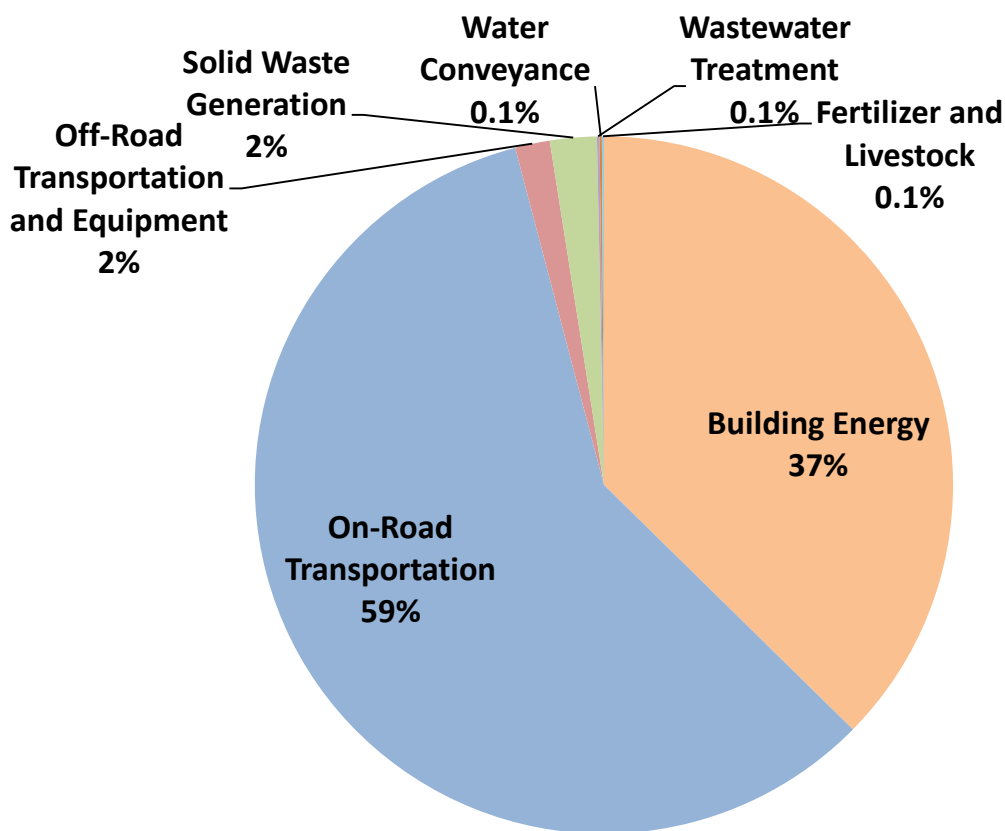
- Transportation Demand Management – General Plan Policy: Chapter 5 – Policy 5-P-13. Encourage existing major employers to develop and implement Transportation Demand Management programs to reduce peak period trip generation.
- Alternative Fuel Stations – General Plan Policy: Chapter 4 – Policy 4-P-9. Require a percentage of parking spaces in large parking lots or garages to provide electrical vehicle charging facilities.
- Charging Stations – General Plan Policy: Chapter 4 – Policy 4-P-10. Require electric vehicle charging and alternative fuel facilities at all new and remodeled gas stations.
- Ride Sharing – General Plan Policy: Chapter 4 -Policy 4-P-11. Promote ride-sharing and car-sharing programs.
- Drive-Through Prohibition – General Plan Policy: Chapter 4 – Policy 4-P-12. Prohibit new drive-thru food and service facilities with the exception of vehicle serving businesses, such as car wash and oil/lube, and limit expansion of the drive-thru components of existing facilities which increase idling vehicles.
- Traffic Calming – General Plan Policy: Chapter 4 – Policy 4-P-13. Require development of traffic roundabouts, where feasible, as an alternative to a traffic signal, to reduce idling vehicles.
- Transportation Tech – General Plan Policy: Chapter 4 – Policy 4-P-14. Develop and integrate Intelligent Transportation Technologies, as applicable, into Petaluma’s transportation system.
- Trip Reduction Ordinance: Municipal Code Chapter 11.90. Requirements for employers with 100+ employees at a given work site to distribute information on the benefits of alternative transportation, designate a transportation coordinator, and perform annual surveys and reports on employee transportation use.
- Waste Minimization and Recycling
 - Construction Phase Recycling Plan – General Plan Policy: Chapter 2 – Policy 2-P-121. Require development projects to prepare a Construction Phase Recycling Plan that would address the reuse and recycling of major waste materials (soil, vegetation, concrete, lumber, metal scraps, cardboard packaging, etc.) generated by any demolition activities and construction of the project.
 - Plastic Bottles – General Plan Policy: Chapter 4 – Policy 4-P-21G. Investigate and replace bottled water in City offices with alternate source of drinking water.
 - Compost – General Plan Policy: Chapter 4 – Policy 4-P-21D. Develop a residential and commercial food waste composting program.
 - Environmental Purchasing – General Plan Policy: Chapter 4 – Policy 4-P-32. Develop and implement a municipal Environmentally Preferable Purchasing Program.

- Green Purchasing – General Plan Policy: Chapter 4 – Policy 4-p-21D. Purchase goods containing recycled materials for City use.
- Urban Forestry and Natural Areas
 - Required Tree Planting – General Plan Policy: Chapter 4 – Policy 4-P-6A. Require planting of trees for every significant tree removed at a project site. Replacement planting may occur on the project site or on a publicly owned area, with long-term maintenance assured. Encourage the use of trees which provide biogenic benefits to air quality and are suitable to the local environment.
- Water and Wastewater Efficiency
 - Petaluma’s water treatment facility currently supplies 846 acre feet per year of recycled water for outdoor turf irrigation. This is projected to increase to over 1,100 acre feet per year by 2020.
 - Sewer Lateral Replacement Grant Program: provides financial assistance to property owners for the replacement of their private sewer lateral, which is often a source of infiltration and inflow to the sewer collection system.
 - High Efficiency Toilet Rebate: Up to \$150 rebate for each high-efficiency toilet installed.
 - High Efficiency Clothes Washer Rebate: Up to \$125.00 rebates for high efficiency clothes washing machines.
 - Mulch Madness: Offers free mulch, compost, cardboard, an irrigation conversion kit and free native plants from a local native plant nursery to those customers who wish to sheet mulch their existing turf. Free volunteer labor for those that are unable to install measures themselves.
 - Smart Yard: improves landscape water use efficiency by assessing and installing water-use efficiency irrigation and landscape systems. The cost of the systems and labor is added to a monthly water bill. The charges are added to the water bill for 5 years, after which the customer officially owns the system.
- Multi-sector
 - The City of Petaluma’s Biomass-to-Biofuel Project will leverage highly optimized anaerobic digestion technology and state-of-the-art biogas scrubbing technology to produce more than 150,000 gallons gas equivalent of compressed natural gas (CNG) annually. The biogas will be produced primarily from high strength waste, food waste and fats, oils and grease, and wastewater solids. This renewable fuel will replace high carbon intensity fuels with CNG that has a net negative carbon intensity for Petaluma’s transit fleet and its waste hauler’s collection fleet. This project could serve as a model for a local renewable fuel program. The project combines several features for reducing carbon emissions:

- Efficiently producing and utilizing a very low carbon intensity, renewable vehicle fuel as a replacement for high carbon intensity fuels, like diesel.
- Substantially reducing truck traffic and fuel consumption by keeping and treating commercial food waste, FOG and food processing waste within the community
- Discontinuing the disposal of readily biodegradable waste in situations and landfills where aggressive greenhouse gases are produced and difficult to contain.
- Greenhouse Gas Emissions
 - General Plan Policy: Chapter 4 – Policy 4-P-15. Improve air quality by reducing emissions from stationary point sources of air pollution (e.g., equipment at commercial and industrial facilities) and stationary area sources (e.g., wood-burning fireplaces & gas powered lawn mowers) which cumulatively emit large quantities of emissions.
 - Climate Action Plan – General Plan Policy: Chapter 4 – Policy 4-P-27. The City shall prepare a Community Climate Action Plan to identify and prioritize programs, projects, and procedural policies that will help the City achieve the community greenhouse gas emission goals of Resolution 2005-118 (25% below 1990 levels by 2015).

5.4.3 Greenhouse Gas Inventory and Forecast

Figure 5.4-2. Petaluma 2010 Community GHG Inventory by Source



Petaluma's inventory is similar to other cities in the county and state. The majority of the GHG emissions are from transportation due to fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes and businesses in Petaluma. Residential uses account for most (54%) of the building energy emissions in Petaluma. Commercial uses account for 46% of building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In Petaluma, total GHG emissions generated by community activities in 2010 were 441,880 MTCO₂e, which is approximately 12% of countywide GHG emissions in the same year. This is a 14% increase from estimated 1990 emissions, which were 387,020 MTCO₂e. Table 5.4-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the City of Petaluma.

Table 5.4-3. Petaluma Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	134,720	35%	165,260	37%	182,020	36%	190,180	35%	209,020	36%	218,060	37%
On-Road Transportation	228,530	59%	258,940	59%	303,090	60%	330,670	61%	339,440	58%	336,690	57%
Off-Road Transportation and Equipment	5,980	2%	7,110	2%	8,550	2%	10,290	2%	19,370	3%	20,210	3%
Solid Waste	11,960	3%	9,580	2%	10,050	2%	10,530	2%	11,530	2%	12,020	2%
Wastewater Treatment	390	0%	520	0.1%	540	0%	550	0%	620	0%	650	0%
Water Conveyance	5,440	1%	470	0.1%	720	0%	750	0%	880	0%	930	0%
Total	387,020	100%	441,880	100%	504,970	100%	542,970	100%	580,870	100%	588,560	100%
Per-Capita Emissions	9.0		7.6		8.5		8.9		8.5		8.2	

5.4.4 Greenhouse Gas Reduction Goal and Measures

The City of Petaluma joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 24 local GHG reduction measures. The City's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local measures) would be approximately 542,970 MTCO₂e. The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 376,630 MTCO₂e, which would be a reduction of approximately 31% compared to 2020 BAU conditions. The City will achieve these reductions through reduction measures that are technologically feasible and cost-effective per AB 32 through a combination of state (72%), regional (17%), and local (11%) efforts. With the reduction measures in CA2020, per-capita emissions in Petaluma will be 6.2 MTCO₂e per person, a 31% reduction in per capita emissions compared to 1990.

Table 5.4-4. Petaluma 2020 GHG BAU Emissions, Reductions, and CAP Emissions

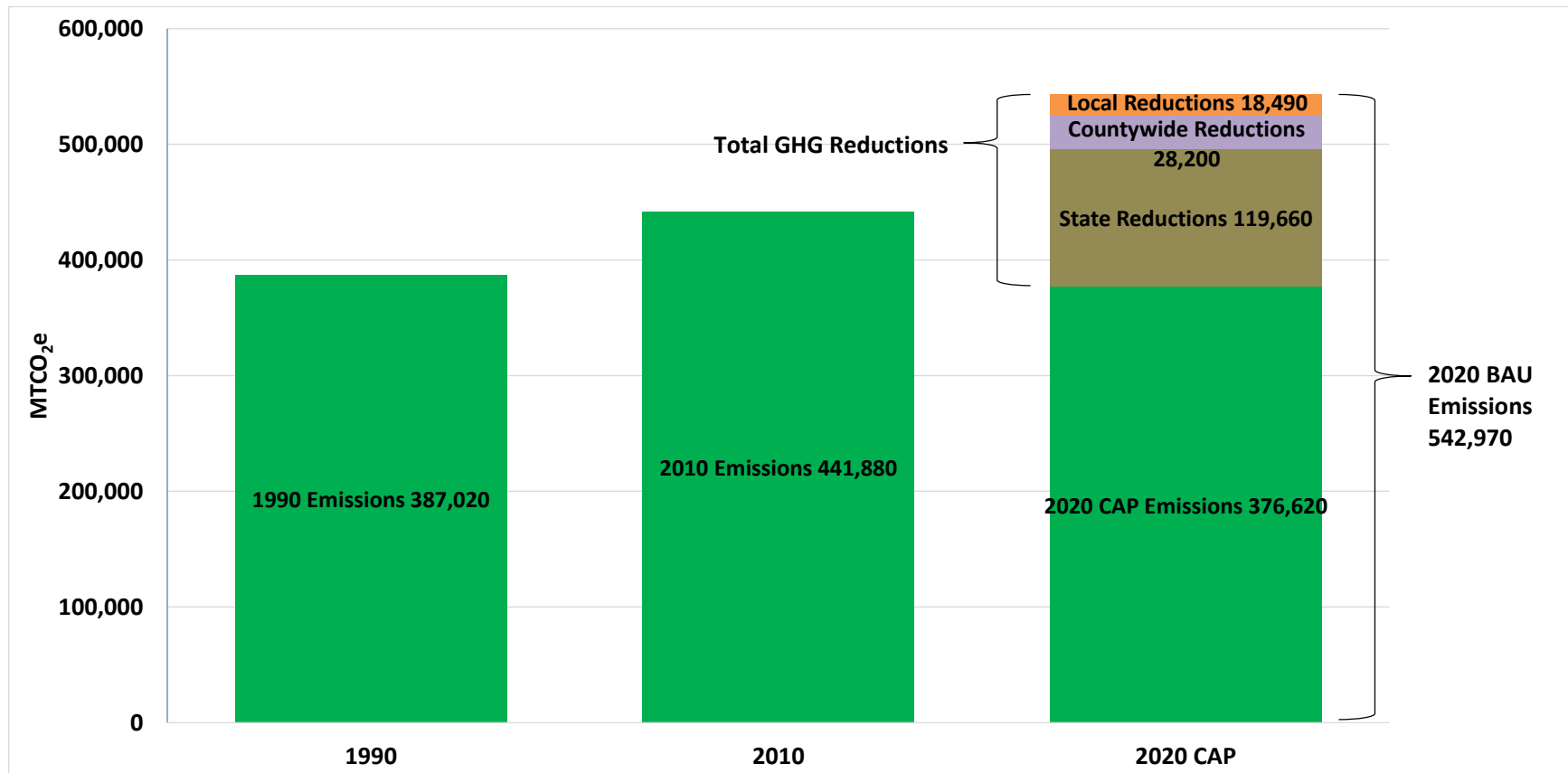
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction from BAU
		State	County-wide	Local	Total		
Building Energy	190,180	43,440	11,900	9,160	64,500	125,680	34%
On-Road Transportation	330,670	75,300	8,540	1,640	85,470	245,200	26%
Off-Road Transportation and Equipment	10,290	910	-	2,670	3,580	6,710	35%
Solid Waste	10,530	-	6,950	-	6,950	3,590	66%
Water Conveyance	750	-	680	5,020	5,710	- ¹	100%
Wastewater Treatment	550	-	140	-	140	420	25%
Total Emissions	542,970	119,660	28,200	18,490	166,350	376,630	31%
		72%	17%	11%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.4-3 shows Petaluma's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Petaluma benefits greatly from the work the state and other regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.4-3. Petaluma 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures by Source

As shown in Table 5.4-5, the City of Petaluma will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g., Title 24 energy efficiency measures). State measure reductions total 119,660 MTCO₂e, including the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS.

Regional measures will reduce emissions by 28,200 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 18,490 MTCO₂e will be achieved primarily through locally adopted measures relevant to the City of Petaluma. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Petaluma are, in order of importance, Measure 2-L4 (Solar in Existing Non-Residential Buildings), Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009), and Measure 7-L3 (Reduce Fossil fuel Use in Equipment). These three measures, in addition to reducing GHG emissions, will save energy, improve air quality and public health in the region, and conserve water and other natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact include the Community Choice Aggregation (CCA) measure, the waste-to-energy measure, and the waste diversion measure.

Table 5.4-5 presents the individual GHG reduction measures that Petaluma has selected for the CAP. For more information on the specifics of the measures, see Appendix C.

City of Petaluma Biomass to Biofuel Project

The City of Petaluma is partnering with the California Energy Commission in a pilot project to capture the gas released naturally by food waste generated in the City and reuse it for fuel for the City's municipal vehicle fleet. The Biomass to Biofuel project will use state of the art technology to capture the gas from food waste and wastewater solids. The gas will then be used for the City's transit fleet and the waste collection vehicle fleet. The project will be an excellent example of how wastewater utilities and the food processing industry can reduce the carbon intensity of transportation.

Table 5.4-5. Petaluma 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	9,236	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	2,686	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	4,135	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	155	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	2,259	N/A
Goal 2: Increase Renewable Energy Use	46,104	
Measure 2-S1: Renewables Portfolio Standard	36,470	N/A
Measure 2-S2: Solar Water Heaters	153	N/A
Measure 2-R1: Community Choice Aggregation	9,481	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	6,161	
Measure 5-R1: Improve and Increase Transit Service	49	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	1,294	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	1,198	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	959	N/A
Measure 5-R8: Safe Routes to School	2,662	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	75,303	
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	70,043	N/A
Measure 6-S2: Advanced Clean Cars	2,140	N/A
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	3,119	N/A
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	3,286	
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	911	N/A
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	2,338	N/A
Measure 7-R2: Alternative Fuel for Transit Vehicles	38	N/A
Goal 9: Increase Solid Waste Diversion	3,106	
Measure 9-R1: Waste Diversion Goal	3,106	N/A
Goal 10: Increase Capture and Use of Methane from Landfills	3,841	
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	3,841	N/A
Goal 11: Reduce Water Consumption		
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	141	
Measure 13-R1: Infrastructure and Water Supply Improvement	6	N/A
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	136	N/A
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	678	
Measure 14-R1: Sonoma County Water Agency Carbon Free Water by 2015	678	N/A
Local Measures		
Goal 1: Increase Building Energy Efficiency	414	

State, Regional, and Local Measures	2020 GHG Reductions		Participation Rate
Measure 1-L2: Outdoor Lighting	403	50%	of outdoor lighting to participate
Measure 1-L3: Shade Tree Planting	11	1,000	trees planted
Goal 2: Increase Renewable Energy Use	8,407		
Measure 2-L1: Solar in New Residential Development	106	50%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	1,889	15%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	97	10%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	6,315	20%	of existing non-residential development with solar
Goal 3: Switch Equipment from Fossil Fuel to Electricity	340		
Measure 3-L1: Convert to Electric Water Heating	340	10%	of households
Goal 4: Reduce Travel Demand Through Focused Growth	1,378		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	1,201	60%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	130	15%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	47	15%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	255		
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	255	100%	of trips affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	2,619		
Measure 7-L1: Electric Vehicle Charging Station Program	3	5	charging stations installed
Measure 7-L2: Electrify Construction Equipment	224	10%	of equipment
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	2,392	Yes	

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 8: Reduce Idling	53		
Measure 8-L1: Idling Ordinance	NQ	2	minutes below state law
Measure 8-L2: Idling Ordinance for Construction Equipment	53	2	minutes below state law
Goal 9: Increase Solid Waste Diversion	< 1		
Measure 9-L1: Create Construction and Demolition Reuse and Recycling Ordinance	< 1	3%	beyond baseline
Goal 11: Reduce Water Consumption	5,024		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	3,755	20%	Reduction in per capita water use
Measure 11-L2: Water Conservation for New Construction*	130	100% /50%	% of new residential/ nonresidential development
Measure 11-L3: Water Conservation for Existing Buildings*	1,139	25%/ 50%	% of new residential/ nonresidential development
Goal 12: Increase Recycled Water and Greywater Use	< 1		
Measure 12-L1: Greywater Use	< 1	2%	greywater goal
State Measure Reductions in Petaluma	119,660		
Regional Measure Reductions in Petaluma	28,200		
Local Measure Reductions in Petaluma	18,490		
Grand Total Emissions Reductions in Petaluma	166,350		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.4.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Petaluma has recognized the need to reduce GHG emissions from municipal operations. Petaluma completed the “City of Petaluma Greenhouse Gas Emissions Reduction Action Plan Analysis” in October 2009. This municipal climate action plan outlines GHG reduction initiatives that the City can pursue for its facilities. The analysis and resulting GHG emissions reductions include opportunities for improved municipal building efficiency, fleet composition, street light retrofits, water/wastewater system improvements, and PV system installations.

Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Petaluma and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Rohnert Park

Commitments to meeting
community greenhouse
gas reduction goals.



5.5 Rohnert Park

This section presents the community greenhouse gas (GHG) emissions profile specific to Rohnert Park and the measures that the City of Rohnert Park will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.5.1 Community Summary

Rohnert Park is located approximately 50 miles north of San Francisco and is bordered by the cities of Cotati to the southwest and Santa Rosa to the north. By automobile, Rohnert Park is accessed regionally from U.S. 101 and State Route (SR) 116. U.S. 101 travels north-south through Rohnert Park, connecting the City to Mendocino County on the north and the San Francisco Bay Area to the south. SR 116 is connected to U.S. 101 and to cities and destinations including Sebastopol, the Sonoma Coast, and the Russian River to the west; Petaluma to the south; and the Sonoma Valley to the east.

Modeled on the neighborhood unit concept, Rohnert Park was established in 1956 as a master-planned city. The neighborhood unit concept emphasized the development of cities as a series of neighborhood units, with single-family residences organized around a centrally located school and park. Commercial areas were planned at the periphery of each neighborhood unit.

Rohnert Park has a designated stop on the SMART commuter rail line, which is expected to start service in late 2016. The SMART line will connect the major cities of Sonoma and Marin Counties along U.S. 101, from Cloverdale to the Larkspur Ferry Terminal. Rohnert Park is located approximately midway on the planned SMART rail system and is one of 10 SMART stations planned in Sonoma County, which also include neighboring Cotati, Santa Rosa, and Petaluma. In 2013, the City received the Priority Development Area (PDA) planning grant from the Metropolitan Transportation Commission to prepare a PDA Plan to leverage the coming SMART station and Multi-Use Path (MUP) to support creation of a transit-oriented, pedestrian-friendly downtown for Rohnert Park. The PDA Plan also promotes infill growth supporting development of Central Rohnert Park as a complete community, with a mix of uses and greater range of transit, bicycle, and pedestrian circulation options.

Both the SMART commuter train and the MUP are intended to provide alternative forms of transportation, potentially reducing vehicular congestion on U.S. 101 and related GHG emissions.

Demographics

Rohnert Park spans 7 square miles and had a population of 40,971 as of the 2010 census. In 2020 the population of Rohnert Park is expected to be 47,232, an increase of 15% over 2010. Employment in the area is expected to increase by 43%. Rohnert Park's demographic composition in 2010 was 76% White, 2% African American, 1% Native American, 5% Asian, 0.4% Pacific Islander, 10% from other races, and 6% from two or more races. Persons of Hispanic or Latino origin were 22%.

As shown in Table 5.5-1, growth in population, housing, and jobs in the City is expected to occur moderately over the planning period.

Table 5.5-1. Rohnert Park Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	36,326	40,971	42,590	47,232	50,804	54,581
Housing	13,404	16,143	16,941	18,787	20,208	21,710
Employment	15,288	15,038	17,393	21,460	21,460	21,460

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the City based on its internal planning forecasts.

According to the 2010 Census data, the City of Rohnert Park is majority owner-occupied with 54% of housing units owned and 46% rented.

Energy and Water Use

Compared to households in the county as a whole, Rohnert Park households use less electricity, natural gas, and water. They also use less electricity, natural gas, and water than households statewide.

Table 5.5-2. Rohnert Park, County, and State 2010 Average Energy and Water Use (per household, per year)

	Rohnert Park	County	State
Electricity (kWh)	6,039	7,042	9,320
Natural Gas (Therms)	392	413	512
Water Use (Gallons)	62,733	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the City of Rohnert Park Urban Water Management Plan.

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

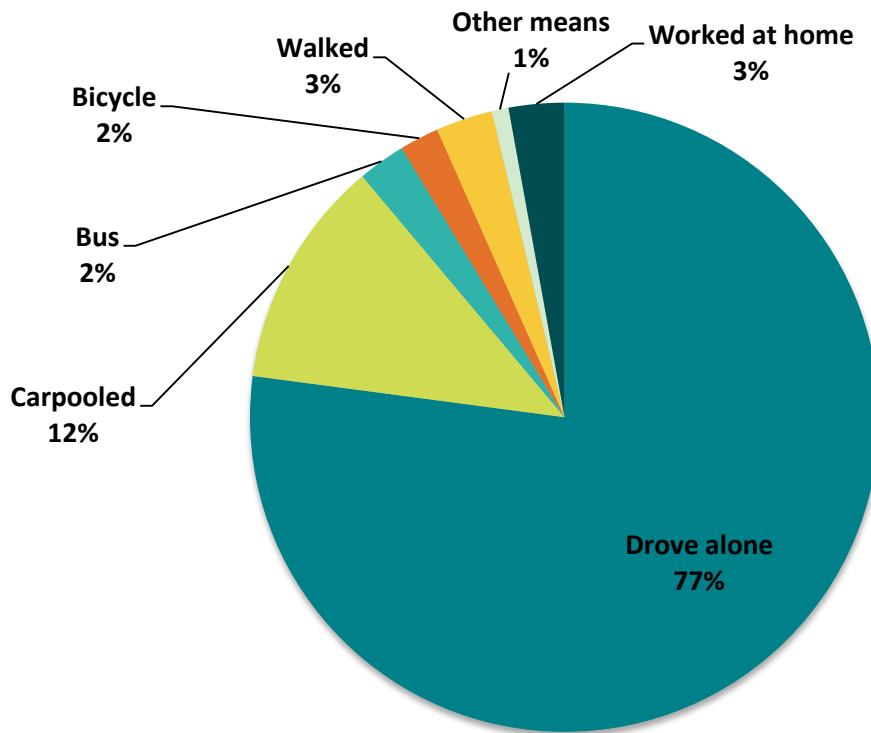
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In inventory year 2010, most Rohnert Park residents (77%) drove to work, with 12% carpooling. According to Census data, it takes residents of Rohnert Park an average of 27.7 minutes to get to work (U.S. Census Bureau 2014).

Figure 5.5-1. Modes to Work in Rohnert Park in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.5.2 Rohnert Park's Existing Actions to Reduce GHG Emissions

Rohnert Park has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have been helping to reduce GHG emissions. The City has adopted the following ordinances and General Plan policies that help to reduce GHG emissions and will support the implementation of the formal GHG reduction measures in this CAP.

- Building Energy
 - Green Building Ordinance: Municipal Code Chapter 15.16.020. Adoption of CALGreen Tier 1 residential and non-residential voluntary measures as mandatory.
 - Residential Retrofits: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Residential Appliance Upgrades: Programs through PG&E and other agencies.
 - Solar Installations at Residences: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Solar Sonoma County program.
 - Climate Action Projects Completed for energy efficiency:
 - Lighting Retrofit (2001)

- APS Measures (2006)
- PV APS Package (2006)
- Computer Network Controls (2009)
- PV-New City Hall (2009)
- LED Christmas Light Replacement (2009)
- Staff Energy Efficiency Coordinator (2010)
- HPS to LED A – Park Lights Project (2010)
- Countywide Building Retrofit Program (2011)
- Energy Efficiency Conservation Block Grant Program: Develop, promote, implement, and manage energy efficiency and conservation programs.
- Land Use and Transportation
 - Bicycle and Pedestrian Master Plan.
 - Zero Emission Mobility Program: Initiate a fleet of zero emissions vehicles.
 - AB 118 Alternative Fuel Vehicle Grant.
 - Urban Growth Boundary – General Plan Goal: Chapter 2.4 – Goal LU-A. Maintain a compact urban form with a defined UGB. Ensure land surrounding the City is maintained for open space.
 - Rail Service and Transit Center – General Plan Policy: Chapter 4 – Policies TR-33 through TR-34. Continue efforts to develop commuter rail service along Northwestern Pacific right-of-way and evaluate and implement a multi-hub transit corridor along Rohnert Park Expressway that incorporates a rail station, bus transfer station, frequent shuttles to Sonoma State, and parking.
 - Increased Bus Stops and Shelters – General Plan Policy: Chapter 4 – Policies TR-30 through TR-32. Determine locations of new bus stops in conjunction with increased transit service routes, require stops and shelter in conjunction with new development, and ensure stops and shelters comply with standards set in TR-32.
 - Increased Transit Service – General Plan Policy: Chapter 4 – Policies TR-28 through TR-29. Work with Sonoma County Transit and Golden gate transit to increase bus service, expand bus system for newly developed areas, explore the feasibility of a Sonoma State University campus shuttle and student discounts for transit.
 - Trip Reduction Ordinance: Municipal Code Chapter 10.80. All employers within the City of Rohnert Park with 100 or more employees at an individual job site shall disseminate trip reduction information regarding transportation alternatives including carpools, vanpools, transit and bicycling, and other methods of reducing trips such as telecommuting,

compressed work week, and flexible work hours annually to each employee and to all new employees as they are hired.

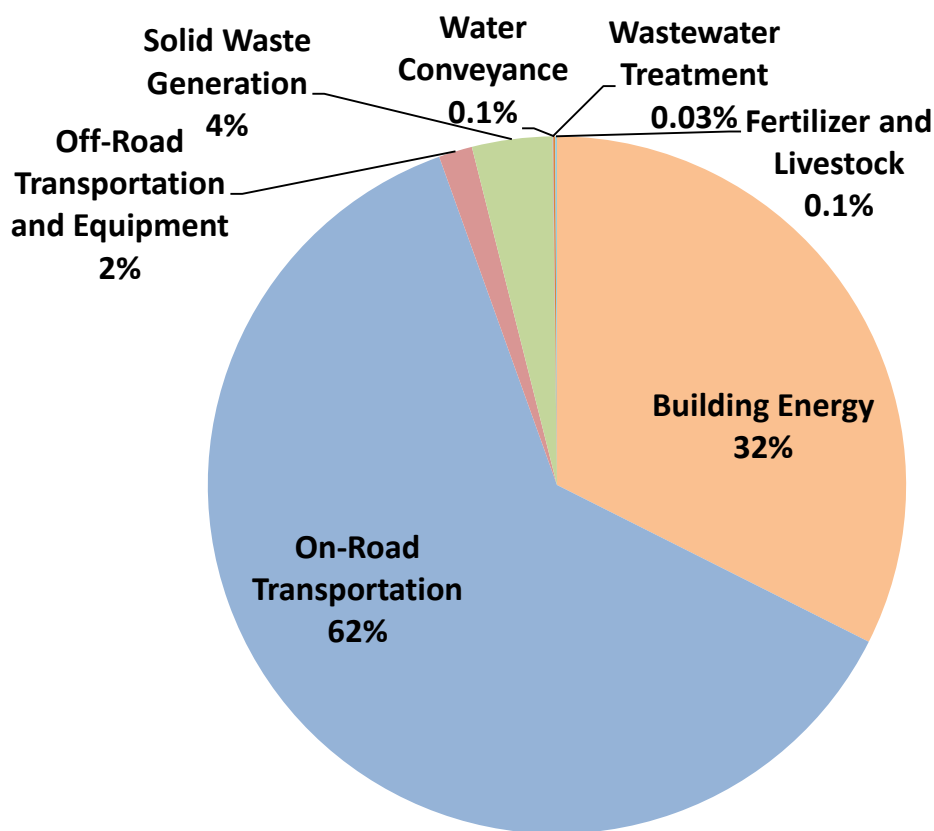
- Transportation Demand Management for Carpools – General Plan Policy: Chapter 4 – Policy TR-22. Adoption of a non-mandatory employer-based transportation demand management program for Rohnert Park businesses. Intended to reduce the use of single-occupancy vehicles for the commute to work.
- Alternative Transportation: General Plan Goal TR-F – Chapter 4. Encourage alternative modes of travel including transit, bicycle, and walking.
- Parking Policies: reduced auto parking requirement for commercial to increase bike parking/storage. Also recognize compact car, preferential parking for EVs, hybrids.
- New Parking Standards for Mixed Use Development – General Plan Policy: Chapter 4 – Policy TR-25. Reduce parking requirements for mixed used development, allow shared parking facilities, and cash-in-lie payments for required parking in mixed use areas.
- Idling Ordinance: Limited number of drive-through with “general” prohibition.
- Bicycle Circulation – General Plan Policy: Chapter 4 – Policies TR-39 through TR-43. Update Bicycle Master Plan to incorporate Class I bikeways, implement design standards for bikeways, ensure continuous and interconnected bikeways, and establish bike parking requirements in the Zoning Ordinance.
- Pedestrian Circulation – General Plan Policy: Chapter 4 – Policies TR-37 and TR-38. Provide continuous sidewalks along all existing and future streets, and establish pedestrian-friendly amenities along streets running through mixed use, high residential, public, or park areas.
- Water and Wastewater Efficiency
 - Water Waste Regulations: Municipal Code Chapter 13.62. Promotes the efficient use of the entire water supply provided by the City; to eliminate the intentional or unintentional waste of water when a reasonable alternative solution is available; and to prohibit the use of equipment that is wasteful.
 - Water Shortage Emergency Plan: Municipal Code Chapter 13.66. Voluntary Conservation. Achieve an overall system-wide reduction goal of 10%.
 - Conservation Devices – General Plan Policy: Chapter 5 – Policy PF-15. Continue to require water-conserving devices for all new development.
 - Non-Residential Development – General Plan Policy: Chapter 5 – Policy PF-16. Require non-residential uses to implement water conservation practices as a condition of development
 - Rebates – General Plan Policy: Chapter 5 – Policy PF-18. Work with SCWA to offer rebates on non-residential water usage.

- Water Audits for Businesses – General Plan Policy: Chapter 5 – Policy PF-20. At the request of businesses, conduct water audits and work with them to develop plans for reducing wastewater and discharge.
- Water Conservation Program – General Plan Policy: Chapter 5 -Policy PF-22. Adopt a comprehensive water conservation program for City employees.
- Best Management Practices – General Plan Policy: Chapter 5 – PF-23. Continue to implement water conservation BMPs.
- Water Conservation Rate – General Plan Policy: Chapter 5 – Policy PF-25. Adopt a tiered water rate schedule that increases cost as the quantity of water used increases; and/or provides seasonal rates or excess-use surcharges.
- Climate Action Projects Completed for water conservation:
 - Pool Covers (2006)
 - Decommission Community Center Fountain (2010)
 - Pump Measures (2006)
 - Tank Booster Station Improvement Projects (2008)
 - Pool Pump Measures
 - Pump Measures – Savings Criteria \$1,500 (2010)
 - Closure of 1 Community Pool (2010)
- Mandatory Conservation: System-wide reduction of 20% by making all voluntary measures mandatory.
- Urban Forestry and Natural Areas
 - Open Space Protection – General Plan Policy: Chapter 2.4 – Policy 2.4.2. Adjust UGB to protect agricultural or open spaces.
 - Open Space Designation – General Plan Policy: Chapter 5 – Policy OS-1. Ensure that land in the Planning Area designated as Open Space in the General Plan is maintained.
 - Specific Open Space Buffers – General Plan Policy: Chapter 5 – Policy OS – 2. Dedicate open space buffers along Petaluma Hill Road as part of the University District and Northeast Specific Plans.
 - Northwest Community Separator – General Plan Policy: Chapter 5 – Policy OS-4 through OS-4B: Requires 180 acres of land to be preserved in the Northwest Community Separator.
 - Acquisition of Open Space Land – General Plan Policy: Chapter 5 – Policy OS-4D. Adopt a mechanism to ensure open space protection from development either through mitigation or payment of a fee in lieu of acquisition.

- Open Space Aggregation – General Plan Policy: Chapter 5 – Policy OS-5. Ensure open space parcels are aggregated to the maximum extent feasible to avoid piecemeal acquisition.
- Creek Protection – General Plan Policy: Chapter 5 – Policy OS-7. Use creek protection zones for permanent public open space and compatible conservation purposes.
- Wetlands Potential – General Plan Policy: Chapter 5 – Policy OS-8. Explore the feasibility of integrating wetlands and vernal pool areas with new development or open space areas.
- Parks, Recreation, Open Space Plan – General Plan Policy: Chapter 5 – Policy OS-10. Prepare a Parks, Recreation, and Open Space Master Plan.
- Natural Resource Protection – General Plan Policy: Chapter 2.4 – Policy 2.43. Add lands to the UGB to exclusively protect natural resources.
- Wetland Conservation – General Plan Policy: Chapter 7 – Policy EC-5. Requires delineation of wetland and biological habitats in areas where development is set to occur.
- Wetland and Restoration Funding – General Plan Policy: Chapter 7 – Policy EC-6.
- Tree Planting Ordinance: replacement of trees if the ones removed are not sick/unsafe, or pay an in-lieu fee for trees to be planted by the City.
- General
 - Resolution No. 2007-164 and Plan C. Adoption of GHG Emissions Reduction Action Plan Analysis.
 - Approval of the GHG Emissions Reduction Action Plan Analysis. Adoption of “Plan C.” Approval of the GHG Emissions Reduction Action Plan Analysis.

5.5.3 Greenhouse Gas Inventory and Forecast

Figure 5.5-2. Rohnert Park 2010 Community GHG Inventory by Source



Rohnert Park's inventory follows a similar trend to the other communities in Sonoma County and the state. The majority of GHG emissions are from on-road transportation (62%) due to fossil fuel combustion. The next largest source is building energy (32%), which is due to the fossil fuel used to make electricity and natural gas used in homes, schools, businesses, and industrial practices. Residential uses account for most (65%) of the building energy emissions in Rohnert Park. Commercial uses account for 35% of building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In Rohnert Park, total GHG emissions generated by community activities in 2010 were 264,260 MTCO₂e, which is approximately 7% of countywide GHG emissions in the same year. This is a 9% decrease from estimated 1990 emissions, which were 291,320 MTCO₂e. Table 5.5-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the City of Rohnert Park.

Table 5.5-3. Rohnert Park Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	84,930	29%	85,750	32%	98,490	31%	113,990	31%	119,030	32%	124,360	33%
On-road Transportation	158,100	54%	164,230	62%	202,600	64%	238,700	64%	226,890	61%	227,460	60%
Off-road Transportation and Equipment	4,020	1%	4,120	2%	5,130	2%	6,860	2%	12,220	3%	12,660	3%
Solid Waste	40,830	14%	9,840	4%	10,810	3%	12,710	3%	13,130	4%	13,580	4%
Wastewater Treatment	70	0%	80	0.0%	80	0%	90	0%	100	0%	110	0%
Water Conveyance	3,370	1%	250	0.1%	320	0%	370	0%	400	0%	430	0%
Total	291,320	100%	264,260	100%	317,430	100%	372,730	100%	371,780	100%	378,610	100%
Per-Capita Emissions	8.0		6.4		7.5		7.9		7.3		6.9	

5.5.4 Greenhouse Gas Reduction Goal and Measures

The City of Rohnert Park joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 22 local GHG reduction measures. The City's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local reduction measures) would be approximately 372,730 MTCO₂e. The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 251,970 MTCO₂e, which would be a reduction of approximately 32% compared to 2020 BAU conditions. The City will achieve these reductions through reduction measures that are technologically feasible and cost-effective per AB 32 through a combination of state (70%), regional (20%), and local (10%) efforts. Per-capita reductions in Rohnert Park in 2020 would be 2.6 MTCO₂e per person. With the reduction measures in CA2020, per-capita emissions in Rohnert Park will be 5.3 MTCO₂e per person, a 33% reduction in per capita emissions compared to 1990.

Table 5.5-4. Rohnert Park 2020 GHG BAU Emissions, Reductions, and CAP Emissions

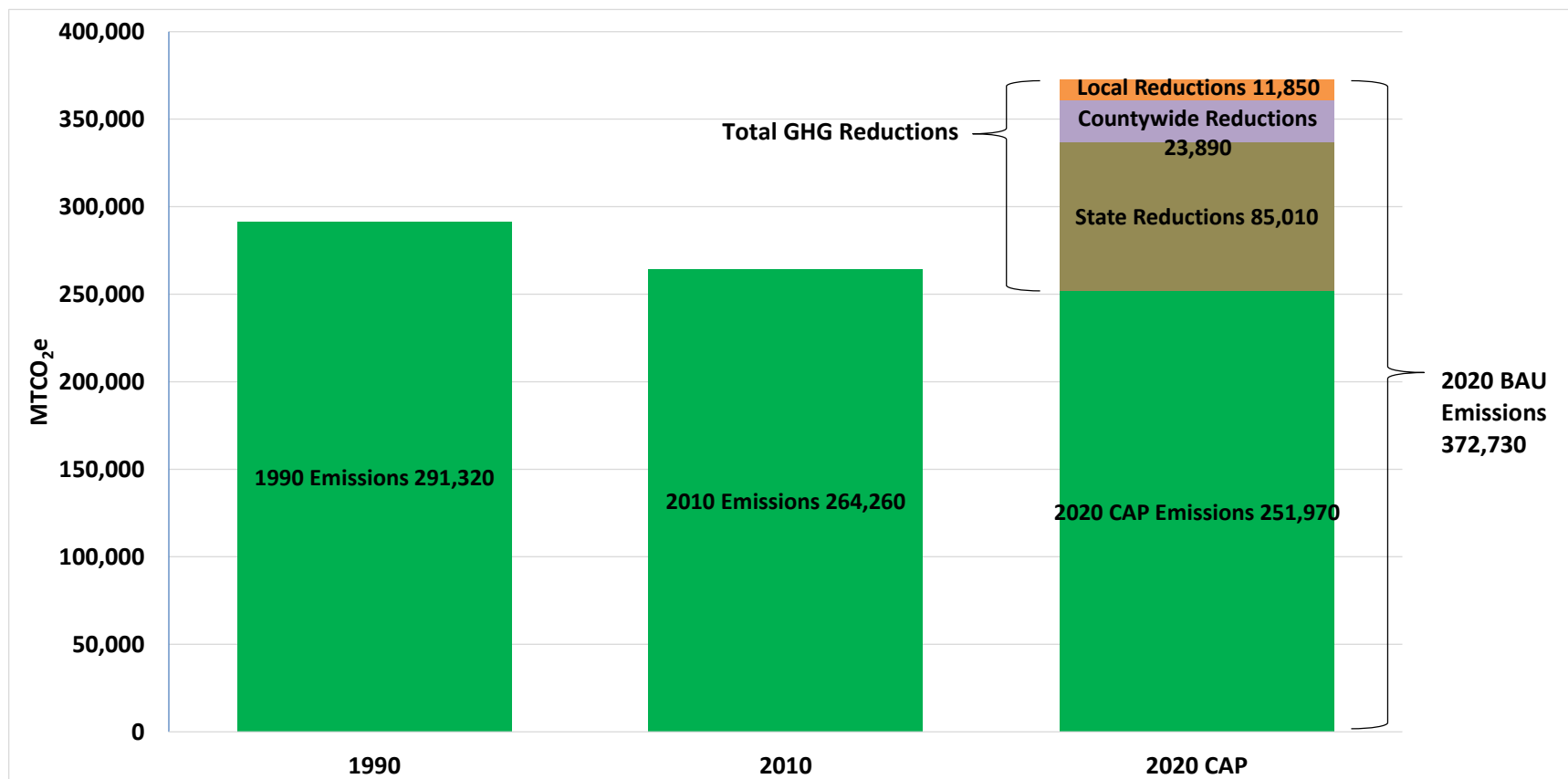
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction From BAU
		State	County-wide	Local	Total		
Building Energy	113,990	29,510	7,910	3,140	40,560	73,440	36%
On-Road Transportation	238,700	54,890	6,020	3,820	64,730	173,980	27%
Off-Road Transportation and Equipment	6,860	610	-	30	640	6,220	9%
Solid Waste	12,710	-	9,570	-	9,570	3,130	75%
Water Conveyance	370	-	300	4,860	5,160	- ¹	100%
Wastewater Treatment	90	-	90	-	90	-	100%
Total Emissions	372,730	85,010	23,890	11,850	120,760	251,970	32%
		70%	20%	10%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.5-3 shows Rohnert Park's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Rohnert Park benefits greatly from the work the state and regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.5-3. Rohnert Park 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

As shown in Table 5.5-5, the City of Rohnert Park will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g., Title 24 energy efficiency measures). State measure reductions total 85,010 MTCO₂e, which include the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS, which will reduce GHG emissions from Rohnert Park's on-road and off-road transportation, and building energy use in 2020.

Regional measures will reduce emissions by 23,890 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 11,850 MTCO₂e will be achieved through locally adopted measures, relevant to the City of Rohnert Park. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Rohnert Park are, in order of importance, Measure 2-L4 (Solar in Existing Non-Residential Buildings), Measure 2-L2 (Solar in Existing Residential Buildings), and Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009). These three measures, in addition to reducing GHG emissions, will save energy, improve air quality and public health in the City, and conserve natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact are the Community Choice Aggregation (CCA) measure, the waste-to-energy measure, and the waste diversion measure.

Table 5.5-5 presents the individual GHG reduction measures that Rohnert Park has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

City of Rohnert Park Electric Municipal Vehicle Fleet

Along with the other communities in the county, the City of Rohnert Park joined the Sonoma County Local Government Electric Vehicle (EV) Partnership to collaborate as a region on the implementation of EVs and EV charging infrastructure. Purchasing electric vehicles for the City's municipal vehicle fleet, and constructing vehicle charging infrastructure will help the City reduce its municipal operations GHG emissions.

Table 5.5-5. Rohnert Park 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	7,341	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	3,634	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	2,291	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	103	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	1,313	N/A
Goal 2: Increase Renewable Energy Use	30,072	
Measure 2-S1: Renewables Portfolio Standard	23,461	N/A
Measure 2-S2: Solar Water Heaters	122	N/A
Measure 2-R1: Community Choice Aggregation	6,489	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	4,142	
Measure 5-R1: Improve and Increase Transit Service	71	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	851	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	788	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	630	N/A
Measure 5-R8: Safe Routes to School	1,803	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	54,894	
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	51,165	N/A
Measure 6-S2: Advanced Clean Cars	1,524	N/A
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	2,205	N/A
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	2,482	
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	608	N/A
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	1,874	N/A
Goal 9: Increase Solid Waste Diversion	3,760	
Measure 9-R1: Waste Diversion Goal	3,760	N/A
Goal 10: Increase Capture and Use of Methane from Landfills	5,814	
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	5,814	N/A
Goal 11: Reduce Water Consumption		
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A
Goal 12: Increase Recycled Water and Greywater Use	1	
Measure 12-R1: Recycled Water*	1	N/A
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	113	
Measure 13-R1: Infrastructure and Water Supply Improvement	20	N/A
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	93	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	282		
Measure 14-R1: Sonoma County Water Agency Carbon Free Water by 2015	282	N/A	
Local Measures			
Goal 1: Increase Building Energy Efficiency	287		
Measure 1-L2: Outdoor Lighting	276	50%	of outdoor lighting to participate
Measure 1-L3: Shade Tree Planting	11	1,000	trees planted
Goal 2: Increase Renewable Energy Use	2,792		
Measure 2-L1: Solar in New Residential Development	59	15%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	949	15%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	185	10%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	1,599	10%	of existing non-residential development with solar
Goal 3: Switch Equipment from Fossil Fuel to Electricity	63		
Measure 3-L1: Convert to Electric Water Heating	63	5%	of households
Goal 4: Reduce Travel Demand Through Focused Growth	1,773		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	862	20%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	846	75%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	64	15%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	2,042		

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 5-L1: Local Transportation Demand Management Program	630	38%	of employees eligible
Measure 5-L2: Carpool-Incentives & Ride-Sharing Program	1,229	78%	of employees eligible
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	183	100%	of trips affected
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	3		
Measure 7-L1: Electric Vehicle Charging Station Program	3	5	charging stations installed
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	
Goal 8: Reduce Idling	32		
Measure 8-L1: Idling Ordinance	NQ	2	minutes below state law
Measure 8-L2: Idling Ordinance for Construction Equipment	32	2	minutes below state law
Goal 11: Reduce Water Consumption	4,862		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	4,441	37%	Reduction in per capita water use
Measure 11-L2: Water Conservation for New Construction* ¹	-	100%/50%	% of new residential/nonresidential development
Measure 11-L3: Water Conservation for Existing Buildings*	421	25%/50%	% of new residential/nonresidential development
State Measure Reductions in Rohnert Park	85,010		
Regional Measure Reductions in Rohnert Park	23,890		
Local Measure Reductions in Rohnert Park	11,850		
Grand Total Emissions Reductions in Rohnert Park	120,760		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

¹ Rohnert Park chose to participate in this measure, but there would be no reductions from this measure due to overlapping reductions with other water measures

5.5.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Rohnert Park has recognized the need to reduce GHG emissions from municipal operations. In 2007, the City adopted the “City of Rohnert Park Greenhouse Gas Emissions Reduction Action Plan Analysis.” The City has completed 19 climate action projects aimed at reducing municipal GHG emissions, including lighting and equipment retrofits, fleet improvements, and installing solar electricity generation on City Hall. The City also plans to implement even more ambitious climate action projects in the future, including more PV installations and lower carbon fuels for the municipal fleet.

Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Rohnert Park and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Santa Rosa

Commitments to meeting
community greenhouse
gas reduction goals.



5.6 Santa Rosa

The Santa Rosa City Council adopted a Climate Action Plan in June 2012 and a Municipal Climate Action Plan in 2013. This section provides information about Santa Rosa's greenhouse gas emissions profile and measures the City of Santa Rosa has adopted as well as how Santa Rosa's CAP works with CA 2020 and contributes to regional greenhouse gas emissions reductions to help meet state, regional, and local reduction targets.

5.6.1 Community Summary

Located in central Sonoma County, Santa Rosa is the county seat and the heart of Sonoma County. The largest city between Portland and San Francisco, Santa Rosa serves a four county region as the hub for technology and entrepreneurial businesses, retail, banking, and employment. It is a center of governmental services, home to the region's state and federal offices. Santa Rosa has a dynamic and well-balanced economy, anchored by strengths in tourism, high-tech manufacturing, and retail. Residents enjoy a superb quality of life. The city has a vibrant and active downtown with shops, restaurants, and events.

Demographics

The city encompasses about 42 square miles and has a population of just over 173,000 in 2015. In 2010, the city's demographic composition was 29% Latino, 60% white, 2% black, 0.9% American Indian or Alaska Native, 5% Asian, 0.4% Native Hawaiian or other Pacific Islander, and 3% some other race or two or more races.

Table 5.6-1 Santa Rosa Socioeconomic Data

	Actual			Projected
	1990	2010	2015	2035
Population	113,313	167,815	173,031	237,000
Housing	47,711	67,396	68,551	96,295
Employment	58,761	72,513	85,000	132,100

Sources: California State Department of Finance, U.S. Census, California Employment Development Department, Santa Rosa General Plan 2035

Energy and Water Use

Compared to households in the county as a whole, Santa Rosa households use less electricity and water but more natural gas. Additionally, they use less electricity, natural gas, and water than households statewide.

Table 5.6-2. Santa Rosa, County, and State 2010 Average Energy and Water Use (per household, per year)

	Santa Rosa	County	State
Electricity (kWh)	5,959	7,042	9,320
Natural Gas (Therms)	453	413	512
Water Use (Gallons)	65,530	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the City of Santa Rosa (water).

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

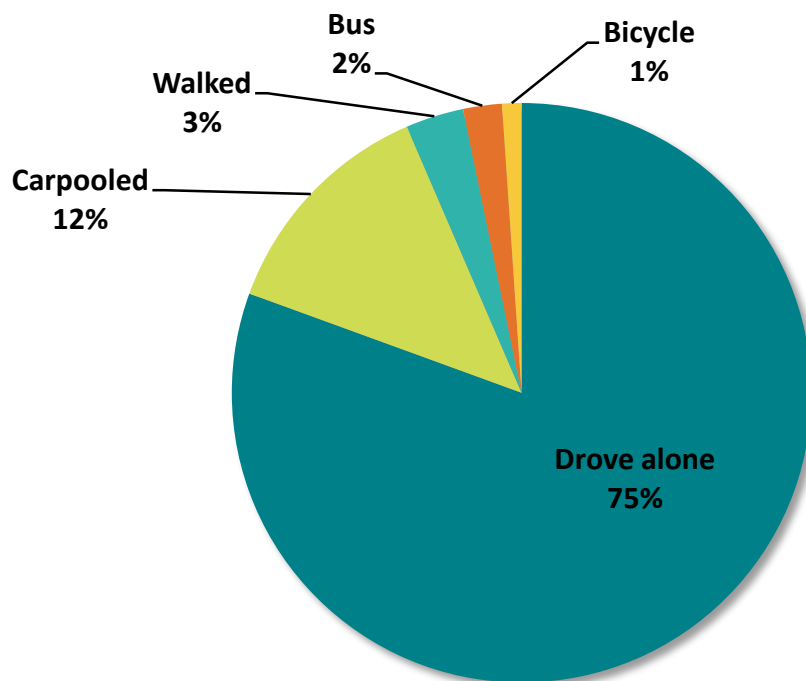
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In 2010, 74.6% of Santa Rosans drove alone to work while 11.9% carpooled. Slightly more than 2% used public transportation, 2.7% walked, and 1.4% bicycled. The mean travel time to work was 22.8 minutes. (U.S. Census Bureau 2014)

Figure 5.6-1. Modes to Work in Santa Rosa in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006-2010

5.6.2 Santa Rosa's Existing Actions to Reduce GHG Emissions

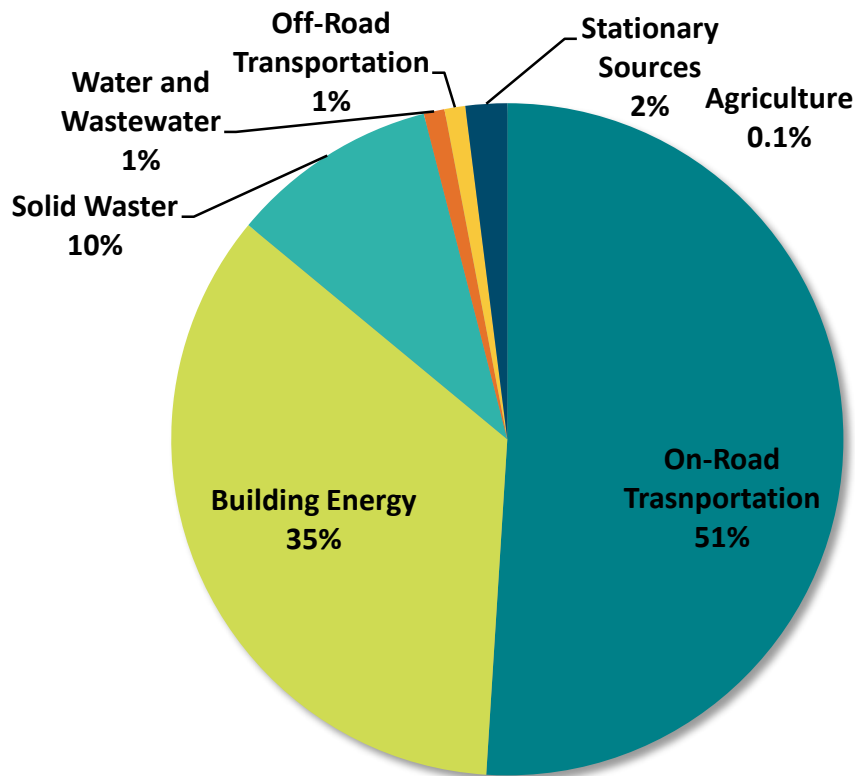
Santa Rosa continues to implement its Climate Action Plans to reduce energy use, promote renewable energy use, along with other actions to help reduce greenhouse gas emissions. The following highlights actions Santa Rosa has taken, or is implementing.

- Building Energy and Energy Efficiency
 - Santa Rosa's Build it Green voluntary program has evolved into a mandatory Tier 1 CalGreen program for residential and non-residential structures.
 - For over two decades, the City has installed energy efficient features in City facilities, including energy efficient lighting and heating, ventilation, and air conditioning units.
 - Cool roofs have been installed on several City buildings.
 - The City has partnered with the Sonoma County Energy Independence Program which offers low interest financing and technical assistance to property owners for energy efficiency retrofits.
 - Lighting in parks and on streets have been retrofit to improve efficiency.
 - General Plan Housing Element goal H-G-2 requires, as allowed by CalGreen Tier 1 standards, energy efficiency through site planning and building design by assisting residential developers in identifying energy conservation and efficiency measures appropriate to the Santa Rosa area. The Housing Element contains policies to implement this goal which address fuel efficient heating and cooling equipment, supporting partnerships for energy efficiency retrofits, and reducing use of water.
- Renewable Energy
 - Solar installations on City properties produce about 710,000 kilowatt hours of green energy annually as of 2016.
 - The City is planning to install solar panels on the rooftops of four parking garages.
 - Santa Rosa partnered with Sonoma State University to develop a biomass to energy program at the Laguna Treatment Plant, which included constructing wetlands and growing energy rich, non-food biomass in wastewater.
 - Santa Rosa pipes treated wastewater to the Geysers steam fields, which generates electricity for more than 100,000 households in Sonoma and other North Bay counties.
 - The City plants and issues permits for new trees annually (230 in 2015).
 - The City's municipal electricity accounts were enrolled in Sonoma Clean Power's "Clean Start" program.
 - The City of Santa Rosa was designated an Early Adopter through the Solar Powering America by Recognizing Communities, a program which will promote solar installations in the city.

- Land Use and Transportation
 - Santa Rosa has General Plan policies and a Bicycle and Pedestrian Master Plan which promote the addition of bicycle and pedestrian facilities. Such facilities are added each year through City's Capital Improvement Program.
 - The City has adopted the Downtown and North Station Area Specific Plans, illustrating support for higher density and greater intensity development surrounding Sonoma-Marin Area Rail Transit stations. In 2016, the City is in the process of completing the Roseland Area / Sebastopol Road Specific Plan, which is focused around the bus transfer center on Hearn Avenue.
 - The Reimagining CityBus process has resulted in a new service plan for bus transit in Santa Rosa, with improved headways.
 - Real-time transit information is available through the "My Santa Rosa CityBus Real-time Transit Information Program" via the web, smartphone app, and text.
 - The Santa Rosa Free Ride Trip Reduction Incentive Program provides incentives to encourage people to use a community alternative to travel to and from work.
 - The City has 10 electric vehicle charging stations at City facilities and plans to expand.
 - Electric and renewable diesel buses are being evaluated for addition to the fleet.
 - The City is developing progressive parking strategies throughout downtown, including demand responsive rates.
 - The City fleet includes hybrid, compressed natural gas, and electric vehicles.
- Water and Wastewater Efficiency
 - The City has sponsored "Drought Drive-Thru" events providing residents, free of charge, items such as water efficient shower fixtures, shower timers, spray nozzles, leak detectors, and buckets.
 - The "Take it from the Tap" program provides students with educational information about water use, along with a water bottle to encourage use of tap water rather than bottled water.
 - Water Department staff table at community events such as the Wednesday Night Market, to highlight water saving techniques and water-use efficiency to local residents.
 - Water Department staff hosts Graywater Workshops to provide residents information on how to design, install, use and maintain a laundry to landscape graywater irrigation system.
 - Free water saving toilets, shower heads, and faucet aerators are provided by Santa Rosa Water from time to time, including in 2015.
 - The City has expanded use of recycled water, sending about half of the Subregional System's to the Geysers, with other uses to irrigate public places, such as parks.

5.6.3 Greenhouse Gas Inventory and Forecast – 2007

Figure 5.6-2. Santa Rosa Community GHG Inventory by Source



Source: Santa Rosa Climate Action Plan, 2012

Since Santa Rosa previously developed a Climate Action Plan, its GHG inventory is from 2007 rather than 2010. As with other Sonoma County communities, the majority of emissions are from transportation due mostly to fossil fuel combustion in motor vehicles. The next largest source is building energy, which includes emissions related to energy used to heat homes and businesses in Santa Rosa.

Residential uses account for 55% of building energy emissions in Santa Rosa, with non-residential uses accounting for 45%. The other categories of emissions are smaller in comparison to transportation and building energy.

Table 5.6-3. Santa Rosa Community GHG Inventory and Forecast

Source	2007 Inventory		2015 Forecast		2020 Forecast		2035 Forecast	
Building Energy	469,520	36%	477,910	36%	492,020	35%	624,280	35%
On-Road Transportation	684,280	52%	691,190	52%	728,820	52%	959,470	53%
Off-Road Transportation	17,670	1%	17,990	1%	18,810	1%	23,580	1%
Solid Waste	139,770	11%	141,340	11%	146,860	11%	185,340	10%
Wastewater and Water	9,840	1%	9,950	1%	10,340	1%	13,040	1%
Total	1,321,080		1,338,380		1,396,850		1,805,710	
Total with state reductions			1,254,100		1,235,180		1,418,670	

Source: Santa Rosa Climate Action Plan, 2012

Notes: Forecasts are Business as Usual

Santa Rosa CAP includes agricultural emissions, which are not included in this chart.

The Business as Usual Forecast identifies how emissions would grow if consumption trends and efficiencies were to remain at 2007 levels. The forecasts are based on growth projected in the Santa Rosa General Plan. Since the General Plan horizon year is 2035, these projections do not match those for other communities in Climate Action 2020, which include 2040 and 2050.

When emissions are adjusted to account for state actions such as the Renewable Portfolio Standard, vehicle standards, and CalGreen building standards, the emissions forecasts are reduced, as shown in Table 5.6-3.

5.6.4 Greenhouse Gas Reduction Goal and Measures

The Santa Rosa CAP includes measures which will allow Santa Rosa to achieve the reduction target of 25% below 1990 emission levels by 2020. GHG reduction strategies aim to reduce GHG emissions from each source to avoid reliance on any one strategy or emissions source to achieve the target. In total, existing actions, state programs, and GHG measures identified by Santa Rosa will reduce emissions by 558,080 MTCO₂e by 2020. Regional efforts to reduce GHGs are included in Santa Rosa's local measures (see Table 5.6-5), which is different than how they were addressed for the other communities in CA 2020, where they were separated out as regional strategies.

Table 5.6-4. Total Santa Rosa GHG Reduction Summary by Topic

Source	2020 GHG Reductions MTCO₂e
State and local programs	189,400
Energy Efficiency and Conservation	117,690
Renewable Energy	76,830
Parking and Land Use Management	32,680
Improved Transport Options	13,130
Optimized Vehicular Travel	59,850
Waste Reduction, Recycling	64,370
Water and Wastewater	3,750
Off-Road Vehicles	380
Total	558,080

Greenhouse Gas Reduction Measures

Table 5.6.5 illustrates GHG reduction measures adopted in Santa Rosa's CAP.

Table 5.6-5. Santa Rosa GHG Emissions Reductions by Measure

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO₂e
1	Goal 1, Goal 3	ENERGY EFFICIENCY	
1.1	1-L1	Continue to enforce CALGreen requirements¹	-
1.1.1	1-L1	New development compliance with Cal Green standards	
1.1.2	1-L1	Continue Tier 1 standards for new development	
1.1.3	1-S1	New development built with net zero electricity in 2020	
1.1.4	1-S1	Evaluate incentives to net zero electricity prior to 2020	
1.2	1-L1, 1-L2, 1-L4	Facilitate energy efficiency in existing buildings	103,390
1.2.1	1-R1	Provide information on free or low cost energy audits	
1.2.2	1-R1	Work with SCEIP to offer assistance, financing for retrofits	
1.2.3	1-R1	Create informational brochure/website for renters	
1.2.4	1-R1	Create informational brochure/website for historic buildings	

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
1.2.5	1-R1	Seek funding to retrofit affordable housing units	
1.2.6	1-R1	Identify neighborhoods appropriate for retrofit pilot program	
1.2.7	1-R1, 1-L2	Reduce energy use in all City facilities	
1.2.8	1-R1	Reduce energy use in city schools and at SR Junior College	
1.2.9	1-R1	Reduce energy use in all existing buildings	
1.3	1-R1	Smart Meter Utilization	7,650
1.3.1	N/A	Require real-time energy monitors to track energy use	
1.3.2	N/A	Inform community regarding metering options	
1.3.3	1-R1	Provide information on appliance rebates	
1.4	1-L3	Plant and maintain trees	1,640
1.4.1	1-L3	Develop a tree inventory	
1.4.2	1-L3	Implement the City tree preservation ordinance	
1.4.3	1-L3	Require new development to provide public & private trees	
1.4.4	1-L3	Create an Urban Greening Policy	
1.4.5	1-L3	Develop a web application to provide updated tree information	
1.5	N/A	Require new sidewalks, paving to have high solar reflectivity	250
1.5.1	N/A	Adopt ordinance requiring use of cool paving materials	
1.5.2	N/A	Allow for green roofs and address historic structures.	
1.5.3	N/A	Create a Green Streets policy.	
1.6	1-R2	Facilitate use of energy efficient appliances	520
1.6.1	1-R2	Find funds to develop rebate program for appliances	
1.7	3-L1	Switch natural gas appliances to electricity	4,240
1.7.1	3-L1	Utilize appliance rebate program for replacement	
1.7.2	3-L1	Identify programs to facilitate replacement	
2	Goal 2	RENEWABLE ENERGY	
2.1	2-R1, 2-L1, 2-L2, 2-L3, 2-L4	Support small-scale renewable energy systems	Supportive

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
2.1.1	2-L1, 2-L2, 2-L3, 2-L4	Update zoning code to remove barriers to these systems	
2.1.2	2-L1, 2-L2, 2-L3, 2-L4	Implement a solar policy	
2.1.3	2-L1, 2-L2, 2-L3, 2-L4	Consider pre-wiring and plumbing for these systems	
2.1.4	2-L1, 2-L2, 2-L3, 2-L4	Create municipal projects which include renewable energy	
2.2	2-R1, 2-L1, 2-L2, 2-L3, 2-L4	Low interest financing for renewable energy installations	20,790
2.2.1	2-L1, 2-L2, 2-L3, 2-L4	Partner with SCEIP to provide financing for solar	
2.2.2	2-R1	Explore feed-in-tariff to spur renewable energy installation	
2.3	2-R1, 2-L1, 2-L2, 2-L3, 2-L4	Establish a comprehensive renewable energy program	56,040
2.3.1	2-R1	Set renewable power generation goal by council resolution	
2.3.2	2-R1	Work with PG&E to increase use of renewable energy sources	
2.3.3	2-R1	Explore cost of Community Choice Aggregation	
2.3.4	2-L1, 2-L2, 2-L3, 2-L4	Evaluate feasibility of mid-size renewable projects in City	
3	Goal 4, Goal 5	Parking and Land Use	
3.1	4-L1, 4-L2, 4-L3, 4-L4	Increase jobs and housing density downtown & near transit	11,680
3.1.1	4-L3	Support Urban Growth Boundary	
3.1.2	4-L1, 4-L2, 4-L3, 4-L4	Implement station plans and corridor plans	
3.2	4-L1, 4-L3	Complementary land uses to decrease need for vehicle travel	6,270
3.2.1	N/A	Work with employers to provide on-site services	
3.2.2	5-R7, 5-R8, 5-R10, 5-L4, 5-L5	Improve non-vehicular network to promote walking, biking	
3.2.3	4-L1	Support mixed use, higher density development near services	
3.3	4-L4	Support development of affordable housing	960

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
3.3.1	4-L4	Provide affordable housing near transit	
3.3.2	4-L4	Implement the Housing Allocation Plan	
3.4	5-L6	Limit free parking in high traffic areas	12,030
3.4.1	5-L6	Price on street parking relative to congestion	
3.4.2	5-L6	Implement residential permit program	
3.4.3	5-L6	Evaluate the zoning code to reduce parking where appropriate	
3.5	5-L6	Unbundle price of parking from property costs	940
3.5.1	5-L6	Investigate mechanisms to unbundle parking from property cost	
3.5.2	5-L6	Implement policy to encourage unbundled parking	
3.6	5-L4, 5-L5	Provide traffic calming to encourage walking and biking	800
3.6.1	5-L4, 5-L5	Install calming features to improve ped/bike experience	
4	Goal 5, Goal 7	Increase safe, reliable alternatives to vehicle travel	
4.1	5-R7, 5-R8, 5-R10, 5-L4, 5-L5	Improve the bicycle and pedestrian network	1,880
4.1.1	5-R8, 5-R10, 5-L4	Implement the Bicycle and Pedestrian Master Plan	
4.1.2	5-L4	Update bicycle parking regulations	
4.1.3	5-L4	Provide bicycle safety training to residents and employees	
4.1.4	5-R8, 5-L4	Continue to support Safe Routes to School and transit programs	
4.1.5	5-R10, 5-L4	Implement a bike-share program	
4.2	5-R1, 5-R2, 5-R3, 5-R4, 5-R5, 5-R6, 5-R7	Improve transit to and within Santa Rosa	6,410
4.2.1	5-R1, 5-R7	Provide real time arrival and departure information	
4.2.2	5-R1	Provide safe spaces to wait for bus arrival	
4.2.3	5-R3	Support establishment of SMART rail service	
4.2.4	5-R3	Explore high frequency/rapid bus along major transit corridors	
4.2.5	7-R2	Replace bus fleet with GHG reducing vehicles	

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
4.2.6	5-R1, 5-R2	Evaluate system performance to maximize transit trips provided	
4.2.7	5-R1, 5-R2	Evaluate measures to increase transit ridership	
4.3	5-R1, 5-R2, 5-R3, 5-R4, 5-R5, 5-R6, 5-R7, 5-R9, 5-L1, 5-L2, 5-L3, 5-L6, 5-L7	Increase shared vehicle and transit trips	4,010
4.3.1	5-R9	Work to establish a car-sharing operation in Santa Rosa	
4.3.2	5-R4, 5-R5, 5-L1, 5-L2, 5-L7	Work with large employers to provide rideshare programs	
4.3.3	5-R4, 5-R5, 5-R6, 5-L2, 5-L3, 5-L7	Consider expanding employee programs promoting transit use	
4.3.4	5-R5, 5-L2, 5-L7,	Provide awards for employee use of alternative commute options	
4.3.5	5-R4, 5-R5	Encourage new employers of 50+ provide subsidized transit passes	
4.3.6	5-R6	Work with local school districts, SRJC to provide subsidized passes	
4.3.7	5-L6, 5-L7	Identify locations for additional park-and-ride lots	
4.4	5-L4	Consider Car-Free Sunday demonstration for use of streets	Supportive
4.4.1	5-L4	Designate some Sundays as car-free in different neighborhoods	
4.5	5-R5, 5-L1	Encourage remote work centers and telecommuting	830
4.5.1	5-R5, 5-L1	Promote workplace alternatives including telecommuting	
5	Goal 6, Goal 7, Goal 8	Increase use of alternatively fueled vehicles	
5.1	7-R1, 7-R2, 7-L1	Facilitate use of electric and hybrid vehicles	2,600
5.1.1	7-R1, 7-L1	Provide electric recharging stations in City facilities/lots	
5.1.2	7-R1, 7-L1	Require new parking lots to include electric vehicle recharging	
5.1.3	7-R1, 7-L1	Allow EV charging stations as permitted uses in larger parking lots	

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
5.1.4	7-R1, 7-L1	Provide priority parking for electric hybrid vehicles in city lots	
5.1.5	7-R1	Consider rebates for employee purchase of electric vehicles	
5.1.6	7-R1, 7-L1	Expand electric vehicle charging network	
5.2	7-R2, 7-L2, 7-L3	Support Low Carbon Fuel Standard & alternative fuels	52,480
5.2.1	6-S1	Require new fueling stations to provide alternative fuels	
5.2.2	6-S1	Offer guidance about diesel-to-biodiesel conversions	
5.2.3	6-S1, 7-R2	Develop tri-generation fuel cell for City/public vehicles	
5.2.4	6-S1	Develop alternative fueling stations in Santa Rosa	
5.2.5	6-S1	Increase participation in SRJC alternative fuel classes	
5.3	8-L1, 8-L2	Limit vehicle idling	2,140
5.3.1	8-L1	Work with law enforcement to enforce state idling rules	
5.3.2	8-L1	Shut off cars when waiting to pick up children at school	
5.3.3	8-L1	Consider amending zoning code to prohibit new drive-through facilities	
5.4	7-R1	Facilitate use of neighborhood electric vehicles (NEV)	2,630
5.4.1	7-R1	Identify streets appropriate for NEV	
5.4.2	7-R1	Create a NEV street network	
5.4.3	7-R1	Explore rebates for purchases of NEV	
5.4.4	7-R1	Develop a map and signage for NEV network	
6	Goal 9	Reduce solid waste sent to landfill from Santa Rosa	
6.1	9-R1, 9-L1	Increase recycling and composting of waste	64,370
6.1.1	9-R1	Increase waste accepted for curbside recycling	
6.1.2	9-R1	Work with Waste Management to encourage composting/recyclable containers	
6.1.3	9-L1	Increase diversion of construction waste	
6.2	9-R1	Reduce use of non-recyclable materials	Supportive
6.2.1	9-R1	Discourage use of Styrofoam and plastic bags	
6.2.2	9-R1	Reduce amounts of packaging used	
6.2.3	9-R1	Discourage bottled water at City events	

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
6.2.4	9-R1	Divert 75% of waste by 2020	
7	Goal 11, Goal 12, Goal 13, Goal 14	Improve water & wastewater efficiency	
7.1	11-R1, 11-L1, 11-L2, 11-L3, 12-L1	Conserve water	1,700
7.1.1	11-L2	Require reduction in potable water for new development	
7.1.2	11-L1, 11-L2, 11-L3	Expand water conservation efforts	
7.1.3	11-L1	Use water meters which track real-time water use	
7.1.4	N/A	Utilize smart water meters to save water and costs	
7.2	13-R1, 13-R2	Improve efficiency of water/wastewater facilities	2,050
7.2.1	2-R1, 12-R1	Provide recycled water to Geysers to generate clean energy	
7.2.2	14-L1	Install innovative renewable energy projects at treatment plant	
7.3	12-R1	Increase use of recycled water in Santa Rosa	
7.3.1	12-R1	Expand infrastructure network to deliver recycled water	
7.3.2	12-R1	Install dual plumbing in some new development	
8	Goal 18	Improve efficiency of agricultural operations/food consumption	
8.1	18-R1, 18-R2, 18-R3	Increase amount of food grown and consumed locally	Supportive
8.1.1	18-R3	Incentivize residential agriculture	
8.1.2	18-R3	Promote growing of fruits/vegetables in front yards	
8.1.3	18-R3	Establish community gardens and urban farms	
8.1.4	18-R3	Revise zoning code to allow small animals, chickens, bees	
8.1.5	18-R2	Promote Slow Food campaign for restaurants/wineries	
9	Goal 7, Goal 8, Goal 11	Reduce emissions from construction & lawn/garden activities	
9.1	7-L2	Encourage use of electric lawn and garden equipment	20
9.1.1	7-L2	Re-establish voluntary exchange of gas mowers/blowers	

Santa Rosa Measure Number	Similar to CA2020 Measure Number	Santa Rosa Measure Name	2020 GHG Reductions MTCO2e
9.1.2	7-L2	Encourage provision of outside outlets	
9.1.3	11-L2, 11-L3	Replace high water use landscapes	
9.2	8-L2	Reduce construction equipment emissions	360
9.2.1	8-L2	Minimize idling time to 5 minutes or less	
9.2.2	8-L2	Maintain construction equipment per manufacturer's specs	
9.2.3	8-L2	Limit GHG construction equipment emissions with measures	
Grand Total Emissions Reductions in Santa Rosa²			368,680

Notes:

- ¹. GHG reductions from CalGreen requirements are included in existing activities. For more information, see the Santa Rosa CAP.
- ². Does not include state measures reductions (161,760 MTCO2e), or existing measure reductions (27,640 MTCO2e)

Sebastopol

Commitments to meeting
community greenhouse
gas reduction goals.



5.7 Sebastopol

This section presents the community greenhouse gas (GHG) emissions profile specific to Sebastopol and the measures that the City of Sebastopol will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.7.1 Community Summary

Sebastopol has a unique and highly valued small-town character. Sebastopol is the hub of West Sonoma County. While the incorporated area is small, Sebastopol serves a much larger unincorporated area stretching to the Pacific Ocean and the Russian River. The City's "market area" comprises a population of approximately 30,000 to 50,000 people, who, to varying degrees, use Sebastopol as their "town" for goods, services, and recreational and cultural activities. Thus, the town has far more economic activity, traffic, and recreational and cultural services than would be apparent based simply on the incorporated population.

The City is surrounded by vineyards, orchards, rural residential, and wetlands, located minutes from the Sonoma Coast and the Russian River area, and just 52 miles north of San Francisco. Sebastopol is at the crossroads of two State Highways, Highways 116 and 12, and is just 8 miles from the county's largest city, Santa Rosa. Sebastopol has a typical Mediterranean climate, with summertime highs above 83 degrees and wintertime lows near 35 degrees.

Demographics

Sebastopol spans 1.9 square miles and has largely residential and commercial land uses. The City had a population of 7,379 as of the 2010 census. In 2020 the population of Sebastopol is expected to be 7,613, an increase of 3% over 2010. Employment in the area is expected to increase by 20%. Sebastopol's demographic composition in 2010 was 88% White, 1% African American, 0.8% Native American, 1.6% Asian, 0.3% Pacific Islander, 4% from other races, and 4% from two or more races. Persons of Hispanic or Latino origin were 12%.

As shown in Table 5.7-1, the City is expected to experience modest but steady growth in population, housing, and jobs in the future.

Table 5.7-1. Sebastopol Socioeconomic Data

	Actual		Projected			
	1990	2010	2015	2020	2040	2050
Population	7,004	7,379	7,497	7,613	8,188	8,608
Housing (# of Houses)	2,842	3,345	3,431	3,521	3,803	3,994
Employment	4,301	5,102	5,507	6,147	6,668	6,827
Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the City based on its internal planning forecasts.						

According to the 2010 Census data, Sebastopol is majority owner-occupied with 53% of all houses owner-occupied and 47% renter-occupied.

Energy and Water Use

Compared to households in the county as a whole, Sebastopol households use less electricity and water but more natural gas. They also use less electricity, natural gas, and water than households statewide.

Table 5.7-2. Sebastopol, County, and State 2010 Average Energy and Water Use (per household, per year)

	Sebastopol	County	State
Electricity (kWh)	5,606	7,042	9,320
Natural Gas (Therms)	468	413	512
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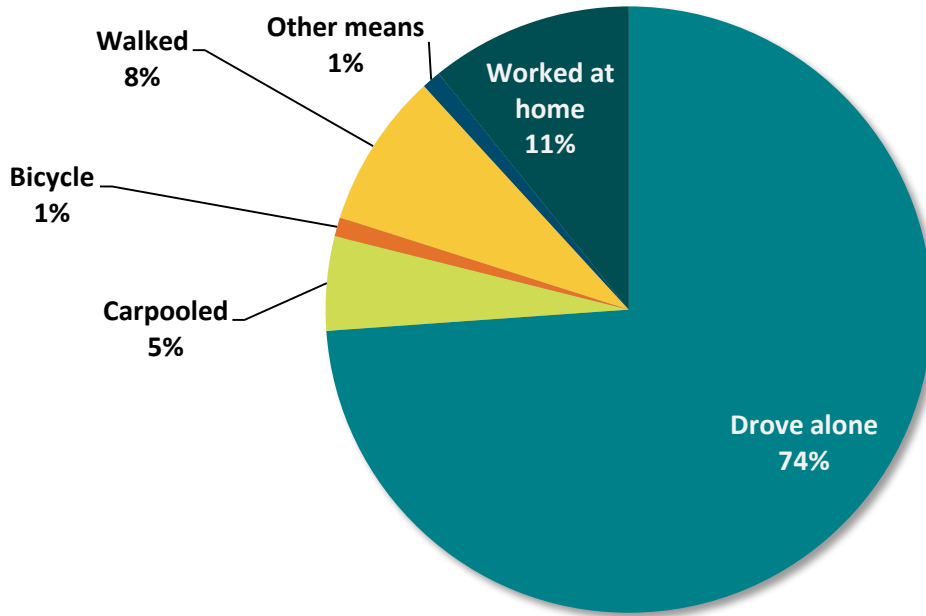
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, most Sebastopol residents (74%) drove to work alone, with about 5% carpooling. It takes a Sebastopol resident on average 24 minutes to get to work (U.S. Census Bureau 2014).

Figure 5.7-1. Modes to Work in Sebastopol in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.7.2 Sebastopol's Existing Actions to Reduce GHG Emissions

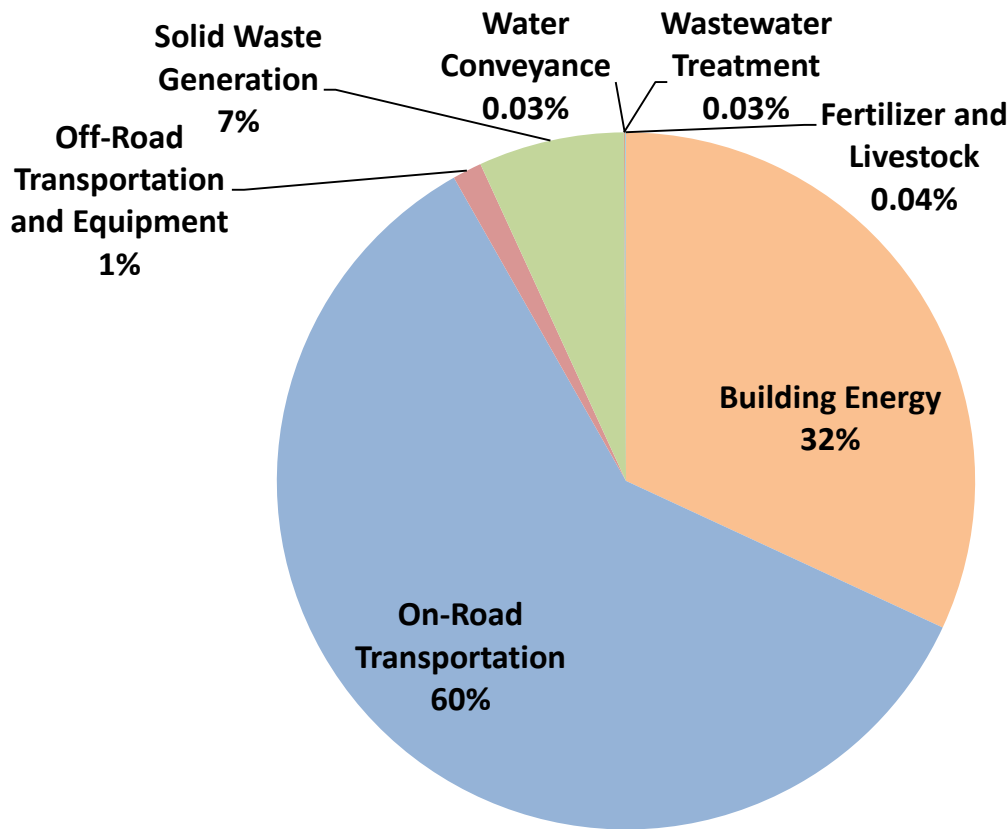
Sebastopol has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have been helping to reduce GHG emissions. The City has adopted the following ordinances and General Plan policies that help to reduce GHG emissions and will support the implementation of the formal GHG reduction measures in this CAP.

- Building Energy
 - Residential Retrofits: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Residential Appliance Upgrades: Programs through PG&E and other agencies.
 - Solar Installations at Residences: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Solar Sonoma County program (Resolution No. 5696).
 - LED Light Bulbs program (Resolution No. 5816).
 - Green Building Ordinance: Adoption of Tier 1 Voluntary measures for residential and non-residential structures adopted as mandatory requirements (Municipal Code Chapter 15.04.140).
- Land Use and Transportation
 - Bicycle and Pedestrian Master Plan.

- Urban Growth Boundary: General Plan Policy – Chapter 1: Goal 2: P.9.
- Measure O: Urban Growth Boundary Initiative.
- Zero Emission Dedicated Electric Vehicles Program (Resolution No. 5729).
- Plug-In Electric Vehicles or Hybrids – Plug In Partners (Resolution 5674).
- Promote measures to reduce travel demand: General Plan Policy – Chapter 2: Goal 10: P.27 Continue to implement the Trip Reduction Ordinance.
- Encourage transit use: General Plan Policy – Chapter 2: Goal 6: P.19 Continue to support and expand the Sebastopol Transit Service.
- Reduce regional traffic growth: General Plan Policy – Chapter 2: Goal 1: P.2 Coordinate with the Sonoma County Congestion Management Plan.
- Support regional alternatives to single-occupant vehicle: General Plan Policy – Chapter 2: Goal 1: P.3 Support policies and programs which increase the use of transit, carpools, bicycles, etc.
- Water and Wastewater Efficiency
 - Grey Water: two multifamily developments have installed systems.
 - Water and Sewerage System Conservation Requirements: Municipal Code Chapter 13.04.
 - Urban Runoff Reduction Requirements: Municipal Code Chapter 15.77.
 - Water Fixture Retrofits Water Conservation Rebate Program: Resolution No. 5621 Resolution to amend incentives for water conservation.
 - Water and Energy Conservation Requirements: Municipal Code Chapter 15.74.
 - Water Efficient Landscaping Requirements: Municipal Code Chapter 15.36.
- Urban Forestry and Natural Areas
 - Open Space Conservation Tree Planting: planted thousands of trees in Laguna de Santa Rosa Wetlands Preserve.
 - Street Tree Program.
 - Adopt a Landscape Program.
 - Tree Protection Ordinance: Municipal Code Chapter 8.12.
- Waste Minimization and Recycling
 - Food Waste: Sebastopol residents may put all vegetative food waste in their yard debris.

5.7.3 Greenhouse Gas Inventory and Forecast

Figure 5.7-2. Sebastopol 2010 Community GHG Inventory by Source



Sebastopol's inventory is similar to other cities in the county and state. The majority of the emissions are from on-road transportation due to fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes, and business in Sebastopol. Residential uses account for most (52%) of the building energy emissions in Sebastopol. Commercial uses account for 48% of building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In Sebastopol, total GHG emissions generated by community activities in 2010 were 76,330 MTCO₂e, which is approximately 2% of countywide GHG emissions in the same year. This is a 4% increase from estimated 1990 emissions, which were 73,230 MTCO₂e. Table 5.7-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the City of Sebastopol.

Table 5.7-3. Sebastopol Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	21,840	30%	24,370	32%	26,980	32%	28,930	31%	31,320	32%	32,450	33%
On-road Transportation	42,030	57%	45,730	60%	51,540	60%	56,550	61%	55,800	58%	54,990	57%
Off-road Transportation and Equipment	970	1%	1,040	1%	1,260	1%	1,570	2%	2,930	3%	3,020	3%
Solid Waste	8,010	11%	5,150	7%	5,450	6%	5,900	6%	6,380	7%	6,590	7%
Wastewater Treatment	20	0%	20	0.0%	20	0%	20	0%	20	0%	20	0%
Water Conveyance	370	1%	30	0.0%	30	0%	30	0%	30	0%	30	0%
Total	73,230	100%	76,330	100%	85,280	100%	92,990	100%	96,480	100%	97,100	100%
Per-Capita Emissions	10.5		10.3		11.4		12.2		11.8		11.3	

5.7.4 Greenhouse Gas Reduction Goal and Measures

The City of Sebastopol joins other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 27 local GHG reduction measures. The City's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local reduction measures) would be approximately 92,990 MTCO₂e. The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 63,430 MTCO₂e, which would be a reduction of approximately 32% compared to 2020 BAU conditions. The City will achieve these reductions through reduction measures that are technologically feasible and cost-effective per AB 32 through a combination of state (64%), regional (26%), and local (10%) efforts. With the reduction measures in CA2020, per-capita emissions in Sebastopol will be 8.3 MTCO₂e per person, a 20% reduction in per capita emissions compared to 1990.

Table 5.7-4. Sebastopol 2020 GHG BAU Emissions, Reductions, and CAP Emissions

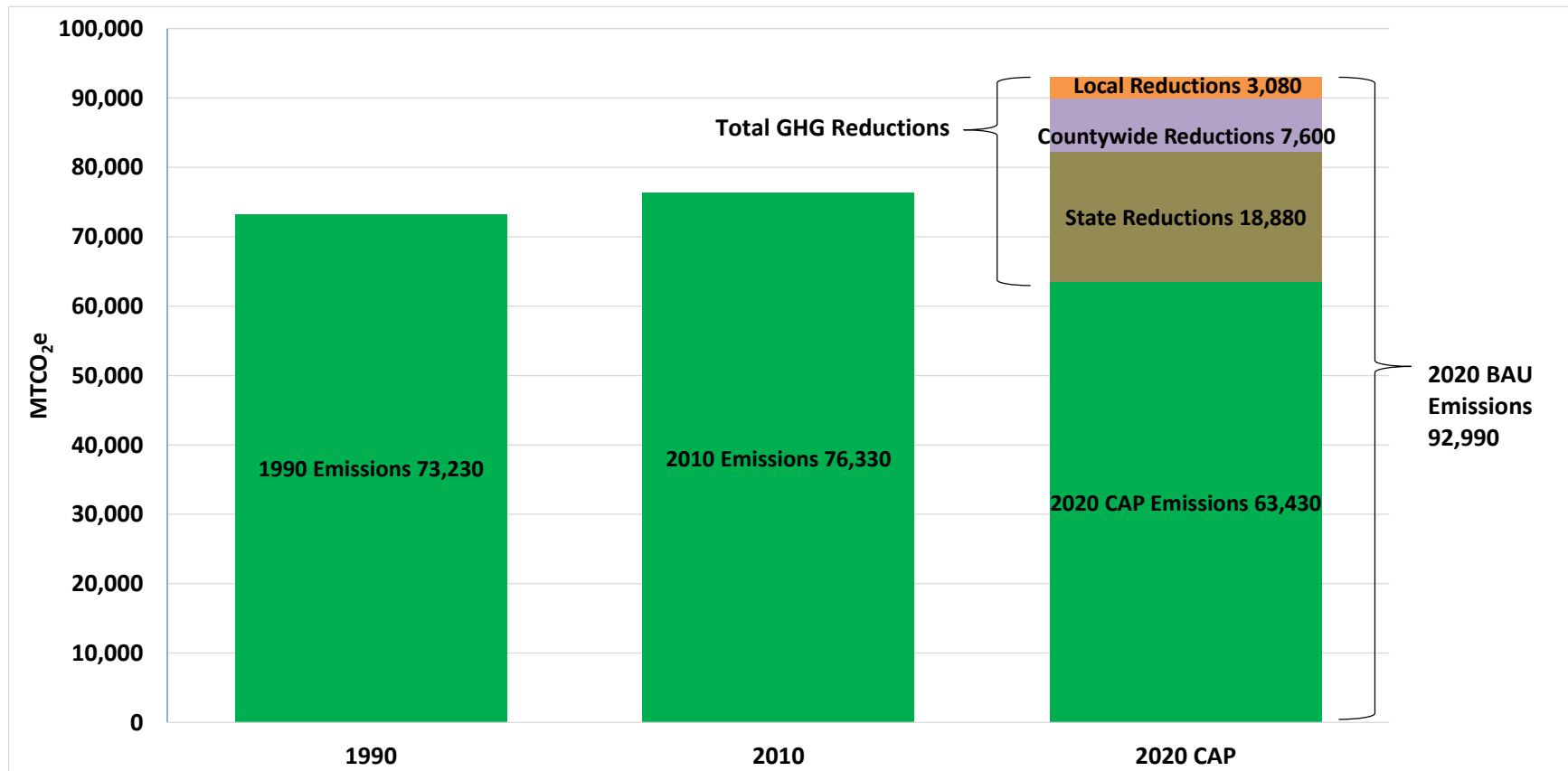
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction From BAU
		State	County-wide	Local	Total		
Building Energy	28,930	6,780	1,770	1,780	10,320	18,600	36%
On-Road Transportation	56,550	11,970	1,360	720	14,050	42,500	25%
Off-Road Transportation and Equipment	1,570	140	-	50	190	1,390	12%
Solid Waste	5,900	-	4,450	-	4,450	1,450	75%
Water Conveyance	30	-	10	530	540	⁻¹	100%
Wastewater Treatment	20	-	10	-	10	10	69%
Total Emissions	92,990	18,880	7,600	3,080	29,560	63,430	32%
		64%	26%	10%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.7-3 shows Sebastopol's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Sebastopol benefits greatly from the work the state and regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.7-3. Sebastopol 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

As shown in Table 5.7-5, the City of Sebastopol will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g., Title 24 energy efficiency measures). State measure reductions total 18,880 MTCO₂e, which include the Pavley vehicle

Sustainable Sebastopol

Sebastopol has committed to a diverse range of programs and policies that reduce the emissions of GHGs. The City maintains a list of the programs, policies, and resolutions that it has adopted, and tips for members of the community to take on the City website. One of these resolutions, adopted in 2002, establishes the City's official support for the use of alternatively fueled vehicles for the City's municipal fleet.

fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS, which will reduce GHG emissions from Sebastopol's on-road and off-road transportation and building energy use in 2020.

Regional measures will reduce emissions by 7,600 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 3,080 MTCO₂e will be achieved through measures the City of Sebastopol has chosen. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community. The City intends to review the suite of measures with an eye towards expedited implementation of selected measures to achieve timely emission reductions.

The three measures that will have the greatest impact in Sebastopol are, in order of importance, Measure 2-L4 (Solar in Existing Non-Residential Buildings), Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009), and Measure 5-L2 (Carpool-Incentives & Ride-Sharing Program). These three measures, in addition to reducing GHG emissions, will save energy, improve air quality and public health in the City, and conserve water and other natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact are the Community Choice Aggregation (CCA) measure, the waste-to-energy measure, and the waste diversion measure.

Table 5.7-5 presents the individual GHG reduction measures that Sebastopol has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

Table 5.7-5. Sebastopol 2020 GHG Emissions Reductions by Measure

State and Regional Measures	2020 GHG Reductions	Participation Rate
Goal 1: Increase Building Energy Efficiency	1,538	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	531	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	603	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	69	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	335	N/A
Goal 2: Increase Renewable Energy Use	7,007	
Measure 2-S1: Renewables Portfolio Standard	5,619	N/A
Measure 2-S2: Solar Water Heaters	23	N/A
Measure 2-R1: Community Choice Aggregation	1,364	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	977	
Measure 5-R1: Improve and Increase Transit Service	13	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	195	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	181	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	144	N/A
Measure 5-R8: Safe Routes to School	444	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A

State and Regional Measures	2020 GHG Reductions	Participation Rate	
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	11,969		
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	11,074	N/A	
Measure 6-S2: Advanced Clean Cars	298	N/A	
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	597	N/A	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	526		
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	139	N/A	
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	386	N/A	
Goal 9: Increase Solid Waste Diversion	1,722		
Measure 9-R1: Waste Diversion Goal	1,722	N/A	
Goal 10: Increase Capture and Use of Methane from Landfills	2,725		
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	2,725	N/A	
Goal 11: Reduce Water Consumption			
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A	
Goal 12: Increase Recycled Water and Greywater Use	< 1		
Measure 12-R1: Recycled Water*	< 1	N/A	
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	21		
Measure 13-R1: Infrastructure and Water Supply Improvement	7	N/A	
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	14	N/A	
Local Measures			
Goal 1: Increase Building Energy Efficiency	33		
Measure 1-L2: Outdoor Lighting	29	25%	of outdoor lighting to participate

State and Regional Measures	2020 GHG Reductions	Participation Rate	
Measure 1-L3: Shade Tree Planting	4	400	trees planted
Goal 2: Increase Renewable Energy Use	1,712		
Measure 2-L1: Solar in New Residential Development	26	100%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	248	15%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	221	75%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	1,217	25%	of existing non-residential development with solar
Goal 3: Switch Equipment from Fossil Fuel to Electricity	32		
Measure 3-L1: Convert to Electric Water Heating	32	10%	of households
Goal 4: Reduce Travel Demand Through Focused Growth	245		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	208	60%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	24	15%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	13	20%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	471		
Measure 5-L1: Local Transportation Demand Management Program	144	38%	of employees eligible
Measure 5-L2: Carpool-Incentives & Ride-Sharing Program	282	78%	of employees eligible
Measure 5-L3: Guaranteed Ride Home	NQ	Yes	
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	45	100%	of trips affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	

State and Regional Measures	2020 GHG Reductions	Participation Rate	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	42		
Measure 7-L1: Electric Vehicle Charging Station Program	3	5	charging stations installed
Measure 7-L2: Electrify Construction Equipment	38	10%	of equipment
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	
Goal 8: Reduce Idling	9		
Measure 8-L1: Idling Ordinance	NQ	2	minutes below state law
Measure 8-L2: Idling Ordinance for Construction Equipment	9	2	minutes below state law
Goal 9: Increase Solid Waste Diversion	< 1		
Measure 9-L1: Create Construction and Demolition Reuse and Recycling Ordinance	< 1	3%	beyond baseline
Goal 11: Reduce Water Consumption	532		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	418	20%	Reduction in per capita water use
Measure 11-L2: Water Conservation for New Construction*	4	100%/50%	% of new residential/nonresidential development
Measure 11-L3: Water Conservation for Existing Buildings*	110	25%/50%	% of new residential/nonresidential development
Goal 12: Increase Recycled Water and Greywater Use	3		
Measure 12-L1: Greywater Use	3.23	25%	greywater goal
State Measure Reductions in Sebastopol	18,880		
Regional Measure Reductions in Sebastopol	7,600		
Local Measure Reductions in Sebastopol	3,080		
Grand Total Emissions Reductions in Sebastopol	29,560		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.7.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Sebastopol has recognized the need to reduce GHG emissions from municipal operations. The City has existing programs in place for green municipal buildings and alternative fuels for its municipal fleet. Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Sebastopol and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Sonoma

Commitments to meeting
community greenhouse
gas reduction goals.



5.8 Sonoma

This section presents the community greenhouse gas (GHG) emissions profile specific to Sonoma and the measures that the City of Sonoma will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.8.1 Community Summary

The City of Sonoma is home to three of the first ten California Historical Landmarks, along with a number of other historic sites. Located in the heart of one of the world's premier wine producing regions, Sonoma is a working town with a rich cultural heritage. The adjacent scenic hills and agricultural valley provide a setting of unparalleled natural beauty. The San Francisco de Solano mission and other historic buildings that surround the central Plaza complement the area's viticultural prominence and visual beauty to make Sonoma a distinctive and successful tourism destination. The City serves as the economic hub for the rural Sonoma Valley, which has a population of about 39,000. Sonoma has typical Mediterranean weather with hot, dry summers and cool, wet winters. The City is located in the southeast portion of the county, west of Napa and east of Petaluma.

Demographics

Sonoma spans 2.7 square miles and has largely residential, commercial, and agricultural land uses. The City had a population of 10,678 as of the 2010 census. In 2020 the population of Sonoma is expected to be 11,165, an increase of 5% over 2010. Employment in the area is expected to increase by 21%. Sonoma's demographic composition in 2010 was 87% White, 0.5% African American, 0.5% Native American, 3% Asian, 0.2% Pacific Islander, 7% from other races, and 2.5% from two or more races. Persons of Hispanic or Latino origin were 15%.

As shown in Table 5.8-1, the City is expected to experience relatively slow growth in population, housing, and jobs in the future.

Table 5.8-1. Sonoma Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	8,121	10,648	11,009	11,165	11,692	11,964
Housing	3,866	5,060	5,123	5,196	5,441	5,568
Employment	4,937	5,746	6,350	6,954	7,978	8,178

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the City based on its internal planning forecasts.

According to the 2010 Census, City of Sonoma housing is majority owner-occupied with 59% of housing units owner-occupied and 41% rented.

Energy and Water Use

Compared to households in the county as a whole, Sonoma households use less electricity but more natural gas and water. They also use less electricity, natural gas, and water than households statewide.

Table 5.8-2. Sonoma, County, and State 2010 Average Energy and Water Use (per household, per year)

	Sonoma	County	State
Electricity (kWh)	5,997	7,042	9,320
Natural Gas (Therms)	483	413	512
Water Use (Gallons)	84,136	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the City of Sonoma Urban Water Management Plan.

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

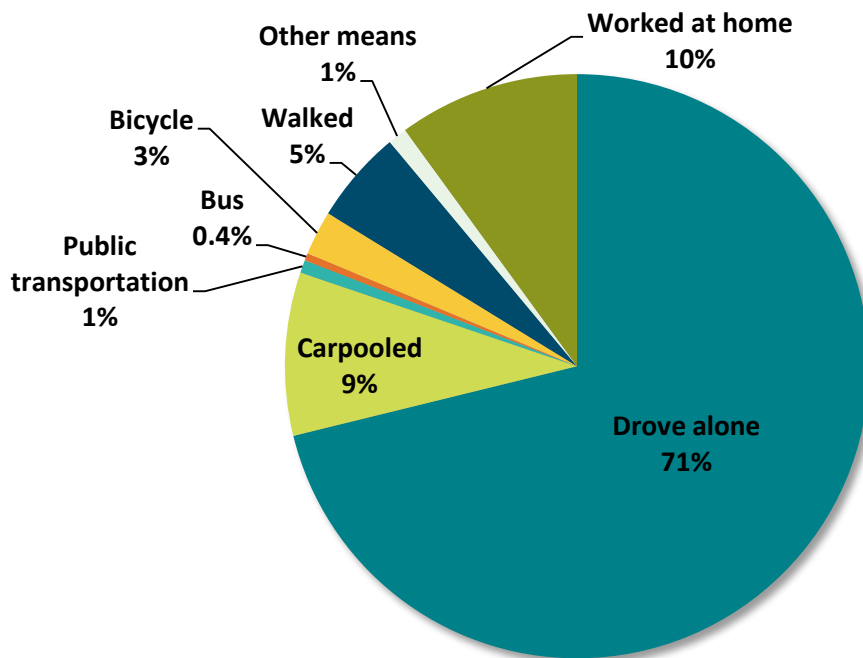
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, most Sonoma residents (71%) drove alone to work, and about 9% carpooled. For many residents of Sonoma, alternative transportation options are not available for their commute trip. With the average trip to work for residents of Sonoma taking 25.5 minutes, and limited bus service, riding a bus is not a viable option for many City residents (U.S. Census Bureau 2014).

Figure 5.8-1. Modes to Work in Sonoma in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.8.2 Sonoma's Existing Actions to Reduce GHG Emissions

Sonoma has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have been helping to reduce GHG emissions. Sonoma has adopted the following ordinances and General Plan policies that would also help to reduce GHG emissions and will support the implementation of the formal GHG reduction measures in this CAP.

- Building Energy
 - Residential Retrofits: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Residential Appliance Upgrades: Programs through PG&E and other agencies.
 - Solar Installations at Residences: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Solar Installations at businesses.
 - Standardized Permit Submittal for Residential PV Systems: In an effort to promote a consistent methodology of processing permits by all jurisdictions within the Redwood Empire Chapter of Code Officials, this standardized permit submittal has been developed for residential roof-mounted PV electrical systems of up to 5 kilowatts (kW).
 - Sonoma County Energy Independence Program (SCEIP): Enables residential and commercial property owners to access PACE financing for permanently installed energy or

water improvements to their property. Under Energy Upgrade California, rebates are available for homeowners interested in doing energy retrofit improvements.

- Sustainability Program – General Plan Implementation Measure: Chapter 3 – Measure 3.2.1 General Plan Goal: ER-3: Conserve natural resources to ensure their long-term sustainability. CAL Green Building Standards Code: Municipal Code Chapter 14.10.050. City adopts Tier 1 as mandatory for all new residential and non-residential buildings.
- General Plan Policy 6.2: Implement Sonoma’s Green Building Ordinance to ensure new development is energy and water efficient, and consider establishing additional incentives to achieve energy and water conservation efficiencies higher than those required by the Ordinance. Revise and/or revisit the ordinance as necessary to reflect the introduction of a State-wide green building code.
- General Plan Policy 6.4: Promote the use of alternative energy sources such as solar energy, cogeneration, and non-fossil fuels.
- The City offers a Business Improvement Matching Funds Loan Program for improvements to commercial buildings, including lighting retrofits, insulation and weatherization, energy management systems, HVAC system upgrades, water heating systems, irrigation efficiency systems, rainwater harvesting systems, low-flow toilets, and similar types of improvements to the building or property that have been identified through a qualified energy and/or water efficiency survey.
- Land Use and Transportation
 - Bicycle and Pedestrian Master Plan.
 - Mixed Use Development – General Plan Policy: Chapter 4 – Policy 3.2 General Plan Goal CE-3: Minimize vehicle trips while ensuring safe and convenient access to activity centers and maintaining Sonoma’s small-town character.
 - General Plan Policy 3.2: Encourage a mixture of uses and higher densities where appropriate to improve the viability of transit and pedestrian and bicycle travel.
 - Increased Transit Service – General Plan Policy 3.3. Promote transit use and improve transit services.
 - General Plan Goal 6.0: Promote environmental sustainability through support of existing and new development which minimizes reliance on natural resources.
 - General Plan Policy 6.1: Preserve open space, watersheds, environmental habitats and agricultural lands, while accommodating new growth in compact forms that de-emphasizes the automobile.
 - General Plan Policy 6.5: Incorporate transportation alternatives such as walking, bicycling and, where possible, transit into the design of new development.
 - Idling Ordinance: Municipal Code 9.56.080 other limitations. A. Limitations on the Idling of Commercial Vehicles. When parked within 100 feet of a residential zoning district, a driver

of a commercial vehicle shall not cause or allow an engine to idle for more than five consecutive minutes, except as necessary for the loading or unloading of cargo within a period not to exceed 30 minutes.

- General Plan Goal CE-2: Establish Sonoma as a place where bicycling is safe and convenient.
 - General Plan Policy 2.1: Promote bicycling as efficient alternative to driving.
 - General Plan Policy 2.2: Extend the bike path system, with a focus on establishing safe routes to popular destinations.
 - General Plan Policy 2.3: Expand availability of sheltered bicycle parking.
 - General Plan Policy 2.5: Incorporate bicycle facilities and amenities in new development.
- General Plan Goal CE-3: Minimize vehicle trips while ensuring safe and convenient access to activity centers and maintaining Sonoma's small-town character.
 - General Plan Policy 3.2: Encourage a mixture of uses and higher densities where appropriate to improve the viability of transit and pedestrian and bicycle travel.
 - General Plan Policy 3.3: Promote transit use and improve transit services.
 - General Plan Policy 3.4: Encourage shared and "park once" parking arrangements that reduce vehicle use.
- General Plan Goal CD-4: Encourage quality, variety, and innovation in new development.
 - General Plan Policy 4.4: Require pedestrian and bicycle access and amenities in all development.
- Waste Minimization and Recycling
 - Increase Waste Diversion in Municipal Facilities: Recycling is required in all City offices.
 - Compost Your Veggies Program: All vegetative food waste can be added to yard debris bins.
 - Commercial Composting Program. Collects waste from local restaurants and kitchens and converts to high organic soil from local gardens, farms, and vineyards
 - Pharmaceutical Drop-off Program: In partnership with the Sonoma County Water Agency, the City and local pharmacies have instituted a program in which residents may return unused pharmaceutical products as a means of diverting them from the sanitation system.
 - Waste Reduction Goal: General Plan Goal ER-3: Conserve natural resources to ensure their long-term sustainability.
 - General Plan Policy 3.1: Increase the conservation-effectiveness and cost-effectiveness of the solid waste source reduction program through expanded recycling and composting.

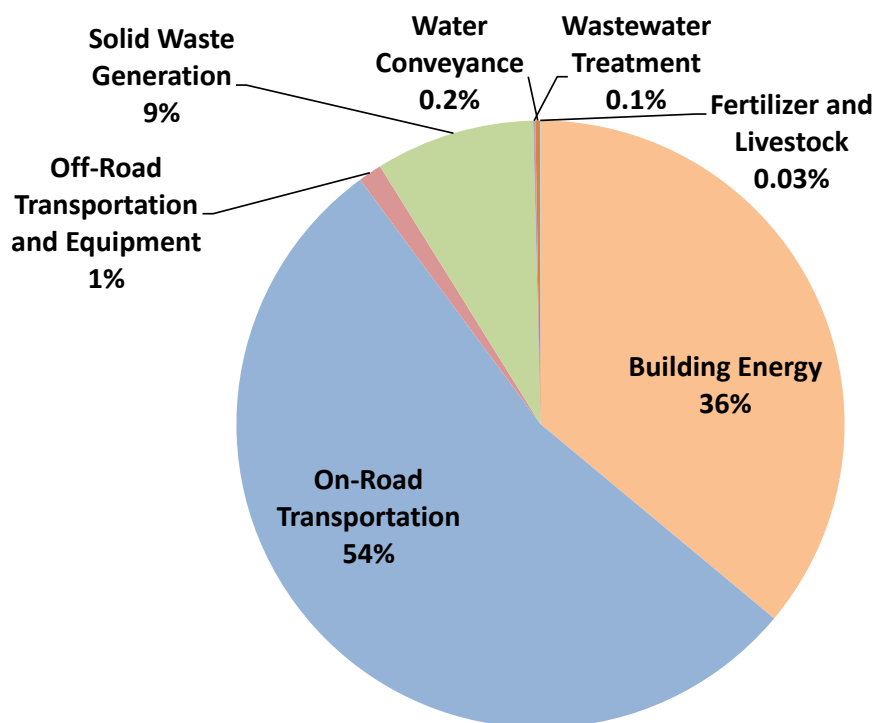
- Polystyrene Food Packaging: Municipal Code Chapter 7.30. The purpose of this chapter is to decrease the use and presence of polystyrene products in order to promote the public health, reduce solid waste disposal and litter, protect air quality and the ozone layer, protect wildlife, livestock and the environment. The City council supports a ban on all uses of polystyrene not deemed absolutely critical.
- Green Purchasing Policy: Municipal Code Chapter 3.04.060: In an effort to comply with the State of California Public Contract Code, the City recognizes the state guidelines referencing purchase of recycled products.
- General Plan Goal ER-3: Conserve natural resources to ensure their long-term sustainability.
- Water and Wastewater Efficiency
 - General Plan Policy 6.3: Promote the use of sustainable construction techniques and environmentally sensitive design for all housing, to include best practices in water conservation. Low-impact drainage, and greenhouse gas reduction.
 - General Plan Implementation Measure 3.2.2: Continue to implement the Xeriscape Ordinance and update it as necessary to achieve water conservation objections.
 - Water Conservation Strategy – General Plan Implementation Measure: Chapter 3 – Measure 2.4.1, General Plan Goal ER-2: Identify, preserve, and enhance important habitat areas and significant environmental resources. Prepare and implement a comprehensive strategy for water conservation and the protection of water quality, including quantified objectives, with the goal of producing a Water Element for the General Plan.
 - General Plan Policy 2.4: Protect Sonoma Valley watershed resources, including surface and ground water supplies and quality.
 - General Plan Policy 6.6: Ensure sufficient water resources to serve existing and future residents provided for under Sonoma’s 2020 General Plan: 1) take proactive steps to improve water conservation; 2) upgrade water supply infrastructure; 3) increase the local supply of water through new wells; 4) protect the quality and sustainability of groundwater resources; 5) investigate alternative water supply options.
 - Prior to the issuance of any building permit for new development, a water demand analysis, accompanied by a water conservation plan that targets CALGreen water standards, shall be submitted by the applicant and shall be subject to the review and approval of the City Engineer.
 - Water-Efficient Landscaping: Municipal Code Chapter 14.32: “This policy protects local water supplies through the implementation of a whole system approach to design, construction, installation and maintenance of the landscape resulting in water-conserving climate-appropriate landscapes, improved water quality and the minimization of natural resource inputs.

- Water Shortage and Conservation Plan: Municipal Code Chapter 13.10: Regulations that enforce the conservation of water for the greatest public benefit with particular regard to public health, fire protection, and domestic use; to conserve water by reducing waste; and to achieve water use reductions in response to water shortages that occur from time to time. Includes voluntary measures and, when applicable by county council, mandatory measures.
- Urban Water Management Plan: Resolution adopting the City of Sonoma 2010 Urban Water Management Plan.
- The City has issued one building permit for a greywater system and one commercial development (Sonoma Valley Oaks) installed a greywater system.
- Sustainability Workshops: The Sonoma Community Center has offered a number of sustainability workshops related to greywater, rainwater harvesting, recycling, gardening with native plants, and water conservation.
- The City’s Business Improvement Matching Funds Loan Program described above under “Building Energy” also supports water efficiency improvements on existing commercial buildings.
- Agriculture, Urban Forestry, and Natural Areas
 - General Plan Goal CD-1: Contain urban land uses within a compact area that preserves surrounding open space and agricultural resources.
 - General Plan Policy 1.4: Coordinate planning efforts with the County to protect adjacent agricultural land and open space.
 - General Plan Goal ER-1: Acquire and protect important open space in and around Sonoma.
 - General Plan Policy 1.3: Support community programs that preserve and promote agriculture.
 - Urban Growth Boundary: An Urban Growth Boundary (UGB) is established at the location shown on this General Plan’s Land Use Plan map. The UGB is a line beyond which urban development will not be allowed, except for public parks, public schools, and uses consistent with the General Plan “Agriculture” land use designation as of February 25, 2000.
 - Tree Ordinance: Municipal Code Chapter 12.08: Regulations prohibiting unnecessary damage, removal, or destruction of trees.
 - Resource Conservation Strategy – General Plan Implementation Measure General Plan Goal ER-2: Conserve natural resources to ensure their long-term sustainability. General Plan Implementation Measure 3.3.1 Develop a sustainable resource conservation strategy for City facilities, services, and projects with quantifiable standards that serves as a model of green building and operation for the community.

- Natural Resource Conservation – General Plan Policy: Chapter 3 – Policy 3.2 General Plan Goal ER-3: Conserve natural resources to ensure their long-term sustainability. General Plan Policy 3.2: Encourage construction, building maintenance, landscaping, and transportation practices that promote energy and water conservation and reduce greenhouse gas emissions.
- General Plan Goal 6.0: Promote environmental sustainability through support of existing and new development which minimizes reliance on natural resources.
- General Plan Policy 3.2: Encourage construction, building maintenance, landscaping, and transportation practices that promote energy and water conservation and reduce greenhouse gas emissions.
- General Plan Implementation Measure 3.2.1: Implement a sustainability program that includes quantified objectives, standards and incentives for green construction and assistance to local businesses and agricultural operations to institute green practices for construction and land, energy, and water conservation.

5.8.3 Greenhouse Gas Inventory and Forecast

Figure 5.8-2. Sonoma 2010 Community GHG Inventory by Source



Sonoma's inventory is similar to other cities in the county and state. The majority of the GHG emissions are from transportation due to fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes and businesses in Sonoma. Residential uses account for most (53%) of the

building energy emissions in Sonoma. Commercial uses account for 47% of building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In Sonoma, total GHG emissions generated by community activities in 2010 were 103,370 MTCO₂e, which is approximately 3% of countywide GHG emissions in the same year. This is a 7% increase from estimated 1990 emissions, which were 96,890 MTCO₂e. Table 5.8-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the City of Sonoma.

Table 5.8-3. Sonoma Community GHG Backcast, Inventory, Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	31,750	33%	37,280	36%	41,350	35%	43,620	36%	47,960	36%	49,120	37%
On-road Transportation	50,850	52%	55,670	54%	64,500	55%	65,950	54%	68,870	52%	66,090	50%
Off-road Transportation and Equipment	1,120	1%	1,300	1%	1,600	1%	1,950	2%	3,720	3%	3,810	3%
Solid Waste	10,110	10%	8,750	8%	9,490	8%	10,180	8%	11,410	9%	11,690	9%
Wastewater Treatment	90	0%	120	0.1%	120	0%	120	0%	130	0%	130	0%
Water Conveyance	2,970	3%	250	0.2%	330	0%	340	0%	380	0%	390	0%
Total	96,890	100%	103,370	100%	117,390	100%	122,170	100%	132,470	100%	131,240	100%
Per-Capita Emissions	11.9		9.7		10.7		10.9		11.3		11.0	

5.8.4 Greenhouse Gas Reduction Goal and Measures

The City of Sonoma joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 20 local GHG reduction measures. The City's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local reduction measures) would be approximately 122,170 MTCO₂e. The City's local GHG reduction measures, in combination with state and regional measures, would reduce the City's GHG emissions in 2020 to 85,700 MTCO₂e, which would be a reduction of approximately 30% compared to 2020 BAU conditions. The City will achieve these reductions through reduction measures that are technologically feasible and cost-effective per AB 32 through a combination of state (63%), regional (33%), and local (4%) efforts. Per-capita reductions in Sonoma in 2020 would be 3.3 MTCO₂e per person. With the reduction measures in CA2020, per-capita emissions in Sonoma will be 7.7 MTCO₂e per person, a 36% reduction in per capita emissions compared to 1990.

Table 5.8-4. Sonoma 2020 GHG BAU Emissions, Reductions, and CAP Emissions

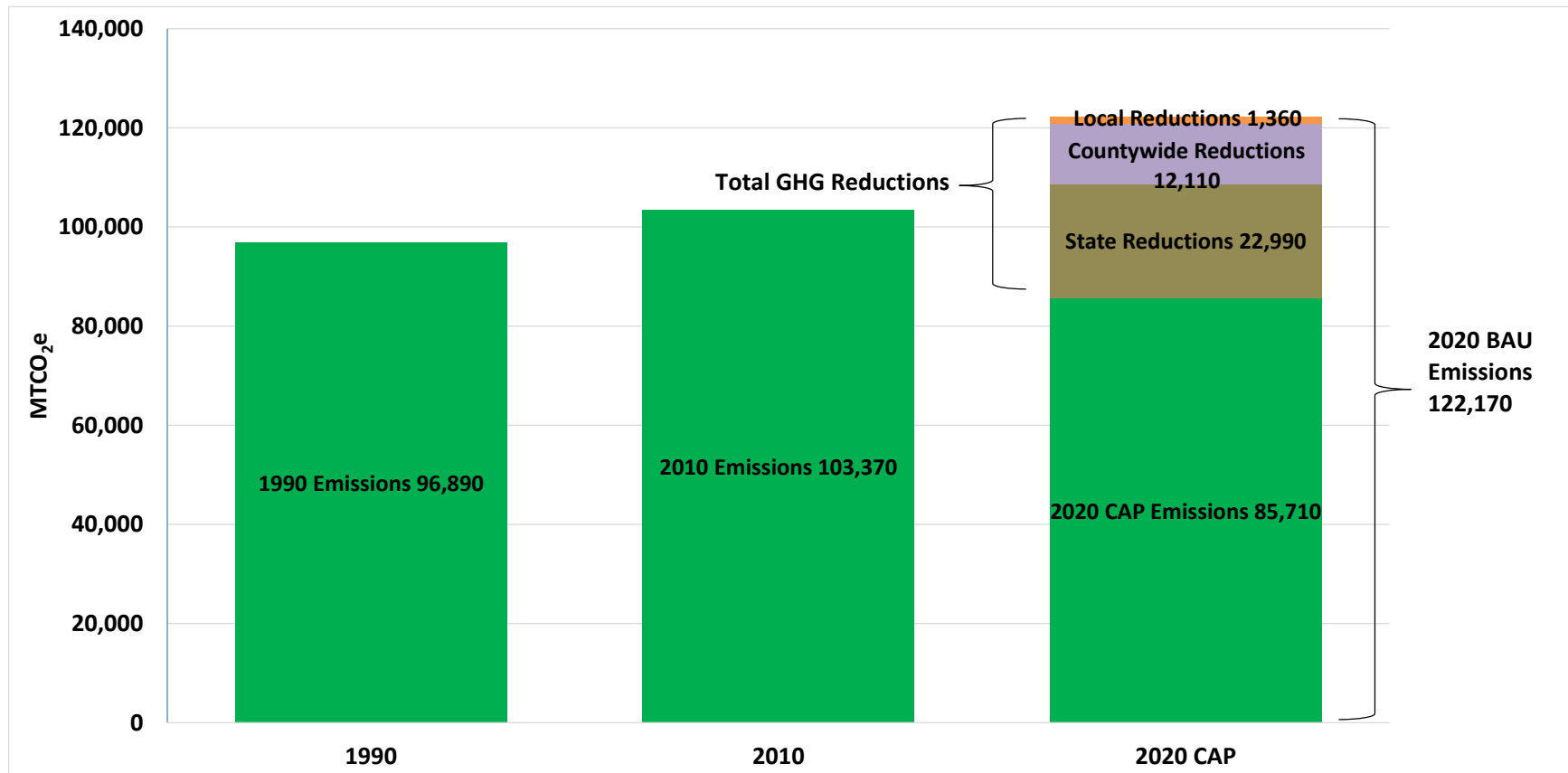
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction From BAU
		State	County- wide	Local	Total		
Building Energy	43,620	9,670	2,950	570	13,190	30,440	30%
On-Road Transportation	65,950	13,140	1,640	50	14,820	51,120	22%
Off-Road Transportation and Equipment	1,950	170	-	20	190	1,760	10%
Solid Waste	10,180	-	7,200	-	7,200	2,980	71%
Water Conveyance	340	-	310	730	1,040	- ¹	100%
Wastewater Treatment	120	-	10	-	10	110	11%
Total Emissions	122,170	22,990	12,110	1,360	36,460	85,700	30%
		63%	33%	4%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.8-3 shows Sonoma's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the City's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Sonoma benefits greatly from the work the state and regional entities are committed to implementing on climate action. See Chapter 4 for more information on state and regional actions.

Figure 5.8-3. Sonoma 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

As shown in Table 5.8-5, the City of Sonoma will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the City to comply with state mandates (e.g. Title 24 energy efficiency measures). State measure reductions total 22,990 MTCO₂e, which include the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS, which will reduce GHG emissions from Sonoma's on-road and off-road transportation, and building energy use in 2020.

Regional measures will reduce emissions by 12,110 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 1,360 MTCO₂e will be achieved through local measures. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Sonoma are, in order of importance, Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009), and Measure 11-L3 (Water Conservation for Existing Buildings), Measure 2-L2 (Solar in Existing Residential Buildings). These three measures, in addition to reducing GHG emissions, will save energy, improve air quality and public health in the region, and conserve water and other natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the City. Of the regional measures, the measures with the greatest impact are the Community Choice Aggregation (CCA) measure, the waste-to-energy measure, and the waste diversion measure.

Table 5.8-5 presents the individual GHG reduction measures that Sonoma has selected for the CAP.

City of Sonoma Electric Municipal Vehicle Fleet

Along with the other communities in the county, the City of Sonoma joined the Sonoma County Local Government Electric Vehicle (EV) Partnership to collaborate as a region on the implementation of EVs and EV charging infrastructure. Purchasing electric vehicles for the City's municipal vehicle fleet, and constructing vehicle charging infrastructure will help the City reduce its municipal operations GHG emissions.

Table 5.8-5. Sonoma 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	2,173	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	741	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	901	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	39	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	493	N/A
Goal 2: Increase Renewable Energy Use	10,446	
Measure 2-S1: Renewables Portfolio Standard	7,998	N/A
Measure 2-S2: Solar Water Heaters	34	N/A
Measure 2-R1: Community Choice Aggregation	2,415	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	1,207	
Measure 5-R1: Improve and Increase Transit Service	< 1	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	239	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	221	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	177	N/A
Measure 5-R8: Safe Routes to School	572	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	13,140	

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	12,097	N/A	
Measure 6-S2: Advanced Clean Cars	288	N/A	
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	755	N/A	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	604		
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	173	N/A	
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	431	N/A	
Goal 9: Increase Solid Waste Diversion	3,012		
Measure 9-R1: Waste Diversion Goal	3,012	N/A	
Goal 10: Increase Capture and Use of Methane from Landfills	4,190		
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	4,190	N/A	
Goal 11: Reduce Water Consumption			
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A	
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	16		
Measure 13-R1: Infrastructure and Water Supply Improvement	2	N/A	
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	14	N/A	
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	310		
Measure 14-R1: Sonoma County Water Agency Carbon Free Water by 2015	310	N/A	
Local Measures			
Goal 1: Increase Building Energy Efficiency	173		
Measure 1-L2: Outdoor Lighting	172	80%	of outdoor lighting to participate
Measure 1-L3: Shade Tree Planting	1	50	trees planted

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 2: Increase Renewable Energy Use	394		
Measure 2-L1: Solar in New Residential Development	2	8%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	245	11%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	7	2%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	141	2%	of existing non-residential development with solar
Goal 4: Reduce Travel Demand Through Focused Growth	18		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	16	50%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	2	15%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	1	20%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	26		
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	26	80%	of trips affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	24		
Measure 7-L1: Electric Vehicle Charging Station Program	2	3	charging stations installed
Measure 7-L2: Electrify Construction Equipment	22	5%	of equipment
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	
Goal 8: Reduce Idling			
Measure 8-L1: Idling Ordinance	NQ	2	minutes below state law
Goal 11: Reduce Water Consumption	729		

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	436	10%	Reduction in per capita water use
Measure 11-L2: Water Conservation for New Construction*	16	50%/50%	% of new residential/nonresidential development
Measure 11-L3: Water Conservation for Existing Buildings*	278	25%/10%	% of new residential/nonresidential development
Goal 12: Increase Recycled Water and Greywater Use	< 1		
Measure 12-L1: Greywater Use	< 1	2%	greywater goal
State Measure Reductions in Sonoma	22,990		
Regional Measure Reductions in Sonoma	12,110		
Local Measure Reductions in Sonoma	1,360		
Grand Total Emissions Reductions in Sonoma	36,460		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.8.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Sonoma has recognized the need to reduce GHG emissions from municipal operations. The City has an existing program for using alternative fuels for its municipal fleet. Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Sonoma and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Windsor

Commitments to meeting
community greenhouse
gas reduction goals.



5.9 Windsor

This section presents the community greenhouse gas (GHG) emissions profile specific to Windsor and the measures that the Town of Windsor will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.9.1 Community Summary

The Town of Windsor is a family-oriented community with a diverse population, a robust economy, and strong ties to the surrounding Sonoma County wine country and nearby Russian River recreation areas. Windsor follows the “Smart Growth” model for development that favors a mix of land uses, walkable neighborhoods, compact building design, transportation choices, distinctive architecture, and a strong sense of community. Visitors to Windsor appreciate its small-town character, comfortable and welcoming pace, downhome atmosphere, and quality shopping, restaurants, summer concerts, special events, and public spaces. Windsor residents enjoy excellent educational, recreational, civic, and cultural facilities and services, including the award-winning Town Green, Keiser Community Park, and Foothill Regional Park. The Town values its cultural diversity and promotes opportunities for all residents to share their unique heritage and engage in the life of the community.

Windsor embraces the concept of sustainability and supports efforts to increase the resilience of its residents and businesses in response to the environmental, social, and economic effects of changing climate conditions. The Town promotes energy efficiency and the use of renewable energy and is recognized as a leader in water conservation and the use of recycled water. The Town consistently follows prudent fiscal policies and practices to ensure sufficient resources in times of economic downturn or other challenges. The location and timing of new development in Windsor is carefully managed in order to maximize community benefits and minimize the impact of development on existing infrastructure, public services, and the Town’s fiscal well-being. The Town’s voter-approved Urban Growth Boundary is intended to retain the Town’s small size, manage new growth and development, and maintain its rural surroundings.

Demographics

Windsor spans 7.3 square miles and has largely residential and commercial land uses. The Town had a population of 26,801 as of the 2010 census. In 2020 the population is expected to be 28,190, an increase of 5% over 2010. Employment in the area is expected to increase by 15%. Windsor’s demographic composition in 2010 was 74% White, 0.8% African American, 2% Native American, 3% Asian, 0.2% Pacific Islander, 15% from other races, and 5% from two or more races. Persons of Hispanic or Latino origin were 32%. According to the 2010 Census data, the Town of Windsor is majority owner-occupied with only 24% of all housing units occupied by renters. This is the lowest percentage of renters in the county. Windsor’s current average household income is the highest in the county, and in terms of age demographics, its population is the youngest.

As shown in Table 5.9-1, the Town is expected to experience steady growth in population, housing, and jobs in the future.

Table 5.9-1. Windsor Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	13,371	26,801	27,295	28,190	32,663	34,167
Housing	4,912	8,970	9,418	9,828	11,435	11,949
Employment	4,898	8,963	9,609	10,283	11,280	11,626

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the Town based on its internal planning forecasts.

Energy and Water Use

Compared to households in the county as a whole, Windsor households use more electricity, natural gas, and water. This may be due to larger household sizes and a greater percentage of households with children. However, Windsor households use less electricity, natural gas, and water than households statewide.

Table 5.9-2. Windsor, County, and State 2010 Average Energy and Water Use (per household, per year)

	Windsor	County	State
Electricity (kWh)	7,145	7,042	9,320
Natural Gas (Therms)	503	413	512
Water Use (Gallons)	86,862	75,810	107,869

Sources:

Town Data: provided by PG&E (energy) and by the Town of Windsor Urban Water Management Plan.

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

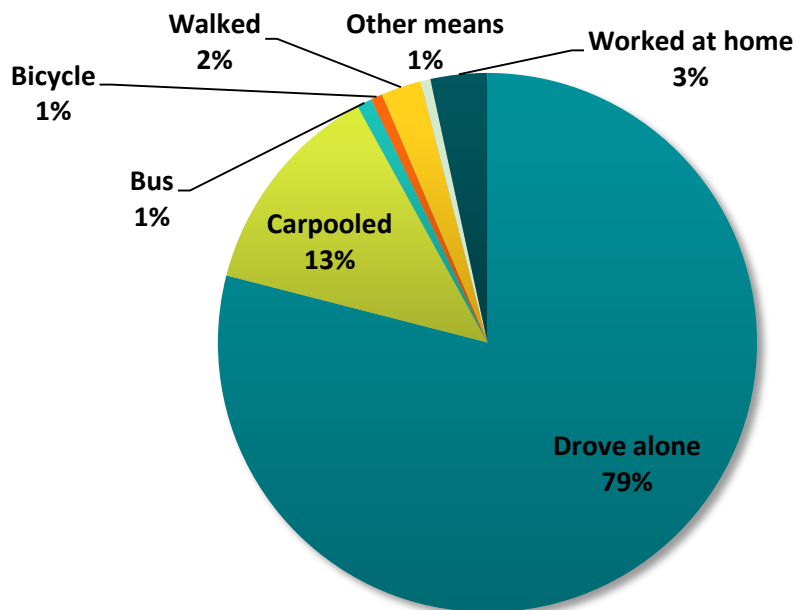
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In inventory year 2010, most Windsor residents (79%) drove alone to work, with 13% carpooling. With the average trip to work for residents of Windsor taking 23.5 minutes and limited bus service, riding a bus is not a viable option for many Windsor residents (U.S. Census Bureau 2014).

Figure 5.9-1. Modes to Work in Windsor in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.9.2 Windsor’s Existing Actions to Reduce GHG Emissions

Windsor has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have been helping to reduce GHG emissions. The Town has adopted the following ordinances and General Plan policies that also help to reduce GHG emissions and will support the implementation of the formal GHG reduction measures in this CAP.

- Building Energy
 - Residential Retrofits: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Residential Appliance Upgrades: Windsor Efficiency Pay-As-You-Save (PAYS®) program for water saving retrofit projects and appliances replacement. Also included as an implementation program in the Town’s 2015 General Plan Housing Element.
 - Solar Installations at Residences: Energy Upgrade California in Sonoma County – Whole House Upgrade Program.
 - Energy Conservation Measures – General Plan Policy: Chapter 6 (Energy) - H.1.6. Energy conservation measures such as insulation and weather stripping should be encouraged in existing structures through public education and financial assistance to low- and moderate-income families. General Plan Housing Element Policy 8.3 provides similar encouragement for residential buildings.

- Solar Access – General Plan Policy: Chapter 6 (Energy) – Policy H.1.2. New residential and non-residential development should provide for solar access and encourage the use of solar easements.
- Passive Heating and Cooling – General Plan Policy: Chapter 6 (Energy) – Policy H.1.4. New residential and subdivision developments should be required to consider opportunities for passive heating and cooling.
- CALGreen Building Standards Code: Title VII, Chapter 2, Article 11. Tier 1 measures for residential and non-residential structures adopted as mandatory. General Plan Housing Element Policy 8.1 contains similar policy language and also refers to the Town’s Green Building Ordinance.
- Energy Conservation Promotion – General Plan Policy: Chapter 6 (Air Quality) – Policy G.2.6. Promote energy conservation/efficiency programs.
- Resolution authorizing the Town’s participation in the Sonoma County Energy Independence Program and other PACE financing programs.
- Ordinance No. 2013-279: Authorization of the Implementation of a Community Choice Aggregation Program, Sonoma Clean Power (SCP).
- Land Use and Transportation
 - Bicycle and Pedestrian Master Plan.
 - Urban Growth Boundary – General Plan Policy: Chapter 4 (Community Development Pattern) – Policy B.1. Establish and Urban Growth Boundary with sufficient land to accommodate the Town’s growth for the next 20 years.
 - Transit Oriented Development: The Town adopted the Station Area/Downtown Specific Plan in 2012. The plan increases densities within a 1/4 of the intermodal center.
 - Transit Oriented Development – General Plan Housing Element Policy 8.5. The Town shall encourage residential development in proximity to the Sonoma-Marin Area Rail Transit (SMART) Station, consistent with the Windsor Station/Downtown Specific Plan, to reduce vehicle miles traveled and promote transit ridership.
 - Complete Streets - General Plan: Chapter 4 (Transportation) – Policy D.3.2. The Town shall consider the needs of transit riders, pedestrians, people in wheelchairs, cyclists, and others in long-range planning and street design.
 - Mixed Land Use – General Plan: Chapter 4 (Transportation) - Policy D.5.2. The Town should encourage higher density mixed land uses within walking distances of existing and future transit stops.
 - Land Use and Circulation – General Plan Policy: Chapter 6 (Energy) – Policy H.1.1. The Town should promote land use patterns that reduce operational energy requirements especially for transportation purposes.

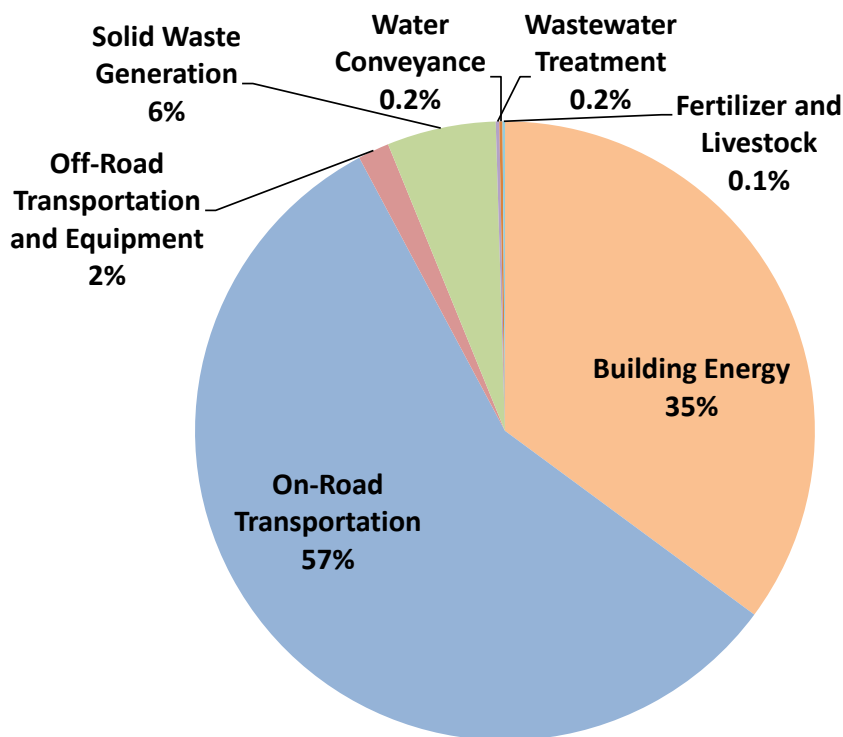
- Housing Element – General Plan Housing Element (Opportunities for Water Conservation) - Policy 8.1. The Town shall establish a development pattern that helps reduce vehicle miles traveled and promotes transit ridership, and pedestrian and bicycle access.
- Increased Transit Infrastructure – General Plan: Chapter 4 (Transportation) - Policy D.5.4. The Town shall require developers to construct, when appropriate, transit facilities including bus turnouts shelters and benches.
- Commitment to Increased Transit Service – General Plan Policy D.5.3. The Town should support expansion of local bus service, and should continue to provide paratransit services to qualified users.
- Carpooling – General Plan Policy: Chapter 6 (Air Quality) – Policy G.2.5. The Town should support and participate in regional carpooling, vanpooling, and other high occupancy vehicle efforts.
- Trip Reduction Ordinance: Municipal Code Title IV – Chapter 4. Employers within the Town with one hundred (100) or more employees at an individual job site shall disseminate trip reduction information regarding transportation alternatives including carpools, vanpools, transit and bicycling and other methods of reducing trips such as telecommuting, compressed work week and flexible work hours annually to each employee and to all new employees as they are hired.
- Energy Conservation Development Incentives – General Plan Program: Chapter 6 (Energy) – Implementation Program H.1. The Town shall consider reducing automobile parking area requirements for new developments in exchange for owner-supplied transit, in-lieu fee payments for public transit, vegetation that shades bike routes and parking lots in the summer, and other amenities.
- Installed public electric vehicle (EV) charging stations.
- Green Purchasing – General Plan Program: Chapter 6 – Implementation Program H.6. The Town should purchase energy-efficient automobiles and other equipment.
- Water and Wastewater Efficiency
 - Wastewater Methane Capture: The Town’s ongoing Modernization Study is evaluating a number of aspects of the treatment plant processes, including solids handling, and a review of potential methane capture may be included as part of the Study.
 - Water Fixture Retrofits (Windsor Pay-As-You-Save Program). On-bill water financing and retrofits.
 - Increase Waste Diversion in Municipal Facilities: The minimum required diversion rate in the Exclusive Franchise agreement is 45%. The minimum diversion rates in the Non-exclusive Franchise agreements (C&D debris) is 60% to 65%, depending on the franchisee.
 - Recycled Water: The Town has an extensive system of recycled water use, concentrated in the west side of Windsor.

- Water Conservation Techniques – General Plan Policy: Chapter 6 (Water Resources and Quality) – Policy C.1.2. Encourage water conservation through measures such as low-flow and low-flush toilets and showers, drought resistant landscaping, and using recycled water.
- Water Efficient Landscape Ordinance: Municipal Code Title XII, Chapter 3, Article 9. Creates provisions for the design, construction, installation and maintenance of the landscape resulting in water conserving climate-appropriate landscapes, improved water quality and the minimization of natural resource inputs.
- Conservation of Water Supply: Municipal Code Title XII, Chapter 3, Article 8. Ordinance relates to the suspension of new connections to the Town’s water system, waste of water prohibited, prohibition of non-essential use of water, and conditional use of sprinklers.
- Water Resources and Quality – General Plan: Chapter 6 (Water Resources and Quality) – Policy C.1. Protect and manage the Town’s surface water and groundwater resources to meet the needs of Windsor.
- Agriculture, Urban Forestry and Natural Areas
 - Open Space Preservation – General Plan Policy: Chapter 6 (Open Space) – Policy A.1. Preserve open space land for commercial agricultural and productive uses, the protection and use of natural resources, the enjoyment of scenic beauty and recreation, and protection from natural hazards.
 - Agricultural Perpetuity – General Plan Policy: Chapter 6 (Agricultural Lands) – Policy B.1.1. The Town shall encourage the County to preserve agricultural activities on state-designated important farmlands and on prime soils outside the Urban Growth Boundary in recognition that prime agricultural land (defined as Class I and II soils by the U.S. Soil Conservation Service) is an irreplaceable natural resource. Town’s Zoning Ordinance (Chapter 27.24: Agricultural Preservation) requires agricultural buffers.
 - Legal Mechanisms for Open Space Protection – General Plan Policy: Chapter 6 (Open Space) – Policy A.1.7. Employ actions such as land acquisition, conservation easements, dedications and property owner/developer exactions, and impact mitigations to protect open space.
 - Resource Preservation – General Plan Policy: Chapter 6 (Open Space) – Policy A.1.2. Encourage the preservation of oak woodlands, productive farmlands, riparian corridors, and visually prominent hillsides and ridgelines.
 - Clustering Development – General Plan: Chapter 6 (Open Space) Policy A.1.2: The Town shall encourage the preservation of sensitive environmental resource areas, such as oak woodlands, productive farmlands, riparian (creekside) corridors, and visually prominent hillsides and ridgelines through measures such as clustering development and conservation easements. Town’s Zoning Ordinance (Section 27.20.040: Creekside Development) requires setbacks and regulates development along creeks.

- Trees – General Plan Program: Chapter 6 (Biological Resources) – Implementation Program D.3. Develop regulations to define and protect oaks and heritage trees to be incorporated into the existing regulations. The Town has adopted Zoning Ordinance Chapter 27.36: Tree Preservation and Protection to implement this policy.

5.9.3 Greenhouse Gas Inventory and Forecast

Figure 5.9-2. Windsor 2010 Community GHG Inventory by Source



Windsor's inventory is similar to other cities in the county and state. The majority of the GHG emissions are from transportation due to fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes and business in Windsor. Residential uses account for most (69%) of the building energy emissions in Windsor. Commercial uses account for 31% of building energy emissions. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

Total GHG emissions generated by community activities in 2010 were 157,830 MTCO₂e, which is approximately 4% of countywide GHG emissions in the same year. This is a 19% increase from estimated 1990 emissions, which were 133,000 MTCO₂e. This is due to the socioeconomic growth experienced in the Town. Between 1990 and 2010, the Town experienced substantial growth. Population in the Town doubled, and the number of houses and jobs nearly doubled. Table 5.9-3 shows the 1990 backcast, the 2010 inventory and business-as-usual (BAU) forecasts for 2015, 2020, 2040 and 2050 for the Town of Windsor.

Table 5.9-3. Windsor Community GHG Backcast, Inventory, and BAU Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	34,600	26%	55,500	35%	61,450	34%	64,640	34%	73,760	35%	76,740	35%
On-Road Transportation	77,700	58%	90,210	57%	103,730	58%	109,250	58%	119,140	56%	119,910	55%
Off-Road Transportation and Equipment	1,400	1%	2,580	2%	3,060	2%	3,660	2%	7,100	3%	7,380	3%
Solid Waste	17,150	13%	8,980	6%	9,330	5%	9,780	5%	11,080	5%	11,520	5%
Wastewater Treatment	150	0%	290	0.2%	300	0%	310	0%	360	0%	370	0%
Water Conveyance	1,990	1%	260	0.2%	440	0%	470	0%	570	0%	590	0%
Total	133,000	100%	157,830	100%	178,300	100%	188,120	100%	212,010	100%	216,520	100%
Per-Capita Emissions	9.9		5.9		6.5		6.7		6.5		6.3	

5.9.4 Greenhouse Gas Reduction Goal and Measures

The Town of Windsor joins the other Sonoma County communities to support the regional GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 21 local GHG reduction measures. The Town's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local reduction measures) would be approximately 188,120 MTCO₂e. The Town's local GHG reduction measures, in combination with state and regional measures, would reduce the Town's GHG emissions in 2020 to 127,720 MTCO₂e, which would be a reduction of approximately 32% compared to 2020 BAU conditions. The Town will achieve these reductions through reduction measures that are technologically feasible and cost-effective per AB 32 through a combination of state (66%), regional (26%), and local (8%) efforts. With the reduction measures in CA2020, per-capita emissions in Windsor will be 4.5 MTCO₂e per person, a 54% reduction in per capita emissions compared to 1990.

Table 5.9-4. Windsor 2020 GHG BAU Emissions, Reductions, and CAP Emissions

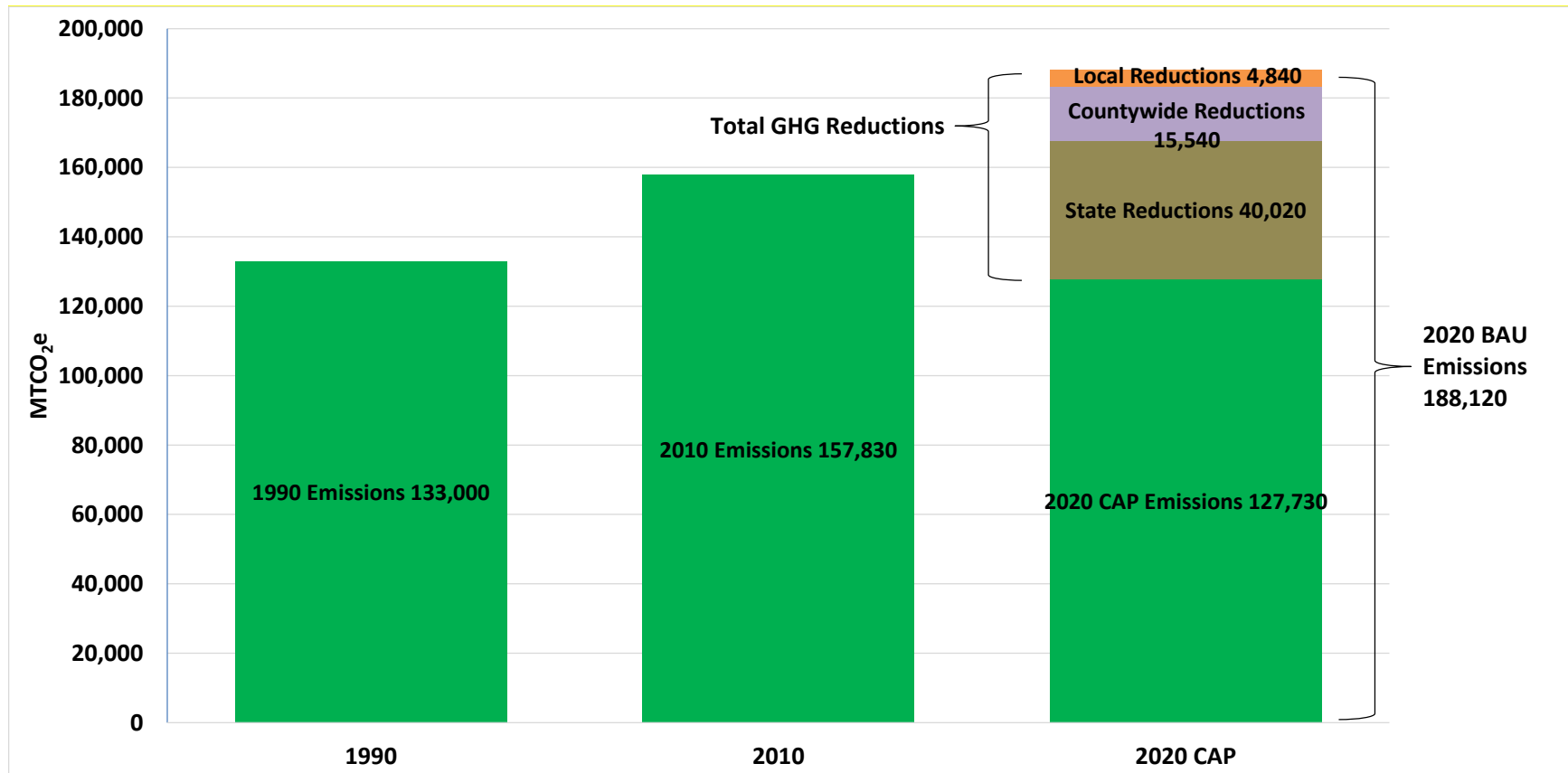
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction from BAU
		State	County-wide	Local	Total		
Building Energy	64,640	14,160	4,270	3,010	21,440	43,200	33%
On-Road Transportation	109,250	25,530	2,950	430	28,900	80,350	26%
Off-Road Transportation and Equipment	3,660	320	-	30	360	3,310	10%
Solid Waste	9,780	-	7,830	-	7,830	1,950	80%
Water Conveyance	470	-	440	1,370	1,810	- ¹	100%
Wastewater Treatment	310	-	60	-	60	250	19%
Total Emissions	188,120	40,020	15,540	4,840	60,390	127,720	32%
		66%	26%	8%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.9-3 shows Windsor's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the Town's reduction measures. The contribution of state, regional, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. Like the other communities, Windsor benefits greatly from the work the state and regional entities are committed to implementing on climate action See Chapter 3 for more information on state and regional actions.

Figure 5.9-3. Windsor 1990, 2010, and 2020 GHG Emissions; 2020 State, Regional, and Local Reductions



Greenhouse Gas Reduction Measures by Source

As shown in Table 5.9-5, the Town of Windsor will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the Town to comply with state mandates (e.g., Title 24 energy efficiency measures). State measure reductions total 40,020 MTCO₂e, which include the Pavley vehicle fuel efficiency standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS, which will reduce GHG emissions from Windsor's on-road and off-road transportation, and building energy use in 2020.

Regional measures will reduce emissions by 15,540 MTCO₂e and will be implemented by regional entities, including the Regional Climate Protection Authority (RCPA), Sonoma County Water Agency (SCWA), County of Sonoma Energy Independence Office (ESD), Sonoma County Transportation Authority (SCTA), and Sonoma Clean Power (SCP).

An additional reduction of 4,840 MTCO₂e will be achieved through local measures. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in Windsor are, in order of importance, Measure 2-L4 (Solar in Existing Non-Residential Buildings), Measure 2-L2 (Solar in Existing Residential Buildings), and Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009). These three measures, in addition to reducing GHG emissions, will provide co-benefits that save energy, reduce utility costs, improve air quality and public health in the region, and conserve water and other natural resources. As the county and state continue to experience a historic drought, water conservation will remain an especially important co-benefit.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the Town. Of the regional measures, the measures with the greatest impact include the Community Choice Aggregation (CCA) measure, the waste-to-energy measure, and the waste diversion measure.

Table 5.9-5 presents the individual GHG reduction measures that Windsor has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

Windsor High School Sustainability

Windsor High School has become a model of sustainability, with significant help from the Town. The high school practices aggressive recycling, water conservation, energy efficiency, and uses alternative fuels in school buses. The Town has helped and encouraged the high school to adopt these practices by offering free waste disposal in exchange for the school strongly emphasizing recycling to students, and by providing recycled water at no cost to the school for landscape irrigation and toilet flushing.

Table 5.9-5. Windsor 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	3,699	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	1,086	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	1,357	N/A
Measure 1-S3: Industrial Boiler Efficiency	-	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	347	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	909	N/A
Goal 2: Increase Renewable Energy Use	14,729	
Measure 2-S1: Renewables Portfolio Standard	11,656	N/A
Measure 2-S2: Solar Water Heaters	64	N/A
Measure 2-R1: Community Choice Aggregation	3,010	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	2,158	
Measure 5-R1: Improve and Increase Transit Service	19	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	412	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	381	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	305	N/A
Measure 5-R8: Safe Routes to School	1,041	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	25,532	
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	23,793	N/A
Measure 6-S2: Advanced Clean Cars	756	N/A
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	982	N/A
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	1,111	
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	324	N/A
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	787	N/A
Goal 9: Increase Solid Waste Diversion	2,893	
Measure 9-R1: Waste Diversion Goal	2,893	N/A
Goal 10: Increase Capture and Use of Methane from Landfills	4,935	
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	4,935	N/A
Goal 11: Reduce Water Consumption		
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	59	
Measure 13-R1: Infrastructure and Water Supply Improvement	1	N/A
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	58	N/A
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	438	
Measure 14-R1: Sonoma County Water Agency Carbon Free Water by 2015	438	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Local Measures			
Goal 1: Increase Building Energy Efficiency	135		
Measure 1-L1: Expand the Green Building Ordinance Energy Code	62	10	points beyond Title 24
Measure 1-L2: Outdoor Lighting	68	25%	of outdoor lighting to participate
Measure 1-L3: Shade Tree Planting	5	500	trees planted
Goal 2: Increase Renewable Energy Use	2,715		
Measure 2-L1: Solar in New Residential Development	37	25%	of new houses to participate
Measure 2-L2: Solar in Existing Residential Building	868	15%	of existing homes with solar
Measure 2-L3: Solar in New Non-Residential Developments	13	5%	of new non-residential development to participate
Measure 2-L4: Solar in Existing Non-Residential Buildings	1,798	25%	of existing non-residential development with solar
Goal 3: Switch Equipment from Fossil Fuel to Electricity	162		
Measure 3-L1: Convert to Electric Water Heating	162	10%	of households
Goal 4: Reduce Travel Demand Through Focused Growth	311		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	282	50%	of growth to result in mixed use
Measure 4-L2: Increase Transit Accessibility	23	15%	of growth to be 25+ units
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Measure 4-L4: Affordable Housing Linked to Transit	6	15%	of new development to be affordable
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	83		
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	83	100%	of trips affected

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	63		
Measure 7-L1: Electric Vehicle Charging Station Program	31	50	charging stations installed
Measure 7-L2: Electrify Construction Equipment	32	5%	of equipment
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	
Goal 11: Reduce Water Consumption	1,368		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	788	15%	Reduction in per capita water use
Measure 11-L2: Water Conservation for New Construction*	103	100%/50%	% of new residential/nonresidential development
Measure 11-L3: Water Conservation for Existing Buildings*	478	25%/10%	% of new residential/nonresidential development
State Measure Reductions in Windsor	40,020		
Regional Measure Reductions in Windsor	15,540		
Local Measure Reductions in Windsor	4,840		
Grand Total Emissions Reductions in Windsor	60,390		

*Measures reduce emissions from multiple sources (i.e. water and energy)

NQ = not quantified

5.9.5 Municipal Greenhouse Gas Reduction Measures

Like the other cities and the county, Windsor has recognized the need to reduce GHG emissions from municipal operations. The Town of Windsor completed an assessment of GHG emissions for municipal facilities in 2003, thereby establishing a baseline for year 2000. The Town Council demonstrated leadership on this issue by adopting a GHG Emission Reduction Action Plan in 2008, documenting a path to a 26.2% reduction in GHG emissions by 2020. Progress toward the Town goal is reviewed by the Town Council every 2 years. The most recent review, in April 2015, showed that the Town is on track to meet and perhaps even exceed its GHG reduction goal. (Gilliran Energy Management, Inc., 2015)

Over the last decade, the Town has implemented a number of energy reduction projects that will also result in GHG reductions. These include lighting upgrades, street lighting conversions to LED, a PV system atop the municipal gymnasium, cool roofs to reflect sunlight to avoid overheating buildings, water supply pump retrofits, and the purchase of energy-efficient vehicles including hybrids. The Town also purchases diesel fuel with 5% biodiesel, reducing emissions from diesel-fueled vehicles. The Town estimates that the combination of all these actions will result in a projected 35% reduction (below 2,000 levels) of GHG emissions from Town-owned and -operated equipment and facilities by 2020.

Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. Windsor and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

Unincorporated Sonoma County

Commitments to meeting
community greenhouse
gas reduction goals.



5.10 Unincorporated Sonoma County

This section presents the community greenhouse gas (GHG) emissions profile specific to the unincorporated county and the measures that the County of Sonoma will implement, with the support of the RCPA and other regional entities, as part of the regional approach to reducing GHG emissions.

5.10.1 Community Summary

The unincorporated portion of Sonoma County includes all areas not within the jurisdictional limits of Cloverdale, Cotati, Healdsburg, Petaluma, Rohnert Park, Santa Rosa, Sebastopol, Sonoma, or Windsor. Located in Northern California in the heart of Wine Country, Sonoma County has a unique position near the Pacific Ocean and the San Francisco Bay Area. Sonoma County is renowned for its scenic landscapes—from open hillsides, plentiful valleys, celebrated vineyards, and agricultural lands to the Russian River and the picturesque Sonoma Coast. The geographic features and climatic variation of Sonoma County contributes to its success in wine production and other agricultural activities. Sonoma County's land uses reflect the residential and rural values of the county while supporting strong local industries.

Demographics

The unincorporated county covers approximately 1,684 square miles (the entire county is 1,768 square miles) and has largely residential, commercial, and agricultural land uses. The unincorporated county had a population of 121,281 as of the 2010 census. In 2020, the population is expected to be 124,100, an increase of 2% compared to 2010. Employment in the area is expected to increase by 14%.

The countywide demographic composition in 2010 was 87% White, 0.5% African American, 0.5% Native American, 3% Asian, 0.2% Pacific Islander, 7% from other races, and 2.5% from two or more races (demographic composition data for the unincorporated county is not available). Persons of Hispanic or Latino origin were 15%.

As shown in Table 5.10-1, the unincorporated portion of the county is expected to experience steady growth in population, housing, and jobs in the future.

Table 5.10-1. Unincorporated County Socioeconomic Data

	Actual			Projected		
	1990	2010	2015	2020	2040	2050
Population	146,796	121,281	123,025	124,100	134,121	140,390
Housing	54,633	49,049	49,933	50,894	55,234	57,755
Employment	45,413	41,486	44,367	47,257	49,852	51,579

Socioeconomic data were derived from the SCTA travel demand model and incorporate input from the County based on its internal planning forecasts.

According to the 2010 Census, housing in the unincorporated areas of the county is majority owner-occupied with 63% of all housing units owned and 37% rented.

Energy and Water Use

Compared to households in the county as a whole, households in the unincorporated areas use less natural gas but more electricity and water. Households in the unincorporated county are, overall, located in more rural areas, which are generally less efficient than households located in more urbanized areas. Larger, more rural houses typically have a higher water footprint because of increased landscaping needs. Unincorporated county households use less electricity, natural gas, and water than households statewide, however.

Table 5.10-2. Unincorporated County, Total County, and State 2010 Average Energy and Water Use (per household, per year)

	Unincorporated Sonoma County	All County	State
Electricity (kWh)	9,207	7,042	9,320
Natural Gas (Therms)	375	413	512
Water Use (Gallons)	93,365	75,810	107,869

Sources:

City Data: provided by PG&E (energy) and by the SCWA Urban Water Management Plan.

County Data: provided by PG&E (energy) and the cities or their Urban Water Management Plans (water).

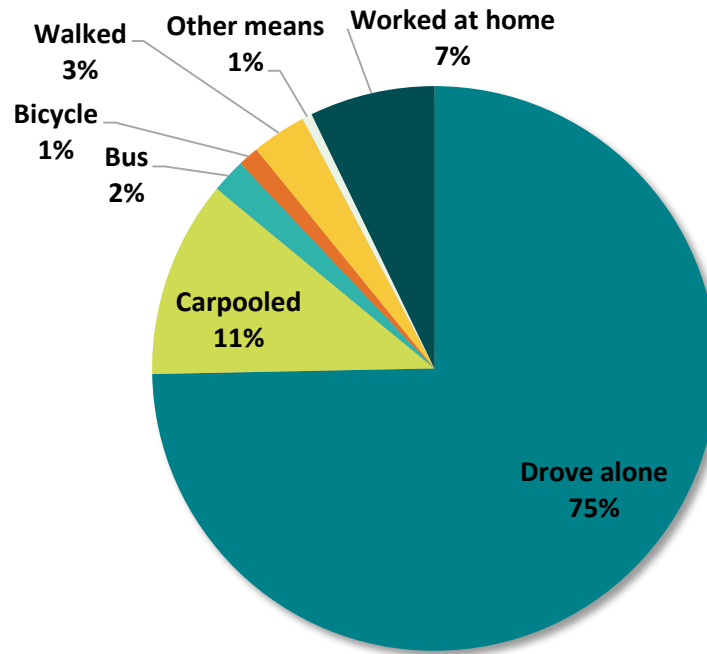
State Data: U.S. Energy Information Administration 2009, U.S. Geological Survey 2014, California Department of Finance 2015.

kWh = kilowatt hours

Transportation Commute Modes

In the inventory year 2010, most unincorporated area residents (75%) drove alone to work and about 11% carpooled, which is similar to other Sonoma County communities. The average trip to work for the total county, including unincorporated and incorporated areas, is 25.3 minutes (U.S. Census Bureau 2014).

Figure 5.10-1. Modes to Work in the Unincorporated County in 2010



Source: U.S. Census Bureau 2014: American Community Survey 2006–2010

5.10.2 The County's Existing Actions to Reduce GHG Emissions

The County has already taken a number of steps to reduce energy use, promote renewable energy use, and other actions that have already been helping to reduce GHG emissions. The County has also implemented projects and adopted ordinances and General Plan policies that would also help to reduce GHG emissions and will support the implementation of the formal GHG reduction measures in this CAP. These are summarized below.

- Building Energy
 - CALGreen Building Standards Code: County Code Chapter 7. Tier 1 measures for residential and non-residential structures adopted as mandatory.
 - Comprehensive Energy Project on County Facilities. Conservation measures employed at County facilities: Upgraded lighting technology, thermal energy storage, variable speed controls, and HVAC improvements.
 - Residential Retrofits: CDC retrofitted 1073 homes through housing/mobile home rehabilitation programs.
 - Property Assessed Clean Energy (PACE) Program: Via AB 811 and SB 555 property owners may finance energy and water efficiency and conservation, and renewable generation improvements to existing homes and business properties via a special voluntary property tax assessment.

- Sonoma PACE Financing Marketplace: The offering of multiple PACE financing products to property owners in the county including products such as the County's SCEIP, California FIRST, California HERO, and Figtree Finance.
- PACE Program Permitting and Inspection Procedures: Special permit procedure for energy and water conservation improvements financed through PACE; permitting for building projects not typically requiring permits.
- County of Sonoma Energy Independence Office: Serves as a community clearinghouse of information, tools, services, programs, financing information, and resources for the general public, contractor communities, and other public entities engaged in pursuing energy and water efficiency and renewable energy initiatives. The office operates and administers County programs including the Sonoma PACE Financing Marketplace (including SCEIP), Energy Watch Program, Green Business Program, Windsor Pay-As-You-Save, and the residential rebate program for Healdsburg Electric.
- Sonoma County Energy Watch (SCEW): a local government partnership between the County of Sonoma's Energy and Sustainability Division and PG&E designed to reduce energy usage and expenses. The program provides energy efficiency services to local governments, special districts, nonprofit organizations, and small to medium businesses. These services include: no-cost energy audits, technical assistance, project consultation, enhanced rebates and incentives, and an on bill financing option. Between the program's inception in 2009 and the end of 2014, nearly \$2 million in incentives have been paid to over 470 projects. The resulting energy savings are estimated to be 10,500,000 kWh/year.
- Sonoma County retrofit/renewables program: This program provides residential and commercial property owners with one-stop success to energy analysis, certified vendors, and a financing package for solar and energy efficiency retrofit projects, working in collaboration with SCEIP and leveraging that existing resource.
- Solar photovoltaic electrical generation at County facilities to augment county needs. 750 kW solar energy system plus 706 kW system at the Los Guilicos Juvenile Justice Center. The two PV systems are designed to generate enough clean energy to cover 100% of the campus electricity bills. This represents the average electricity use of 105 homes and is expected to reduce GHG by 324 metric tons over its 25-year life.
- The County's General Services Department has implemented 38 County facility energy efficiency projects on 24 different County-owned buildings. This work will ultimately save \$41.6 million in energy use over the lifetime of the improvements.
- Landfill Gas Power Plant: produces over 7 megawatts (MW) of renewable electrical energy 24 hours/day, 7 days/week, enough to power a community of 17,000 people. The electricity is sold to the Power and Water Resources Pooling Authority, which provides carbon-free electricity to SCWA, among other entities. A BioGas Filtration Plant (also called the CNG plant) was completed in February 2009. CNG produced at the Central

Disposal Site is currently used to fuel select vehicles in the Sonoma County Transit bus fleet. The plant uses membrane filtration to convert landfill gas to vehicle fuel.

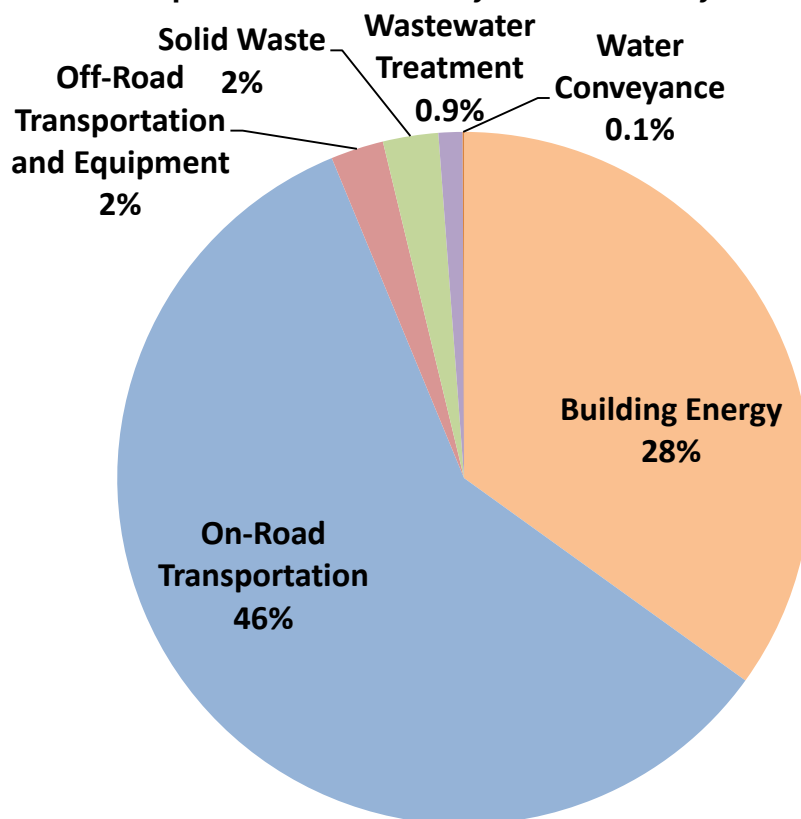
- Sonoma Clean Power Community Choice Aggregation (CCA): Several cities and the County formed SCP to provide electricity with a higher percentage of non-fossil fuel energy sources. Transmission, distribution, customer service and billing remain the same, delivered through the existing utility (PG&E).
- Hydropower: The Warm Springs Dam was completed in 1984, a hydroelectric turbine was installed a few years later and has been producing electricity since the late 1980s. This turbine has a generation capacity of 2.6 MW. Since energy production is influenced by the flow of water through the dam, actual energy production is usually at about 1.3 MW. Actual annual energy production from 2006 to 2008 was approximately 11,800 to 14,800 megawatt-hours.
- In 2013 the Sonoma County Zoning Code was amended to enable the construction and use of renewable energy facilities including bioenergy, geothermal, solar, wind, cogeneration, and similar technologies. Uses are now classified into two categories of Accessory systems and Commercial Facilities allowing streamlining with special use standards.
- Land Use and Transportation
 - Fleet Operations Division: Sonoma County was named the #1 2015 Government Green Fleet in North America Award Winner and has been a Government Green Fleet Award Winner in 2010, 2011, 2012, 2013 and 2014. Other designations include a US Environmental Protection Agency (EPA) Clean Air Excellence Award Winner 2015, an Accredited NAFA Sustainable Fleet 2015, a Fleet Technology Top Tier Light & Medium Duty Efficient Fleet Award 2015, California EPA Governor's Environmental and Economic Leadership Award Winner 2013, a Green Fleet 40 Sustainability All Stars Award Winner 2013 and the Bay Area Climate Collaborative "Most EV-Ready Community" Award 2012 and 2011. Sonoma County Transit Fleet changes:
 - In 1990, Sonoma County's transit and paratransit fleets were 100% diesel powered. In 1996, the transition to CNG buses began with the addition of 15–40-foot heavy-duty coaches.
 - In 2000, approximately 31% of the Sonoma County Transit fleet was powered by natural gas and diesel vehicles dropped to 57%. During this period, more gasoline powered minibuses were introduced into the fixed-route fleet, representing approximately 12% of the fleet makeup.
 - By 2010, all of the County's 30- and 40-foot heavy duty coaches had transitioned to CNG, representing 92% of the fleet. The remainder of the fleet comprises small gasoline-powered minibuses. The 2013 fleet composition remains the same as 2010; however, the average vehicle age has decreased. With the delivery of nine new

(replacement) 40-foot CNG buses in 2014, the fleet total will remain the same, but the average vehicle age will again decrease.

- Waste Minimization and Recycling
 - AB 939 compliance for solid waste generation and diversion, which requires California cities, counties, and approved regional solid waste management to divert 25% of their solid waste by 1995 and 50% by year 2000 and afterward.
 - Sonoma Green Business Program: Provides certification and resources for small to medium-sized consumer-oriented businesses that express a desire to contribute to sustainability efforts through resource conservation.
 - Recycling Market Development Zone Program (RMDZ): Businesses that use recycled material in their products, and are located within RMDZs, are eligible for loans, technical assistance, relaxed building permits, and other incentives. The program originated from CalRecycle, but is administered at the local level by zone administrators throughout the state.
- Water and Wastewater Efficiency
 - Reduced size and cost of standard septic systems when low flow plumbing fixtures are installed.
 - Sonoma County Water Efficient Landscape Ordinance: County Code Chapter 7D3. Regulates the design, installation, and maintenance of new and rehabilitated landscapes in terms of plant selection, soil amendments, water features such as recycled water, and irrigation systems.
- Agriculture, Urban Forestry and Natural Areas
 - Open Space Conservation: Over 250,000 protected acres in the County, including 106,000 acres protected by the Sonoma County Agricultural Preservation and Open Space District as well as lands protected through other programs, including agricultural land preservation through the County's ongoing participation in the Williamson Act.

5.10.3 Greenhouse Gas Inventory and Forecast

Figure 5.10-2. Unincorporated Sonoma County 2010 Community GHG Inventory by Source



The unincorporated area's inventory is similar to cities in the county and state in many respects. The majority of the GHG emissions are from on-road transportation due to fossil fuel combustion in personal and light-duty vehicles. The next largest source is building energy, which includes emissions related to energy used to heat the homes, and business in the county. Most energy consumption in the unincorporated areas of the county is for residential purposes, with 57% of building energy emissions resulting from residential uses. Commercial energy use emissions account for 39% of building energy emissions. Emissions resulting from energy consumed for industrial purposes are a small fraction (4%) of total energy use emissions in the community. The other categories of emissions are much smaller in comparison to building energy and on-road transportation.

In the unincorporated county, total GHG emissions generated by community activities in 2010 were 1,004,510 MTCO₂e, which is approximately 39% of countywide GHG emissions in the same year. This is a 19% decrease from estimated 1990 emissions, which were 1,244,320 MTCO₂e. The decrease in emissions from 1990 is partly due to a decrease in population, employment, and housing for the unincorporated county, as the cities annexed unincorporated land into their limits. Therefore, a portion of the reduction in emissions is due to changes in the jurisdictional boundaries of the cities, and not actually due to a decrease in emission-generating activities within the unincorporated areas.

Table 5.10-3. Unincorporated Sonoma County Community GHG Backcast, Inventory, and Forecasts

Source	1990 Backcast		2010 Inventory		2015 Forecast		2020 Forecast		2040 Forecast		2050 Forecast	
Building Energy	502,330	40%	350,950	35%	386,270	36%	401,390	36%	430,210	36%	447,780	37%
On-Road Transportation	519,670	42%	590,970	59%	612,650	58%	657,210	58%	688,330	57%	680,920	56%
Off-Road Transportation and Equipment	26,550	2%	24,780	2%	27,010	3%	29,600	3%	43,640	4%	44,380	4%
Solid Waste	170,730	14%	25,900	3%	27,140	3%	28,320	3%	30,140	2%	31,320	3%
Wastewater Treatment	13,610	1%	11,240	1.1%	11,400	1%	11,500	1%	12,430	1%	13,010	1%
Water Conveyance	11,440	1%	660	0.1%	780	0%	790	0%	850	0%	890	0%
Total	1,244,320	100%	1,004,510	100%	1,065,260	100%	1,128,810	100%	1,205,610	100%	1,218,310	100%
Per-Capita Emissions	8.5		8.3		8.7		9.1		9.0		8.7	

5.10.4 Greenhouse Gas Reduction Goal and Measures

The County of Sonoma in representing the unincorporated portion of the county joins the other Sonoma County communities to support the countywide GHG emissions reduction target of 25% below 1990 countywide emissions by 2020 through adoption of 24 local GHG reduction measures. The county's GHG emissions under 2020 BAU conditions (in absence of state, regional, and local measures) would be approximately 1,128,810 MTCO₂e. The county's local GHG reduction measures, in combination with state and regional measures, would reduce the county's GHG emissions in 2020 to 781,160 MTCO₂e, which would be a reduction of approximately 31% compared to 2020 BAU conditions. The county will achieve these reductions through reduction measures that are technologically feasible and cost-effective per AB 32 through a combination of state (70%), regional (21%), and local (9%) efforts. Per-capita reductions in the county in 2020 would be 2.8 MTCO₂e per person.

Table 5.10-4. Unincorporated Sonoma County 2020 GHG BAU Emissions, Reductions, and CAP Emissions

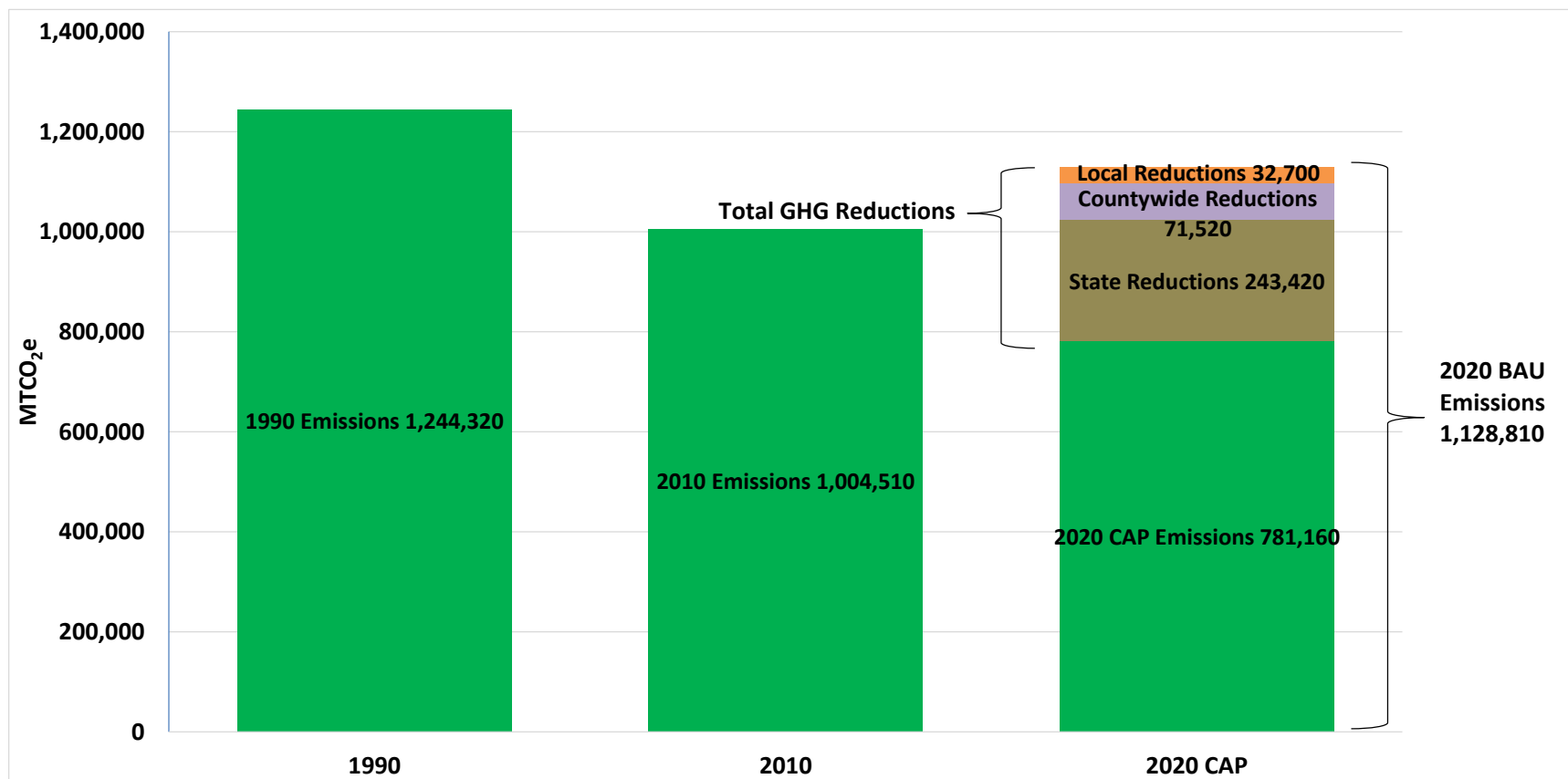
Source	2020 BAU Forecast	Reductions				2020 CAP Emissions	% Reduction From BAU
		State	County-wide	Local	Total		
Building Energy	401,390	100,930	32,800	19,650	153,370	248,020	38%
On-Road Transportation	657,210	139,870	17,450	8,250	165,570	491,640	25%
Off-Road Transportation and Equipment	29,600	2,620	-	70	2,690	26,910	9%
Solid Waste	28,320	-	20,630	-	20,630	7,690	73%
Water Conveyance	790	-	500	4,730	5,230	- ¹	100%
Wastewater Treatment	11,500	-	150	-	150	11,350	1%
Total Emissions	1,128,810	243,420	71,520	32,700	347,650	781,160	31%
		70%	21%	9%			

Values may not sum due to rounding.

¹ The CAP reduction for the water conveyance sector is greater than 2020 BAU emissions because it contains emission reductions from multiple sectors. Water conveyance measures reduce improve efficiency, which reduces electricity use within the building energy sector.

Figure 5.10-3 shows the county's 1990 and 2010 GHG emissions total, 2020 BAU emissions forecast total, and the total emissions remaining after implementation of the county's reduction measures. The contribution of state, countywide, and local reductions are overlaid on the 2020 BAU emissions forecast total, representing the total emissions reductions achieved in 2020. As noted above, the decrease in emissions from 1990 is partly due to changes in the jurisdictional boundaries of the cities, and not actually due to a decrease in emission-generating activities within the unincorporated county.

Figure 5.10-3. Unincorporated Sonoma County 1990, 2010, and 2020 GHG Emissions; 2020 State and Local Reductions



Greenhouse Gas Reduction Measures

As shown in Table 5.10-5, the County of Sonoma will achieve its reduction goal through a combination of state, regional, and local measures. State reduction measures are implemented through state law, including some that require action by the County to comply with state mandates (e.g., Title 24 energy efficiency measures). State reductions total 243,420 MTCO₂e, which include the Pavley vehicle standards, Title 24 building standards, the state's low carbon fuel standard, and the RPS.

Regional measures will reduce emissions by 71,520 MTCO₂e and will be implemented by countywide entities, including RCPA, SCWA, County of Sonoma Energy Independence Office, SCTA, and SCP.

An additional reduction of 32,700 MTCO₂e will be achieved through local measures. The locally adopted measures, although not as high-achieving of GHG reductions as the state and regional measures, are important because they represent the actions that local communities can take directly. The communities have local control over their infrastructure and policies and have selected the local measures that best suit the needs of their community.

The three measures that will have the greatest impact in the unincorporated county are, in order of importance, Measure 2-L4 (Solar in Existing Non-Residential Buildings), Measure 2-L2 (Solar in Existing Residential Buildings), and Measure 11-L1 (Senate Bill SB X7-7 - Water Conservation Act of 2009). These three measures, in addition to reducing GHG emissions, will save energy, and conserve natural resources.

On the state level, the RPS and the Pavley measures have the greatest potential to reduce emissions in the unincorporated county. Of the regional measures, those with the greatest impact are the Community Choice Aggregation (CCA) measure, the waste-to-energy measure, and the waste diversion measure.

Table 5.10-5 presents the individual GHG reduction measures that Sonoma County has selected for the CAP. For more information on the specifics of each measure, see Appendix C.

Sonoma County Green Business Program

Sonoma County Green Business is an award winning program that has been verifying green businesses in the County for many years. The program ensures that businesses who want to be certified meet high standards of environmental performance. The standards that the program sets, in addition to reducing GHG emissions and helping the County meet its goal, ensure water and energy conservation, and reduce air pollutants that can cause health problems for certain populations.

Table 5.10-5. Unincorporated Sonoma County 2020 GHG Emissions Reductions by Measure

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate
State and Regional Measures		
Goal 1: Increase Building Energy Efficiency	23,979	
Measure 1-S1: Title 24 Standards for Commercial and Residential Buildings	4,821	N/A
Measure 1-S2: Lighting Efficiency and Toxics Reduction Act (AB1109)	9,945	N/A
Measure 1-S3: Industrial Boiler Efficiency	345	N/A
Measure 1-R1: Community Energy Efficiency Retrofits for Existing Buildings	3,126	N/A
Measure 1-R2: Expand the Community Energy Efficiency Retrofits Program	5,744	N/A
Goal 2: Increase Renewable Energy Use	108,726	
Measure 2-S1: Renewables Portfolio Standard	85,487	N/A
Measure 2-S2: Solar Water Heaters	330	N/A
Measure 2-R1: Community Choice Aggregation	22,909	N/A
Goal 3: Switch Equipment from Fossil Fuel to Electricity	1,022	
Measure 3-R1: Stationary Fuel Switching Incentives	1,022	N/A
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	13,040	
Measure 5-R1: Improve and Increase Transit Service	< 1	N/A
Measure 5-R2: Supporting Transit Measures	NQ	N/A
Measure 5-R3: Sonoma-Marín Area Rail Transit	NQ	N/A
Measure 5-R4: Trip Reduction Ordinance	2,516	N/A
Measure 5-R5: Supporting Measures for the Transportation Demand Management Program	NQ	N/A
Measure 5-R6: Reduced Transit Passes	2,330	N/A
Measure 5-R7: Alternative Travel Marketing & Optimize Online Service	1,864	N/A
Measure 5-R8: Safe Routes to School	6,336	N/A
Measure 5-R9: Car-sharing Program	NQ	N/A
Measure 5-R10: Bike Sharing Program	NQ	N/A

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 6: Increase Vehicle and Equipment Fuel Efficiency	139,873		
Measure 6-S1: Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard	129,432	N/A	
Measure 6-S2: Advanced Clean Cars	3,545	N/A	
Measure 6-S3: Assembly Bill 32 Vehicle Efficiency Measures	6,896	N/A	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	7,029		
Measure 7-S1: Low Carbon Fuel Standard: Off-Road	2,621	N/A	
Measure 7-R1: Shift Sonoma County (Electric Vehicles)	4,408	N/A	
Goal 9: Increase Solid Waste Diversion	8,303		
Measure 9-R1: Waste Diversion Goal	8,303	N/A	
Goal 10: Increase Capture and Use of Methane from Landfills	12,323		
Measure 10-R1: Increase Landfill Methane Capture and Use for Energy	12,323	N/A	
Goal 11: Reduce Water Consumption			
Measure 11-R1: Countywide Water Conservation Support and Incentives	NQ	N/A	
Goal 13: Increase Water and Wastewater Infrastructure Efficiency	257		
Measure 13-R1: Infrastructure and Water Supply Improvement	104	N/A	
Measure 13-R2: Wastewater Treatment Equipment Efficiency*	153	N/A	
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems	391		
Measure 14-R1: Sonoma County Water Agency Carbon Free Water by 2015	391	N/A	
Local Measures			
Goal 1: Increase Building Energy Efficiency	404		
Measure 1-L2: Outdoor Lighting	392	20%	of outdoor lighting to participate

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Measure 1-L3: Shade Tree Planting	11	1,000	trees planted
Measure 1-L4: Co-Generation Facilities	1	10	MWh of cogeneration
Goal 2: Increase Renewable Energy Use	19,242		
Measure 2-L2: Solar in Existing Residential Building	5,402	15%	of existing homes with solar
Measure 2-L4: Solar in Existing Non-Residential Buildings	13,839	25%	of existing non-residential development with solar
Goal 4: Reduce Travel Demand Through Focused Growth	681		
Measure 4-L1: Mixed-Use Development in City Centers and Along Transit Corridors	681	20%	of growth to result in mixed use
Measure 4-L3: Supporting Land Use Measures	NQ	Yes	
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options	7,569		
Measure 5-L1: Local Transportation Demand Management Program	1,864	38%	of employees eligible
Measure 5-L2: Carpool-Incentives & Ride-Sharing Program	3,634	78%	of employees eligible
Measure 5-L3: Guaranteed Ride Home	NQ	Yes	
Measure 5-L4: Supporting Bicycle/Pedestrian Measures	NQ	Yes	
Measure 5-L5: Traffic Calming	518	100%	of trips affected
Measure 5-L6: Parking Policies	1,553	10%	of area affected
Measure 5-L7: Supporting Parking Policy Measures	NQ	Yes	
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment	3		
Measure 7-L1: Electric Vehicle Charging Station Program	3	5	charging stations installed
Measure 7-L3: Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching	NQ	Yes	
Goal 8: Reduce Idling	69		
Measure 8-L1: Idling Ordinance	NQ	2	minutes below state law
Measure 8-L2: Idling Ordinance for Construction Equipment	69	2	minutes below state law

State, Regional, and Local Measures	2020 GHG Reductions	Participation Rate	
Goal 9: Increase Solid Waste Diversion	3		
Measure 9-L1: Create Construction and Demolition Reuse and Recycling Ordinance	3	3%	beyond baseline
Goal 11: Reduce Water Consumption	4,712		
Measure 11-L1: Senate Bill SB X7-7 - Water Conservation Act of 2009*	4,712	12%	Reduction in per capita water use
Goal 12: Increase Recycled Water and Greywater Use	22		
Measure 12-L1: Greywater Use	22	10%	greywater goal
Goal 15: Reduce Emissions from Livestock Operations	NQ		
Measure 15-L1: Encourage voluntary manure management techniques that reduce emissions from the decomposition of manure at dairies	NQ	Yes	
Measure 15-L2: Encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation	NQ	Yes	
Goal 16: Reduce Emissions from Fertilizer Use	1,759**		
Measure 16-L1: Encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer)	1,759	Yes	
State Measure Reductions in Unincorporated Sonoma County	243,420		
Regional Measure Reductions in Unincorporated Sonoma County	71,520		
Local Measure Reductions in Unincorporated Sonoma County	32,700		
Grand Total Emissions Reductions in Unincorporated Sonoma County	347,650		

* Measures reduce emissions from multiple sources (i.e. water and energy)

**Reductions from this measure are included in the countywide accounting of GHG reductions and are not jurisdiction-specific reduction totals.

NQ = not quantified

5.10.5 Municipal Greenhouse Gas Reduction Measures

Like the cities in Sonoma County, County government has recognized the need to reduce GHG emissions from municipal operations. In 2006, the County adopted its “Climate Protection Action Plan.” The Plan includes measures to reduce energy and water consumption in County

government buildings and reductions in fleet vehicle fuel consumption and use of lower-carbon fuels, including electric vehicles, and set a target of reducing emissions from County operations by 20% by 2010. Implementation of this plan has been ongoing since adoption and the reduction target has been met and exceeded.

Although municipal GHG reduction measures are not part of this countywide plan, action by the cities and the County to reduce municipal emissions is still important. The County and the other local communities will continue to pursue actions that reduce GHG emissions from municipal operations. Descriptions of potential municipal GHG reduction measures are provided in Appendix E as an informational resource.

6. Readiness

Sonoma County Climate Readiness



Chapter 6

Sonoma County Climate Readiness

6.1 Introduction and Background

Sonoma County has long been a leader in addressing greenhouse gas (GHG) emissions and working to reduce the pace of climate change. Much of this work has focused on *climate mitigation*, which refers to reducing the amount of climate change, primarily through measures like those described in Chapter 3, *Reducing Community Emissions*.

However, even with the aggressive climate mitigation measures in Climate Action 2020 (CA2020), climate changes cannot be avoided entirely. Preparing for a changed climate is therefore a fundamental part of Sonoma County's overall climate action program. Reducing vulnerability to climate change hazards and bolstering community readiness to face the unavoidable climate impacts already underway are collectively referred to as *climate adaptation*. While climate mitigation and adaptation have different objectives, many strategies can be used to simultaneously achieve both goals (see Section 6.4.2).

This chapter provides a vulnerability assessment that evaluates potential impacts from anticipated climate change hazards on three key community resource areas. The assessment is not a comprehensive vulnerability analysis, nor does it provide site-specific prescriptions for action. Instead, the analysis provides a starting point for a countywide discussion on climate impacts and vulnerabilities and sets forth goals that the Regional Climate Protection Authority (RCPA) and local communities can use to guide future climate adaptation actions. This chapter also discusses strategies already underway to prepare for climate change, as well as recommendations for further improvement.

Information summarized in this chapter is drawn from the *Climate Ready Sonoma County: Climate Hazards and Vulnerabilities* report prepared by North Bay Climate Adaptation Initiative (NBCAI) for RCPA (Cornwall et al. 2014). NBCAI is a non-governmental organization comprising natural resource managers, policy makers, and scientists committed to working together to create positive solutions to the problem of climate adaptation for the ecosystems and watersheds of Sonoma County.

6.2 Climate Change Projections

Climate change projections analyze the likelihood that certain climate conditions will occur in the future. Various climate change models include different assumptions regarding the amount, location, and timing of change, and are thus subject to uncertainty regarding their results. The two primary sources of uncertainty in climate projections are *natural variation* and *climate mechanics*. Natural variation includes numerous independent processes that drive natural

patterns on time scales ranging from minutes to seasons to decades, whereas climate mechanics refers to the complex physical processes that influence climate and how it responds to changing conditions. There is also uncertainty about how quickly and vigorously humanity will reduce GHG emissions. Given this uncertainty, climate change modeling projections are often considered “scenarios” based on long-term trends and estimates of variability (uncertainty is discussed in greater detail in the *Hazards and Vulnerabilities* report).

Despite the uncertainty and complexity inherent in climate change models, there are recurring themes that scientists agree are important to understanding what the future may hold for the region. Sonoma County already benefits from a number of cutting-edge efforts to understand climate trends, in part because local entities are key participants in these efforts. In particular, NBCAI used a set of projections for local temperature, precipitation, and hydrology across Sonoma County derived from the Basin Characterization Model (BCM) prepared by scientists from the U.S. Geological Survey and the University of California, Davis Center for the Environment (Flint et al. 2013). These projections were developed by applying global circulation models at a scaled-down resolution that helps identify watershed-level impacts of climate change here in Sonoma County.

Four of the BCM climate scenarios were selected to inform the vulnerability assessment. The two major variables among the four scenarios are GHG emission levels and precipitation. For example, if humans succeed in significantly reducing global GHG emissions in the near term (“mitigated GHG emissions”) and precipitation levels increase (“more precipitation”), the future will be “warm/wet.” Figure 6-1 identifies the scenarios based on the relationship among the two variables. The scenarios are described in greater detail in the *Hazards and Vulnerabilities* report.

Figure 6-1. Future Climate Scenarios for Sonoma County

	Less Precipitation	More Precipitation
High GHG Emissions (greater temperature increase)	Hot/Dry”	Hot/Wet
Mitigated GHG Emissions (less temperature increase)	Warm/Dry	Warm/Wet”

The difference between the “hot” and “warm” scenarios is based on the effects of higher GHG emissions versus lower (more mitigated) GHG emissions. There is uncertainty around precipitation in the global circulation models. Therefore, the difference between the “wet” and “dry” futures reflects the fact that different global climate models produce different rainfall projections.

6.3 Vulnerability Assessment

Climate vulnerability consists of the combined effect of exposure, sensitivity, and adaptive capacity, as defined below.

Different areas in Sonoma County will have different exposures to various climate change effects. For example, due to the county’s coastal location, it will not be exposed to flooding from increased and rapid snowmelt. However, portions of Sonoma County will likely be subjected to an increased future risk of sea-level rise. Therefore, *exposure* is how much change a species or system is likely to experience. Section 6.3.1 identifies the climate change exposures that are projected to occur in Sonoma County.

Baseline conditions in communities and natural systems will influence sensitivity to a particular climate exposure. For example, an increase in extreme heat events is likely to disproportionately harm people, plants, and animals not acclimatized to extreme heat. In all locations, extreme heat will do more harm to those with compromised or fragile health. *Sensitivity*, then, is a measure of whether and how much a species or system is likely to be affected by its exposure. Section 6.3.2 evaluates the sensitivity of various community resources to the climate change exposures identified in Section 6.3.1.

An adaptation capacity assessment—an evaluation of the ability to avoid, accommodate, or cope with climate change impacts—is not included in this chapter. However, strategies already underway to prepare for climate change and goals for further improvement are described in Sections 6.4 and 6.5.

6.3.1 Climate Change Hazards in Sonoma County

The BCM scenarios and other recent studies indicate that climate change could affect Sonoma County in the following ways.

Hotter, Drier Weather with Longer Summers



More extremely hot days



More frequent and intense droughts



More frequent and intense wildfires



Fewer winter nights that freeze

More Variable Rain



Greater risk of extreme floods

Sea Level Rise



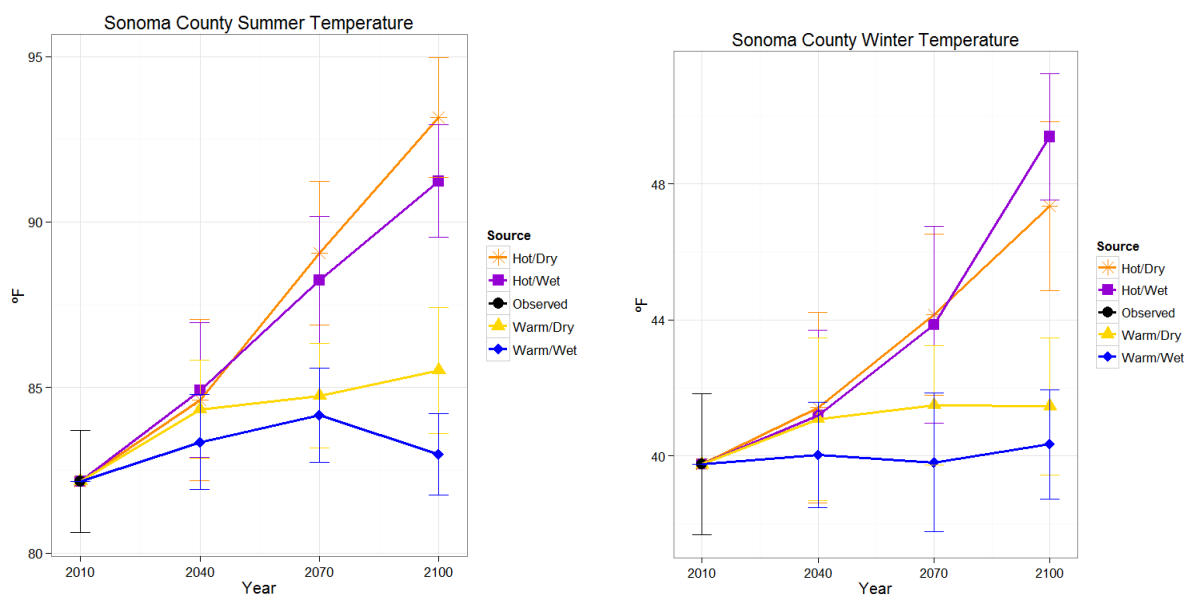
Higher sea level and storm surge

Hotter, Drier Weather with Longer Summers



Higher Average Temperatures and More Extreme Heat Events: Sonoma County is expected to experience more very hot days and overall higher temperatures over a longer warm season. Average monthly maximum temperatures have already risen by 2.7 degrees Fahrenheit (°F) since 1900. Most climate change models project that temperatures will continue to rise, whether they use high or mitigated carbon emissions trends. Figure 6-2 depicts average summer high temperatures projected by the four models chosen for comparison in this report. In the two scenarios with mitigated emissions, summer high temperatures are expected to rise by 1 to 2°F. In the scenarios with uncurbed emissions, average summer high temperatures projected to increase by up to 9 to 11°F by 2100.

Figure 6-2. Observed (1981–2010) and Projected Future Summer and Winter Temperature for Sonoma County



Data source: California Basin Characterization Model, Flint et al. (2013).

Table 6-1 shows how these temperature increases can create public health and safety risks, by comparing the increases to the temperature threshold (95°) for an “extreme heat event” as defined for the Santa Rosa area.

Table 6-1. Number of Times per Year When Maximum Temperature Is Projected to Exceed 95°F for 3 or More Consecutive Days in the Santa Rosa Plain

Period	Number
1981–2000	26
2010–2039	39
2040–2069	55
2070–2099	148



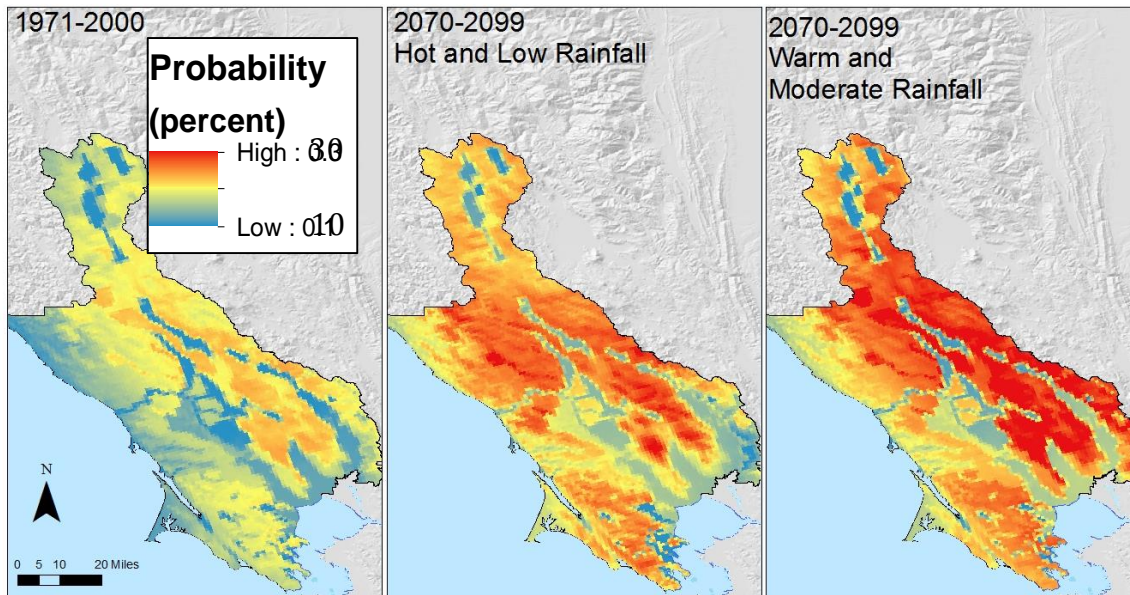
More Frequent and Intense Droughts: Whether the North Bay region experiences more or less rainfall overall, the land will likely be drier overall because warmer temperatures increase evapotranspiration (the loss of water from plants and soil into the air) even under the two “wet” scenarios. Climatic water deficit (CWD) is a numeric measure of drought stress that quantifies the extent to which plants’ need for water exceeds moisture available in the soil. Three of the four climate scenarios examined in this report indicate a rising CWD for the 21st century while the “Warm/Wet” scenario indicates nearly equivalent CWD to the historic period. The CWD is projected to increase over this century, producing 10 to 20% drier soil conditions in the summer months, leaving less water available for groundwater recharge or runoff into rivers and creeks, increasing irrigation needs, and causing stress to natural vegetation and water-dependent ecosystems. The greatest increases in soil dryness are projected in the south and southeastern portions of the county.



More Frequent and Intense Wildfire: Risk of fire is likely to continue to rise due to increased dryness of vegetation, compounded by productivity of plants in the spring (which creates more fuel for dry season wildfires). By the end of this century, the chances of one or more fires during a 30-year period are projected to increase from 15–20% at present to 25–33% in the mountainous areas of the county, a fire regime akin to that experienced today in the Santa Monica Mountains of Southern California. See Figure 6-3.

Figure 6-3. Changes in Projected Fire Probability for Sonoma County

Change in Projected Fire Probability



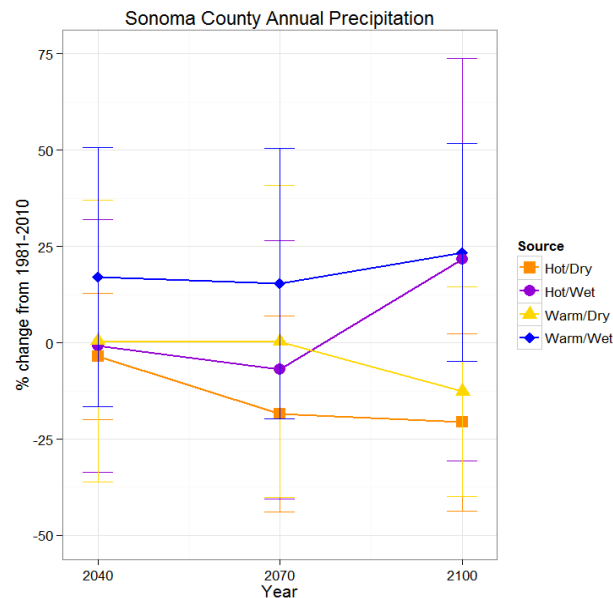
Fewer Winter Nights that Freeze: Projected winter low temperatures are also expected to rise in the future. In general, the coast, ridges, and mountain peaks will experience the most significant warming, whereas valley bottoms are projected to warm less dramatically. Figure 6-2 depicts projected winter low temperatures under the four scenarios included in this chapter. In the two models with mitigated emissions, winter low temperatures are expected to rise by 1 to 2°F. In the two models with uncurbed emissions, average winter low temperatures are projected to increase by up to 7 to 9°F by 2100. These increases have potential implications for controlling disease vectors, agricultural pests, and agricultural practices.

More Variable Rain

While there is a direct link between higher GHG emissions and higher temperatures, there is disagreement about whether the future will be wetter or drier overall. Some models predict less annual rainfall in our region, while others predict more. However, all four climate scenarios evaluated in this chapter include more variation in the timing and amount of precipitation from individual rain events. All of the BCM scenarios indicate that Sonoma County will continue to have some years with precipitation similar to historic averages interspersed with more extreme conditions. The “Warm/Wet” scenario projects some years with an almost 75% increase in mean annual precipitation, while the “Hot/Dry” and “Warm/Dry” scenarios project years with decreases

between 25–50% of historical averages (see Figure 6-4). Overall, the wettest scenario projects almost a 25% increase in precipitation compared to historical (20th century) conditions, whereas the driest scenario projects an approximately 20% decrease.

**Figure 6-4. Graph of Annual Precipitation
Projected under Four Representative Climate Futures**



Whether the North Bay region experiences more or less total rainfall, the land will likely be drier overall because warmer temperatures increase evapotranspiration. Because most models project a shorter, more condensed wet season, this shift in rainfall timing combined with warmer weather causes soils and plants to dry out more by the end of the summer season compared to current conditions. Even models that project more winter rain also project reduced available soil moisture.



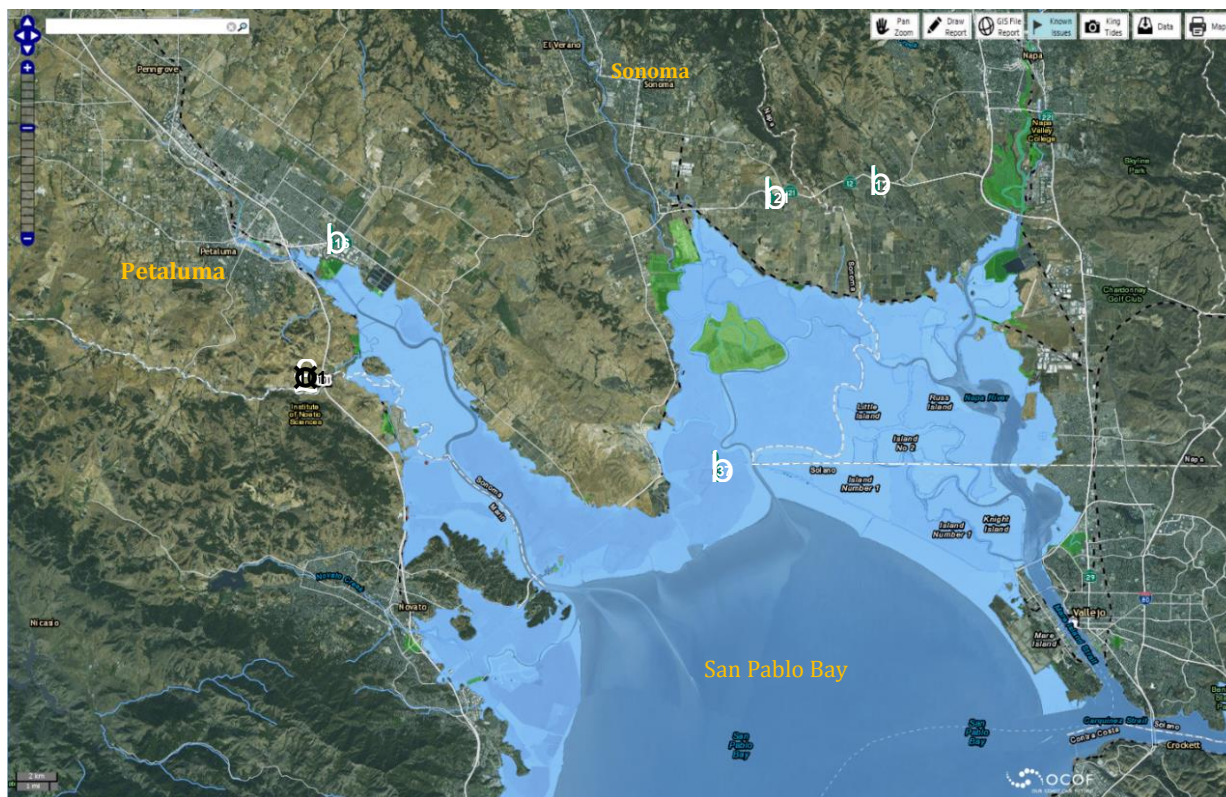
Increased Risk of Extreme Floods: The climate scenarios project increased seasonal variability of precipitation, runoff, and stream flows for Sonoma County, along with increased likelihood of “extreme” precipitation and drought events that were rare or unprecedented in the historic past. The precise risk of flood events is difficult to predict, however. Much of Sonoma County’s wintertime precipitation comes in the form of “atmospheric rivers” from the Pacific Ocean. An atmospheric river is a relatively narrow ribbon of moisture in the atmosphere with ample moisture and strong winds. These atmospheric phenomena can produce very high precipitation in relatively focused areas. The amount and intensity of precipitation therefore depends greatly on where these atmospheric rivers make landfall. Under climate change projections for California, the average intensity of a typical atmospheric river does not increase, but there may be more years with more frequent storm events and occasional events that are much stronger than historical ones. Moreover, the length of the season over which storm events may occur is predicted to increase. These changes to the patterns of storm events may result in more frequent and more severe floods in Sonoma County.

Sea Level Rise



More Frequent Coastal Flooding, Increased Erosion, and Saltwater Intrusion: Sea levels are projected to rise between 16.5 and 65.8 inches by the end of this century. Rising sea levels, combined with increased storm surge, will lead to more frequent inundation of low-lying areas, and flooding of homes, infrastructure, agricultural lands, and natural areas on the shores of San Pablo Bay and the ocean coast, with the greatest impact anticipated during winter storms.

Figure 6-5. Areas at Risk of Flooding with 39 Inches of Sea-Level Rise in Southern Sonoma County



The areas at risk of flooding in southern Sonoma County with 39 inches of sea-level rise and a 20-year storm near the cities of Petaluma and Sonoma are shown in light blue. Darker blue is the current extent of the bay. Bright green areas are low enough to flood, but are protected by features such as levees or berms. Source: Our Coast Our Future (2014).

Figure 6-6. Areas at Risk of Flooding with 39 Inches of Sea Level Rise near Bodega Bay



Areas at risk of flooding near Bodega Bay with 39 inches of sea-level rise and a 20-year storm are shown in light blue. Darker blue is the current extent of the ocean. Bright green areas are low enough to flood, but are cut off from inundation by features such as levees or road berms. The light green dots show the extent of waves during a 20-year storm; note that waves are projected to pass over Doran Beach and into Bodega Harbor. Source: Our Coast Our Future (2014).

6.3.2 Climate Vulnerabilities in Sonoma County

The discussion in Section 6.3.1 shows that Sonoma County will be exposed to a variety of unavoidable climate change effects. However, as noted above, exposure does not necessarily mean that the community will be sensitive to the effect; individuals, property, and the environment may be exposed to a climate change threat but not sensitive to its consequence. For example, most healthy adults will adjust to small increases in average annual temperatures.

This section explores key vulnerabilities for three categories of community resources—people and social systems, built systems, and natural and working lands. A high-level overview of the resource, including essential functions and importance to the community, is presented first. Because climate sensitivity depends, in part, on baseline conditions, existing climate stressors are also briefly described for each resource. Anticipated vulnerabilities to the hazards identified in Section 6.3.1 are subsequently analyzed. Please refer to the *Hazards and Vulnerabilities Report* for summaries of climate exposures and vulnerabilities for each resource.

People and Social Systems

People and social systems include Sonoma County’s residents and visitors, households, neighborhoods, cities, economic activities, social services, food systems, education, business, emergency services, public safety, and law enforcement. These communities and community systems will exhibit a wide range of abilities to prepare for, respond to, and recover from climate hazards. In particular, disparities in health, education, and income levels will make certain populations and communities more vulnerable to climate change. The social systems that help support basic needs for people—including food, water, shelter, transportation, and healthcare—are also vulnerable to breakdown from climate-related crises, especially those systems that currently suffer from dwindling resources and financial support.

Table 6-2. Climate Change Effects on People and Social Systems

Hotter, Drier Weather with Longer Summers	
More extremely hot days	<ul style="list-style-type: none">• Increased heat-related illness, particularly among those inland, in poor health, working outdoors, in urban heat islands, and/or without air conditioning• Premature death• Added stress on emergency services and health care systems
More frequent and intense droughts	<ul style="list-style-type: none">• Higher prices for water and food• Water shortages from reduced surface and groundwater supplies• Food shortages• Potential pressure on housing and social services due to climate migrants• Increase in respiratory problems• Economic loss from decline in water-dependent recreation and tourism activities
More frequent and intense wildfires	<ul style="list-style-type: none">• Risk of lost connections to energy, water, and food supplies, especially for isolated populations• Displacement and loss of homes• Injuries and death from burns and smoke inhalation• Lung damage and exacerbation of eye and respiratory illness• Economic loss from decline of recreation and tourism following a major fire
Fewer winter nights that freeze	<ul style="list-style-type: none">• Potential increase in disease vectors such as mosquitoes and rodents
More Variable Rain	
Increased risk of extreme floods	<ul style="list-style-type: none">• Death from drowning and injuries from flood• Economic losses for people in low-lying areas along rivers and bay lands, especially those without reliable transportation• Public health risks from damage to sanitation, utility, and irrigation systems• Limitations on access to critical services• Economic impacts on businesses, including agricultural operations, affected by flooding
Sea Level Rise	
Higher sea level and storm surge	<ul style="list-style-type: none">• Physical danger and economic impact for people living near bay lands or the coast• Disruption in the movement of people and goods• Economic loss from inundation of agricultural land

Built Systems

Built systems include residential and non-residential buildings and facilities, and the infrastructure associated with providing water, sanitation, drainage, communications, transportation, and energy. These systems are necessary for maintaining a healthy and well-functioning society, and represent a huge capital investment by both private and public entities. Unfortunately, many built systems and structures are at increased risk of failure due to age and deferred maintenance. For example, Sonoma County's local road network is also falling into

disrepair at an increasing rate. These existing risks are magnified when multiple systems fail at the same time (as in a flood, fire, or other calamity), resulting in cascading impacts throughout the built environment.

Table 6-3. Climate Change Effects on Built Systems

Hotter, Drier Weather with Longer Summers	
More extremely hot days	<ul style="list-style-type: none"> • Damage and disruption to paved roads, rail lines, bridges, electricity transmission lines, and solar and battery facilities • Thermal expansion of bridges • Spikes in energy and water demand; potential stress to supplies • Reduced outputs from thermal power plants, transformers, and other parts of electric systems • Brownouts and blackouts
More frequent and intense droughts	<ul style="list-style-type: none"> • Increased water demand and reduced supply • Disruption of hydropower operations such as Warm Springs Dam; impacts on power generation facilities that rely on water for cooling • Algae and bacterial growth in water supplies • Increased pumping of groundwater leading to well failure, saltwater intrusion, and degraded water quality • Increased evaporation from reservoirs
More frequent and intense wildfires	<ul style="list-style-type: none"> • Disruption of electricity transmission lines • Impacts on roadways • Subsequent landslides that close roads and bury infrastructure, including water supply wells
Fewer winter nights that freeze	<ul style="list-style-type: none"> • None identified
More Variable Rain	
Increased risk of extreme floods	<ul style="list-style-type: none"> • Less predictable reservoir operation • Road closures, landslides, and loss of infrastructure such as bridges/culverts • Increased potholes and roadway damage from intensity of rainfall • Failure of stormwater and waste water treatment systems • Increased cost and complexity for development and infrastructure projects and for retrofitting existing infrastructure
Sea Level Rise	
Higher sea level and storm surge	<ul style="list-style-type: none"> • Damage and/or closure of roads crossing former tidal or estuarine areas (Highways 1 and 37) • Increased storm damage to boats and related shoreline infrastructure • Flooding of low-lying infrastructure such as Sonoma Valley County Sanitation District • Saltwater intrusion and reduced water quality • Disruption of transit routes and travel delays

Natural and Working Lands

Natural lands include Sonoma County's public and private natural and open space areas and the ecosystems these lands support, including wildlife, streams and wetlands, and sensitive species and habitats. Working lands include Sonoma County's diverse and productive agricultural lands. Sonoma County's vineyards, farms, ranches, and timberlands are the cornerstone of the county's economy and add immeasurably to the area's scenic beauty.

Sonoma County has high biodiversity in many of its landscapes and species, potentially increasing the resilience of natural areas overall. However, the county also has many threatened and endangered species, some of which are found only in very limited areas. Stressors such as pollution, loss of streamflow, and invasive species are already causing numerous plants and animals to decline. Habitat fragmentation and development have also compromised the ecological integrity of some landscapes throughout the county, making them more susceptible to climate change hazards. The county's working lands are subject to these same hazards. Agricultural operations depend heavily on the region's historically moderate climate and are therefore vulnerable to the entire range of climate change hazards.

Table 6-4. Climate Change Effects on Natural and Working Lands

Hotter, Drier Weather with Longer Summers	
More extremely hot days	<ul style="list-style-type: none">• Loss of wine grape quality• Land use pressure to develop vineyards closer to the coast• Changes in yield, types, and cultivars of crops• Increased animal vulnerability to pests, stress, and mortality• Lower production in animals• Reduced chill hours
More frequent and intense droughts	<ul style="list-style-type: none">• Increased need for water agricultural land and water-dependent ecosystems• Increased urban water use, at possible expense of agriculture water availability• Shortage of animal feed or rise in cost and access• Increased evapotranspiration from open water sources• Decline or death of water-dependent plants and animals• Potential change in suitable crop varieties, including wine grapes• Increased tree stress and death in timberlands and other forests• Increased off-stream storage of water for agriculture
More frequent and intense wildfires	<ul style="list-style-type: none">• Loss of habitat and agricultural lands• Death of wildlife• Loss of recreational lands and commercial forests• Losses from subsequent erosion and landslides, and sedimentation of streams and wetlands
Fewer winter nights that freeze	<ul style="list-style-type: none">• Unpredictable, potentially sudden, shifts in populations of disease, pests, or invasive species• Earlier vineyard bud break may lead to increased use of water for frost protection
More Variable Rain	
Increased risk of extreme floods	<ul style="list-style-type: none">• Increased erosion and sediment pollution in streams and wetlands• Damage to crops and agricultural lands
Sea Level Rise	
Higher sea level and storm surge	<ul style="list-style-type: none">• Loss of prime recreational and natural areas, including marshes, beaches, mudflats, and dunes• Risk of levee breaches and inundation of agricultural land in formerly tidal areas in southern Sonoma County

6.4 Responding to Climate Change Vulnerabilities

The vulnerabilities outlined in Section 6.3 are significant and cut across virtually all of the county's human and natural systems. Fortunately, many entities in Sonoma County have already begun planning and implementing strategies to increase resilience and readiness for climate change. These strategies target public health and social vulnerability, energy independence, water resource planning, food security, transportation, and conservation. These existing efforts are too

broad to fully capture here, but a sample of critical activities underway is summarized in Table 6-5.

Although impressive and forward-thinking, these current efforts only skim the surface of the effort needed to make our communities truly resilient in the face of climate change. While many entities are increasingly incorporating a climate-changed future into their planning, such as those listed in Table 6-5, a higher-level, more comprehensive approach is also needed to match the scale and variety of climate hazards facing Sonoma County. This broader effort has been led by RCPA and the NBCAI, a collaborative of local organizations. This includes the *Climate Hazards and Vulnerabilities* report that is the basis for this chapter. In 2015, NBCAI and RCPA also sponsored two events with broad participation that clarified the climate readiness challenge and its opportunities for Sonoma County. Section 6.4.1 describes these findings.

6.4.1 Sonoma County Climate Ready Goals

NBCAI, in conjunction with RCPA and other non-governmental partners, is developing a *Roadmap for Climate Resilience* in Sonoma County based on extensive input from public meetings, workshops, focus groups, and technical experts. Over 230 people participated. Out of these events and extensive discussion with multiple interest groups, NBCAI and RCPA developed the following mission for climate readiness efforts in Sonoma County.

Increase the health and resilience of social, natural, and built resources to withstand the impacts of climate change.

The nine goals listed in Table 6-6 are included as part of CA2020 to support this mission. Adoption of these goals by RCPA and local partner agencies (cities and the County) will help set the course for future actions that will increase the adaptive capacity of Sonoma County communities, reduce vulnerability to climate change, and make the county more climate-ready. These goals can also help prioritize the climate mitigation actions identified in Chapter 4 by identifying actions that will increase climate resilience as well as reducing GHG emissions.

Table 6-5. Sample of Existing Local Efforts that Increase Resilience to Climate Change

Public Health and Social Vulnerability	
Hazard Mitigation Planning	Every 5 years, the County updates a local Hazard Mitigation Plan that seeks to reduce death, injuries, property loss, and community disruption caused by natural hazards by analyzing those hazards and developing an implementation plan. Climate change is exacerbating hazards that are already prepared for through the Hazard Mitigation Plan.
Health Action	Health Action is the framework for a community engagement effort, backed by the County, to create a healthier Sonoma County for all residents. Pursuit of Health Action goals in education, health care, and economic security will increase the adaptive capacity of the Sonoma County communities that are most vulnerable to climate change.
Energy	
Energy Independence	The County and cities have implemented a countywide renewable energy and energy efficiency retrofit program that provides incentives, financing, tools, and technical assistance to residential and non-residential property owners. Reducing energy use and increasing on-site generation not only lowers GHG emissions, it also reduces energy costs and helps minimize the health and economic impacts of future climate change-related outages.
Sonoma Clean Power	The County and cities have created a community choice aggregation program that allows more local control in obtaining lower-emission, lower-cost, and more distributed power supplies. These distributed and renewable power sources are less vulnerable to climate-related disruption and come back online faster following an emergency.
Water	
Integrated Water Resource Planning	The Sonoma County Water Agency's <i>Water Supply Strategies Action Plan</i> is a framework for regional integrated water management to increase water supply system reliability, resiliency, and efficiency in the face of limited resources, regulatory constraints, and climate change.
Groundwater Management	Sonoma County Water Agency has led development of Groundwater Management Plans in the Sonoma Valley and Santa Rosa Plain that will improve the ability of groundwater-dependent communities, agricultural operations, rural residents, and ecosystems to function during drought periods. Sonoma County cities, SCWA, the County and water districts are currently engaged in early implementation of the state's new Sustainable Groundwater Management Act.
End-use Water Efficiency	Municipal water and sanitation utilities throughout the county have established programs to support property owners in reducing water use while investing in upgrades to their properties.
On-site Water Storage	The Resource Conservation Districts have led projects to develop on-site water storage on rural and agricultural properties to increase drought resiliency
Food	
Sonoma County Healthy and Sustainable Food Action Plan	The County Department of Health Services has partnered with the Food System Alliance to develop a guide to local action on food production, land and natural resource stewardship, job development, public health, and food system equity, all of which help increase the community's climate resilience. It also encourages practices to support the agricultural sector's ability to adapt to climate change.
Transportation	
Transportation Planning and Investment	Many projects to modernize the transportation system and increase the viability of multiple mobility options are underway through implementation of the Comprehensive Transportation Plan adopted by Sonoma County Transportation Authority. The SMART passenger rail will begin operations in 2016. Countywide Bicycle and Pedestrian Master Plan implementation and Safe Routes to Schools projects support expanded use of lower-cost transportation options that are more reliable under projected climate conditions.
Highway 37 Sea Level Rise planning	Due to its proximity to San Pablo Bay, Highway 37 is at significant risk from sea-level rise and storm surge. Local, regional, and state partners are working to address this infrastructure vulnerability while incorporating habitat enhancements that promote resilience to flooding and storm surge.
Natural and Working Lands	
Climate Action through Conservation	The Sonoma County Agricultural Preservation and Open Space District was created in 1990 to protect working farms and ranches, scenic hillsides, and natural areas that make the county special. The District has preserved over 100,000 acres to date. The District is also working on a <i>Climate Action Through Conservation</i> program to incorporate GHG mitigation and sequestration benefits into land use choices, as well as evaluating the ecosystem services provided by landscapes that will be increasingly important under future climate projections.

Table 6-6. Climate Change Adaptation Goals and Opportunities

Goals	Opportunities	Climate Hazards Addressed
Promote healthy, safe communities	Invest in measures to increase community knowledge and capacity to respond and adapt to climate hazards, including improving baseline health, well-being, and financial security, especially in vulnerable populations. Link vulnerable populations to services that reduce the safety, health, and financial risks related to climate hazards. Reduce non-climate economic and health stressors.	All hazards, especially those sensitive to demographic and economic changes
Protect water resources	Conserve and reuse water, protect and enhance groundwater recharge areas, capture storm- and flood water, protect streamside areas, invest in natural infrastructure. Reduce non-climate stressors such as hydro-modification, pollution, and overuse of water.	Drought, flooding, and infrastructure failure risks to water quantity and quality
Promote a sustainable, climate-resilient economy	Better define the economic risks of climate change. Communicate to businesses and the broader community about practices that contribute to climate resilience and how to implement them. Reduce non-climate stressors.	All hazards, especially those sensitive to demographic and economic changes
Mainstream the use of climate projections (not just past patterns) in planning, design, and budgeting	Educate and share information among government agencies. Create and promote guidelines for how to use climate information in planning and decision making.	All hazards, especially sea-level rise, drought, wildfire, and flooding
Protect coastal, bayside, and inland buffer zones	Protect, expand, and enhance wetlands, water source areas, fire management zones, and flood zones. Review/revise land management plans, development codes, parks plans, and prevention and response plans for floods and fires. Reduce non-climate stressors in these areas.	Sea-level rise, changing temperature and rain patterns, drought, wildfire
Promote food system security and agricultural climate preparedness	Promote peer-to-peer agricultural adaptation networking, including potential need to cultivate alternative crops or adopt new agricultural land management strategies. Reduce non-climate stressors, such as the high cost of land for food production.	Changing temperature and rain patterns, drought, higher food prices
Protect infrastructure: buildings, energy systems, communications systems, water infrastructure, and transportation systems	Conduct a risk assessment by evaluating potential climate impacts on key infrastructure, buildings, and transit systems. Invest in strategies to ensure the long-term sustainability and reliability of energy resources. Reduce non-climate stressors such as deteriorating infrastructure.	Drought, flooding, wildfire, and extreme heat
Increase emergency preparedness	Support continued interagency emergency planning. Educate the public about climate hazards. Assess and address gaps in vulnerable populations' capacity to respond to extreme events. Reduce non-climate stressors such as forest health problems and provide adequate funding for emergency preparedness and response.	Public health and safety impacts of heat, flooding, and wildfire
Monitor the changing climate and its biophysical effects in real time	Measure actual conditions to validate and/or refine models of climate and climate change effects in order to plan and manage with better information.	All hazards

6.4.2 Climate Resilience Co-benefits from GHG Reduction Strategies in CA2020

The GHG reduction measures described in Chapter 4, *Reducing Community Emissions*, will also contribute to the climate readiness of Sonoma County and its resources. Measures under Building Energy will help conserve energy and expand localized, renewable energy generation. These measures will reduce community reliance on the electrical grid, which is vulnerable to climate hazards including extreme weather events, sea-level rise, and heat waves. This, in turn, will help reduce climate-related personal and economic risks for residents and businesses in Sonoma County.

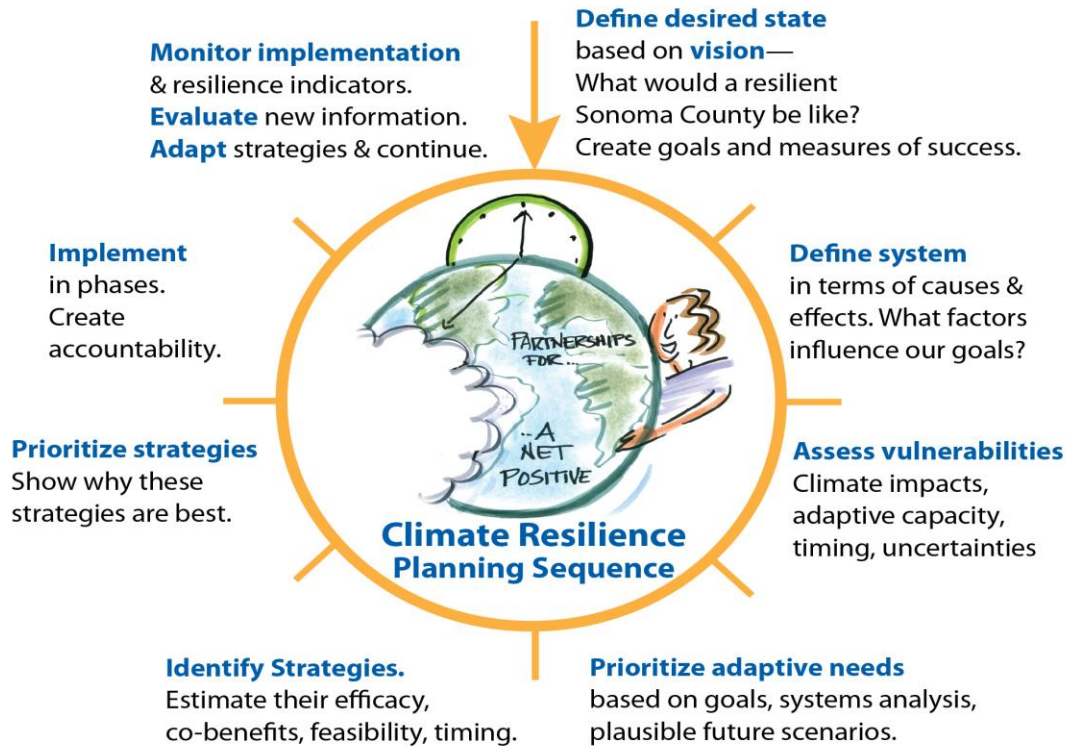
GHG reduction measures under on-road transportation will reduce vehicle miles traveled and increase alternative modes of travel, such as walking, biking, and transit. These measures help reduce stress on the county's aging transportation infrastructure, which is also vulnerable to climate change hazards. Reducing stress on the transportation system helps protect a significant capital investment and avoid service disruptions and the resulting risks to residents and businesses throughout the county.

GHG reduction measures for other sources also provide various resiliency benefits. Strategies to reduce emissions from livestock and fertilizer will also help preserve soil fertility, conserve water, reduce energy use, and support sustainable agricultural products, all of which benefit a community adapting to a changed climate. Increasing reuse of materials and recycling from solid waste helps reduce natural resource use in the manufacture of goods from original materials, thus helping to preserve water supplies, energy supplies, and natural resources that will likely be stressed in the future due to climate change impacts. Protection or enhancement of forests, wetlands, floodplains, or stream systems will not only increase carbon sequestration, but will also bring benefits for water supply, flood control, temperature moderation, and pollination. GHG reduction measures that reduce water demand help reduce climate change vulnerabilities by reducing the demand for stressed water supplies, reducing the amount of water treatment, and reducing the costs associated with water consumption.

6.5 Next Steps

The pervasive nature of anticipated climate change hazards in Sonoma County requires that both public and private entities play a role in enhancing local resilience. The vulnerability assessment summarized above represents some of the first steps in the overall climate readiness sequence, as shown on Figure 6-7.

Figure 6-7. Overall Climate Readiness Sequence for Sonoma County



In line with the goals summarized in Table 6-6, existing efforts to prepare for climate change should be integrated, expanded, and evaluated to explore how well they are serving the community by increasing climate resilience.

On an ongoing basis, climate readiness strategies should be explicitly integrated into existing plans and programs that are already used to promote public health, safety, and prosperity in Sonoma County, including the following.

- **Hazard Mitigation Plans.** Sonoma County’s 2016 hazard mitigation plan will be the first to incorporate current knowledge about climate change and climate hazards facing the county.
- **General Plans, specific plans, and the Local Coastal Plan,** particularly as they relate to locations vulnerable to flood, landslide, and coastal hazards, and locations important for water supply, groundwater recharge, and shoreline protection. As required under new state law (Senate Bill 379, 2015), general plan safety elements must include “climate adaptation and resiliency strategies,” including “goals, policies, and objectives for their communities based on the most current information available regarding climate change adaptation and resiliency.” Senate Bill 379 also allows jurisdictions to use adopted climate action plans, such as CA2020, to meet this new requirement.

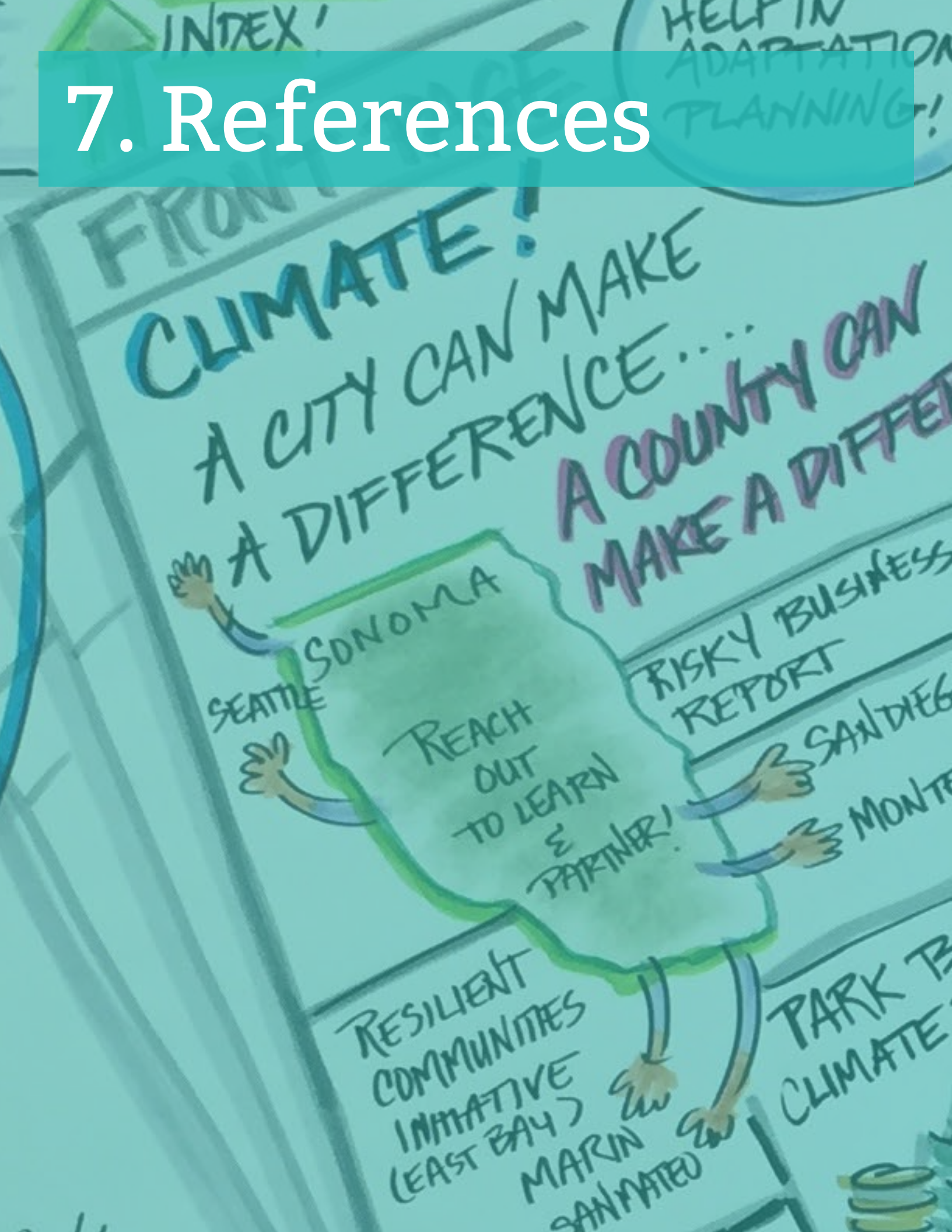
- Parks, trails, and open space plans.
- Water supply, stormwater, and flood management plans and ordinances. Sonoma County Water Agency is also undertaking an in-depth climate adaptation plan for its operations.
- Environmental impact reports.
- Transportation and other capital improvement plans.
- Public health monitoring.
- Emergency preparedness plans.
- Street tree and water-efficiency ordinances.
- Zoning, building, and fire codes.
- Groundwater management plans.
- Administrative policies, procedures, and initiatives.

In every area, from road-building to public health to transit, help is needed to translate technical information about a changed climate future into appropriate actionable steps. Climate adaptation efforts in Sonoma County have already identified a need for Climate Ready Advisors who can help residents, businesses, local governments, and non-governmental organizations make sense of the growing volume of climate hazard information and produce climate-smart decisions, plans, budgets, and priorities.

Local leaders, residents, and stakeholders, such as RCPA, must work together to respond to the county's climate vulnerabilities, implement the goals in Table 6-6, and evaluate how well current and new strategies are increasing community readiness for climate change.

An effective response to the climate challenge requires substantial investment, and therefore calls for a deep analysis of how to make that investment cost effective. As the cities and County have already done with Health Action and an array of new clean-power programs, the community will need to re-imagine and re-align its investments so that new and existing incentives, disincentives, and funding streams result in climate-resilient behavior throughout Sonoma County.

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Chapter 7

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None

JULY 2016

Climate Action 2020 and Beyond

Appendices

Appendix A

Climate Action 2020 Community Climate Action Plan Consistency Checklist Template

This appendix provides a consistency checklist template to be adapted and modified for use by local agency planning staff to assist in determining a discretionary project's consistency with the Climate Action 2020 (CA2020) Community Climate Action Plan (CAP). Participating agencies will modify the checklist based on the details of the implementation measures each agency has agreed to, which will provide a "floor" but not a "ceiling" for individual agency plan compliance. The purpose of the checklist is both to evaluate consistency with the plan and to facilitate local and regional monitoring as required by CEQA Guideline 15183.5. When the checklist is completed for a project, it should be emailed to the RCPA at checklist@rcpa.ca.gov.

Discretionary projects that utilize the checklist, as modified by the individual agency, and can demonstrate consistency with all applicable mandatory local or regional measures in the CAP, can conclude that their impacts related to greenhouse gas (GHG) emissions would be less than significant under CEQA because the project would be consistent with a qualified GHG reduction plan under State CEQA Guidelines Section 15183.5:

(b) Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.

...

(b) (2) A plan for the reduction of greenhouse gas emissions, once adopted following certification of an EIR or adoption of an environmental document, may be used in the cumulative impacts analysis of later projects. An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project.

The significance threshold for projects using the checklist for streamlining is "consistency with an applicable plan for the reduction of greenhouse gas emissions meeting the requirements of CEQA guidelines Section 15183.5."

A.1 Non-Discretionary Projects and Other Projects Exempt from CEQA

Although this checklist applies only to discretionary projects that are not otherwise exempt from CEQA, CA2020 achieves emissions reductions for other projects as well, including those that are exempt from CEQA review. Mandatory requirements in local ordinances or other local and state regulations that reduce GHG emissions (such as Title 24 energy efficiency requirements, a local idling ordinance or other regulations) will still apply to non-discretionary (ministerial) projects as well as to discretionary projects that are otherwise exempt from CEQA.

A.2 Applicability to Discretionary Projects

For the purposes of CEQA streamlining, the checklist may be used for residential, commercial, and mixed use projects.

The checklist may be used for other projects, including industrial projects, but should only be used in combination with a back-stop significance threshold (see A.3, below). This checklist does not provide CEQA streamlining for projects involving larger stationary source GHG emissions or stationary sources that involve combustion of fossil fuels for the purposes of electric power generation. These sources of GHG emissions are not included in CA2020 to avoid duplication of state and federal regulations of these sources, including the California Cap and Trade regulation. If such projects are subject to CEQA, they should be reviewed for applicable measures under the adopted CA2020, but they would not qualify for streamlining.

This checklist is also not suitable for other discretionary agricultural or forestry projects (other than agricultural processing facilities, such as wineries) because the character of emissions associated with such projects, including emissions and sinks related to carbon sequestration, are not part of the formal CA2020 inventory and forecasts, and thus such projects would require separate project-specific analysis and could not tier from CA2020.

A.3 Alternative and Back-Stop Threshold

If the project cannot be found consistent with CA2020, then it will need to use an alternative framework for significance thresholds in the project's CEQA review. This would include, for example, industrial projects and projects that cannot fully implement all applicable checklist measures. As an interim backstop threshold, to be used in combination with any applicable checklist measures, CA2020 recommends using the CEQA threshold developed by the Bay Area Air Quality Management District staff in 2009 (BAAQMD Staff's Revised Draft Options and Justification Report, October, 2009)¹, or another threshold that is at least as effective in reducing or limiting

¹ BAAQMD staff's threshold was developed for the purposes of meeting 2020 targets, and thus the threshold is only an interim threshold for the purposes of this plan.

GHG emissions. For projects other than stationary sources, the BAAQMD significance threshold is 1,100 metric tons of CO₂e per year or 4.6 metric tons of CO₂e per service population (residents and employees) per year. For plan level emissions analysis (e.g., a general plan or specific plan), that significance threshold is 6.6 metric tons of CO₂e per service population per year. All mandatory measures under CA2020 (i.e., those adopted in state statute or local ordinances) would still apply to projects whether or not they tier from CA2020 for CEQA purposes.

A.4 Overview of Checklist Requirements and Monitoring

A project is only required to implement mandatory measures. For voluntary measures, a project is not required to implement the measure, and is only required to identify if it intends to implement the measure for informational purposes and for monitoring. Although many measures are voluntary, tracking their implementation serves a crucial monitoring and adaptive management goal for both the RCPA and the participating agencies. Tracking the implementation of both mandatory and voluntary measures will be critical to future modifications to the plan.

This checklist includes regional and local GHG reduction measures relevant to new projects only. CAP measures that are not relevant to new development or that require no action by new development projects are not included in this checklist.

In addition to the CAP measures, each jurisdiction should add other ordinances or jurisdictional requirements that are related to GHG reductions to this checklist to further support the jurisdiction's determinations concerning GHG reductions.

A.5 How to Use the Checklist

The CAP consistency checklist is used only for proposed development projects that are subject to CEQA and are not otherwise exempt. A project is considered consistent with CA2020 as long as it implements all mandatory measures that are applicable to the project.

Project applicants should complete the checklist prior to filing an application. The applicant should include an explanation of how the proposed project is consistent with or will implement each applicable item on the checklist. If a checklist item is not applicable to the project, the applicant should indicate "N/A" and provide a brief explanation. The checklist prepared by the applicant will be reviewed by local agency staff and revised as necessary to complete the evaluation of the project's consistency with the CAP.

The consistency checklist will be integrated into the development review process at each participating local agency. The process for local agency staff will typically follow these steps:

1. Review the compliance checklist submitted by the project applicant and revise as necessary. Provide a copy of the completed checklist to the RCPA.

2. If the compliance checklist demonstrates that the project will implement all applicable mandatory measures from the CAP, no further CEQA review of the project's contribution to climate change impacts is required. The completed checklist should be referenced in and attached to the CEQA initial study for the project. At this point, staff can complete the project CEQA document and the remaining steps in the local agency's development review process.
 - a. Depending on the project and any actions necessary to ensure compliance with CAP measures, staff may include any necessary mitigation measures in the project CEQA document and in the conditions of approval.
3. If the project is of a type not addressed in the CAP (e.g., an industrial project with stationary source emissions, see A.2), or if the project cannot implement all applicable mandatory CAP measures, then an alternative GHG analysis will be needed for the project CEQA document, as described above in A.3. Typically, this will necessitate a project-specific GHG inventory and development of project-specific mitigation measures.

Basic Template for Community Climate Action Plan Compliance Checklist Table for Greenhouse Gas Analysis

Table 1. Private Development Projects

A. General Project Information:

Date:	_____	
Project name:	_____	Case No: _____
Project address:	_____	
Compliance Checklist Prepared By:	_____	Date: _____
Brief Project Description:	_____	

B. Compliance Checklist Table:

Instructions: Complete the following table by determining if the project will implement actions consistent with the identified GHG reduction measures and providing project-level details in the “Remarks” column. Projects that do not comply with a mandatory measure may be determined to be inconsistent with CA2020.

For voluntary measures, a project is not required to implement the measure, and is only required to identify if it intends to implement the measure for informational purposes only. A project is considered consistent with CA2020 as long as it implements all mandatory measures that are applicable to the project. Voluntary measures implemented should be noted for the purpose of plan monitoring. For the purposes of the monitoring required by CEQA Guideline 15183.5, please email completed checklists to RCPA at checklist@rcpa.ca.gov.

Table 2. Mandatory Requirements and Voluntary Measures Applicable to New Development Projects

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 1: Increase Building Energy Efficiency			
1-S1. Title 24 Standards for Commercial and Residential Buildings [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with local building code regarding energy efficiency?</i></p> <p>The California Building Standards Commission is responsible for adopting and updating Title 24 standards, which then become the default standards for jurisdictions throughout the state. Building departments in each Sonoma County jurisdiction implement this measure through local building code adoption.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
1-S2. Lighting Efficiency and Toxics Reduction Act (AB 1109) [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with local building code regarding lighting efficiency?</i></p> <p>The California Energy Commission is responsible for implementing this measure through the prescription of minimum efficiency lighting standards. Minimum lighting standards are implemented through local building code.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
1-L1. Expand the Green Building Ordinance Energy Code [Windsor Only]	<p>MANDATORY: <i>Does the project comply with the Town of Windsor's building code pertaining to expanded Green Building requirements?</i></p> <p>The Town of Windsor will require compliance with community energy efficiency standards which exceed Title 24 standards 1 by 10%.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
1-L2. Outdoor Lighting [All jurisdictions except Cloverdale]	<p>MANDATORY: <i>Does the project comply with local LED outdoor lighting requirements?</i></p> <p>Participating jurisdictions have identified that they will require new development to use light-emitting diode (LED) bulbs for outdoor lighting.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
1-L3. Shade Tree Planting [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with local shade tree planting requirements?</i></p> <p>VOLUNTARY: <i>If there are no mandatory shade tree planting requirements applicable to the project, projects are still encouraged to plant shade trees where appropriate. If the project will voluntarily install shade trees, please check “not applicable” and “project includes voluntary shade tree planting,” and describe.</i></p>	<input type="checkbox"/> Project Complies with Mandatory Requirements <input type="checkbox"/> Project Does Not Comply with Mandatory Requirements <input type="checkbox"/> Mandatory Requirements Not Applicable <input type="checkbox"/> Project includes voluntary shade tree planting	
1-L4. Co-Generation Facilities [Petaluma, unincorporated county only]	<p>VOLUNTARY: <i>Does the project include co-generation facilities?</i></p> <p>For large commercial or industrial projects (>100,000 square feet), co-generation facilities are voluntary but are encouraged for suitable large developments. If the project will voluntarily include cogeneration, please check “not applicable” and describe.</p>	<input type="checkbox"/> Project Includes Co-generation <input type="checkbox"/> Project Does Not Include Co-generation <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 2: Increase Renewable Energy			
2-S2. Solar Water Heaters [All jurisdictions]	<p>VOLUNTARY: <i>Does the project include solar hot water heating?</i></p> <p>Installation of solar water heaters is voluntary (unless required by other statute) but is encouraged for all applicable projects. The state's Residential Solar Water Heater Program (AB 1470) creates a \$25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas and electricity use in homes and businesses throughout the state. The Public Utilities Commission will design and implement a program of incentives for the installation of solar water heaters.</p>	<input type="checkbox"/> Project Includes Solar Hot Water <input type="checkbox"/> Project Does Not Include Solar Hot Water <input type="checkbox"/> Not Applicable	
2-R1. Community Choice Aggregation [All jurisdictions other than Healdsburg]	<p>VOLUNTARY: <i>Will the project will participate in SCP and, if so, will it participate in CleanStart or EverGreen?</i></p> <p>Participation in SCP is voluntary but is encouraged for all projects. Sonoma Clean Power (SCP) is a community choice aggregation (CCA) program and electricity provider that works with Pacific Gas & Electric Company (PG&E) to provide their customers with electricity that has a higher renewable energy content. SCP offers two participation options for the CCA: the CleanStart option provides 33% renewable power in 2014, and the EverGreen option, which provides 100% renewable power. This measure includes the potential to increase participation in the CleanStart and EverGreen options by 2020.</p>	<input type="checkbox"/> Project Participates in SCP <input type="checkbox"/> Project Does Not Participate in SCP <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
2-L1. Solar in New Residential Development [Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma and Windsor only]	<p>MANDATORY: <i>Does the project comply with local requirement(s) for rooftop solar PV on new residential development?</i></p> <p>Each participating jurisdiction will define which new development must provide rooftop solar photovoltaic (PV) by defining qualifying criteria (such as “all projects with more than 5 units”) and the amount of solar required (such as “20% of electricity demand from on-site solar”) depending on the structure of the local measure and target penetration rate.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
2-L2. Solar in Existing Residential Buildings [All jurisdictions]	<p>MANDATORY: <i>Does the remodel or alteration project comply with local requirement(s) for rooftop solar PV on existing residential development?</i></p> <p>Applies if participating jurisdiction decides that remodels/renovations are required to meet community-defined target for solar installations. Each participating jurisdiction to define qualifying criteria for remodels and renovations (such as the minimum square footage) and amount of solar (such as 10% of remodel square footage) depending on the structure of the local measure and target penetration rate.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
2-L3. Solar in New Non-Residential Developments [Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, Sonoma, and Windsor only]	<p>MANDATORY: <i>Does the project comply with local requirement(s) for rooftop solar PV on new non-residential development?</i></p> <p>Each participating jurisdiction must define which new development must provide rooftop solar PV by defining qualifying criteria (such as “all projects over 50,000 square feet”) and amount of solar required (such as “20% of electricity demand from on-site solar”) depending on the structure of the local measure and target penetration rate.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
2-L4. Solar in Existing Non-Residential Buildings [All jurisdictions]	<p>MANDATORY: <i>Does the remodel or alteration project comply with local requirement(s) for rooftop solar PV on existing non-residential development?</i></p> <p>Applies if participating jurisdictions decide that removal/renovations are required to meet community-defined targets for solar installations. Each participating jurisdiction must define which remodels/renovations must provide rooftop solar PV by defining qualifying criteria (such as “all projects over 20,000 square feet”) and how much solar is required (such as “provide 10% of electricity demand from remodeled space”) depending on the structure of the local measure and target penetration rate.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 3: Switch Equipment from Fossil Fuel to Electricity			
3-R1. Stationary Fuel Switching Incentives [All jurisdictions]	<p>VOLUNTARY: <i>Does the project will include installation of alternatives to propane, fuel oil, and other fossil fuels for heating</i></p> <p>New buildings are encouraged to use on-site PV electric generation instead of propane for heating and other applicable uses. The Regional Climate Protection Authority (RCPA), SCP, County of Sonoma Energy and Sustainability Division, and Northern Sonoma County Air Pollution Control District (NSCAPCD) will be creating the incentives to support this measure. These agencies will coordinate with the local jurisdictions to develop outreach efforts to achieve widespread implementation each jurisdiction.</p>	<input type="checkbox"/> Project Includes Alternative Fuels <input type="checkbox"/> Project Does Not Include Alternative Fuels <input type="checkbox"/> Not Applicable	
3-L1 Convert to Electric Water Heating [Healdsburg, Petaluma, Rohnert Park, Sebastopol and Windsor only]	<p>MANDATORY: <i>Does the project comply with mandatory requirements adopted by the local jurisdiction?</i></p> <p>VOLUNTARY: <i>If no mandatory requirement applies, but the project will voluntarily include conversion to electric water heating, please check “not applicable” and “project includes voluntary conversion to electric water heating,” and describe.</i></p>	<input type="checkbox"/> Project Complies with Mandatory Requirements <input type="checkbox"/> Project Does Not Comply with Mandatory Requirements <input type="checkbox"/> Mandatory Requirements Not Applicable <input type="checkbox"/> Project includes voluntary conversion to electric water heating	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 4: Reduce Travel Demand Through Focused Growth			
4-L1. Mixed-Use Development in City Centers and Along Transit Corridors [All jurisdictions]	<p>MANDATORY: <i>Is the project consistent with the jurisdiction's adopted policies regarding mixed use development, including policies and requirements in adopted general plans, area plans, specific plans, and zoning codes?</i></p> <p>The jurisdictions will identify and support mixed use development in city-centers and transit-oriented development locations through their General Plans, Area Plans, and Specific Plans and zoning codes.</p>	<input type="checkbox"/> Project is Consistent <input type="checkbox"/> Project is Not Consistent <input type="checkbox"/> Not Applicable	
4-L2. Increase Transit Accessibility [All jurisdictions, except unincorporated county]	<p>MANDATORY: <i>Is the project consistent with the jurisdiction's adopted policies regarding transit accessibility, including policies and requirements in adopted general plans, area plans, specific plans, and zoning codes?</i></p> <p>Each jurisdiction will identify potential areas for transit-oriented development and include policies and incentives to encourage development near high-quality transit service. General Plans, Specific Plans, zoning codes, and ordinances will define requirements for transit accessibility to encourage transit-oriented development. Each jurisdiction will also identify potential incentives that may include reduced parking requirements, reductions in building and permit fees, density increases, and other related items.</p>	<input type="checkbox"/> Project is Consistent <input type="checkbox"/> Project is Not Consistent <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
4-L3. Supporting Land Use Measures [All jurisdictions]	<p>VOLUNTARY: <i>Does the project include installation of transit and/or other amenities as described below?</i></p> <p>Participating jurisdictions will encourage new development to provide amenities to support transit and other modes of transportation, including transit stops, bicycle facilities, good pedestrian networks, car-sharing locations, and electric vehicle (EV) charging stations and to encourage residential developments at a variety of price points to increase options for workers (especially public serving employees) of Sonoma to live within the county.</p>	<p><input type="checkbox"/> Project Includes Transit and/or Other Amenities</p> <p><input type="checkbox"/> Project Does Not Include Transit and/or Other Amenities</p> <p><input type="checkbox"/> Not Applicable</p>	
4-L4. Affordable Housing Linked to Transit [All jurisdictions, except unincorporated county]	<p>MANDATORY: <i>Does the project comply with adopted policies and ordinances regarding location of affordable housing near transit corridors, transit hubs and downtown cores?</i></p> <p>VOLUNTARY: <i>If there are no mandatory requirements and the project will voluntarily provide support for affordable housing near transit, please check “not applicable” and “project includes voluntary support,” and describe.</i></p> <p>Each jurisdiction would develop policies and incentives to encourage affordable housing development for cities and unincorporated county. The jurisdictions would draft new ordinances or offer incentives encouraging the affordable housing development near transit hubs and city centers. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density, and other related items.</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary support for affordable housing near transit</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options			
5-R3. Sonoma Marin Area Rail Transit [Cloverdale, Healdsburg, Windsor, Rohnert Park, Cotati, Petaluma and unincorporated county]	<p>MANDATORY: <i>If project is in proximity to a SMART station or connecting pedestrian and bicycle facilities, is it consistent with any adopted requirements supportive of SMART, including policies and requirements in General Plans, Area Plans, Specific Plans, Station Area Plans, zoning codes, or infrastructure plans?</i></p> <p>SMART and jurisdictions along the SMART Corridor are establishing policies to support SMART, such as transit-oriented development at planned SMART stations, future local transit planning for SMART, and pedestrian and bicycle facilities to connect to SMART stations.</p>	<input type="checkbox"/> Project is Consistent <input type="checkbox"/> Project is Not Consistent <input type="checkbox"/> Not Applicable	
5-R4. Trip Reduction Ordinance [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with the adopted Trip Reduction Ordinance?</i></p> <p>Sonoma County Transportation Authority (SCTA) will develop and local jurisdictions will adopt and both will implement a Trip Reduction Ordinance (TRO) requiring employers with 50+ employees to offer one of the following: pre-tax transit expenses, transit or vanpool subsidy, free or low-cost shuttle, or an alternate benefit. The TRO may also consider more ambitious recommendations such as specific transportation demand management (TDM) programs offered to all employees, annual monitoring and reporting requirements, or specific trip reduction or mode share target rates. The TRO will also provide a non-trip reduction alternative in the form of purchase of an equivalent amount of GHG offsets for employer.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-R5. Supporting Measures for the Transportation Management Program [All jurisdictions]	<p>VOLUNTARY: <i>Does the project include Transportation Demand Management measures?</i></p> <p>SCTA will develop a TDM program that incorporates the following: Support for employer-based TDM program efficiency; TDM programs in specified business districts; support for development of jurisdiction-specific TDM programs, including programs such as transit subsidies or parking cash-out for new development. The jurisdictions may develop a TDM program for employers which may include the strategies mentioned above and assist interested employers in implementing strategies, and may offer financial incentives for employers.</p>	<input type="checkbox"/> Project Includes TDM Measures <input type="checkbox"/> Project Does Not Include TDM Measures <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-R6. Reduced Cost Transit Passes [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with any adopted reduced-cost transit pass requirements?</i></p> <p>VOLUNTARY: <i>Where subsidized transit pass provision is not a mandatory requirement, it is nonetheless encouraged. If the project will include the voluntary provision of subsidized transit passes, please check “not applicable” and “includes voluntary reduced-cost transit passes,” and describe.</i></p> <p>SCTA would work to identify funding for and/or assist in subsidizing reduced transit passes. Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be responsible for rolling out and publicizing reduced transit passes. Agencies would encourage employers and new developments to provide reduced-cost monthly transit passes. Each jurisdiction would partner with transit agencies to negotiate cost-sharing and facilitate transit pass distribution. Requirements could be implemented for new or expanded employers with 50 employees or more (to be consistent with Senate Bill 1339) and new residential projects of 25 units or more. If a local jurisdiction decides to make requirements mandatory, then a non-trip reduction alternative, in the form of required purchase of an equivalent amount of GHG offsets, shall be provided for employers choosing not to implement trip reductions.</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary reduced-cost transit passes</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-R7. Alternative Travel Marketing & Optimize Online Service [All jurisdictions]	<p>MANDATORY: Does the project comply with any adopted requirements for marketing alternative transportation services?</p> <p>VOLUNTARY: Where alternative transportation marketing is not a mandatory requirement, it is nonetheless encouraged. If the project will include the voluntary marketing for alternative transportation, please check “not applicable” and “includes voluntary marketing measures,” and describe.</p> <p>SCTA would be the lead agency to implement this measure and would find funding for or subsidize communication channels to provide information on alternate travel means. Local jurisdictions would work with SCTA to ensure that consistency in service and information is maintained throughout the county. SMART will also be doing travel marketing for its services.</p> <p>The jurisdictions would provide targeted marketing in various formats to employees, employers, residents, and developers. Agencies would update existing online resources with current TDM strategy information and promote the use of these online resources when implementing other TDM strategies. Marketing materials should provide accurate and timely information regarding commute reduction strategies. Information could be rolled into human resources policies for new employee orientation. Real-time transit data could be made available online with trip planning tools, with mobile phone apps as a future development. These marketing efforts could be made mandatory for new residential projects consisting of 25 units or more, and new or expanded projects with 50 employees or more (consistent with Senate Bill 1339).</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary marketing measures for alternative transportation</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-R8. Safe Routes to School [All jurisdictions]	<p>MANDATORY: <i>Is the project consistent with adopted requirements for safe routes to school?</i></p> <p>VOLUNTARY: <i>Where these requirements are not mandatory, they are encouraged where applicable. If the project will provide any voluntary support for safe routes to school, please check “not applicable” and “includes voluntary Safe Routes to School,” and describe.</i></p> <p>SCTA, working with local school districts, would be the lead agency to implement this measure and find funding for or subsidize safe routes to school programs. Local jurisdictions and school districts would need to coordinate on bus routes that cross jurisdictions. SCTA would partner with local schools to tailor the program to fit each school’s needs and help look for funding to support the program.</p>	<input type="checkbox"/> Project Complies with Mandatory Requirements <input type="checkbox"/> Project Does Not Comply with Mandatory Requirements <input type="checkbox"/> Mandatory Requirements Not Applicable <input type="checkbox"/> Project includes voluntary Safe Routes to School measures	
5-R9. Car Sharing Program [All jurisdictions]	<p>VOLUNTARY: <i>Will the project provide car share parking spaces?</i></p> <p>RCPA/SCTA would be the lead agency to implement this measure, and would work with the Sonoma County Air Resources Team and find funding for or subsidize mobile device infrastructure needed to implement a car sharing program. RCPA/SCTA could consider partnering with commercial car sharing service providers to identify locations or markets to roll out the service.</p>	<input type="checkbox"/> Project Includes Car Share Parking <input type="checkbox"/> Project Does Not Include Car Share Parking <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L1. Local Transportation Demand Management Program [Cloverdale, Cotati, Healdsburg, Rohnert Park, Sebastopol, unincorporated county]	<p>MANDATORY: <i>Is the project consistent with adopted TDM requirements for businesses with 50 or more employees?</i></p> <p>VOLUNTARY: <i>If the project is not required to implement TDM, then TDM measures are still encouraged where appropriate. If any voluntary TDM measures will be implemented by the project, please check “not applicable” and “includes voluntary TDM above minimum TRO requirements,” and describe.</i></p> <p>This measure supports TDM measures for employers with fewer than 50 employees, additional voluntary TDM measures (beyond the minimum TRO requirements) for larger employers, and requirements for TDM measures in new large residential projects.</p> <p>TDM programs may include: participation in vanpool programs, EV charging stations, reduced parking requirements for affordable or senior housing projects, reduced cost transit passes, unbundled parking costs, priced parking, bicycle amenities, car-share pods, telecommuting and alternative work schedules, ride-matching services, and emergency ride home.</p> <p>Each jurisdiction will define the threshold for application of the ordinance, the specific TDM measures to be implemented, and methods to methods for monitoring employer compliance. Incentives for voluntary TDM by employers with fewer than 50 employees may also be used, such as reduced parking requirements, reductions in fees, and other related items.</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary TDM measures above minimum TRO requirements</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L2. Carpool-Incentives & Ride-Sharing Program <i>[Cloverdale, Cotati, Healdsburg, Rohnert Park, Sebastopol, unincorporated county]</i>	<p>VOLUNTARY: <i>Does the project will include voluntary carpool or rideshare elements or support?</i></p> <p>Each participating jurisdiction will create or promote a regional ride-sharing program and encourage participation by local employers through their TDM programs with a focus on large employers to create programs.</p>	<input type="checkbox"/> Project Includes Carpool or Rideshare Measures <input type="checkbox"/> Project Does Not Include Carpool or Rideshare Measures <input type="checkbox"/> Not Applicable	
5-L3. Guaranteed Ride Home <i>[Cloverdale, Cotati, Sebastopol, unincorporated county]</i>	<p>MANDATORY: <i>Does the project comply with any adopted “guaranteed ride home” requirements?</i></p> <p>VOLUNTARY: <i>If there are no mandatory guaranteed ride home requirements applicable to the project and the project will voluntarily implement guaranteed ride home programs, please check “not applicable” and “voluntary guaranteed ride home measures,” and describe.</i></p> <p>Participating jurisdictions would implement a guaranteed ride home program that provides a free car share, shuttle, or taxi ride home to employees in case of an emergency (illness, family crisis, unscheduled overtime) for employees who uses an alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency.</p>	<input type="checkbox"/> Project Complies with Mandatory Requirements <input type="checkbox"/> Project Does Not Comply with Mandatory Requirements <input type="checkbox"/> Mandatory Requirements Not Applicable <input type="checkbox"/> Project includes voluntary guaranteed ride home measures	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L4. Supporting Bicycle/Pedestrian Measures [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with mandatory bike and pedestrian master plan requirements?</i></p> <p>VOLUNTARY: <i>If there are no facilities in the bike and pedestrian master plan in the project area and no relevant municipal code requirement, but the project will voluntarily include bicycle and pedestrian facilities, please check “not applicable” and “voluntary bicycle/pedestrian facilities,” and describe.</i></p> <p>SCTA will work with the cities and county transit agencies to coordinate the identification and implementation of cross-jurisdictional bicycle and pedestrian corridor projects. Each jurisdiction will update municipal codes and prepare or update their bike/pedestrian master plan, as needed. The bike and pedestrian master plans will outline needed improvements and the areas identified for expansion. Communities will also coordinate with transit agencies to improve the bike-transit facilities. Facilities may include projects to close bicycle/pedestrian route gaps, increased bike storage on buses, at bus stops, and at transit hubs, bicycle facilities at all park-and-ride lots and transit stations, and bike sharing programs.</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary bicycle and pedestrian facilities</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L5. Traffic Calming [All jurisdictions]	<p>MANDATORY: <i>Is the project consistent with adopted traffic calming measures?</i></p> <p>Each jurisdiction will develop a strategy to implement traffic-calming measures in downtown cores, accident hotspot locations, near schools and libraries, and other areas appropriate to their community setting. Traffic-calming measures can be made a condition of new development approvals where appropriate and can be incorporated in General Plans, Area Plans, and Specific Plans. Specific measures may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.</p>	<input type="checkbox"/> Project is Consistent <input type="checkbox"/> Project is Not Consistent <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L6. Parking Policies [Cloverdale, Healdsburg, and unincorporated county only]	<p>MANDATORY: <i>Does the project comply with parking policies or ordinances adopted to reduce single-occupancy vehicle travel?</i></p> <p>VOLUNTARY: <i>If there are no mandatory parking requirements applicable to the project, but the project will voluntarily implement any measures such as shared parking, reduced parking, providing transit or bicycle facilities, etc., please check “not applicable” and “voluntary parking measures,” and describe</i></p> <p>This measure would implement additional parking policies to promote reduction in single-occupancy vehicle travel. Requirements may include on-street market pricing in downtown areas, reduced parking requirements, shared parking, and in-lieu fees, in combination with providing transit and bicycle facilities, in appropriate areas.</p> <p>Each participating jurisdiction would be responsible for implementing this measure. Staff would develop a process for implementation and management, which may include updating municipal codes. The jurisdictions would draft new ordinances and/or general plan policies, or offer incentives encouraging reduced parking requirements and increased transit or bicycle facilities.</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary parking measures</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L7. Supporting Parking Policy Measures [All jurisdictions, except Rohnert Park]	<p>MANDATORY: Does the project comply with any mandatory requirements for prioritized parking for hybrid/EV cars, carpools, and vanpools?</p> <p>VOLUNTARY: If there are no mandatory prioritized parking requirements, but the project will voluntarily implement any prioritized parking, please check “not applicable” and “voluntary measures,” and describe</p> <p>This measure includes the promotion of prioritized parking for hybrid/EV cars, carpools, vanpools at city-centered corridors, new developments, public parking areas, and municipal facilities. Participating jurisdictions may consider amending zoning code to require new parking lots to provide prioritized parking for carpools, vanpools, hybrids, and EVs, and provide charging facilities and/or incentives.</p>	<p><input type="checkbox"/> Project Complies with Mandatory Requirements</p> <p><input type="checkbox"/> Project Does Not Comply with Mandatory Requirements</p> <p><input type="checkbox"/> Mandatory Requirements Not Applicable</p> <p><input type="checkbox"/> Project includes voluntary priority parking for EVs and/or other transport modes</p>	

Goal 6: Increase Vehicle and Equipment Fuel Efficiency

All measures supporting this goal (Measure 6-S1. Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard [LCFS], Measure 6-S2. Advanced Clean Cars, and Measure 6-S3. Assembly Bill 32 Vehicle Efficiency Measures) are state measures that will benefit new projects using passenger vehicles and trucks, but will require no project-level actions.

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicle and Equipment			
7-R1. Shift Sonoma County (Electric Vehicles)	<p>With RCPA/SCTA as the lead, and in partnership with SCP, this measure would implement a countywide EV promotion program. The measure may include incentives for EV home, commercial, or institutional chargers, promotion of EV purchase, preferential public parking, working with employers to provide preferential parking and charging stations, working with the hospitality and wineries to promote an “EV/wine trail,” demonstration projects, education, and outreach.</p> <p>Implementation of this measure for new development projects will occur under local measure 7-L1.</p>	Not Applicable to development projects; see Measure 7-L1	
7-R2. Alternative Fuels for Transit Vehicles	<p>VOLUNTARY: <i>Does the project will include the use of alternatively fueled vehicles?</i></p> <p>SCTA will work with transit agencies to replace diesel and gasoline buses with hybrid buses or compressed natural gas buses and to establish a goal to replace at least 50% of the bus fleet with alternatively fueled buses. This measure may also include the replacement of diesel and gasoline buses with electric buses as feasible.</p>	<input type="checkbox"/> Project Includes Alternative Fueled Vehicles <input type="checkbox"/> Project Does Not Include Alternative Fueled Vehicles <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
7-L1. Electric Vehicle Charging Station Program [All jurisdictions]	<p>VOLUNTARY: <i>Does the project include EV charging stations and/or EV-ready infrastructure?</i></p> <p>The participating jurisdictions would work with PG&E and SCP to identify grants and other funding sources to help finance the installation of charging stations throughout the county. In addition, SCP, County of Sonoma Energy and Sustainability Division (through available PACE financing options), and NSCAPCD would create a package to install and finance charging stations.</p>	<input type="checkbox"/> Project Includes EV Charging or Infrastructure <input type="checkbox"/> Project Does Not Include EV Charging or Infrastructure <input type="checkbox"/> Not Applicable	
7-L2 Electrify Landscaping Equipment [Cotati, Healdsburg, Petaluma, Sebastopol, and Windsor]	<p>MANDATORY: <i>Does the project comply with adopted requirements for electrified landscaping equipment?</i></p> <p>Participating jurisdictions would adopt an ordinance that reduces gasoline-powered landscaping equipment use and/or reduces the number and operating time of such equipment. New development would be required to provide adequate amount and location of electrical outlets to allow use of electrical landscaping equipment. New development would also be also required to prepare landscaping plans that commit to any jurisdictional targets for use of alternatively fueled or electric landscape equipment goals.</p>	<input type="checkbox"/> Project is Consistent <input type="checkbox"/> Project is Not Consistent <input type="checkbox"/> Not Applicable	
7-L3. Electrify Construction Equipment [Cotati, Healdsburg, Petaluma, Sebastopol, and Windsor]	<p>MANDATORY: <i>Does the project comply with adopted requirements for use of alternatively fueled equipment (including electrical equipment) during project construction?</i></p> <p>Each participating jurisdiction has identified a goal for construction equipment use of alternative fuels or electricity in place of diesel and gasoline.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
7-L4. Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching <i>[Only applies to agricultural projects]</i>	<p>VOLUNTARY: <i>Does the project include use of alternatively fueled and/or efficient agricultural equipment and vehicles?</i></p> <p>This voluntary measure would include supporting farmers to reduce fuel use in agricultural equipment by converting equipment currently using gasoline, diesel, or liquid propane gas to alternative fuels with lower GHG intensity (such as natural gas, biofuels, or solar electricity) as feasible, keep equipment maintained and in good working order, replace old equipment with newer and more efficient equipment, and use global positioning systems (GPS) to optimize equipment operation. A particular focus may be expanding renewable energy use for water pumps and wind machines.</p>	<input type="checkbox"/> Project Includes Alternately Fueled equipment/vehicles <input type="checkbox"/> Project Does Not Include Alternately Fueled equipment/vehicles <input type="checkbox"/> Not Applicable	
Goal 8: Reduce Idling			
8-L1. Idling Ordinance <i>[Petaluma, Rohnert Park, Sebastopol, Sonoma, and unincorporated county only]</i>	<p>MANDATORY: <i>Does the project comply with the adopted idling ordinance?</i></p> <p>Participating jurisdictions will adopt new ordinances that limit idling for commercial vehicles to no more than 3 minutes.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
8-L2. Idling Ordinance for Construction Equipment <i>[Petaluma, Rohnert Park, Sebastopol, and unincorporated county only]</i>	<p>MANDATORY: <i>Does the project comply with the adopted idling ordinance for construction equipment.</i></p> <p>Participating jurisdictions will adopt new ordinances that limit idling for construction vehicles and equipment to no more than 3 minutes.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 9: Increase Solid Waste Diversion			
9-R1. Waste Diversion Goal [All jurisdictions]	<p>MANDATORY: Does the project comply with applicable countywide and/or jurisdictional ordinances concerning mandatory waste minimization and diversion requirements?</p> <p>The Sonoma County Waste Management Agency (SCWMA) would be the lead agency for implementing this measure. SCWMA could create a fund for new and expanded waste collection programs that the jurisdictions could contribute money to, and facilitate countywide or individual jurisdiction waste ordinances. Local jurisdictions would work with waste providers to identify baseline diversion rates, opportunities for additional waste diversion, and achievable diversion goals before a certain time period, all of which can be incorporated into the waste provider's contract with a jurisdiction.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
9-L1. Construction and Demolition Reuse and Recycling Ordinance [All jurisdictions]	<p>MANDATORY: Does the project include a Construction Phase Recycling Plan that meets the minimum diversion rate for C&D waste?</p> <p>Each jurisdiction has or will adopt minimum diversion rates for Construction and Demolition (C&D) waste. [NOTE: Community to identify specific diversion rate.]</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
Goal 10: Increase Capture and Use of Methane from Landfills			
<p>The measure supporting this goal (Measure 10-R1. Waste-to-Energy Facilities) would only apply to landfills and would support installation of methane capture technology and associated monitoring systems on all landfills without methane capture and that are not otherwise required to install or upgrade equipment under the state rule, with a goal of reaching the highest feasible methane capture rate (i.e., approaching 100%). This measure would also increase methane capture at landfills that already capture methane by expanding existing collection wells and would support increased electricity generation capacity at the Central Disposal Site by an additional 1.8 gigawatt-hour (GWh) by 2020. While this measure will help to reduce the GHG emissions associated with landfilled waste from new development, it requires no project-level action by development projects.</p>			

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 11: Reduce Water Consumption			
11-R1. Countywide Water Conservation Support and Incentives [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with all local or regionally adopted water conservation measures?</i></p> <p>Sonoma County Water Agency (SCWA) is responsible for implementing this measure in cooperation with the local jurisdictions. SCWA would identify areas where additional conservation would be most effective and develop conservation goals. The local jurisdictions would work with SCWA to identify conservation opportunities, and to develop new ordinances or general plan policies pertaining to water conservation.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
11-L1. Senate Bill X7-7 – Water Conservation Act of 2009 [All jurisdictions]	<p>MANDATORY: <i>Does the project comply with all local or regionally adopted water conservations to implement the requirements of SB X7-7?</i></p> <p>This statute requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per-capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the “20X2020 goal”). Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target (in terms of gallons per capita per day) to meet this goal. Specific per-capita water use reduction goals vary by water agency.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
11-L2. Water Conservation for New Construction <i>[Petaluma, Rohnert Park, Sebastopol, Sonoma, and Windsor only]</i>	<p>MANDATORY: <i>Does the project comply with all local building standards and codes relative to water efficiency in new construction?</i></p> <p>Under this measure, participating jurisdictions will update building standards and codes for new buildings to require adoption of voluntary CALGreen Tier 1 water efficiency measures, including use of low-water irrigation systems, installation of rainwater systems, installation of water-efficient appliances and plumbing fixtures, a 30% to 40% reduction over baseline indoor water use, and a 55% to 60% reduction in outdoor potable water use (CALGreen Tier 1 or 2).</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	
11-L3. Water Conservation for Existing Buildings <i>[Petaluma, Rohnert Park, Sebastopol, Sonoma, and Windsor only]</i>	<p>MANDATORY: <i>Does the project comply with adopted requirements to implement water conservation upgrades in existing buildings?</i></p> <p>Under this measure, the participating jurisdictions would adopt a water reduction target for existing development that exceeds the Senate Bill X7-7 20% reduction target and implement a program to renovate existing buildings to achieve higher levels of water efficiency. The participating jurisdictions could require water conservation upgrades for all existing buildings that undergo substantial remodels or renovations (such as compliance with Title 24 Part 6 (2013) CALGreen Tier 1 voluntary water efficiency standards) and/or incentivize water efficiency upgrades outside the permitting process.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Project Does Not Comply <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 12: Increased Recycled Water and Greywater Use			
12-R1. Recycled Water [All jurisdictions]	<p>VOLUNTARY: <i>Does the project include the use of recycled water, where available?</i></p> <p>Under this measure, the wastewater treatment providers in the county and the jurisdictions would coordinate on the strategies for implementation of this measure, including use of recycled water where appropriate in new development and encouraging the retrofit of irrigation systems to promote the use of recycled water for landscaping and irrigation.</p> <p>Consider programs to collect stormwater for on-site reuse for landscape irrigation.</p>	<input type="checkbox"/> Project Includes the Use of Recycled Water <input type="checkbox"/> Project Does Not Include the Use of Recycled Water <input type="checkbox"/> Not Applicable	
12-L1. Greywater Use [All jurisdictions except Cloverdale, Cotati, and Rohnert Park]	<p>MANDATORY: <i>Does the project comply with adopted requirements for the use of greywater for non-potable uses?</i></p> <p>VOLUNTARY: <i>If no local mandate exists, and the project will use greywater for non-potable uses, please check “not applicable” and describe.</i></p> <p>Each participating jurisdiction has established a goal to replace a certain percentage of potable water that was previously being used for residential non-potable uses (landscaping, toilet water, etc.) with greywater.</p>	<input type="checkbox"/> Project Complies with Mandatory Requirements <input type="checkbox"/> Project Does Not Comply with Mandatory Requirements <input type="checkbox"/> Mandatory Requirements Not Applicable <input type="checkbox"/> Project includes voluntary use of greywater for non-potable uses	
Goal 13: Increase Water and Wastewater Infrastructure Efficiency			
<p>The measures supporting this goal (Measure 13-R1. Infrastructure and Water Supply Improvement and Measure 13-R2. Wastewater Treatment Equipment Efficiency) apply to water and wastewater infrastructure only and not to individual development projects, but will benefit new development by reducing the indirect GHG emissions of providing water and wastewater services by promoting increased efficiency. No project action is required.</p>			

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems Including Methane			
The measures supporting this goal (Measure 14-R1. Sonoma County Agency Carbon Free Water by 2015 and Measure 14-L1. Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale) apply to water infrastructure only and not to individual development projects, but will benefit new development by reducing the indirect GHG emissions of providing water and wastewater services by promoting use of renewable energy. No project action is required.			
Goal 15: Reduce Emissions from Livestock Operations			
15-L1. Livestock Manure Management [Livestock and Dairy projects only]	<p>VOLUNTARY: <i>Does the project include manure management measures to reduce methane emissions?</i></p> <p>This voluntary measure would encourage manure management techniques that reduce emissions from the decomposition of manure at dairies. Strategies include on-site management approaches that reduce methane emissions, like dry composting or pasturing, as well as opportunities to convert methane to fuel using some form of methane digestion.</p>	<input type="checkbox"/> Project Includes Manure Management Measures <input type="checkbox"/> Project Does Not Include Manure Management Measures <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
15-L2 Reduce Emissions from Enteric Fermentation <i>[Dairy and livestock projects only]</i>	<p>VOLUNTARY: <i>Does the project include enteric fermentation reduction methods?</i></p> <p>This voluntary measure would encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation (both methane and nitrous oxide). Potential methods for reducing these emissions include manipulating animal diet to inhibit a rumen environment favorable to methanogens. A range of potential emission options include dietary oils (such as whole cottonseed oil, sunflower oil, coconut oil, and palm oil), the use of corn or legume silage in place of grass silage, use of concentrate feeds, nitrates, ionophores, and tannins, and improving forage quality and the overall efficiency of dietary nutrient use. Potential use of pomace from wine-making should also be explored.</p>	<p><input type="checkbox"/> Project Includes Enteric Fermentation Reduction</p> <p><input type="checkbox"/> Project Does Not Include Enteric Fermentation Reduction</p> <p><input type="checkbox"/> Not Applicable</p>	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 16: Reduce Emissions from Fertilizer Use			
16-L1. Optimize Fertilizer Use [Agricultural projects only]	<p>VOLUNTARY: <i>Exploration of methods to optimize fertilizer is encouraged, where feasible, especially when it results in reduction of nitrogen fertilizer usage. If the project will employ methods to optimize fertilizer use, please check “implements” and describe.</i></p> <p>Under this measure, the County would implement a policy to encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer). The County and any other interested jurisdictions would work with growers to provide incentives for organic fertilizers as an alternative. The County would create an outreach program to help growers optimize nitrogen application rates, decrease overall fertilizer inputs and cost, maintain current crop yields, and reduce emissions of nitrous oxide.</p>	<input type="checkbox"/> Project Includes Fertilizer Optimization <input type="checkbox"/> Project Does Not Include Fertilizer Optimization <input type="checkbox"/> Not Applicable	
Goal 17: Protect and Enhance the Value of Open and Working Lands			
17-R1. Conserve Open Space and Working Lands [SCAPOS, working with other agencies (including cities and the County) and non-governmental partners]	<p>VOLUNTARY: <i>Does the project include conservation of open space and/or working lands?</i></p> <p>Under this measure, the partnering agencies and other entities will support the preservation of natural open space and working lands to prevent loss of carbon stock.</p>	<input type="checkbox"/> Project Includes Land Conservation Element <input type="checkbox"/> Project Does Not Include a Land Conservation Element? <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
17-R2. Enhance Natural Resources on Open and Working Lands through Climate Beneficial Management Practices <i>[RCD and partners]</i>	<p>VOLUNTARY: <i>Does the project include enhancement of natural resources on open and working lands?</i></p> <p>Under this measure, the communities and regional partners would continue to work to enhance the natural resources of open and working lands, including agricultural and timber lands.</p>	<input type="checkbox"/> Project Includes Enhancement of Open and Working Lands <input type="checkbox"/> Project Does Not Include Enhancement of Open and Working Lands <input type="checkbox"/> Not Applicable	
Goal 18: Promote Sustainable Agriculture			
18-L1. Certification Programs <i>[Agricultural projects and wineries only]</i>	<p>VOLUNTARY: <i>Does the project seek certification under relevant certification protocols, including providing documentation of that certification when achieved?</i></p> <p>The County would support sustainable agricultural certification programs that promote practices that will reduce GHG emissions and/or enhance carbon stocks and sequestration. This measure supports development and implementation of rigorous standards in documenting, tracking, and disclosing sustainability practices that reduce GHG emissions. Some of the certification programs include Certified Organic, Certified Biodynamic, and Certified California Sustainable Winegrowing, among others. Sonoma County Winegrowers is leading a 100% sustainable wine partnership with county wineries and vineyard owners and operators.</p>	<input type="checkbox"/> Project Includes Sustainable Certification <input type="checkbox"/> Project Does Not Include Sustainable Certification <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
18-L2. Promote the Sale of Local, Sustainable, and Organic Grown Foods and/or Products [All jurisdictions]	VOLUNTARY: <i>Does the project include any support for local, sustainable, and organic (or equivalent) foods?</i> The County and local jurisdictions would support local farmers' markets to provide community residents with local, sustainable, and organic (or equivalent) sources of food that can displace carbon-intensive food production practices.	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
18-L3. Urban Agriculture [All jurisdictions]	VOLUNTARY: <i>Does the project include any opportunities for small-scale urban farming areas and/or gardens?</i> Under this measure, participating jurisdictions would amend zoning code to allow for small-scale urban farming areas and gardens in the cities in appropriate areas (excluding areas that are more suitable for infill and transit-oriented mixed land uses).	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
Goal 19: Increase Carbon Sequestration			
19-R1. Carbon Farming [The County, Resource Conservation Districts, Natural Resources Conservation Service, and the SCAPOSD]	VOLUNTARY: <i>Does the project include carbon farming activities?</i> Under this measure, the County and the partnering agencies will promote increased carbon sequestration on croplands and working rangelands by adding soil organic material and other measures and will support increasing availability of local compost.	<input type="checkbox"/> Project Includes Carbon Farming <input type="checkbox"/> Project Does Not Include Carbon Farming <input type="checkbox"/> Not Applicable	
19-R2. Establish a Target for Increased Carbon Sequestration [RCPA, SCAPOSD, RCDs, NRCS, and partners]	VOLUNTARY: <i>Does the project meet or support any established carbon sequestration targets?</i> Under this measure, the RCPA will work with local partners to establish short- and long-term targets for increasing carbon sequestration throughout the County.	<input type="checkbox"/> Project Meets Established Target(s) <input type="checkbox"/> Project Does Meet Established Target (s) <input type="checkbox"/> Not Applicable	

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Appendix B

Inventory and Forecast Details

B.1 Introduction

This appendix summarizes the data sources and general methods that were used to develop Sonoma County’s greenhouse gas (GHG) inventory for 2010, the backcast of emissions to 1990, and the “business-as-usual” (BAU) forecasts for 2015, 2020, 2040, and 2050 for the Climate Action 2020 (CA2020) Community Climate Action Plan (CAP). These will be referred to as the “inventory,” “backcast,” and “forecast” in this appendix. Methods are described for each emissions source below.

B.2 GHG Inventory Structure and Definitions

GHG Inventory. The GHG Inventory includes GHG emissions associated with community activities occurring within the geographic or jurisdictional boundaries of the county and generally consists of sources of emissions that the County and its communities can influence or control. It is an activity-based inventory (as opposed to a consumption-based inventory). The inventory includes emissions that occur both inside and outside the jurisdictional boundaries, but only to the extent that such emissions are due to land uses and activities within the county.

Direct/Indirect Emissions. GHG emissions can be classified as either *direct* (emissions that occur at the end use location, such as natural gas combustion for building heating) or *indirect* (emissions that result from consumption at the end use location but occur at another location, such as the consumption of electricity in a residence which results in emissions that occur at the power plant). For direct emissions (such as natural gas combustion in buildings), if the County and communities can have a substantial effect on those emissions by influencing energy use (such as through green building codes), then the direct emissions are included in the inventory. For indirect emissions (such as solid waste disposed outside of the county), if the County or communities (or other agency in the county) can have a substantial effect on those indirect emissions by influencing demand (such as waste minimization and diversion programs), then they are included in the inventory. By including emissions that are controlled by or subject to the influence of the County and communities, the inventory can form the basis for local climate action planning. The term *emissions* refers to GHG emissions and not to emissions of air quality pollutants.

GHG Emission Sources. GHG emissions are divided into the following seven sources: building energy, on-road transportation, off-road transportation and equipment, solid waste, wastewater

treatment, water conveyance, and livestock and fertilizer. Stationary source emissions were estimated for informational purposes but were not included in the GHG inventory¹.

Business-as-Usual (BAU) Forecasts. BAU represents a future scenario that does not consider the possible reduction of GHG emissions that may result from any legislation or regulation that would go into effect after the inventory year. The BAU projections are estimates of future emissions based on energy and carbon intensity in the existing economy with the expected increases in population and economic growth in the future. BAU forecasts are presented in CA2020 for 2015, 2020, 2040, and 2050 for community emissions.

Unit of Measure. The unit of measure used throughout CA2020 is metric tons of carbon dioxide equivalent (MTCO₂e). Presenting inventories in carbon dioxide equivalence allows characterization of the complex mixture of GHG as a single unit taking into account that each gas has a different global warming potential (GWP)². One million MTCO₂e is abbreviated MMTCO₂e.

Carbon Stock Sources. Estimates of carbon stored in soil and vegetation (not emissions) in agricultural lands (including cropland and grazing land), non-agricultural rural lands (including forests and grasslands), and urban forests were also provided for informational purposes but were not included in the GHG inventory. Storage of carbon in these lands represent an emissions “sink”³ because soil and vegetation remove carbon dioxide from the atmosphere. However, the ICLEI *U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions* (ICLEI–Local Governments for Sustainability 2012) (referred to as the *2012 ICLEI Community Protocol*) recommends that emissions sinks be disclosed but not combined with other emissions created by human activity in an emissions inventory.

B.3 Previous Inventories

The Climate Protection Campaign (CPC) assessed community and municipal GHG emissions for a number of years as part of the 2008 Community CAP. Emissions were estimated for the years 1990 and 2010 as part of the 2008 CAP. CPC also prepared emissions estimates for every year between 2000 and 2011.

Community emissions included emissions for the entire county, including both the cities and the unincorporated areas. These inventories used slightly different methods and data sources from those used in the inventory for CA2020, as data sources have expanded and improved, and methods for calculating emissions have grown more robust. This appendix identifies important

¹ Stationary source emissions were not included because the County and communities have limited jurisdictional control over stationary sources, and large stationary point source emissions are regulated by the State of California (under Assembly Bill 32 through cap-and-trade) and through the U.S. Environmental Protection Agency (under the Clean Air Act) for GHG emissions. Thus, for the larger stationary point sources, local regulation of such sources (as part of CA2020) can be duplicative of state and federal authority.

² The GWP values used in the backcast, inventory, and forecast are 1 for CO₂, 28 for CH₄, and 265 for N₂O (Intergovernmental Panel on Climate Change 2013).

³ An *emissions sink* is a natural or artificial reservoir that accumulates and stores GHG or carbon-containing compounds for an indefinite period.

differences in activity data, emission factors, and methods that explain the different estimate of GHG emissions for 1990 and 2010 between those prepared previously by CPC and those prepared for CA2020.

The previous community inventories included emissions for building energy, on-road transportation, solid waste, and livestock and fertilizer. The new inventory, backcast, and forecast contained in CA2020 include additional emissions sources to encompass more sources of emissions and provide a more comprehensive picture of emissions associated with the county.

B.4 Inventory Year

The inventory year is 2010. The year 2010 was chosen because complete or nearly complete activity data are available for 2010 for all sources to support inventory preparation.

Socioeconomic data for 2010, including population, employment, and housing figures, have been developed for the county by the Sonoma County Transportation Authority (SCTA) and the Association of Bay Area Governments (ABAG) and are largely based on the 2010 U.S. Census. For sources where 2010 data are not available, appropriate scaling methodologies were developed to project activity data to 2010. Any actions initiated by communities to reduce GHG emissions implemented prior to 2010 are accounted for in the inventory and forecasts.

B.5 1990 Backcast

A backcast to 1990 levels was developed primarily using socioeconomic information (i.e., population, households, and employment) for each emissions source to “backcast” from the 2010 inventory. 1990 activity data and 1990 emission factors were used where available for relevant emissions sources. The development of a 1990 emissions backcast for the communities allows for the comparison of the GHG inventory, forecasts, and effect of GHG reduction measures to 1990 levels per the countywide GHG reduction target.

B.6 2015, 2020, 2040, and 2050 Business as Usual Forecasts

The BAU forecasts for 2015, 2020, 2040, and 2050 primarily use socioeconomic metrics to scale the inventory year (2010) data. A unified set of socioeconomic data (population, jobs (potentially jobs by type), and households) has been developed by SCTA.

Additional methods of forecasting 2010 activity and emissions data to each forecast year have been used depending on the source and availability of data. For example, water consumption and wastewater generation projections are available in Urban Water Management Plans (UWMPs). SCTA’s Sonoma County Travel Demand (SCTM) model was used to develop the transportation forecasts. The methods used for forecasting for each source are discussed below.

B.7 Inventory Boundaries and Socioeconomic Data

As noted above, the BAU forecasts for 2015, 2020, 2040, and 2050 use socioeconomic metrics to scale the inventory year data. However, the jurisdictional boundaries change over time due to annexations from the unincorporated county, so socioeconomic projections were adjusted to eliminate artificial decreases in GHG emissions for the unincorporated county for CA2020 planning purposes. A description of this adjustment is discussed below.

Rohnert Park has indicated that they will reach full-buildout of their current General Plan by 2020. Assuming that city limit population, employment, and housing provided by SCTA for the entire county (and all other cities) remains constant, then the unincorporated county numbers would need to be adjusted downward to include the Rohnert Park buildout projections while not increasing the countywide totals.

Because these socioeconomic data (which represent the city-limits of each city and the area outside of the city-limits for the unincorporated county) were used to forecast emissions in most sources, unincorporated county emissions would decline from 2015 to 2020 based on the downward adjustment performed to incorporate Rohnert Park's full buildout projections. This is not a real decline in emissions; it is merely a shift in the assignment of emissions from the unincorporated county to Rohnert Park.

To avoid this artificial decline in emissions for the unincorporated county, emissions for the unincorporated county are only associated with the *area outside the sphere of influence*⁴ of each city for each future year (as opposed to the *area outside city limits*⁵).

In this framework, annexations from Rohnert Park (or any other city) will not affect unincorporated county emissions. Since the cities only annex into their spheres of influence, this annexation will not change the unincorporated county socioeconomic data. Under this scenario, county population, employment, and housing numbers increase each year and emissions do not show an artificial decline due to Rohnert Park's annexations.

This is a more accurate framework with regard to what the unincorporated county will have control over in the future, and is therefore more appropriate for CA2020.

However, this approach was not used for 1990 emissions. Data regarding the spheres of influence for each city for the year 1990 were not available; only city limit data were available. Consequently, 1990 unincorporated county emissions do not represent activities outside the sphere of influence of each city (as is the case for all other years); they represent activities outside the city limits of each city for 1990. This means that the 1990 emissions boundaries for the unincorporated county (on which the GHG emission reduction target is based) are not consistent

⁴ "Sphere of influence" refers to the spatial region over which each city has a level of cultural, economic, or political exclusivity.

⁵ "City limits" refers to the defined boundary or border of a city.

with the emission boundaries for all other years (i.e., the 1990 boundaries are for city-limits not for spheres of influence).

Despite the changes in city and unincorporated county boundaries over time, the overall county boundary (in relation to other neighboring counties) has not changed. Thus, there is a higher accuracy in the comparison of the countywide inventory between past years (e.g., 1990), the inventory year (2010), and the forecast years. This is one of the reasons why the GHG emission reduction target⁶ for CA2020 is based on countywide emissions compared to 1990 countywide emission levels overall, and not based on individual community emissions compared to 1990 individual jurisdictional emissions.

B.8 Inventory Protocol

The ICLEI - Local Governments for Sustainability (ICLEI) *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (October 2012) was used to quantify emissions for 2010 wherever applicable and appropriate. For some sources, like carbon stock estimates for natural and urban lands, the ICLEI 2012 Community Protocol provides no guidance and alternative protocols were consulted including the Association of Environmental Professionals (AEP) white paper on baseline community inventories (Association of Environmental Professionals 2011) and Intergovernmental Panel on Climate Change (IPCC) (Intergovernmental Panel on Climate Change 2000) methodologies.

B.9 Emission Sources

The following section includes detailed methods and supporting information for each emission source included in the 2010 inventory, 1990 backcast, and 2015, 2020, 2040, and 2050 BAU forecasts. For each source, the following information is provided:

- Overview: a brief description of the emission calculation(s).
- Changes from CPC's Previous Inventory: a brief discussion of the reasons for different emissions estimates in CPC's previous GHG inventories for 1990 and 2010 (Climate Protection Campaign 2008).
- Data and Models: a list of data and models used to calculate emissions.
- Inventory Methods: the detailed methodology for calculating emissions.
- Forecast and Backcast Methods: the detailed methodology for forecasting and backcasting emissions.

⁶ The Climate Action 2020 reduction target is 25% below 1990 levels by 2020 for the entire county.

B.9.1 Building Energy

Electricity and Natural Gas

Overview

GHG emissions from electricity and natural gas consumption for the residential, commercial, industrial, and institutional sources for each community.

Changes from CPC's Previous Inventory

1990 Emissions. The primary reason for the change in the emissions estimate compared to the prior CPC 1990 estimate is due to a different emission factor. CPC's average emission factors were 0.645 lbs CO₂e/kWh for electricity and 13.6 lbs CO₂e/therm for natural gas. The average emission factors used for CA2020 are 0.583 lbs CO₂e/kWh for electricity and 11.7 lbs CO₂e/therm for natural gas⁷. CA2020 includes electricity for agriculture and water pumping from water conveyance, while CPC included these emissions in building energy emissions, which is another reason why CA2020 emissions are lower than CPC emissions. CA2020 also includes emissions from Transmission and Distribution (T&D) loss whereas the CPC estimate did not.

2010 Emissions. The primary reason for the change in the emissions inventory is due to a different emission factor. CPC reported an average emission factor of 0.445 lbs CO₂e/kWh for electricity but did not report an emission factor for natural gas. The average emission factors used in CA2020 were 0.446 lbs CO₂e/kWh for electricity and 11.7 lbs CO₂e/therm for natural gas⁸. CA2020 electricity emission factor is slightly different because the 2010 inventory incorporates the emission factor for electricity supplied by Healdsburg Electric (0.386 lbs CO₂e/kWh), in addition to the emission factor for electricity supplied by PG&E (0.445 lbs CO₂e/kWh), and also emission factors for CH₄ and N₂O from eGRID (28.49 lbs CH₄/GWh and 6.02 lbs N₂O/GWh, respectively). Electricity for agriculture and water pumping are included in water conveyance emissions, while CPC included these emissions in building energy emissions; this is another reason why CA2020 emissions are lower than CPC emissions. CA2020 also includes emissions from T&D loss in this source whereas the CPC estimate did not.

Data and Models

- Electricity consumption (kWh) provided by Pacific Gas & Electric Company (PG&E).
- Natural Gas consumption (therms) provided by PG&E.

⁷ The electricity emission factor represents emissions from a combination of Pacific Gas & Electric Company (PG&E) electricity and Healdsburg Electric electricity. The PG&E emission factor, 0.572 lbs CO₂e/kWh, and the natural gas emission factor are both from the whitepaper *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, April 2013). The Healdsburg Electric emission factor, 0.002 lbs CO₂e/kWh, was provided by the City of Healdsburg.

⁸ The electricity emission factor represents emissions from a combination of PG&E electricity and Healdsburg Electric electricity. The PG&E emission factor, 0.445 lbs CO₂e/kWh, and the natural gas emission factor are both from the whitepaper *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, April 2013). The Healdsburg Electric emission factor, 0.386 lbs CO₂e/kWh, was provided by the City of Healdsburg.

- Electricity consumption (kWh) provided by the City of Healdsburg (Crowley pers. comm.).
- Utility specific electricity GHG emission factors for PG&E from Climate Registry's Electric Power Sector Protocol (Pacific Gas and Electric 2013).
- State-specific GHG emission factors for electricity (U.S. Environmental Protection Agency 2014).
- State-specific GHG emission factors for natural gas (Climate Registry 2014).
- Socioeconomic data from SCTA, including population, square footage of commercial and industrial establishments, employment by sector, and number of households.

Inventory Methods

CO₂ emissions from electricity provided by PG&E were estimated by multiplying electricity use by the utility-specific CO₂ emission factor for PG&E from the Climate Registry's Electric Power Sector Protocol report for 2010. This factor (444.64 lbs CO₂e/MWh) represents all emissions related to electricity deliveries in 2010, including owned and purchased power.⁹ An emission factor for the City of Healdsburg municipal electricity utility was provided by the City: 386 lbs CO₂e/MWh (Crowley pers. comm.). Methane (CH₄) and nitrous oxide (N₂O) emissions for both utilities were calculated using U.S. Environmental Protection Agency (U.S. EPA) Emissions & Generation Resource Integrated Database (eGRID) emission factors for the CAMX/WECC region (U.S. Environmental Protection Agency 2014).

GHG emissions from natural gas consumption were calculated by multiplying the natural gas consumption values by state-specific emission factors for the year 2010 from the Climate Registry protocol (Climate Registry 2014).

Electric Power T&D losses were calculated for electricity supplied by both utilities (U.S. Environmental Protection Agency 2014). Upstream emissions from electricity use and refrigerant leakage are not included due to limited jurisdictional control and limited data resources.

Forecast and Backcast Method

2015, 2020, 2040, and 2050 BAU building energy emissions were estimated by projecting 2010 data using the socioeconomic forecasts. Residential energy use was projected using housing data in each of the forecast years. Non-residential use was projected using employment data in each of the forecast years. A future PG&E emission factor was calculated by taking an average of emission factors for a five year period that encompasses the inventory year (2008–2012) to partially neutralize the large annual variability in utility emission factors. PG&E has published future

⁹ The emission factor varies from year to year because of a variety of factors that influence a utility's ratio of owned to purchased power and the source of generation (natural gas, hydroelectric, coal, etc.). The emission factor is higher in years when a utility purchases more power to meet California electricity demand. Thus, the emission factor for any given year can vary and also varies widely by utility company.

emissions factors out to 2020 but those take into account RPS advancement, whereas the BAU forecast does not take into account future GHG reduction activities.¹⁰

1990 emissions were estimated using CPC's 1990 energy use data (actual activity data). These countywide data were then apportioned to the cities using socioeconomic data (population and employment) for 1990. Electricity use in the agricultural and water pumping category was included in water conveyance emissions. Natural gas in the agricultural and water pumping category was included in building energy emissions.

Residential Fuel Use

Overview

Calculation of GHG emissions from residential combustion of fossil fuels of any type *except* natural gas (discussed above). This includes kerosene, propane (or liquefied petroleum gas LPG), and wood.

Changes from CPC's Previous Inventory

This source was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- U.S. Census data from the American Community Survey (ACS).
- Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS) dataset.
- EIA State Energy Data System (SEDS).
- Emission factors from the 2012 ICLEI Community Protocol and Climate Registry protocols.

Inventory Methods

Quantification methods consistent with the 2012 ICLEI Community Protocol to quantify GHG emissions from residential fuel combustion were used. The number of households in the county that use each type of fuel (kerosene, propane, and wood) were obtained from ACS data. Fuel consumption per household was approximated using state-level fuel use from the EIA SEDS for each fuel type and the number of households statewide that use each fuel type from the RECS. Fuel use in Sonoma households was determined by multiplying the approximated fuel use per household by the number of households obtained from the ACS. Emissions were then determined by multiplying the Sonoma County fuel use for each fuel type by the corresponding emission factors from the 2012 ICLEI Community Protocol, and Climate Registry protocols. Countywide emissions were allocated to each community using housing data.

¹⁰ BAU Forecasts do not include Sonoma Clean Power. This is included in the GHG emission reduction analysis described in Appendix C.

Forecast and Backcast Methods

1990 backcast and 2015, 2020, 2040, and 2050 BAU residential fuel use emissions were estimated by scaling total 2010 emissions using household data for those years.

B.9.2 On-Road Transportation

Overview

GHG emissions from fuel consumption in on-road vehicles.

Changes from CPC's Previous Inventory

1990 Emissions. The primary reason for the change in the emissions estimate is mostly due to a different emission factor: CPC's average emission factor is 778.2 g CO₂e/mile, while the CA2020 average emission factor is 599.0 g CO₂e/mile. CPC used the CACP model to determine fuel consumption using average fleet fuel efficiency values. The EMFAC model emission factors and fleet mix for Sonoma County for 1990 were used in CA2020, which is the current state of the practice for emissions inventories. The difference in emissions is also partly to a different conversion factor from daily vehicle miles traveled (VMT) to annual VMT: CPC's factor is 365, while the CA2020 factor is 347, as recommended by SCTA. This conversion factor leads to different estimate of annual VMT for 1990: 3,008 million annual VMT for CPC versus 2,860 million annual VMT for CA2020.

2010 Emissions. The primary reason for the change in the emissions inventory is likely because of different annual VMT and different emission factors. CA2020 uses SCTA's daily VMT using an Origin-Destination method for the county, along with the conversion factor from daily VMT to annual VMT of 347. CPC did not report 2010 VMT for the county, but they likely used MTC VMT along with a conversion factor of 365 days per year. Because CPC did not report VMT, it is uncertain what their average emission factor is. CPC used the CACP model to determine fuel consumption using average fleet fuel efficiency values. CA2020 used the EMFAC model emission factors and fleet mix for Sonoma County for 2010, which is the current state of the practice for emissions inventories. The average emission factor used in CA2020 is 508.6 g CO₂e/mile for 2010.

Data and Models

- VMT provided by the SCTA's SCTM model.
- Annualized VMT and trips provided by SCTA, aggregated by community and for speed increments ("speed bins") of 5 miles per hour (mph) from 0 to 65 mph
- California Air Resources Board's (ARB) EMFAC2011 model¹¹.

¹¹ The Emissions Factor (EMFAC) model is a transportation model issued by the California Air Resources Board. It includes a set of emission factors that represent the vehicle fleet, speeds, and environmental conditions that can be useful in performing project-level air quality modeling.

- Fuel emission factors from the Climate Registry (Climate Registry 2014).

Inventory Methods

Quantification of on-road transportation emissions followed the 2012 ICLEI Community Protocol. VMT was provided by SCTA for 2010. The VMT was not separated by vehicle type but contained all on-road vehicles in the county, including passenger vehicles, heavy-duty trucks, transit buses, etc. To convert daily VMT to annual VMT, a factor of 347 days per year, obtained in consultation with SCTA staff, was used. To determine VMT by community, SCTA apportioned one-half of the trip distance for any trip with an origin or destination within a community. This eliminates apportioning through-trips on freeways or major arterials to the communities containing them, while adding regional traffic burden to land uses generating trips on a 50/50 split. This is the current recommended approach of the State's Regional Targets Advisory Committee and provides a better accounting of VMT associated with land use community than approaches that apportion VMT on a pro-rata share or on the basis of VMT that occurs within the boundaries of a community. This approach can also help to reveal potential differences in VMT generation that can be useful during future land use and GHG reduction planning. The VMT by speed bin, and the corresponding speeds and outputs from the EMFAC2011 model, were used to determine emission factors that were used to quantify the GHG emissions for on-road vehicles.

Forecast and Backcast Methods

VMT for model validated years (2010 and 2040) were used to interpolate VMT for 1990, 2015, 2020, 2040, and 2050. EMFAC2011 CO₂ emission factors are available through 2030 and were used to estimate emissions for all years except 2040 and 2050. Emission factors for 2040 and 2050 were estimated by linearly extrapolating emission factors from 1990–2030. CH₄ and N₂O emission factors were assumed to remain constant beyond 2030.

VMT from the SCTA model was not available for 1990. Based on guidance from SCTA, 1990 VMT for the entire county was obtained from the Highway Performance Monitoring System (HPMS). Speed and community distributions from 2010 were used to apportion the countywide HPMS VMT.

B.9.3 Off-Road Transportation and Equipment

Overview

GHG emissions from off-road vehicles and equipment (e.g., recreational, harbor craft, rail yard, private airport, lawn and garden, agricultural, commercial, and industrial equipment).

Changes from CPC's Previous Inventory

This source was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- Data from ARB's OFFROAD2007 and OFFROAD2011 model.
- ARB's Diesel Off-road On-line Reporting System.

Inventory Methods

For quantification of off-road emissions, the 2012 ICLEI Community Protocol was generally followed. The 2012 ICLEI Community Protocol recommends using U.S. EPA's NONROAD model, but this analysis used ARB's OFFROAD model, because it is more specific to California communities than the NONROAD model.

Off-road vehicle and equipment emissions are difficult to quantify for individual communities, as there is no specific tracking of off-road equipment on a sub-county level basis. ARB's OFFROAD model provides estimates for emissions at the county level for a variety of off-road equipment types, including construction equipment, lawn and garden equipment, airport ground support equipment, and recreational equipment. County-level data from the OFFROAD2007 model were used as the foundation of the analysis. Additional data were obtained from the ARB from their 2011 Diesel Off-road On-line Reporting System (DOORS) model that revises some of the diesel fuel consumption values to reflect statewide diesel regulation that wasn't included in the 2007 model. The resulting emissions were allocated to each of the communities of the county based on housing, population, or employment (depending on the equipment type). While the 2012 ICLEI Community Protocol doesn't include employment as a metric to allocate emissions, employment was used to allocate emissions for certain equipment types (e.g., construction) for this analysis. Employment data are typically more accessible than the ICLEI-recommended metric of building permits. This analysis is based on the model's default assumption of annual hours of operation for all equipment in the county.

The output from the OFFROAD model includes emissions from airport ground support equipment (GSE) at small public and private airports located throughout the county (such as the Petaluma Municipal Airport and the Sonoma County Airport). Airport GSE are used to transport passengers as well as baggage and freight, to support maintenance and repair functions, and to provide power to various service functions. They include tugs for airplane pushback and hook-up, carts for moving people and materials, vehicles, forklifts and lifts, belt and container loaders, and other equipment. They also include vehicles such as light duty trucks that are used for airplane maintenance and fueling on the air-side of airport operations. Airport GSE does not include aircraft engines. Airport GSE emissions were allocated to each city using airport operations instead of socioeconomic data.

Emissions from on-site off-road agricultural equipment are included under this source. Agricultural equipment emissions are proportionally biased to the unincorporated county inventory because nearly all agricultural activity occurs in the unincorporated county. Total agricultural equipment emissions were allocated to each community using crop acreage data for the total county and each community.

Emissions from freight rail equipment are not included due to lack of jurisdictional control of this source of emissions and limited activity in the county.

Forecast and Backcast Methods

2015, 2020, 2040, and 2050 BAU off-road emissions were estimated using the OFFROAD model, which was run for each forecast year through 2040, the furthest future year available in the model. Off-road emissions in the year 2050 were scaled using the growth in the socioeconomic data between 2040 and 2050. Depending on the equipment type, growth in population, households, or employment was used to project emissions from 2040 to 2050. Emissions from livestock and fertilizer and airport GSE equipment were projected using linear extrapolations of crop data and airport operations data.

Emissions in 1990 were backcast using output from the model and allocated to the communities using socioeconomic data, crop data, and airport operations data.

B.9.4 Solid Waste

Overview

GHG emissions associated with the decomposition of waste generated by each community.

Changes from CPC's Previous Inventory

1990 Emissions. The primary change in the emissions estimate is due to a different emission factor for waste. Both inventories include the same waste tonnage for 1990 (521,779 tons), but the emission factors likely differ. The CPC emission factor is not available. The average emission factor used in CA2020 is 0.735 MTCO₂e/ton from the 2012 ICLEI Community Protocol. The CA2020 emission factor represents emissions from the average ton of mixed municipal solid waste because waste profile data was not available for the year 1990.

2010 Emissions. The primary reason for the change in the emissions inventory is likely due to a different emission factor for waste. CA2020 uses 355,477 total tons of waste to estimate emissions for the county for 2010. CPC did not report their 2010 waste tonnage for the county, so it is not possible to compare the tonnage numbers or the emission factors. The average emission factor used in CA2020 is 0.390 MTCO₂e/ton, which represents a number of emission factors for different waste types as reported in the 2012 ICLEI Community Protocol. This factor is higher than the 1990 factor because the waste profile for 2010 differs from 1990.

Data and Models

- Tons of waste (residential and commercial) sent to landfills in the inventory year provided by the Sonoma County Waste Management Agency (SCWMA).
- 2003 Sonoma County Solid Waste Generation Study (R3 Consulting Group 2003).
- Emission factors from the 2012 ICLEI Community Protocol.

Inventory Methods

Per the 2012 ICLEI Community Protocol for indirect future emissions from community-generated waste during the inventory year, total tons of waste (residential and commercial) sent to landfills

in the inventory year and waste profile data were used in conjunction with equations from ICLEI. The total tons of waste by community and landfill in 2010 were provided by SCWMA. Waste profile data were obtained from CalRecycle¹². Waste profile data include the percentage of waste types disposed within the county (e.g., 17% food waste, 3% textiles). Emission factors for each waste type (food waste, textiles, etc.) were obtained from the 2012 ICLEI Community Protocol, which are based on the U.S. EPA's Waste Reduction Model (WARM), and were multiplied by the corresponding waste amounts generated in each community to calculate future indirect emissions. Emissions from the Redwood Landfill were calculated separately using the ICLEI equations, as that landfill has a known methane collection rate of 90%. The other landfills that the county's waste is sent to were assumed to have a 75% methane collection rate, consistent with the default rate specified by ICLEI.

Emissions from composting and combustion of solid waste were not included in the inventory due to data availability issues, as CalRecycle does not provide this data. These sources are likely minor emissions sources.

Forecast and Backcast Methods

2015, 2020, 2040, and 2050 solid waste emissions were estimated by scaling 2010 year waste generation data and waste emissions using socioeconomic data from SCTA. Residential waste and waste emissions were scaled using population data, while commercial waste and waste emissions were scaled using employment data.

1990 emissions were estimated using 1990 waste generation tonnage from the *2003 Sonoma County Solid Waste Generation Study* to determine per-capita waste generation (R3 Consulting Group 2003). This per-capita number was multiplied by the 1990 population of each community to get tons of waste by community. The 2010 breakdown of residential and commercial waste was applied to 1990 waste. The 2012 ICLEI Community Protocol emission factor for mixed municipal solid waste was used for 1990 emissions (waste profile data was not available for 1990).

B.9.5 Wastewater Treatment

Overview

Fugitive GHG emissions from the treatment of industrial, residential, commercial, and institutional wastewater produced within each community that is treated at municipal wastewater treatment plants (WWTPs).

Changes from CPC's Previous Inventory

This source was not included in CPC's 1990 backcast or 2010 inventory.

¹² CalRecycle is California's leading authority on recycling, waste reduction, and product reuse. Officially known as the Department of Resources Recycling and Recovery, CalRecycle plays an important role in the stewardship of California's vast resources and promotes innovation in technology to encourage economic and environmental sustainability.

Data and Models

- 2012 ICLEI Community Protocol equations for emissions calculations.
- Wastewater treatment data from the Sonoma County Water Agency (SCWA) (the Sanitation Districts) and the individual communities who operate WWTPs.

Inventory Methods

Energy consumed to operate any WWTP that is located within a community's borders is included in building energy emissions and not in wastewater treatment emissions.

Fugitive emissions from wastewater treatment were calculated following the 2012 ICLEI Community Protocol equations for each component of wastewater treatment. Each municipal wastewater facility that serves Sonoma County was contacted to request data, including population served, cubic feet of digester gas produced and combusted per day (if applicable), fraction of methane in digester gas (if applicable), BOD5 load¹³, the fraction of BOD5 removed during treatment, gallons of wastewater treated per day, and information regarding any existing methane capture, combustion, or energy conversion programs. The data obtained from the WWTPs were used in conjunction with the ICLEI equations to determine fugitive wastewater emissions. GHG emissions from septic systems were estimated using the ICLEI equation for septic systems and default percentages of septic users in rural and urban areas, and population.

Forecast and Backcast Methods

1990, 2015, 2020, 2040, and 2050 BAU wastewater emissions were estimated for each community by scaling 2010 emissions using population data for those years.

B.9.6 Water Conveyance

Overview

Water consumption-related emissions originate from energy used to transport, treat, and pump of water to the county or each community. Emissions from water conveyance were estimated for the following sources: 1) the energy associated with water conveyance and treatment *within* each community (such as local pumps distributing water within that community's boundaries) and 2) energy associated with water conveyance from *outside* each community (such as regional pumps delivering water from the State Water Project to a community's borders).

Changes from CPC's Previous Inventory

This source was not included in CPC's 1990 backcast or 2010 inventory.

¹³ BOD5 = biochemical oxygen demand of wastewater during decomposition occurring over a 5-day period

Data and Models

- Water consumption (gallons) in the inventory year (2010) for each community from the UWMPs for the county's water retailers and from a few cities.
- Water supply sources for each community.
- Energy intensity factors from the 2012 ICLEI Community Protocol, the City of Healdsburg, and SCWA.

Inventory Methods

Water consumption values in 2010 were obtained from individual UWMPs for each community, which provide a standard template of water sources and demand projections for current and future years. Additional water use data was supplied by Cloverdale, Sebastopol, and Healdsburg. For the unincorporated county, a per capita water value was averaged for the Valley of the Moon Water District and the Sweet Water Springs water district. This per capita value was applied to the entire unincorporated county population.

Water energy transmission factors (in units of kWh per million gallons of water conveyed) were obtained from SCWA for all of the cities served by SCWA. Water pumping energy use for Healdsburg was provided by the City, and water pumping energy intensities for other communities that use groundwater were estimated using the ICLEI factor of 4.45 kWh per million gallon of well foot depth. Well depth was estimated based on California Department of Water groundwater bulletins.

Total gallons of water were multiplied by the energy intensity factors described above, based on the source of the water (imported water, groundwater, surface water, etc.) to calculate electricity from water use. Energy used to distribute and treat SCWA water is provided by PG&E and the Power and Water Resources Pooling Authority (PWRPA). Energy used to pump and treat groundwater is provided by PG&E and PWRPA. Energy used to distribute and treat recycled water is provided by PG&E and PWRPA. For PWRPA, the 2009 PWRPA emission factor was used to estimate emissions. For PG&E, the emission factors as described in the building energy section above were used to estimate emissions.

Water-related energy use was subtracted from building energy use to avoid double-counting. T&D losses associated with water-related electricity were also included in this source (details provided in the building energy section above). Emissions calculations were based on electricity emission factors as described in the building energy section.

It should be noted that agriculture predominantly uses well water directly pumped from agricultural lands. This water was not provided by water retailers and was therefore not contained in the UWMPs used as data sources for this source. Consequently, agricultural well water and other sources of water that is not provided by water retailers was not included in the GHG inventory.

Forecast and Backcast Methods

Water-related emissions in 2015 and 2020 were estimated using the relevant water retailer UWMPs, which provide water projection estimates for future years, including 2015 and 2020. Water consumption in 2040 and 2050 was estimated by scaling 2020 water consumption using population data for 2040 and 2050. Future year water consumption for each community was multiplied by the appropriate water intensity factors assumed for 2010. It was assumed that Cloverdale and Sebastopol will get 100% of its water from groundwater for all future years.

1990 emissions were estimated using CPC's 1990 electricity use data (actual activity data) for the agricultural and water pumping category. These countywide data were apportioned to the cities using 2010 water profile data along with socioeconomic data (population and employment). For 1990, the eGRID emission factors were used (see building energy section for details). This leads to a much higher estimate of emissions in 1990 than for other years.

B.9.7 Livestock and Fertilizer

Overview

GHG emissions from manure management (fugitive emissions of methane and nitrous oxide), enteric fermentation (fugitive emissions of methane and nitrous oxide), and fertilizer use (fugitive emissions of nitrous oxide). Livestock and fertilizer emissions are only reported at the countywide level and not for individual communities.

Changes from CPC's Previous Inventory

1990 Emissions. The primary reason for the change in the emissions estimate is likely due to a different emissions estimation methodology and different emission factors. The livestock counts are likely the same, because CA2020 uses the livestock numbers from the County's 1990 crop report. While CPC does not report the livestock numbers used in their 1990 inventory, they likely used the 1990 crop report. CA2020 followed the 2012 ICLEI Community Protocol methodology for enteric fermentation and manure management. It is unclear what method CPC used to calculate these emissions. CA2020 also includes fertilizer emissions, which CPC likely did not (although the available documentation does not indicate whether CPC included fertilizer emissions).

2010 Emissions. The reasons for the difference in the emissions inventory for 2010 are the same as noted above for the 1990 backcast.

Data and Models

- CropScape Geographic Information System (GIS) database from National Agricultural Statistics Service (NASS).
- The Sonoma County Agricultural Commissioner's 2010 Crop Report.
- Information on organic farming and pasture practices from Sonoma County Resource Conservation Districts.

- Standard emissions factors from U.S. EPA and ARB.

Inventory Methods

Emissions from agricultural vehicles were included in Off-Road Transportation and Equipment emissions. It should be noted that the 2012 ICLEI Community Protocol does not include agricultural vehicle-related emissions with other agricultural emissions.

Manure management emissions were calculated using livestock population numbers from Sonoma County 2010 Crop Report (Sonoma County Agricultural Commissioner 2011). Standard emissions factors from the 2012 ICLEI Community Protocol, U.S. EPA, and ARB, and equations specific to manure management were used to estimate emissions resulting from manure use for the livestock population in the county (ICLEI – Local Governments for Sustainability 2012; U.S. EPA 2013; ARB 2011). In 2010, according to the Sonoma County Resource Conservation Districts, approximately 65% of dairy farms in the County were organic, and 65% of the manure for these farms was deposited in pastures (Jensen pers. comm.). The Carbon Cycle Institute estimates that for nonorganic dairy farms, approximately 25% of manure generated was pasture or daily spread (Creque pers. comm.). This indicates that 47% of total dairy manure was pastured. The remaining 53% of manure was distributed to other manure management processes (including daily spread, solid storage, liquid/slurry, anaerobic lagoon, and deep pit) using statewide averages from ARB.

Similarly, emissions resulting from enteric fermentation were calculated using livestock population numbers from the Agriculture Commissioner, standard emissions factors from the 2012 ICLEI Community Protocol, ARB and U.S. EPA, and equations specific to enteric fermentation from these sources.

Emissions resulting from fertilizer use were calculated using crop acres from the County 2010 crop report multiplied by emission factors from the U.S. EPA based on methods outlined in the 2012 ICLEI Community Protocol.

Forecast and Backcast Methods

2015, 2020, 2040, and 2050 BAU agricultural emissions were estimated by scaling 2010 agricultural emissions by changes in specific agricultural lands/crops as anticipated in the Sonoma County General Plan for 2020 (Sonoma County Permit and Resource Management Department 2008). For crops not forecasted by the general plan, historical trends of changes in county crop acreages from NASS CropScape for 2008–2012 were used to forecast future crop acreages (USDA 2013).

1990 manure management and enteric fermentation emissions were estimated using livestock numbers from the Sonoma County 1990 Crop Report along with methods outlined in the 2012 ICLEI Community Protocol (Sonoma County Agricultural Commissioner 1991; ICLEI – Local Governments for Sustainability 2012). 1990 livestock emission factors from the U.S. 2012 GHG Inventory (Annex 3) were used where available (U.S. Environmental Protection Agency 2013). 1990 emissions from fertilizer were estimated by scaling 2010 emissions using crop acreages from 1990 crop report. According to the Sonoma Resource Conservation District, in 1990 approximately 25% of manure generated in dairy farms in the County was pasture or daily spread (Jensen, pers.

comm.). The remaining 75% of manure was assumed to be distributed to other manure management processes using statewide averages from ARB.

B.9.8 Stationary Sources (Informational Only)

Overview

GHG emissions from stationary (typically industrial) combustion of fossil fuels of any type *except* natural gas (which is accounted for in building energy use emissions) and fugitive emissions from industrial processes for each community. These emissions are reported for informational purposes only and are not included in the backcast, inventory, and forecast because the County and communities have limited jurisdictional control over stationary sources, and large stationary point source emissions are regulated by the State of California (under AB 32 through cap-and-trade) and through the U.S. EPA (under the Clean Air Act) for GHG emissions. Thus, for the larger stationary point sources, local regulation of such sources (as part of CA2020) can be duplicative of state and federal authority.

Changes from CPC's Previous Inventory

This source was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- GHG emissions associated with fuel consumption from the Bay Area Air Quality Management District (BAAQMD) and the North Sonoma County Air Pollution Control District (NSCAPCD) by facility.

Inventory Methods

GHG emissions data for all facilities in Sonoma County under both air districts that have jurisdiction over the county were provided by BAAQMD and NSCAPCD.

Forecast and Backcast Methods

1990 backcast and 2015, 2020, 2040, and 2050 BAU industrial/commercial stationary source emissions were estimated by scaling total 2010 emissions by employment data for those years.

B.10 Carbon Stocks

The estimates of carbon storage in Chapter 2 of CA2020 are contained in a new report titled *Conserving Landscapes, Protecting the Climate: The Climate Action Through Conservation Project* (CATC). (The Nature Conservancy and Sonoma County Agricultural Preservation and Open Space District, 2015). The CATC pilot project provides an estimate of carbon stocks in Sonoma County in various land cover categories, including a 1990 carbon storage backcast, a 2010 estimate and projections for 2030 and 2050. Storage of carbon in these lands represents an emissions “sink” because soil and vegetation remove carbon dioxide from the atmosphere. However, the 2012

ICLEI Community Protocol recommends that emissions sinks associated with global atmospheric carbon cycling be disclosed but not combined with other emissions created by human activity in an emissions inventory. The CATC report contains a detailed explanation of the methodology used to estimate carbon storage. The report is available here:

http://scienceforconservation.org/downloads/climate_action_through_conservation

Table B-1 below summarizes the measured and projected changes in land cover and landscape carbon sequestration in Sonoma County from 1990 to 2050 as presented in the CATC report. The data below were used to develop Figure 2-14 in Chapter 2 of CA2020.

Table B-1: Measured and Projected Changes in Landcover (acres) and Landscape Carbon Sequestration (tons of CO2 equivalent) in Sonoma County, 1990 - 2050 (1)

Acres	Year	Forest	Grassland	Shrubland	Other (2)	Total
Inventory	1990	389,439	138,183	332,591	156,566	1,016,779
	2010	410,524	136,888	293,161	176,207	1,016,780
Baseline Extrapolation	2030	438,321	140,185	257,823	180,451	1,016,780
	2050	477,482	141,032	216,726	181,541	1,016,781
MTC02e	Year	Forest	Grassland	Shrubland	Other (2)	Total
Inventory	1990	161,300,000	11,700,000	35,600,000	6,400,000	215,000,000
	2010	181,900,000	10,800,000	31,400,000	6,200,000	230,300,000
Baseline Extrapolation	2030	206,400,000	11,100,000	27,700,000	6,400,000	251,600,000
	2050	231,400,000	11,200,000	23,400,000	6,400,000	272,400,000

Source: The Nature Conservancy (TNC)/Sonoma County Agricultural Preservation and Open Space District (SCAPOS). 2016. Conserving Landscapes, Protecting the Climate: The Climate Action Through Conservation Project. Available: http://scienceforconservation.org/dl/CATC_Final_Jan2016.pdf

Notes:

(1) TNC/SCAPOS inventories estimated carbon sequestration in Sonoma County landscapes for 1990 and 2010 and then estimated future sequestration for 2030 and 2050 by assumed trends in change, including for vineyard and urban expansion. Data above is from Table 3a. Methodology for the inventory and future estimates are explained further in the source report, which is incorporated by reference.

(2) "Other" Includes: Urban forest, agricultural land, roads and barren land.

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Appendix C

Reduction Measure Details and Analysis Methods

C.1 Introduction

This appendix summarizes the calculations and assumptions used to quantify greenhouse gas (GHG) reductions and monetary costs and savings for the local, regional, and state measures included in the Sonoma Climate Action 2020 and Beyond (CA2020) Community Climate Action Plan (CAP). The primary objective for each measure is provided along with information on measure implementation. The appendix begins with a general overview of the GHG and economic analysis, followed by specific details regarding each of the state, regional, and local emissions reduction strategies.

C.2 Overview of Analysis Methods

Emission reductions achieved by strategies were quantified using guidance provided by the California Air Resources Board (ARB), California Air Pollution Control Officers Association (CAPCOA), California Energy Commission (CEC), and the professional experience of the lead consultant obtained from preparing climate action plans for other jurisdictions in California. Most calculations were performed using standard factors, references, and assumptions rather than a detailed analysis of individual technologies. GHG savings attributed to the individual strategies exclude emissions reductions achieved by other overlapping actions. This avoids double counting emissions benefits and enables a cumulative assessment of emissions reductions achieved by CA2020. All reductions were quantified in terms of metric tons of carbon dioxide equivalent (MTCO₂e) and represent the annual emissions savings in 2020, compared to business-as-usual (BAU).

CA2020 also includes an analysis of 2040 and 2050 emissions reductions for the state measures under two scenarios. The first scenario includes only committed state policies as of 2014. The second scenario includes state policies that have been considered but are not yet adopted, as well as potential technology and market futures based on current proven technologies. The second scenario does not rely on any unproven technologies or assumptions about markets or personal behavioral shifts that are thought to be infeasible.

Monetary costs and savings are estimated using information specific to the county, when available, or for similar cities in the region, California, or United States, prioritized in that order. Most data are from public sources, including municipal governments in California, the California Public Utilities Commission (CPUC), Pacific Gas & Electric Company (PG&E), United States Department of Energy (DOE), CEC, and U.S. Environmental Protection Agency (EPA). Costs

estimated include initial capital cost and programmatic costs. Savings include reduced costs associated with electricity, natural gas, fuel usage, and required maintenance. Ranges were provided for most strategies due to the uncertainties and variability associated with estimating project costs. In general, ranges reflect differences in price estimates for technologies, based on the use of multiple data sources.

C.3 Presentation Framework and Common Assumptions

The following sections present a detailed overview of the emissions reduction strategies and analysis procedures. Measures are grouped by overall CA2020 reduction measure goal (see Chapter 4 for more information), and then grouped into state, regional, and local categories. The following information is provided for all strategies, as available.

1. Objective: Describes the intent and overall goal for each measure.
2. Impact on Local Emissions: Explains how the measure will affect emissions from local activities, including the annual expected GHG reduction achieved by 2020.
3. Implementation Information: Provides a summary of implementation actions that are associated with each measure, community-specific implementation information can be found in Chapter 5.
4. Assumptions: Identifies assumptions used in calculating emission reductions and cost. Table C-1 includes a master list of assumptions for reference across many or most measures.
5. Analysis Method: Provides an overview of the method(s) for calculating GHG reductions and costs for both 2020 and for 2040/2050. Sufficient detail is presented to provide a basic overview of the approach, as opposed to an exhaustive list of all calculations and steps. In general, each measure uses similar methods to determine reductions for 2020 and for 2040/2050. In many cases, the only difference between 2020 and 2040/2050 is the data used for the calculations (e.g., socioeconomic data, water & electricity consumption, waste tons). Methods for quantifying costs/savings are also described here for applicable measures.
6. Activity Data Sources: Explains the source key activity data.
7. Responsible Entities: Lists agencies, departments, and other actors who are responsible for the success of the measure.
8. Key Progress Indicators: Identifies key data that can be collected to evaluate progress over time.

As noted in Table C-1 below, many of the same standard conversions and emissions factors are used to evaluate emissions reductions and costs for multiple strategies. Table C-3 presents the socioeconomic data for each community for each year.

Table 0-1. Master List of Quantification Assumptions for the CAP

Parameter	Value	Unit	Source
Global Warming Potential			
CO2	1	-	IPCC 2013
CH4	28	-	IPCC 2013
N2O	265	-	IPCC 2013
Conversions			
Days per year	365	days/year	Standard conversion
Pounds per metric ton	2,204.62	pounds/MT	Standard conversion
Kilograms per metric ton	1,000	kilograms/MT	Standard conversion
Grams per metric ton	1,000,000	grams/MT	Standard conversion
Grams per kilogram	1,000	grams/kilograms	Standard conversion
Metric ton per kilogram	0.001	MT/kg	Standard conversion
Therms per million British thermal units (MMBtu)	10	therms/MMBtu	Standard conversion
Energy use ratio: Single Family: Multi-family housing—Electricity	1.97	-	EIA 2009
Energy use ratio: Single Family: Multi-family housing—Natural gas	2.27	-	EIA 2009
Kilowatt-hour (kWh) per megawatt-hour (MWh)	1,000.00	kWh/MWh	Standard conversion
MWh per gigawatt-hours (GWh)	1,000.00	MWh/GWh	Standard conversion
kWh per GWh	1,000,000.00	kWh/GWh	Standard conversion
Minutes per hour	60.00	minutes/hour	Standard conversion
metric ton per ton	0.91	MT/ton	Standard conversion
Million gallons per gallon	0.0000010	million gallons/ gallon	Standard conversion
watts per kilowatt	1,000	W/kW	Standard conversion
Energy Ratio for gasoline	33.4	kWh/gallon-gasoline	CAPCOA 2010, VT-3, Page 310
Energy Ratio for diesel	37.7	kWh/gallon-gasoline	CAPCOA 2010, VT-3, Page 310
gallons per acre-foot	325,851	gal/ac-ft	Standard conversion

Parameter	Value	Unit	Source
Emission Factors			
2010 Energy			
Electricity			
CO2 (PG&E Electricity)	0.445	lbs/kWh	PG&E 2014a
CO2 (Healdsburg Electric Utility)	0.386	lbs/kWh	Crowley pers. comm.
CO2 (eGRID Electricity)	0.611	lbs/kWh	eGRID 9th Edition v1.0 - CAMX
CO2 (Power & Water Resources Pooling Authority [PWRPA])	0.173	lbs/kWh	Sonoma County Water Agency
CH4	0.0000285	lbs/kWh	eGRID 9th Edition v1.0 - CAMX
N2O	0.0000060	lbs/kWh	eGRID 9th Edition v1.0 - CAMX
Natural Gas			
CO2 (PG&E natural gas)	11.7	lbs/therm	PG&E 2013
CH4	0.005	kg/MMBtu	ICLEI Community Protocol - Table B.3
N2O	0.0001	kg/MMBtu	ICLEI Community Protocol - Table B.3
Propane			
CO2	61.46	kg/MMBtu	ICLEI Community Protocol - Table B.4
CO2	5.59	kg/gal	ICLEI Community Protocol - Table B.4
CH4	0.011	kg CH4/MMBtu	ICLEI Community Protocol - Table B.4
N2O	0.0006	kg N2O/MMBtu	ICLEI Community Protocol - Table B.4
Gasoline			
CO2	8.78	kg/gal	ICLEI Community Protocol - Table B.1
Diesel			
CO2	10.21	kg/gal	ICLEI Community Protocol - Table B.1
2020 Energy			
Electricity			
CO2 (PG&E BAU)	0.500	lbs/kWh	Calculated by ICF (see Measure 2-S1)
CO2 (PG&E RPS-adjusted)	0.290	lbs/kWh	PG&E 2013
CO2 (Healdsburg Utility BAU)	0.386	lbs/kWh	Crowley pers. comm.
CO2 (Healdsburg Utility RPS-adjusted)	0.309	lbs/kWh	Crowley pers. comm.
CO2 (eGRID CAMX Region RPS-adjusted)	0.422	lbs/kWh	Calculated by ICF (see Measure 2-S1)
CO2 (PWRPA RPS-adjusted)	0.173	lbs/kWh	Simons pers. comm.

Parameter	Value	Unit	Source
CO2 (Sonoma Clean Power – CleanStart)	0.203	lbs/kWh	Sonoma Clean Power 2014. and calculated (see Measure 2-S1)
CO2 (Sonoma Clean Power – EverGreen)	0.070	lbs/kWh	Sonoma Clean Power.
CO2 Non-Renewable System Power (“unspecified sources”)	0.944	lbs/kWh	ARB 2013
CH4 (PG&E and eGRID RPS-adjusted)	0.00002	lbs/kWh	Calculated by ICF (see Measure 2-S1)
N2O (PG&E and eGRID RPS-adjusted)	0.0000042	lbs/kWh	Calculated by ICF (see Measure 2-S1)
T&D losses	6.84%	lbs/kWh	U.S. EPA 2014a
Offroad			
CO2 (gasoline)	8.78	kg/gal	Climate Registry Default Emission Factors 2014, Table 13.1
CO2e (gasoline)	8.85	kg/gal	Calculated using CH4 and N2O emission factors along with GWPs
CO2 (diesel)	10.21	kg/gal	Climate Registry Default Emission Factors 2014, Table 13.1
CO2e(diesel)	10.30	kg/gal	Calculated using CH4 and N2O emission factors along with GWPs
CO2 (liquefied petroleum gas [LPG])	5.79	kg/gal	Climate Registry 2013 EFs, Table 13.1
CO2 (compressed natural gas [CNG])	6.84	kg/gallon gas equivalent (gge)	Calculated using values below
CH4 (agricultural gasoline)	1.26	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH4 (agricultural diesel)	1.44	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH4 (gasoline)	0.50	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH4 (diesel)	0.58	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH4 (LPG)	0.50	grams/gal	ICLEI U.S. Community Protocol Table TR.6.C.1
CH4 (CNG)	7.08	g/gge	Calculated using values below
N2O (gasoline)	0.22	grams/gal	Climate Registry 2013 EFs, Table 13.7
N2O (diesel)	0.26	grams/gal	Climate Registry 2013 EFs, Table 13.7
N2O (LPG)	0.22	grams/gal	ICLEI U.S. Community Protocol Table TR.6.C.1
N2O (CNG)	0.63	g/gge	Calculated using values below
CNG conversion to CO2	0.001906992	MT CO2/m3	Standard conversion

Parameter	Value	Unit	Source
CNG conversion to CH ₄	0.000001973	MT CH ₄ /m ³	Standard conversion
CNG conversion to N ₂ O	0.000000176	MT N ₂ O/m ³	Standard conversion
CNG conversion to GGE	3.58689496	m ³ /gge	Standard conversion

Notes:

CAPCOA = California Air Pollution Control Officers; CEC = California Energy Commission; EIA = Energy Information Administration; EPA = U.S. Environmental Protection Agency; IPCC = Intergovernmental Panel on Climate Change; PG&E = Pacific Gas and Electric Company.

Table 0-2. Trip Proportions in the County

Community	Home-Work	Home-School	Home-Other	Home-Home
Cloverdale	19%	9%	40%	31%
Cotati	15%	6%	43%	36%
Healdsburg	19%	11%	36%	34%
Petaluma	19%	9%	38%	34%
Rohnert Park	17%	8%	39%	36%
Sebastopol	16%	8%	38%	38%
Sonoma	17%	9%	41%	34%
Windsor	18%	10%	41%	30%
Unincorporated County	18%	10%	47%	25%

Table C-3. Socioeconomic Data by Community and Year

Community	1990	2010	2015	2020	2040	2050
Population						
Cloverdale	4,924	8,618	9,015	9,425	10,952	11,651
Cotati	5,714	7,265	7,483	7,777	8,809	9,404
Healdsburg	9,469	11,254	11,285	11,402	11,799	12,002
Petaluma	43,184	57,941	59,440	61,122	68,542	71,980
Rohnert Park	36,326	40,971	42,590	47,232	50,804	54,581
Santa Rosa	113,313	167,815	174,141	199,702	235,919	246,394
Sebastopol	7,004	7,379	7,497	7,613	8,188	8,608

Community	1990	2010	2015	2020	2040	2050
Sonoma	8,121	10,648	11,009	11,165	11,692	11,964
Windsor	13,371	26,801	27,295	28,190	32,663	34,167
Unincorporated Sonoma County	146,796	121,281	123,025	124,100	134,121	140,390
Households						
Cloverdale	1,868	3,249	3,432	3,625	4,230	4,495
Cotati	2,281	3,041	3,162	3,321	3,777	4,028
Healdsburg	3,613	4,471	4,483	4,530	4,687	4,768
Petaluma	16,062	22,198	22,862	23,508	26,362	27,670
Rohnert Park	13,404	16,143	16,941	18,787	20,208	21,710
Santa Rosa	45,901	64,938	68,067	78,826	93,511	97,561
Sebastopol	2,842	3,345	3,431	3,521	3,803	3,994
Sonoma	3,866	5,060	5,123	5,196	5,441	5,568
Windsor	4,912	8,970	9,418	9,828	11,435	11,949
Unincorporated Sonoma County	54,633	49,049	49,933	50,894	55,234	57,755
Employment						
Cloverdale	2,455	3,012	3,624	3,928	4,324	4,492
Cotati	2,940	3,217	3,413	3,714	4,302	4,502
Healdsburg	6,926	7,351	7,399	7,447	7,447	7,447
Petaluma	26,145	31,537	33,644	35,738	38,488	39,897
Rohnert Park	15,288	15,038	17,393	21,460	21,460	21,460
Santa Rosa	58,761	73,670	79,667	87,224	95,253	98,422
Sebastopol	4,301	5,102	5,507	6,147	6,668	6,827
Sonoma	4,937	5,746	6,350	6,954	7,978	8,178
Windsor	4,898	8,963	9,609	10,283	11,280	11,626
Unincorporated Sonoma County	45,413	41,486	44,367	47,257	49,852	51,579

C.4 State Emissions Reduction Strategies

C.4.1 State Reductions by Goal for 2020

State measures apply to all communities in Sonoma County. They are implemented by state agencies but will affect emissions at the local level in each community. For example, CPUC will implement the Renewables Portfolio Standard (RPS), which applies to all municipal and investor-owned utilities and therefore the emissions associated with electricity consumed in the county.

Methods for calculating GHG reductions associated with state reduction strategies were adopted from the Assembly Bill (AB) 32 Scoping Plan (California Air Resources Board 2008, 2013). The statewide reductions were scaled to Sonoma County communities using activity data, such as socioeconomics, energy use, vehicle miles traveled (VMT), etc. These measures were assumed to be implemented first, before any regional or local reduction measures. Thus, regional measures build on state measures, and local measures build on regional measures.

C.4.2 State Reductions by Goal for 2040 and 2050

State measure reductions for 2040 and 2050 were estimated using one scenario that relied only on committed policies and a second scenario including committed policies, uncommitted policies as well as foreseeable technology and market futures. These two scenarios were drawn from a 2013 study, *Estimating Policy-Driven Greenhouse Gas Emissions Trajectories in California: The California Greenhouse Gas Inventory Spreadsheet (GHGIS) Model* by Jeffery Greenblatt of Lawrence Berkeley National Laboratory, which presented statewide emissions between 2010 and 2050. This study did not present a BAU scenario, where emissions increase with growth in the absence of any reduction efforts. Thus in order to identify reductions compared to BAU, CA2020 uses growth factors for BAU from 2010 to 2050 from a CEC report, *Scenarios for Meeting California's 2050 Climate Goals*, by Max Wei et al. (2013).

These growth factors were then applied to the 2010 base inventory used in the Greenblatt 2013 study, in order to derive an approximate 2010 to 2050 BAU case comparable with the Greenblatt 2013 different scenario cases. By comparing the state reductions between the BAU forecast and the two 2010 to 2050 state reduction scenarios, reduction percentages for each GHG source were derived. These reduction percentages were then applied to the BAU forecast for the different Sonoma County communities examined in this study. Specific reductions for individual state measures for 2040 or 2050 were not identified; the analysis was limited to identifying reductions on a source basis.

C.5 Regional Measures

Regional measures apply to the entire county or multiple communities. Entities like the Sonoma County Energy Independence Office (SCEIO) offer programs that are available to residents in every

community. In other instances, such as Sonoma Clean Power (SCP) or the North Sonoma County Air Pollution Control District (NSCAPCD), services from regional entities are available only to communities within the agency's jurisdiction. They are implemented by regional agencies but will affect local emissions in each community. For example, SCP provides its customers with renewable energy, which reduces emissions associated with standard grid-supplied electricity from PG&E.

The reductions were calculated using measure-specific data from regional agencies applied at the community level. These measures were assumed to be implemented second, after state measures but before local measures. Thus, regional measures build on state measures, and local measures build on regional measures. This order of operations helps avoid double-counting emission reductions from state and regional measures.

C.6 Local Measures

Local measures will be implemented by participating cities and by the County. Each jurisdiction will implement its own suite of local measures, depending on the individual goals, capabilities, and characteristics in each community. Each jurisdiction has also chosen the level of participation for each local measure (e.g., the percentage of homes or businesses participating).

The reductions were calculated using measure-specific data at the community level. These measures will build upon state and regional measures and are assumed to be implemented after state and regional measures. This approach helps avoid double-counting emission reductions from state and regional measures.

C.7 Goal 1: Increase Building Energy Efficiency

Measure 1-S1. Title 24 Standards for Commercial and Residential Buildings

Objective: Title 24 requires that buildings be designed to conserve energy and water. CALGreen mandatory and voluntary measures became effective on January 1, 2011. The current energy efficiency standards in Title 24 were adopted in 2013 and took effect on January 1, 2014. The standards are planned to be updated periodically in the future.

Impact on Local Emissions: Title 24 will reduce the amount of electricity and natural gas consumed in buildings within the Sonoma County communities. Reduced electricity consumption reduces demand from power plants that generate GHG emissions. Reduced natural gas consumption results in direct GHG emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions from building energy. Total countywide reductions from this measure are anticipated to be 14,440 MTCO₂e.

Implementation Information: The California Building Standards Commission is responsible for adopting and updating Title 24 standards, which then become the default standards for communities throughout the state. Building departments in each Sonoma County community implement this measure through local building code adoption.

Assumptions:

- State action would apply to new buildings constructed between 2010 and 2020.
- Energy efficiency in the single-family and multi-family residential 2013 Title 24 Standards (effective 2014) increased by 25% and 14%, respectively, relative to the 2008 Standard (California Energy Commission 2012). Energy efficiency in the residential standards is assumed to increase by 17% every 3 years after 2014.
- Energy efficiency in the nonresidential 2013 Title 24 Standard (effective 2014) increased by 30%, relative to the 2008 Standard (California Energy Commission 2012). Efficiency is assumed to increase by 7% every 3 years after 2014.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. This measure only applies to new building construction occurring after 2010, and therefore only new energy consumed from 2010–2020. This is about 9–15% of countywide energy use in 2020.
2. Energy reductions in 2020 for each community were calculated based on the assumed energy efficiency increases in the Title 24 standards and the annual fraction of new energy (energy consumed for buildings constructed from 2011–2020) subject to each code revision (33% of new energy consumption subject to the 2008 code [years 2011–2013], 33% of new energy consumption subject to the 2014 code [years 2014–2016], and 33% of new energy consumption subject to the 2017 code [years 2017–2019]). Energy efficiency increases were multiplied by annual electricity and natural gas consumption in 2020 from new development (new development energy for this measure is considered to be the difference between 2020 consumption and 2010 consumption) to get the amount of energy reduced.
3. Emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: The California Building Standards Commission and building departments in each community.

Key Progress Indicators: Electricity use (kilowatt-hours [kWh]) and natural gas use (therms) in each community.

Measure 1-S2. Lighting Efficiency and Toxins Reduction Act (AB 1109)

Objective: Assembly Bill 1109 (2007), the Lighting Efficiency and Toxins Reduction Act, is structured to reduce statewide electricity consumption from indoor residential lighting by at least 50% from 2007 levels, and by at least 25% from 2007 levels for indoor commercial and outdoor lighting, by 2018. CEC is required to prescribe, by regulation, standards for energy conservation and efficiency, including the adoption of efficiency standards for outdoor lighting.

Impact on Local Emissions: Measure 1-S2 will reduce the amount of electricity consumed in buildings for lighting within all Sonoma County communities. Reduced electricity consumption reduces demand from power plants that generate GHG emissions. Total countywide reductions from this measure are anticipated to be 21,085 MTCO₂e.

Implementation Information: CEC is responsible for implementing this measure through the prescription of minimum efficiency lighting standards affecting all lighting sold in Sonoma County. Implementation of this measure would be gradual through 2020 as older lighting is replaced with newer, more efficient lighting.

Assumptions:

- The percentage of electricity used for other appliances and lighting is 58.5% (calculated from EIA 2009, Table CE4.10 values for the “Marine” Region).
- The percentage of “other appliances and lighting” that is lighting is 50%
- State action would apply to buildings constructed before 2010.
- 5.2% of nonresidential electricity is used for outdoor lighting (California Energy Commission 2006).
- 28.9% of nonresidential electricity is used for indoor lighting (California Energy Commission 2006).
- 17.2% of residential electricity is used for indoor lighting (California Energy Commission 2014).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Electricity usage from lighting in existing residential and nonresidential developments was estimated by multiplying energy use in 2010 by the fraction of energy that is used for outdoor and indoor lighting, as indicated above.
2. Energy reductions achieved by AB 1109 were calculated by multiplying the estimated lighting consumption by the state goals for residential and nonresidential developments.
3. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: CEC and local lighting vendors.

Key Progress Indicators: Electricity use (kWh) for indoor residential lighting and indoor commercial and outdoor lighting in each community.

Measure 1-S3. Industrial Boiler Efficiency

Objective: This measure would require one or more of the following: annual tuning of all boilers, the installation of an oxygen trim system, and/or a non-condensing economizer to maximize boiler efficiency. A source could also replace an existing boiler with a new one that is equipped with these systems. This measure would be implemented gradually as industrial facilities replace boilers.

Impact on Local Emissions: Measure 1-S3 will reduce the amount of natural gas consumed in industrial buildings within the Sonoma County communities. Reduced natural gas consumption results in direct emission reductions from combustion in buildings. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions from building energy. Total countywide reductions from this measure are anticipated to be 345 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- The percentage of industrial natural gas emissions affected by this measure would be 80%.
- The boiler practices included in this measure will reduce statewide industrial natural gas emissions by 5% in 2020 (California Air Resources Board 2013).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. ARB estimates that implementation of the Industrial Boiler Efficiency measure will reduce statewide emissions from industrial natural gas use by 4% (this assumes 80% of the industrial natural gas in the state is affected, multiplied by a 5% reduction) (California Air Resources Board 2008a).
2. GHG reductions achieved by each community for this measure were quantified by multiplying 2020 BAU emissions from industrial natural gas consumption in new development by 0.04 (or 4%). Reductions from existing development were quantified by multiplying 2010 emissions from industrial natural gas consumption by 0.04.
3. New industrial natural gas consumption was determined by subtracting natural gas consumption in 2010 from natural gas consumption in 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: ARB.

Key Progress Indicators: Natural gas use (therms) for industrial boilers and the number of industrial boiler efficiency projects implemented in each community.

Measure 1-R1. Community Energy Efficiency Retrofits for Existing Buildings

Objective: This measure encompasses all existing programs to improve the energy efficiency of community buildings (including homes and businesses) through retrofits. Existing programs which provide access to funding and other incentives include:

- Sonoma Property Assessed Clean Energy (PACE) Financing Marketplace including the Sonoma County Energy Independence Program (SCEIP) financing product
- Sonoma County Energy Watch (SCEW)
- Windsor Pay As You Save (PAYS) program

Actual energy savings data (kWh and therms) were used to estimate GHG reductions for this measure.

Impact on Local Emissions: This measure will reduce the amount of electricity and natural gas consumed in buildings within the Sonoma County communities. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Reduced natural gas consumption results in direct emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities. This measure also reduces emissions from water and wastewater in addition to building energy. Total countywide reductions from this measure are anticipated to be 3,954 MTCO₂e.

Implementation Information: County of Sonoma Energy and Sustainability Division (ESD) is the lead entity responsible for implementing the Sonoma PACE Financing Marketplace including the SCEIP product. ESD and PG&E are the lead entities responsible for implementing the SCEW program, and the Town of Windsor is the lead entity responsible for implementing its PAYS program. The Bay Area Regional Energy Network (BayREN) is another entity responsible for implementing energy efficiency programs in the county. Healdsburg Electric implements energy efficiency programs in its service area. The water service providers also implement energy efficiency upgrades through water conservation measures. Community Action Partnerships will play a role to help the communities expand energy retrofits throughout the county. The Regional Climate Protection Authority (RCPA) and local communities are working with each of these entities to develop outreach efforts to residences and businesses to use any further funding.

Assumptions:

- As noted above, actual energy savings data (kWh and therms) were used to estimate GHG reductions for this measure and thus no assumptions about market penetration or types of retrofits were necessary to estimate direct building energy reductions. However, in order to derive the secondary reductions from water conveyance, a number of assumptions had to be developed as indicated below.

- The following water use breakdown by end use was assumed (ConSol 2010, Yudelso 2010):

End Use	Percentage
Residential Outdoor Water Use	57%
Residential Indoor Water Use	43%
Nonresidential Outdoor Water Use	35%
Nonresidential Indoor Water Use	65%

- The percentage of residences with electric water heaters is 40.3% (EIA 2009)
- The percentage of commercial buildings with electric water heaters is 39.89% (EIA 2003 Pacific Region, table B32)
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009)
- The percentage of commercial buildings with natural gas water heaters is 60.11% (EIA 2003, Pacific Region, table B32)
- The amount of electricity required to heat gallon of hot water is 0.18 kWh/gallon (EPA 2010a)
- The amount of natural gas required to heat gallon of hot water is 0.009 therms/gallon (EPA 2010a)
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Actual energy (kWh and therms) and water savings (gallons) associated with the energy programs above were researched and obtained from RCPA with assistance from other entities. These are real energy savings achieved over the past few years.
2. Building energy-related GHG emissions reductions achieved by this measure were quantified by multiplying the actual energy reductions achieved by each program in 2014 by the appropriate RPS-adjusted utility emission factors. Actual energy reductions are:

Community	Total Annual Electricity Savings in 2014 (kWh)			Total Annual Natural Gas Savings in 2014 (therms)		
	PACE	Windsor PAYS	SCEW	PACE	Windsor PAYS	SCEW
Cloverdale	217,868	-	-	1,833	-	-
Cotati	317,148	-	-	47	-	-
Healdsburg	142,433	-	-	1,293	-	-
Petaluma	917,157	-	-	4,070	-	-
Rohnert Park	605,846	-	-	2,762	-	-
Sebastopol	301,641	-	-	4,758	-	-
Sonoma	230,894	-	-	982	-	-
Windsor	795,011	76,317	-	3,939	25,200	-
Unincorporated County	7,483,919	-	-	67,335	-	-
Countywide	-	-	10,536,311	-	-	27,443

3. Water energy-related reductions were quantified by:
 - a. Multiplying the expected water savings by the water energy intensity factors
 - b. Multiplying the resulting electricity values by the RPS-adjusted utility emission factors.
 - c. Reductions in building energy consumption were calculated by multiplying the water savings by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy savings data from SCEIP/PACE, SCEW, and Windsor PAYS.

Responsible Entities: SCEIP/PACE, SCEW, and Windsor PAYS in collaboration with the communities.

Key Progress Indicators: Electricity savings (kWh) and natural gas savings (therms) in each community for each energy efficiency program.

Measure 1-R2. Expand Community Energy Efficiency Retrofits Program

Objective: Promote energy efficiency in existing residential buildings and commercial buildings, and remove funding barriers for energy efficiency improvements. Achieve the voluntary residential and nonresidential energy efficiency retrofit goals outlined in Table C-3 by 2020. New tools will be explored to encourage participation in retrofit programs, including on-bill repayment programs like Windsor Pay As You Save (PAYS), energy disclosure programs like Home Energy Score, community based campaigns, and others. Providing a variety of retrofit packages allows homeowners to select and customize retrofit options that meet their needs. RCPA will work with the communities to help businesses and consumers anticipate implementation and compliance efforts and costs with the anticipated higher state standards.

Table 0-3. Voluntary Energy Efficiency Retrofit Goals

Retrofit Level	Implementation Goal	Minimum Retrofits	Approx. % Energy Reduction
Level I	60% of participating existing single-family homes	<ul style="list-style-type: none"> • Replace interior high use incandescent lamps with compact fluorescent lights • Seal air leaks 	19% (elec) 9% (gas)
Level II	25% of participating existing single-family homes	<ul style="list-style-type: none"> • All <i>Level I</i> retrofits • Seal duct leaks • Install a programmable thermostat • Replace windows with double-pane, solar-control low E-argon gas wood frame windows 	22% (elec) 19% (gas)
Level III	15% of participating existing single-family homes	<ul style="list-style-type: none"> • All <i>Level II</i> retrofits • Insulate the attic • Replace natural gas furnaces with ENERGY STAR labeled models • Replace clothes washers with ENERGY STAR labeled models • Replace refrigerators with models 15% better than standard ENERGY STAR labeled models • Replace dishwashers with ENERGY STAR labeled models • Replace gas water heaters with efficient models (EF = 0.62) 	32% (elec) 39% (gas)
Multi-family	10% of existing multi-family homes	<ul style="list-style-type: none"> • Will vary on a case-by-case basis. Retrofits should reduce energy consumption (electricity and natural gas) by at least 15%, relative to existing conditions. 	15%
Nonresidential	5% of existing nonresidential buildings	<ul style="list-style-type: none"> • Will vary on a case-by-case basis. Retrofits should reduce energy consumption (electricity and natural gas) by at least 20%, relative to existing conditions. 	20%

Source: U.S. Department of Energy 2013a

Impact on Local Emissions: This measure will reduce the amount of electricity and natural gas consumed in buildings within the Sonoma County communities. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Reduced natural gas consumption results in direct emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities.

Energy efficiency upgrades at residential, commercial and industrial buildings will reduce energy consumption and could provide a variety of co-benefits for residents and the workforce. For example, a well-built energy-efficient structure is more durable and directly reduces certain health risks (e.g., mold, dust mites). Energy efficient buildings also improve general comfort by equalizing room temperatures and reducing indoor humidity. Total countywide reductions from this measure are anticipated to be 12,394 MTCO₂e.

Implementation Information: SCEIO and RCPA are the lead agencies for implementing this measure. ESD and RCPA will work with the participating communities to implement energy efficiency retrofits. Actions may include: Implementing a low-income weatherization program, expanding energy efficiency outreach/education campaigns targeted at residents and businesses, promoting the smart grid, funding and scheduling energy efficiency tune-ups, promoting energy efficiency management services for large energy users and promoting energy efficiency financing tools.

Another action under this measure would be to support voluntary building energy efficiency audits such as those being delivered through the BayREN Home Energy Score pilot as part of real estate transactions through outreach and linkage to potential funding sources. The intent would be to make energy efficiency a routine part of a purchaser's considerations when buying residential or commercial real estate. In addition, expanding voluntary audits may be additional motivation for residential and commercial owners to invest in energy efficiency improvements to increase real estate value prior to sale.

Assumptions:

- Measure goals apply to “existing” residential and nonresidential buildings constructed before 2017.
- In 2020, 10% of all existing single-family and multi-family homes participate in this measure; 5% of all nonresidential buildings participate.
- In 2040, 20% of all existing single-family and multi-family homes participate in this measure; 20% of all nonresidential buildings participate.
- In 2050, 50% of all existing single-family and multi-family homes participate in this measure; 50% of all nonresidential buildings participate.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings associated with the single-family retrofit levels were estimated using the DOE's Home Energy Saver™ (HES).
2. Electricity and natural gas savings provided by the HES were multiplied by the single family home participation rate, the implementation goals (see Table C-3) and the estimated number of homes in 2017 to obtain total energy reductions for single-family residences.

3. Energy reductions achieved by multi-family retrofits were quantified assuming the upgrades would reduce energy consumption by 15%, relative to BAU conditions.
4. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.
5. Energy reductions achieved by nonresidential retrofits were quantified assuming the upgrades would reduce facility-wide energy use by 20%.
6. This reduction was multiplied by the forecasted electricity and natural gas consumption for participating buildings constructed before 2017.
7. Energy savings from the overlapping state and local measures were removed from the energy forecast to avoid double counting.
8. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. For single-family home reductions, the number of homes in 2017 was multiplied by the single-family participation rate chosen by each community and then by the measure implementation goals.
2. For multi-family homes, the number of multi-family homes in 2017 was multiplied by the multi-family participation rate chosen by each community and then by the assumed 15% reduction in energy consumed used in the 2020 analysis.
3. For nonresidential buildings, non-residential electricity and natural gas consumption was multiplied by the non-residential participation chosen by each community and then by the assumed 20% reduction in energy consumed used in the 2020 analysis.
4. All energy reductions were multiplied by the 2020 utility emission factors (the RPS-adjusted factor was used for electricity reductions).

Activity Data Sources: Energy consumption and savings data from the DOE's HES.

Responsible Entities: ESD and RCPA in collaboration with the communities.

Key Progress Indicators: Electricity savings (kWh) and natural gas savings (therms) in each community (or total electricity or natural gas consumption to reflect reduced usage).

Measure 1-L1. Expand the Green Building Ordinance Energy Code

Objective: Require new residential and nonresidential development to exceed CALGreen Title 24 standards through Tier 1 voluntary standards (15% reduction from 2010 Title 24 standards) or Tier 2 (30% reduction from 2010 Title 24 standards). This could involve requiring new development to comply with CALGreen Tier 1 or Tier 2 standards or another percentage beyond Title 24. Extend this requirement to apply to future updates to the Title 24 code until zero net energy is achieved.

Incorporate green building principles and practices into the planning, design, construction, management, renovation, operations, and demolition of all new buildings.

The percentage requirement beyond Title 24 standards for new homes and new nonresidential buildings in each community is as follows:

Community	Percentage Beyond Title 24 Standards 1
Cloverdale	-
Cotati	-
Healdsburg	-
Petaluma	-
Rohnert Park	-
Sebastopol	-
Sonoma	-
Windsor	10%
Unincorporated County	-

Impact on Local Emissions: This measure will reduce the amount of electricity and natural gas consumed in new and remodeled buildings within the communities by requiring a percentage energy reduction beyond the minimum CALGreen code.

Reducing electricity use directly reduces GHG emissions arising from electricity generation, although the emission reductions may not occur within the communities themselves. Reduced natural gas combustion (such as for natural gas water heaters) also results in direct emission reductions that will occur within the communities. Total countywide reductions from this measure are anticipated to be 62 MTCO₂e.

Implementation Information: Each community would be responsible for developing and implementing a new Green Building Ordinance consistent with the goals chosen as part of this measure.

Assumptions:

- All new buildings (residential and nonresidential) built in 2017 and later must comply with the Green Building Ordinance (GBO).
- The ratio of single-family household electricity and natural gas use to multi-family household electricity and natural gas use is 1.97 and 2.27, respectively (Energy Information Administration 2009)¹
- Sonoma County communities are located in climate zone 4 (CAPCOA 2010).

¹ These ratios were calculated using electricity- and natural gas-use data from Table CE4.10 from the U.S. Energy Information Administration 2009 RECS Survey Data.

- The energy reduction for each 1% improvement over 2008 Title 24 standards for Climate Zone 4 is as follows (CAPCOA 2010):
 - 0.09% reduction in electricity use for single-family homes
 - 0.91% reduction in natural gas use for single-family homes
 - 0.12% reduction in electricity use for multi-family homes
 - 0.88% reduction in natural gas use for multi-family homes
 - 0.27% reduction in electricity use for commercial buildings
 - 0.71% reduction in natural gas use for commercial buildings
- Energy reduction estimates for a 1% reduction beyond the most recent 2013 Title 24 standards are not available, so the CAPCOA 2008 standards estimates are used as a proxy.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy reductions associated with overlapping measures were subtracted from the energy used by all new buildings built from 2017 to 2020. This was done in order to determine the energy used by new buildings after the implementation of preceding measures, before the application of the new GBO.
2. New energy use (2017–2020) for single-family and multi-family homes was estimated by multiplying total residential energy use by the ratios listed in the assumptions section above, taking into consideration the number of single-family and multi-family homes within each community.
3. Energy reductions (electricity and natural gas) were then estimated by multiplying the new energy use for single-family homes, multi-family homes, and nonresidential buildings by the percentage reduction beyond T24 as specified by each community (e.g., 10% in the Town of Windsor) and then multiplying by the appropriate reduction factor each 1% reduction beyond 2008 T24 standards.
4. GHG emissions reductions achieved by this measure were quantified by multiplying the energy reductions for each building type by the appropriate utility emission factors, adjusted to account for renewable energy content.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy use data from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of new homes and businesses compliant with new GBOs, electricity savings (kWh) and natural gas savings (therms) in each community associated with

GBO compliance, and/or total electricity or natural gas consumption for new development to reflect reduced usage associated.

Measure 1-L2. Outdoor Lighting

Objective: Adopt outdoor lighting standards to reduce electricity consumption above and beyond the requirements of AB 1109. Replace a certain percentage of incandescent outdoor lighting with light-emitting diode (LED) bulbs by 2020.

The percentage of incandescent outdoor lighting fixtures replaced with LEDs was determined by the communities on an individual basis as follows:

Community	Percentage LED Replacement
Cloverdale	-
Cotati	50%
Healdsburg	80%
Petaluma	50%
Rohnert Park	50%
Sebastopol	25%
Sonoma	80%
Windsor	25%
Unincorporated County	20%

Impact on Local Emissions: This measure will reduce the amount of electricity consumed in buildings within the Sonoma County communities for outdoor lighting. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 1,550 MTCO₂e.

Implementation Information: Implementation mechanisms will be chosen by each jurisdiction and may include developing a new ordinance requiring LED outdoor lighting for new development and/or providing incentives for bulb replacement in existing fixtures.

Assumptions:

- Approximately 5.10% of total residential electricity in each community is used for residential outdoor lighting (California Energy Commission 2014).
- Approximately 5.2% of total commercial electricity in each community is used for commercial outdoor lighting (California Energy Commission 2006).²

² For the PG&E service area, Figure 9-3.

- In existing development, incandescent lamps are used for 59% of exterior lighting (Department of Energy 2012).
- Installation of an outdoor LED fixture achieves a 75% reduction in energy usage, relative to an incandescent bulb (U.S. Environmental Protection Agency 2011a).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy reductions achieved by replacing incandescent bulbs with LED blubs in existing outdoor residential and non-residential lighting fixtures were calculated by first multiplying residential and non-residential BAU electricity consumption in 2017 by the outdoor electricity percentages listed in the assumptions above (to determine outdoor lighting electricity use).
2. Overlapping electricity reductions from other measures were subtracted from the residential and non-residential 2017 BAU outdoor lighting electricity to avoid double-counting reductions.
3. Residential and non-residential outdoor lighting electricity consumption was then multiplied by 59% to estimate the BAU amount of electricity consumed by incandescent bulbs.
4. This value was multiplied by the LED penetration rate chosen by each community and then by 75% to determine the amount of electricity saved through the use of LED bulbs.
5. GHG emissions reductions were then quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020, because this measure applies to existing development.

Activity Data Sources: Energy use data from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of LED outdoor lights installed/sold, electricity savings (kWh) in each community associated with outdoor lighting upgrades, and/or total electricity consumption for outdoor lighting to reflect reduced usage associated with this measure.

Measure 1-L3. Shade Tree Planting

Objective: Expand on current urban tree planting policies and programs to establish a shade tree planting goal for each community to help reduce building energy use. The communities already have different tree planting programs, which vary by location (see Chapter 5 for more information).

The number of trees planted by 2020 was determined by the communities on an individual basis as follows.

Community	# of New Trees Planted by 2020
Cloverdale	100
Cotati	100
Healdsburg	100
Petaluma	1,000
Rohnert Park	1,000
Sebastopol	400
Sonoma	50
Windsor	500
Unincorporated County	1,000

Impact on Local Emissions: This measure will provide additional shade around buildings to reduce the “heat island” effect in urban areas. Reducing heat will reduce the amount of electricity needed for cooling, which, in turn, reduces GHG emissions associated with generating electricity at power plants. Although the emission reductions won’t always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 45 MTCO₂e.

Implementation Information: Implementation mechanisms may include:

- establishing goals and funding sources for new trees planted on city/county property
- implementing a requirement to account for trees removed and planted as part of new construction
- requiring new development to plant shade trees (e.g., require a certain number of new trees per dwelling unit, new resident, square footage of building, or size of lot)
- providing rebates for the purchase of new trees and education about the benefits of shade trees and tree care for residents.

Assumptions:

- Tree planting requirements would take effect in 2017.
- Trees are planted adjacent to buildings where shading is provided; trees planted in the public right-of-way in places not providing building shade would not reduce building energy use and were not included in the calculations.
- Average tree planting age is 1 year and 96% of planted trees would survive, based on data from Los Angeles (McPherson et al. 2008).
- Trees would be a mix of maple, oak, and redwood (Sonoma County 2008).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings from reduced building cooling and energy increases from increased building heating needs were obtained from the U.S. Forest Service's (2011) Tree Carbon Calculator for each tree species. Increases in building heating needs are a small fraction of the energy savings from reduced building cooling.
2. The values were multiplied by the expected number of trees planted.
3. GHG emissions reductions achieved by the measure were quantified by multiplying the total energy reductions by the appropriate RPS-adjusted utility emission factors. Minor GHG increases from increased building heating needs were subtracted from the GHG reductions.
4. Carbon sequestration benefits from shade tree planting were not quantified as they are outside the scope of the CAP.

The communities would incur up-front costs to plant, stake, and mulch trees (assumed to be \$170/tree). Maintenance costs were estimated based on a study conducted by the City of Goleta (2009) (assumed to range from \$15.93 to \$70.39). Cost savings were not calculated for benefits such as air quality, health, property value, or intrinsic value improvements; some studies show a net benefit for trees when these co-benefits are monetized. A lifetime of 40 years for each tree was assumed (McPherson et al. 1999).

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above. A greater amount of planted trees was selected by each community in 2040 and in 2050 to represent an increasing commitment to plant shade trees.

Activity Data Sources: Energy savings from reduced building cooling from the U.S. Forest Service's Tree Carbon Calculator.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of new trees planted in each community and/or total electricity or natural gas consumption to reflect reduced shading effects on cooling electricity usage associated with this measure.

Measure 1-L4. Co-Generation Facilities

Objective: Optimize the use of locally generated energy by encouraging, where feasible, co-generation facilities in new commercial and industrial facilities greater than 100,000 square feet. The communities will encourage co-generation facilities through a number of actions, such as amending ordinances, removing regulatory barriers, providing financial incentives, and providing outreach (see implementation information below).

Background: For the same level of power output, combined heat and power (CHP) systems (or co-generation systems) use less input energy than traditional separate heat and power generation, resulting in fewer CO₂ emissions. Co-generation facilities simultaneously generate electricity and useful heat and are typically used in district heating systems, which are used in a central location to distribute heat to multiple buildings or facilities. In traditional power generation systems, heat is a by-product that is wasted by being released into the environment. In contrast, CHP systems

harvest the thermal energy and use it to heat nearby buildings or processes, thus reducing the amount of natural gas or other fuel that would otherwise be combusted. In addition CHP systems lower the demand for grid electricity, thereby displacing the CO₂ emissions associated with the production of grid electricity (CAPCOA 2010).

CHP technologies, including microturbines, fuel cells, and reciprocating engines, can be implemented on a scale appropriate for residential neighborhoods, planned communities, mixed-use, and commercial developments. These systems typically have a generation capacity of ranging from 30–2,000 kW (CAPCOA 2010). Combustion turbines and backpressure steam turbines are more appropriate for industrial processes or very large commercial developments (CAPCOA 2010). Typical medium/large systems have capacity of 10 MW or greater (CAPCOA 2010, U.S. EPA n.d.).

The 2020 cogeneration electricity capacity target for each community is as follows:

Community	Co-Generation Goal (MWh)
Cloverdale	-
Cotati	-
Healdsburg	-
Petaluma	-
Rohnert Park	-
Sebastopol	-
Sonoma	-
Windsor	-
Unincorporated County	10

Impact on Local Emissions: This measure will replace grid electricity with electricity supplied by co-generation facilities, which is carbon neutral. Reducing demand for grid electricity will reduce GHG emissions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 1 MTCO₂e.

Implementation Information: Implementation mechanisms in each community could include developing new ordinances or offering incentives for co-generation facilities. For example, a Green Building Ordinance may include LEED certification credits (or other GBO compliance mechanisms) for the use of co-generation. The communities could offer financial incentives for CHP development by securing funding available through partnerships with utilities, state and federal government programs (e.g., tax credits, rebates, grants, and low-interest loans), energy performance contracts³, and non-profit organizations. The communities can also encourage

³ "An energy performance contract is an arrangement with an energy service company that bundles together various elements of an energy-efficiency investment, such as installation, maintenance, and monitoring of energy-efficient equipment. These contracts, which often include a performance guarantee to ensure the investment's

cogeneration by removing any unintended regulatory barriers, such as standard interconnection requirements, net metering, and output-based regulations (U.S. EPA 2014b). The communities would need to identify land uses that would be appropriate for this measure, and then conduct outreach efforts that explain new ordinances or incentives that are being offered. Additional information on the successful implementation of CHP systems, including many case studies, can be found in the U.S. EPA Report *Combined Heat and Power: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs* (U.S. EPA 2014b).

Assumptions: All assumptions used for the analysis of this measure are identified in Table C-1.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. To determine the amount of electricity that would be generated using cogeneration, the goal chosen by each community (i.e., 10 megawatt-hours [MWh]) was converted into kWh.
2. Electricity savings were then multiplied by the appropriate RPS-adjusted utility emission factors to determine GHG reductions.

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of co-generation projects implemented in each community and/or the capacity (kW) and generation (kWh) for each new CHP facility.

C.8 Goal 2: Increase Renewable Energy Use

Measure 2-S1. Renewables Portfolio Standard (RPS)

Objective: The RPS obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregators (CCAs) to procure an increasing amount of their electricity from eligible renewable sources. Senate Bill X1-2 (2011) requires regulated entities to meet RPS goals of 20% of retail sales from renewables by the end of 2013, 25% by the end of 2017, and the 33% by the end of 2020.

Impact on Local Emissions: The RPS will reduce the carbon intensity of electricity delivered to the county. Although the emission reductions won't always occur within the geographic boundaries of the communities, the indirect emissions associated with electricity consumed by the communities will be reduced. This measure will reduce GHG emissions from building energy. Total countywide reductions from this measure are anticipated to be 181,793 MTCO₂e.

success, are typically financed with money saved through reduced utility costs but the systems may also be financed using tax-exempt lease-purchasing agreements.” (U.S. EPA 2014b).

Implementation Information: CPUC, IOUs, ESPs, and CCAs will be responsible for implementing this measure by ensuring that an increasing amount of electricity comes from renewable sources.

Assumptions:

- The 2020 BAU electricity emission factor for PG&E is the average of emission factors from 2008–2012, to account for annual variation in emission factors.
- SCP’s CleanStart emission factor will be 30% better than PG&E’s 2020 emission factor.
- The 2020 renewable energy portfolio of all electricity supplied to the county is 33%.

Analysis Method - 2020: In 2010, PG&E supplied electricity to most residents in Sonoma County, and the City of Healdsburg municipal utility supplied electricity to Healdsburg residents. As of 2015, most residents in Sonoma County (except Healdsburg) purchase their electricity from SCP and the remainder purchase their power directly from PG&E. The following steps were used to quantify emission reductions for this measure:

1. GHG emissions due to electricity generation for delivery to Sonoma County in the 2020 BAU community emissions forecast were quantified using the utilities’ BAU CO₂e intensities as of 2010 not assuming any effects of the RPS or the existence of SCP.
2. Because SCP did not exist in 2010, the 2020 BAU forecast uses a PG&E emissions factor for all locations other than Healdsburg.
3. Achievement of the RPS will reduce BAU carbon intensities. RPS-adjusted emissions factors for electricity were calculated assuming an increase of renewable energy to 33% in 2020. The calculated RPS-adjusted emissions factors are:

Utility	CO ₂ (lbs/kWh)	CH ₄ (lbs/MWh)	N ₂ O (lbs/MWh)
PG&E	0.290	-	-
Healdsburg Electric	0.309	-	-
PWRPA	0.173	-	-
SCP - CleanStart	0.203	-	-
SCP - EverGreen	0.070	-	-
eGRID CAMX Region*	0.422	0.020	0.004
* the eGRID CAMX emissions factors for CH ₄ and N ₂ O were applied to all electricity in the absence of utility specific emissions factors.			

4. GHG emissions that would be generated by community electricity consumption in 2020 will therefore be lower as a result of the RPS-adjusted emission factors. These reductions were calculated by multiplying the forecasted 2020 community-wide electricity consumption by the RPS-adjusted emissions factors for PG&E and Healdsburg.
5. The difference in emissions between the 2020 BAU and 2020 RPS scenarios represents the emissions reductions achieved by this state action.

Additional reductions beyond the RPS for SCP users are described below.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: CPUC.

Key Progress Indicators: Utility-specific GHG emission rates and energy generation portfolios.

Measure 2-S2. Residential Solar Water Heater Program (AB 1470)

Objective: The Residential Solar Water Heater Program (AB 1470) creates a \$25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas and electricity use in homes and businesses throughout the state. CPUC will design and implement a program of incentives for the installation of solar water heaters.

The estimate of solar water heaters to be installed for each community for both existing and new homes is the following (see Assumptions below for how these numbers were developed):

Community	Number of Solar Water Heaters		
	Existing Homes	New Homes	Total
Cloverdale	41	5	45
Cotati	38	3	42
Healdsburg	56	1	57
Petaluma	277	16	294
Rohnert Park	202	33	235
Sebastopol	42	2	44
Sonoma	63	2	65
Windsor	112	11	123
Unincorporated County	613	23	636
<i>Total Countywide</i>	1,444	96	1,540

Impact on Local Emissions: Measure 2-S2 will reduce the amount of natural gas and electricity consumed in buildings within the Sonoma County communities. Reduced natural gas consumption results in direct emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities. Reduced electricity consumption in water heaters results in a reduction of indirect emissions at the site of electricity generation (e.g., power plants). This measure would reduce GHG emissions from building energy. Total countywide reductions from this measure are anticipated to be 345 MTCO₂e.

Implementation Information: CPUC is responsible for implementing this measure by providing incentives to property owners who install a solar water heater.

Assumptions:

- The number of solar water heaters installed statewide is 200,000 (California Air Resources Board 2008, Appendix 2 pg. I-26); the number of single-family houses in the state by 2020 is

16,000,000 (CA Department of Finance 2014). Based on this, approximately one in 80 single-family homes constructed between 2010 and 2020 will be retrofitted with a solar water heater.

- The annual reduction in natural gas for switching to a solar water heater is 130 therms (California Air Resources Board 2008, Appendix 2 pg. I-26).
- The annual reduction in electricity for switching to a solar water heater is 2,195 kWh (U.S. Department of Energy 2015, $12.03 \text{ kWh/day} \times 365 \text{ days/year} \div 2 \text{ solar energy factor}$).
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009, Table HC8.6 values for the “Marine” Region)
- The percentage of residences with electric water heaters is 40.3% (EIA 2009, Table HC8.6 values for the “Marine” Region)
- State action would apply to buildings constructed before 2020.
- Natural gas solar water heaters reduce natural gas use by 130 therms (California Air Resources Board 2008).
- Electric solar water heaters reduce electricity use by 2,195 kWh (U.S. Department of Energy 2012a).
- 1,540 solar water heaters will be installed in the county as a result of the measure in 2020 (calculation).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Natural gas and electricity reductions were calculated by multiplying the expected energy reductions by the percentage of homes with each system type and estimated number of water heaters in the county.
2. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: CPUC.

Key Progress Indicators: Electricity use (kWh) and natural gas use (therms) for water heating in each community and/or the number of solar water heaters installed in each community.

Measure 2-R1. Community Choice Aggregation

Objective: Sonoma Clean Power (SCP) is a Community Choice Aggregation (CCA) program and electricity provider that works with PG&E to provide their customers with electricity that has a higher renewable energy content. SCP offers two participation options for the CCA: the CleanStart option provided 33% renewable power in 2014, and the EverGreen option, which provides 100% renewable power. This measure includes the potential to increase participation in the CleanStart and EverGreen options by 2020. SCP also offers a *NetGreen* net energy metering program that

supports local renewable energy, like solar and wind, by allowing customers to offset their electrical usage with energy generated on-site.

Assembly Bill 117 (2002) enables California cities and counties, either individually or collectively, to supply electricity to customers within their community by establishing a CCA program. Unlike a municipal utility, a CCA does not own transmission and delivery systems, but is responsible for providing electricity to residents and businesses. The CCA may own electric generating facilities, but more often, it purchases electricity from private electricity generators.

Impact on Local Emissions: This measure will reduce the carbon intensity of electricity delivered to the county, which reduces GHG emissions at the power plants generating this electricity. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced. Total countywide reductions from this measure are anticipated to be 47,995 MTCO₂e.

Implementation Information: The communities who are members of SCP will work to increase participation in CleanStart and EverGreen, and will encourage new local distributed renewable systems. As SCP gathers momentum and capacity, the members will fund local energy efficiency programs as well as local renewables for CleanStart and EverGreen revenue.

Assumptions:

- The rates of participation for CleanStart and EverGreen are 77% and 5%, respectively, for all communities. (Note: this has increased since the time of publication, so the estimate of GHG impacts from SCP is conservative)
- New SCP CleanStart and EverGreen customers were assumed to be previous PG&E customers (this measure does not apply to Healdsburg because it has its own utility).
- The increase in SCP electricity for both CleanStart and EverGreen is equal to a decrease in PG&E electricity.

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. GHG emission reductions were calculated by first multiplying PG&E electricity in each community by the rates of participation for CleanStart and EverGreen, which were assumed to be 77% and 5%, respectively, for all communities.
2. Then, the new calculated SCP electricity was multiplied by the 2020 RPS-adjusted emission factors for PG&E.
3. Energy reductions from overlapping measures were accounted for to avoid double-counting reductions.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. PG&E electricity in 2040 and 2050 were multiplied by the same participation rates as in 2020 (77% & 5%) to determine new SCP electricity.
2. The calculated SCP electricity values were then multiplied by the 2020 RPS-adjusted emission factors for PG&E. Note: SCP published its first utility-specific emissions factor just prior to publication of Climate Action 2020 and Beyond; this factor will be used to evaluate the impacts of SCP in the future.

Activity Data Sources: Electricity consumption from PG&E.

Responsible Entities: SCP in collaboration with the communities.

Key Progress Indicators: GHG emission rates for SCP's CleanStart and EverGreen, the number of SCP customers for each, and the quantity of electricity supplied to customers (kWh).

Measure 2-L1. Solar in New Residential Development

Objective: Implement a requirement to install solar energy systems on new residential buildings to increase local renewable energy generation. Under this measure, the communities will also encourage or require solar installations on as many new multi-family developments as feasible.

The market penetration rate for new homes installing solar was determined by the communities on an individual basis as follows:

Community	Percentage of New Homes Installing Solar
Cloverdale	-
Cotati	50%
Healdsburg	8%
Petaluma	50%
Rohnert Park	15%
Sebastopol	100%
Sonoma	8%
Windsor	25%
Unincorporated County	-

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 248 MTCO₂e.

Implementation Information: This could be implemented through discretionary approvals and permitting for new projects. This program may also include streamlined permitting, providing

information to homeowners for low interest financing, assisting homeowners in purchasing solar photovoltaics through low-interest loans or property tax assessments, requiring that new development provide for solar access and build solar-ready features into buildings, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance, and other sources. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or power purchase agreement (PPA) companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations. The actual market penetration rates that each community will achieve will likely be influenced by how the community implements this measure. For example, adopting an ordinance to require solar in all new housing will lend itself to a 100% participation rate. If a community relies on the funding sources and financing options discussed above, market penetration would be achieved to the extent that funding is available, most likely resulting in less than a 100% penetration rate.

Assumptions:

- This measure only affects new single-family homes (those built in 2017 and later).
- The energy generated by solar photovoltaics (PV) is carbon neutral (CAPCOA 2010).
- A typical 4 kW residential solar system would generate 5,159 kWh per year (National Renewable Energy Laboratory n.d.).
- The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 5,159 kWh of solar energy will reduce GHG emissions associated with 5,159 kWh of utility electricity generation.
- Initial costs for a residential system (4 kW, roof-mounted) range from \$4.9 to \$5.7 per watt (Lawrence Berkeley National Laboratory and U.S. Department of Energy 2013).
- Solar energy systems would have a 25-year lifetime (U.S. Department of Energy 2013b).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. The PVWatts model was used to calculate the energy potential of each single-family residential solar installation.
2. This value was multiplied by forecasted number of participating homes constructed between 2017 and 2020 in each community (based on penetration rates noted above) to determine total residential energy reductions achieved by the measure.
3. GHG emissions reductions were then quantified by multiplying the total energy reductions by the appropriate RPS-adjusted utility emission factors.

The cost analysis considered two financing scenarios:

- *Direct Purchase:* The building owner directly purchases, installs and maintains the solar panels

- **Power Purchase Agreement:** The building owner enters into a PPA with a local company who owns and maintains the solar panels.

Total capital costs under the direct purchase scenario were calculated based on an initial cost of \$4.9 to \$5.7 per watt installed. The lower residential cost includes rebate payments from the California Solar Initiative (CSI) at \$0.20 per watt and a federal investment tax credit (ITC) of 30% of the system cost, applied after the CSI rebate. The higher residential cost does not include a CSI rebate, because more than 99% of CSI the budget allotted for residential incentives had already been spent, as of May 2014 (California Energy Commission et al. 2014). Annual operating costs of \$0.02 per watt were assumed, based on the PVWatts model. Annual energy cost savings are based on electricity production (which decreases slightly each year due to system degradation), multiplied by the appropriate PG&E utility rates.

No up-front costs were assumed under the PPA scenario. Annual costs savings were estimated to be 10 to 20% off the retail value of the electricity generated (GreenZU 2014).

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with PG&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of residential PV installations in new development and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 2-L2. Solar in Existing Residential Buildings

Objective: Incentivize solar energy installation on existing residential buildings to increase renewable energy generation.

The market penetration rate for existing homes installing solar was determined by the communities on an individual basis as follows:

Community	Percentage of Existing (2017) Homes Installing Solar
Cloverdale	5%
Cotati	15%
Healdsburg	2%
Petaluma	15%
Rohnert Park	15%
Sebastopol	15%
Sonoma	11%
Windsor	15%
Unincorporated County	15%

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 9,942 MTCO₂e.

Implementation Information: This could be implemented through permitting for major remodels and incentives for existing homes. The communities could require all existing homes that undergo major remodels or renovations to install solar. This program may also include streamlined permitting, providing information to homeowners for low-interest financing, assisting homeowners in purchasing solar PV through low-interest loans or property tax assessments, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance, and PACE financing options available through ESD. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations.

Assumptions:

- This measure only affects existing single-family homes (those built before 2017).
- The energy generated by solar PV is carbon neutral (CAPCOA 2010).
- A typical 4 kW residential solar system would generate 5,159 kWh per year (National Renewable Energy Laboratory n.d.).
- The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 5,159 kWh of solar energy will reduce GHG emissions associated with 5,159 kWh of utility electricity generation.
- Solar systems would have a 25-year lifetime (U.S. Department of Energy 2013b).

Analysis Method – 2020: The approach for calculating electricity, emissions reductions, and costs is similar to that described for Measure 2-L1, except that this measure applies to existing single-family homes using the penetration rates identified by each jurisdiction in the table above.

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above. A higher participation rate was selected by each community in 2040 and in 2050 to represent an increasing commitment to outfit existing (pre-2017) homes with solar energy.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with PG&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of residential PV installations in existing homes and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 2-L3. Solar in New Non-Residential Developments

Objective: Implement a requirement to install solar energy systems on new non-residential development to increase local renewable energy generation. Under this measure, the communities will encourage or require solar installations on as many new non-residential developments as feasible.

Incorporate County of Sonoma – PV and electric vehicle (EV) ready ordinances, which require new construction to build structure, wiring and panel capacity for later addition of EV charging and solar PV installation.

The percentage of new nonresidential development constructed between 2017 and 2020 affected by this measure, chosen by each community would be required to incorporate solar energy for some or all of the project’s energy needs. These percentages are:

Community	Percentage of New Development Installing Solar
Cloverdale	-
Cotati	10%
Healdsburg	2%
Petaluma	10%
Rohnert Park	10%
Sebastopol	75%
Sonoma	2%
Windsor	5%
Unincorporated County	-

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won’t always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 535 MTCO₂e.

Implementation Information: This could be implemented through discretionary approvals and permitting for new projects. This program may also include streamlined permitting, providing information to developers for low interest financing, assisting developers in purchasing solar PV through low-interest loans or property tax assessments, requiring that new development provide for solar access and build solar-ready features into buildings, and establishing guidelines for solar

development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance and other sources. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations. The actual market penetration rates that each community will achieve will likely be influenced by how the community implements this measure. For example, adopting an ordinance to require solar in all new non-residential development will lend itself to a 100% participation rate. An ordinance with building-size specifications, such as an ordinance that requires solar only for buildings greater than a certain square footage, would result in a lower penetration rate.

Assumptions:

- This measure only affects new nonresidential buildings (buildings built in 2017 or after).
- Electricity use for nonresidential buildings constructed between 2017 and 2020 was estimated using a linear interpolation of 2010 electricity use and 2020 BAU electricity use.
- The energy generated by solar PV is carbon neutral (CAPCOA 2010).
- The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 50,000 kWh of solar energy will reduce GHG emissions associated with 50,000 kWh of utility electricity generation.
- The average system size is 40 kW.
- Initial costs for a nonresidential system (40 kW roof-mounted) ranges from \$4.3 to \$5.3 per watt (Lawrence Berkeley National Laboratory and U.S. Department of Energy 2013).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Nonresidential energy reductions were calculated by multiplying the forecasted electricity consumption for buildings constructed after 2017 by the participation rate for each community.
2. Electricity savings from overlapping state and local strategies were removed from the nonresidential energy forecast to avoid double counting.
3. GHG emissions reductions were then quantified by multiplying the total energy reductions by the appropriate RPS-adjusted utility emission factors.

The cost analysis considered two financing scenarios:

- *Direct Purchase:* The building owner purchases, installs, and maintains the solar panels
- *Power Purchase Agreement:* The building owner enters into a power purchase agreement (PPA) with a local company that installs, owns, and maintains the solar panels.

Total capital costs under the direct purchase scenario were calculated on a per-project basis based on an initial cost of \$4.3 to \$5.3 per watt installed. The lower nonresidential cost scenario includes the CSI performance based incentive of \$0.03 per kWh for the first 5 years of operation, as well as solar renewable energy certificate valued at \$10 per MWh. The higher cost scenarios only include the ITC. Annual operating costs of \$0.02 per watt were assumed, based on the PVWatts model. Annual energy cost savings were based on electricity production (which decreases slightly each year due to system degradation), multiplied by the appropriate PG&E utility rates.

No upfront costs were assumed under the PPA scenario. Annual costs savings were estimated to be 10 to 20% off the retail value of the electricity generated.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with PG&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of nonresidential PV installations in new development and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 2-L4. Solar in Existing Non-Residential Buildings

Objective: Incentivize solar energy installation for existing nonresidential buildings to increase renewable energy generation.

Each community selected its own goal as to the percentage of existing non-residential buildings (pre-2017) to install solar energy by 2020. These percentages are:

Community	Percentage of Existing Development Installing Solar
Cloverdale	10%
Cotati	15%
Healdsburg	2%
Petaluma	20%
Rohnert Park	10%
Sebastopol	25%
Sonoma	2%
Windsor	25%
Unincorporated County	25%

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won't always occur within the geographic boundaries of

the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 25,714 MTCO₂e.

Implementation Information: This measure could be implemented through discretionary approvals and permitting for existing projects as well as incentives for non-residential buildings outside the permitting process. The communities can require all existing buildings that undergo major remodels or renovations to install solar. This program may also include streamlined permitting, providing information to developers for low interest financing, assisting developers in purchasing solar PV through low-interest loans or property tax assessments, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance, and PACE financing options available through ESD. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations.

Assumptions:

This measure only affects existing nonresidential development (built before 2017).

Electricity use for nonresidential buildings constructed before 2017 was estimated using a linear interpolation of 2010 electricity use and 2020 electricity use.

The energy generated by solar PV is carbon neutral (CAPCOA 2010).

The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 50,000 kWh of solar energy will reduce GHG emissions associated with 50,000 kWh of utility electricity generation.

The average system size is 40 kW.

Initial costs for a nonresidential system (40 kW roof-mounted) ranges from \$4.3 to \$5.3 per watt (Lawrence Berkeley National Laboratory and U.S. Department of Energy 2013).

Analysis Method – 2020: The approach for calculating electricity, emissions reductions, and costs is similar to what is described above for Measure 2-L3, except that this measure applies to existing non-residential buildings using the penetration rates identified by each jurisdiction in the table above.

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above. A higher participation rate was selected by each community in 2040 and in 2050 to represent an increasing commitment to outfit existing (pre-2017) non-residential buildings with solar energy.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with P&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of nonresidential PV installations in existing buildings and/or PV electric generation capacity (kW) or electricity generation (kWh).

C.9 **Goal 3: Switch Equipment from Fossil Fuel to Electricity**

Measure 3-R1. Stationary Fuel Switching Incentives

Objective: RCPA, SCP, SCEIO, and NSCAPCD will create a program and package to incentivize and finance fuel switching from residential propane to on-site PV electric generation. This measure may also include fuel switching from natural gas, wood, fuel oil, and other fossil fuels used in the residential buildings to electricity as feasible based on the application.

Impact on Local Emissions: This measure will reduce the amount of propane (and possibly other fuels) consumed in buildings within the unincorporated areas of Sonoma County, where nearly all of the county's propane is consumed. Reduced propane consumption (or other fossil fuel use reduction) results in direct emission reductions from combustion in buildings. These reductions occur within the geographic boundary of the county. Total countywide reductions from this measure are anticipated to be 1,022 MTCO₂e.

Implementation Information: RCPA, SCP, SCEIO, and NSCAPCD will be responsible for creating the incentives to support this measure, in collaboration with other larger agencies such as the Bay Area Air Quality Management District (BAAQMD). These agencies will coordinate with the local communities to develop outreach efforts to achieve widespread implementation each community.

Assumptions:

- As determined in the GHG inventory, residential propane emissions for the entire county in 2010 were 4,925 MTCO₂e. These emissions were assumed to occur only in the unincorporated portions of the county.
- Participation in this measure in the unincorporated county would be 20% in 2020, 30% in 2040, and 50% in 2050

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Residential propane emissions in the unincorporated county were projected to 2020 using the expected increases in housing between 2010 and 2020.

2. To estimate the amount of propane emissions reduced, it was assumed that there would be a reduction in propane use of 20% due to this measure (see assumptions); thus, 2020 propane use was multiplied by 0.20.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Similar to the 2020 method, 2040 and 2050 propane emissions were projected to 2040 and 2050 using housing data.
2. Propane emissions in 2040 and 2050 were then multiplied by 30% and 50%, respectively, (see assumptions above) to determine the GHG reductions.

Activity Data Sources: Propane emissions from the GHG inventory.

Responsible Entities: RCPA, SCP, ESD, and NSCAPCD, along with the communities.

Key Progress Indicators: Residential propane usage, the number of on-site PV installations, and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 3-L1. Convert Building Equipment to Electricity

Objective: Replace residential natural gas water and space heating equipment with high efficiency electric technologies such as air source heat pumps. Create an ordinance for new development or incentivize the installation of electric equipment in existing development. The initial emphasis of this measure is on residential water heating applications but over time it can be broadened to include space heating and commercial applications.

The market penetration rate for homes converting from natural gas to high efficiency electric water heating was determined by the communities on an individual basis as follows:

Community	Percentage of Households with Natural Gas Heaters Installing Electric Water Heaters
Cloverdale	-
Cotati	-
Healdsburg	1%
Petaluma	10%
Rohnert Park	5%
Sebastopol	10%
Sonoma	-
Windsor	10%
Unincorporated County	-

Impact on Local Emissions: This measure will reduce the amount of natural gas consumed by water heating, thereby directly reducing GHG emissions from gas combustion. These reductions

occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 603 MTCO₂e.

Implementation Information: Implementation mechanisms in each community could include developing ordinances to require electric water heating for new development or implementing incentives for installing high efficiency electric water heaters in existing buildings. The communities would need to develop outreach efforts to increase awareness among community members about the status of electric equipment and the life cycle cost and efficiency benefits relative to older, inefficient resistance heating technologies.

Assumptions:

- The number of homes converting from natural gas to electric water heating is in addition to the number of homes installing solar water heating under Measure 2-S2 (Solar Water Heaters).
- The percentage of indoor water used in residences that is heated is 33% (AquaCraft 2014)
- The percentage of water used in residences that is used for indoor purposes is 43% (ConSol 2010)
- Heating a gallon of hot water requires 0.009 therms of natural gas or 0.18 kWh of electricity (EPA 2010a).
- The proportion of homes with natural gas heaters is 56.5% (U.S. Energy Information Administration 2009).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings were estimated by first multiplying the BAU water use for each community with the proportions of hot water and indoor water used in residences (see assumptions above).
2. Water reductions from overlapping water measures were subtracted from the total BAU water use for each community to avoid double-counting reductions.
3. Then, the quantity of natural gas (in therms) associated with heating BAU residential water in 2020 was determined using the hot water consumption rates, the estimates for the percentage of homes that use natural gas water heaters, and the associated energy required from natural gas heaters to heat one gallon of water listed above.
4. Overlapping energy reductions from Measure 2-S2 (Solar Water Heating) were subtracted to avoid double counting energy reductions.
5. The amount of therms from natural gas heaters was then multiplied by the measure participation rate chosen by each community to get the amount of therms that would be displaced by electric water heaters.
6. To calculate the associated emissions reductions, the displaced therms were multiplied by the appropriate emission factor for natural gas.

7. Switching to electric water heaters would result in an increase in electricity-related emissions, which were calculated using the following steps:
 - a. The amount of displaced therms from natural gas heaters was converted into equivalent units of electricity (kWh) using the ratio of energy required to heat a gallon of water of electricity to natural gas (see assumptions).
 - b. The resulting number of kWh was multiplied by the appropriate RPS-adjusted utility emission factors to get the emissions increase resulting from the increased electricity use.
 - c. These electricity emission increases were then subtracted from the displaced natural gas emission reductions to get the total net measure emission reductions.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. BAU hot water use in 2040 and 2050 was calculated using BAU water consumption from the GHG inventory and the assumptions listed above.
2. The quantity of natural gas (in therms) associated with heating BAU residential water in 2040 and 2050 was determined using the hot water consumption rates, the estimates for the percentage of homes that use natural gas water heaters, and the associated energy required from natural gas heaters to heat one gallon of water listed above.
3. Overlapping energy reductions from Measure 2-S2 (Solar Water Heating) were subtracted to avoid double counting energy reductions.
4. The amount of therms from natural gas heaters was then multiplied by the measure participation rate chosen by each community for 2040 and 2050 to get the amount of therms that would be displaced by electric water heaters.
5. To calculate the associated emissions reductions, the displaced therms were multiplied by the appropriate emission factor for natural gas.
6. Switching to electric water heaters would result in an increase in electricity-related emissions in 2040 and 2050, which were calculated using the steps described above for 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities.

Key Progress Indicators: Electricity use (kWh) and natural gas use (therms) for water heating in each community and/or the number of solar water heaters installed in each community.

C.10 Goal 4: Reduce Travel Demand Through Focused Growth

Measure 4-L1. Mixed-Use Development in City Centers and Along Transit Corridors

Objective: The communities would focus new residential and commercial development in their city centers and along existing and planned transit corridors. Mixed-use development (such as residential use above commercial uses) in such locations would improve the diversity of nearby land uses and facilitate easier access to retail and commercial destinations. Improving the jobs/housing balance would also facilitate access to work destinations. Development adjacent to transit centers and along active transit corridors (commonly called “transit-oriented development” or TOD) would increase the amount of trips that can be completed via transit instead of personal vehicles.

The communities will identify and support mixed use development in city centers and TOD locations through their existing and future General Plans, Area Plans, and Specific Plans. The communities will look for opportunities to improve transit and shuttles that serve these areas and update zoning codes as needed to encourage development along transit corridors, adjacent to transit hubs, and in downtown areas, including mixed-use developments.

The percentage of projected growth resulting in mixed-use development (in city centers and TOD locations) was determined by the communities on an individual basis as follows:

Community	Percentage of Growth Resulting In Mixed-Use Development
Cloverdale	15%
Cotati	70%
Healdsburg	20%
Petaluma	60%
Rohnert Park	20%
Sebastopol	60%
Sonoma	50%
Windsor	50%
Unincorporated County	20%

Impact on Local Emissions: Locating diverse land uses in proximity to each other, such as residential uses in the same neighborhood as retail and office buildings, means residents have less need to travel outside of the neighborhood to meet their daily needs. Mixed-use development encourages walking and bicycling and reduces the length of automobile trips, thereby reducing VMT compared to traditional development patterns. New development near existing and planned

high-quality transit⁴ and other transit lines facilitates increased transit use by people traveling to or from the project site, also resulting in reduced VMT.

When VMT is reduced, vehicle fuel consumption is also reduced. Reduced vehicle fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

CAPCOA indicates that mixed-use development can result in a 9 to 30% reduction in VMT, based on two reports: *Travel and the Built Environment – A Meta-Analysis* (Ewing and Cervero 2010) and *Measuring the effects of mixed land uses on housing values* (Song and Knaap 2004). Additional literature cited by CAPCOA that supports VMT reductions from mixed-use developments includes *Crediting Low-Traffic Developments* (Nelson\Nygaard 2005) and *A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes* (Criterion Planner/Engineers and Fehr & Peers Associates 2001).

Mixed-use development is also widely considered an effective means of reducing traffic congestion. Ranking in the EPA top-ten Smart Growth planning principles, and achieving higher levels of support from planners, policy makers and elected officials and developers, mixing a variety of land uses is generally considered a strategy that optimizes use of transportation infrastructure, improves community quality-of-life, and reduces vehicle travel and related concerns over global warming. Total countywide reductions from this measure are anticipated to be 3,494 MTCO₂e.

Implementation Information: The communities will develop appropriate tools to encourage mixed-use, infill, and transit-oriented development for cities and urbanized unincorporated areas. The primary method will be through updated General Plans and Specific Plans and associated land use designations and site zoning. Policies could include updating zoning codes and improving transit and shuttle service in areas targeted for mixed-use development. The communities would promote and apply existing policies and incentives to further encourage mixed-use, infill, and transit-oriented development. Potential incentives could include reduced parking requirements, reductions in building and permit fees, density increases and other related items.

Assumptions:

- This measure would reduce BAU VMT growth between 2017 and 2020 by 3.9% to 13.5%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 8.8 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).

⁴ High-quality transit is defined as fixed-route bus service with intervals no longer than 15 minutes during peak commute hours.

2. For each community, the VMT reduction percentage was multiplied by the difference in VMT between 2020 and 2017 to get the amount of VMT reduced.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the difference in VMT between 2020 and 2040 and between 2020 and 2050.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the Sonoma County Transportation Authority (SCTA).

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The percentage of growth resulting in mixed-use development in each community, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 4-L2. Increase Transit Accessibility

Objective: Encourage all new residential projects consisting of 25 units or more to be located within 0.5 mile of a transit node, shuttle service, or bus route with regularly scheduled, daily service. Consider requirements such as reduced parking, unbundled parking, subsidized public transportation passes, or ride-matching programs, based on site-specific review.

The percentage of growth that will result in 25+ unit residential development located 0.5 mile from a transit station was determined by the communities on an individual basis as follows:

Community	Percentage of Residential Growth Located Near Transit
Cloverdale	5%
Cotati	15%
Healdsburg	20%
Petaluma	15%
Rohnert Park	75%
Sebastopol	15%
Sonoma	15%
Windsor	15%
Unincorporated County	-

Impact on Local Emissions: This measure will increase transit use, thereby reducing use of personal vehicles. As a result, total fuel consumption in passenger vehicles will be reduced. Reduced vehicle fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 1,057 MTCO₂e.

Implementation Information: Each community will identify potential areas for TOD and prepare policies and incentives to encourage development near high-quality transit service. Strategies include updating General Plans and Specific Plans and zoning codes and developing new ordinances requiring transit accessibility to encourage TOD. Potential incentives could also include reduced parking requirements, reductions in building and permit fees, density increases and other related items. The communities may also work with RCPA/SCTA and transit agencies on this measure.

Assumptions:

- This measure would reduce BAU VMT growth between 2017 and 2020 by 0.4%–5.3%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 2.7 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reductions in passenger vehicle VMT were calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the corresponding VMT reduction percentage was multiplied by the difference in VMT between 2020 and 2017 to get the amount of VMT reduced.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the difference in VMT between 2020 and 2040 and between 2020 and 2050.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: Participating cities and the County, and RCPA/SCTA.

Key Progress Indicators: The percentage of growth resulting in 25+ unit residential development located 0.5 mile from a transit station in each community, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 4-L3. Supporting Land Use Measures

Objective: Encourage new development to provide amenities to support transit and other modes of transportation, including transit stops, bicycle facilities, good pedestrian networks, car-sharing locations, and electric vehicle charging stations.

- Encourage residential developments at a variety of price points to increase options for workers (especially public serving employees) of Sonoma to live within the county.

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	Yes
Petaluma	Yes
Rohnert Park	Yes
Sebastopol	Yes
Sonoma	Yes
Windsor	Yes
Unincorporated County	Yes

Impact on Local Emissions: This measure will increase transit use, thereby reducing use of personal vehicles. As a result, total fuel consumption in passenger vehicles will be reduced. Reduced vehicle fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: Each community will identify appropriate supporting land use strategies to implement for their community and develop specific policies, ordinances and/or guidelines to implement and monitor them. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density and other related items. The communities may also work with RCPA/SCTA on this measure.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: Cities and the County, and RCPA/SCTA.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 4-L4. Affordable Housing Linked to Transit

Objective: Encourage affordable housing developments to locate near transit corridors, transit hubs, and downtown cores. This includes below-market-rate (BMR) housing, which provides greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit.

For development with more than 5 units, the percentage of units that will be affordable housing units was determined by the communities on an individual basis as follows:

Community	Percentage of New Development that is Affordable Housing
Cloverdale	15%
Cotati	15%
Healdsburg	15%
Petaluma	15%
Rohnert Park	15%
Sebastopol	20%
Sonoma	20%
Windsor	15%
Unincorporated County	-

Impact on Local Emissions: Similar to mixed-use development, this measure will increase transit use, thereby reducing use of personal vehicles. As a result, total fuel consumption in passenger vehicles will be reduced. Reduced vehicle fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 142 MTCO₂e.

According to CAPCOA (2010):

“Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. BMR housing provides greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit. It also addresses to some degree the risk that new transit oriented development would displace lower income families. This strategy potentially encourages building a greater percentage of smaller units that allow a greater number of families to be accommodated on infill and transit-oriented development sites within a given building footprint and height limit. Lower income families tend to have lower levels of auto ownership, allowing buildings to be designed with less parking which, in some cases, represents the difference between a project being economically viable or not.”

Implementation Information: Each community would develop policies and incentives to encourage affordable housing development for cities and unincorporated county. The communities would draft new ordinances or offer incentives encouraging the affordable housing development near transit hubs and city-centers. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density and other related items. The communities may also work with RCPA/SCTA on this measure.

Assumptions:

- This measure would reduce BAU VMT growth between 2017 and 2020 by 0.1% to 0.6% (Fehr & Peers 2014a, 2014b). This is about 424,000 VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the difference in VMT between 2020 and 2017 to get the amount of VMT reduced.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the difference in VMT between 2020 and 2040 and between 2020 and 2050.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: The percentage of units that will be affordable housing units, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

C.11 Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options

Measure 5-R1. Improve and Increase Transit Service

Objective: Implement Sonoma County's *Comprehensive Transportation Plan* – look for opportunities to increase bus service, implement bus preferential treatments, implement bus rapid transit (BRT) and/or express service, improve transit marketing, and improve transit amenities.

Impact on Local Emissions: This measure will increase the use of transit in the county and improve the efficiency of the transit network. Increasing transit usage means that residents and workers will take transit instead of driving their personal vehicles, reducing fossil fuel use.

Through network efficiency improvements, buses will consume less fuel as they are driven more efficiently. As a result, the total fossil fuel consumption in vehicles (passenger vehicles and transit vehicles) driven in the communities will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 147 MTCO₂e.

Implementation Information: Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be the lead agencies to implement this measure, with assistance from SCTA. Each transit agency would determine funding needs and identify service gaps or high-demand routes that could be expanded as part of this measure. The agencies would coordinate with SCTA and the local communities as needed to develop and locate new routes or implement BRT routes.

Communities would also implement the *Sonoma County Comprehensive Transportation Plan*, which identifies opportunities to increase bus service, implement bus preferential treatments, implement BRT and/or express service, improve connections to ferry service, improve transit marketing, and improve transit amenities. SCTA and the communities would work with local transit agencies to make service plan improvements outlined in the *Comprehensive Transportation Plan*. Sonoma County transit agencies and SCTA would search for funding opportunities from grants or other sources to finance unfunded service needs. In addition, the agencies would continue to assess other service plan needs.

Assumptions:

- The network expansion component of this measure would reduce community-wide passenger vehicle VMT by 0% to 0.03%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 570,000 VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The service frequency/speed component of this measure would reduce community-wide passenger vehicle VMT by 0% to 0.01%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 100,000 VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- Fehr & Peers estimates that this measure will increase transit VMT in the county by 6.3%, leading to an annual increase in VMT of 66,049 in 2020 (Gilster pers. comm.). This estimate is based on the proposed network expansion for each community and current revenue miles within each community for each transit agency in the county, including Petaluma Transit, Sonoma County Transit, and Golden Gate Transit. The combined net effect to VMT from this measure would be a reduction of 604,000.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).

2. For each community, the passenger VMT reduction percentage was multiplied by the corresponding 2020 VMT value to get the amount of passenger VMT reduced.
3. To quantify GHG reductions, the passenger VMT reduction was multiplied by weighted passenger vehicle emission factors used in the inventory.
4. The transit vehicle VMT increase for each community was multiplied by transit bus emission factors used in the inventory and subtracted from the passenger vehicle GHG reductions to obtain net reductions for this measure.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA and revenue transit vehicle miles from the communities or the 2010 National Transit Database.

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R2. Supporting Transit Measures

Objective: Support transit expansion with the following actions:

- Encourage coordination amongst transit agencies to conduct a countywide transit study to identify opportunities for efficiencies, improve transfers/connections, and identify service gaps. Work with Sonoma County Transit and other transit service providers to amend routes to serve unmet needs, locations, improve frequencies and hours within each community. Look for cross-jurisdictional grant opportunities to fund transit studies and improvements.
- Plan to integrate all transit agencies in the county onto Clipper Card. Find opportunities to accelerate implementation.
- Support system-wide roll-out of real-time bus arrival information at bus stops, online, and via mobile devices for all transit agencies serving the county.

Impact on Local Emissions: This measure will increase the use of transit in the county. Increasing transit usage means that residents and workers will take transit instead of driving their personal vehicles. As a result, fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be the lead agencies to implement this measure. The transit agencies would need to work together to improve efficiency, transfers and service gaps, especially between transit services. SCTA would work with the transit agencies to identify funding for and implement real-time bus arrival information. SCTA would also need to work with the Metropolitan Transportation Commission (MTC) of the Bay Area to bring Clipper Card to Sonoma County.

With the support of Sonoma County and the communities, local transit agency staff would coordinate with each other and other regional agencies to identify and implement service improvements, integrate Clipper Card use into the system, and provide real-time bus arrival information for patrons.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R3. Sonoma-Marin Area Rail Transit

Objective: Ensure policies support the Sonoma-Marin Area Rail Transit (SMART) corridor, such as transit-oriented development at planned SMART stations, future local transit planning for SMART, and pedestrian and bicycle facilities to connect to SMART stations.

Additional Discussion: A rough estimate of potential daily SMART GHG emissions was prepared by using the latest estimate of ridership for the 2015 Initial Operating Segment (IOS) of 2,900 trips/weekday⁵ (Dowling 2011), 330,000 miles/year and 375,000 gallons/year (SMART 2013), and 260 weekdays/year (ICF assumption). Using these assumptions, SMART would have daily GHG emissions of 15 MTCO₂. The forecast SMART riders would generate daily emissions of 19 MTCO₂e, assuming the average commute trip is 23 miles (Dowling 2011) at the model year 2012 average fuel efficiency of 23.6 mpg (U.S. Environmental Protection Agency 2013) and a 1.14 passenger occupancy for commuting (Federal Transit Administration 2010). The daily net benefit of SMART is a reduction of 4 MTCO₂e.

Long-term benefits: Federal Corporate Average Fuel Economy (CAFE) standards require the fleet average for new 2025 passenger vehicles to be 54.5 miles per gallon (mpg),⁶ but it would take a

⁵ This is the lowest ridership number in the Dowling 2011 study. The study estimates that ridership will rise to 4,800 trips/weekday in 2035 for the IOS and 5,050 to 6,550 trips in 2020 with the full project.

⁶ The National Highway Traffic Safety Administration estimates that actual CAFE performance levels will be lower than the target values in the standards (U.S. Environmental Protection Agency/National Highway Traffic Safety Administration 2010, 2012).

number of years after 2025 for the on-road fleet average to reach 54.5 mpg.⁷ At the forecast 2035 IOS ridership level of 4,800 trips/weekday (Dowling 2011) and still assuming the average commute trip is 23 miles (Dowling 2011), the SMART GHG emissions would still be 15 MT (due to no change in number of trains, just increased ridership), but the equivalent passenger vehicle GHG emissions (using 54.5 mpg fleet average) would be 16 MT. This comparison does not take into account any potential effect of the low-carbon fuel standard on train emissions or any improvements in train technology over time. This is evidence that, for the next few decades, SMART daily GHG emissions should be slightly less than equivalent passenger vehicle emissions.

Impact on Local Emissions: This measure will increase the use of rail transit in the county. Increasing rail usage means that residents and workers will take rail instead of driving their personal vehicles. As a result, fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SMART is the lead agency to implement this measure, including construction of new stations and pedestrian and bicycle facilities, and coordinating with the local communities to implement improvements. The communities and transit agencies would coordinate to adopt policies and plans that support the SMART corridor. SCTA will support SMART implementation through planning and advocacy for transportation funding.

Assumptions: N/A

Analysis Method: Reductions for this measure for 2020 were not added to 2020 forecasted emissions because SMART is already built into the BAU VMT forecast for each community and thus the reductions are already included.

Activity Data Sources: N/A

Responsible Entities: SMART.

Key Progress Indicators: SMART ridership, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R4. Trip Reduction Ordinance

Objective: Develop and implement a Trip Reduction Ordinance (TRO) requiring employers with 50+ employees to offer one of the following: pre-tax transit expenses, transit or vanpool subsidy, free or low-cost shuttle, or an alternate trip reduction benefit. The TRO will also include a non-trip reduction alternative, in the form of purchase of an equivalent amount of GHG offsets, for employers choosing not to implement trip reductions. The TRO may also consider more ambitious recommendations such as specific transportation demand management (TDM) programs offered to all employees, annual monitoring and reporting requirements, or specific trip reduction or mode share target rates.

⁷ For example, the 2013 CAFE requirements for new vehicles is a fleet average of 31.1, but the on-road average mpg is 23.6.

Background: The existing Bay Area Commuter Benefits Program, developed by BAAQMD and MTC, currently requires employers with at least 50 employees to offer commuter benefits to their employees. The program gives employers the flexibility to offer one or more of the following benefits to employees:

- Option 1: Pre-Tax Benefit – Allow employees to exclude up to \$130 of their transit or vanpooling expenses each month from taxable income.
- Option 2: Employer-Provided Subsidy – Provide a subsidy to reduce or cover employees' monthly transit or vanpool costs, up to \$75 per month.
- Option 3: Employer-Provided Transit – Provide a free or low-cost transit service for employees, such as a bus, shuttle, or vanpool service.
- Option 4: Alternative Commuter Benefit – Provide an alternative commuter benefit that is as effective in reducing single-occupancy commute trips as Options 1, 2, or 3.

The existing program is a pilot program authorized only through 2016 and only applies within the jurisdictional area of the BAAQMD and does not include the Northern Sonoma Air Pollution Control District. California Health and Safety (H&S) Code Section 40717.9 nominally prohibits public agencies from imposing mandatory “employee trip reduction programs”. BAAQMD (acting with MTC) has a legislative exemption from this prohibition for the pilot program. There is an Attorney General opinion that concludes the following: “An air pollution control district may adopt a regulation specifying a number of alternative means of emission reduction from which employers must choose, where one of the options is to implement an employee trip reduction plan, provided that the alternatives presented are reasonably practicable.” [79 Ops. Cal. Atty. Gen. 214 (1996)]. The same logic would apply to local governments.

This measure would create a new program for 2017 through 2020 through development of a model trip reduction ordinance that could be adopted by local communities throughout the county. This measure would require commuter benefits for employers with more than 50 employees or would require employers who do not want to implement trip reduction measures to purchase an equivalent amount of GHG emissions offsets. By providing an option that does not mandate trip reduction, such an ordinance would not be in conflict with the H&S Code prohibition.⁸

The RCPA would identify sources of valid GHG offsets that could be purchased by employers choosing the offset option. The RCPA will only identify GHG offset sources that have been verified as valid to an acceptable verification protocol.

Impact on Local Emissions: This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county and reduce single-occupancy vehicle

⁸ The City of Santa Monica has been implementing a Transportation Demand Management Ordinance since 1992 to the present and includes an option for employers to purchase Mobile Source Emissions Reduction Credits or submit a trip reduction plan. Approximately 83% of employers opted for the trip reduction plan option. For this CAP, the proposed option is purchase of GHG offset credits, since the CAP is a GHG reduction plan. See: <http://www.compassblueprint.org/Documents/City%20of%20Santa%20Monica%20TDM%20Jacquilyne%20Brooks.pdf>

travel as a result. This means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the total fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 6,113 MTCO₂e.

Implementation Information: This measure requires regional and local effort. The regional lead agency is RCPA/SCTA, who is responsible for developing the model TRO, identifying any mandatory employer transportation benefits, conducting regional outreach and monitoring. The local communities would actually adopt the ordinance, conduct stakeholder outreach during ordinance development and assist with outreach efforts to employers and employees.

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 2.7% for all communities (Fehr & Peers 2014a, 2014b). This is about 15.1 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
1. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: RCPA/SCTA in collaboration with the communities and local employers.

Key Progress Indicators: Number of businesses or employees participating in the TRO, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R5. Supporting Measures for the Transportation Demand Management Program

Objective: The following actions will support Measure 5-R4:

- Support employer-based TDM program efficiency: Look for opportunities for small businesses to share resources and/or create transportation management associations.
- Consider district-wide TDM programs in specified business districts.
- Support development of municipal-specific TDM programs.
- Consider recommendations to local agencies for TDM program requirements for new developments such as transit subsidies or parking cash-out.

Impact on Local Emissions: This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: This measure requires regional and local effort. SCTA staff would develop a TDM program for employers, which may include the strategies mentioned above. Staff at SCTA and in each community would promote the TDM program and assist interested employers in implementing strategies. Communities could consider offering financial incentives for employers because they will bear the costs of running the program. The regional lead agency is SCTA, who is responsible for developing the TRO program and assisting with any smaller TDM program sponsored by employer or business districts. The local communities would assist with outreach efforts to employers and employees.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA in collaboration with the communities and local employers.

Key Progress Indicators: Number of businesses or employees participating in the TDM program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R6. Reduced Cost Transit Passes

Objective: Reduced cost transit passes would encourage commuters to take transit by providing financial incentive to switch from private automobile to bus or other transit mode, reducing commute-related VMT and associated GHG reductions. For example, the City of Santa Rosa offers commuters a \$10 monthly CityPass or Sonoma County Transit Pass. Employees must be

registered in the “Take a Free Ride” program, or employers must be registered in the City’s Trip Reduction Program.

If this measure is made mandatory by a jurisdiction, then the measure will also include a non-trip reduction alternative in the form of purchase of an equivalent amount of GHG offsets (see discussion of the GHG offset purchase option above under Measure 5-R4).

Impact on Local Emissions: This measure will increase the use of transit in the county. Increasing transit usage means that residents and workers will take transit instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 5,660 MTCO₂e.

Implementation Information: This measure requires regional and local coordination. SCTA would work to identify funding for and/or assist in subsidizing reduced transit passes. Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be responsible for rolling out and publicizing reduced transit passes. Agencies would encourage employers and new developments to provide reduced-cost monthly transit passes. Each community would partner with transit agencies to negotiate cost-sharing and facilitate transit pass distribution. Requirements could be implemented for new or expanded employers with 50 employees or more (to be consistent with Senate Bill [SB] 1339) and new residential projects of 25 units or more.

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 2.5% for all communities (Fehr & Peers 2014a, 2014b). This is about 14 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.

2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit in collaboration with the communities and local employers.

Key Progress Indicators: Number of reduced cost transit passes offered in each community, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R7. Alternative Travel Marketing & Optimize Online Service

Objective: Conduct countywide marketing efforts (and consistent community-specific efforts) to provide information on alternate travel means, including transit, 511, shuttles, ride share, car share, bike routes, connection to bike/pedestrian advocacy groups, paratransit, etc.

Impact on Local Emissions: This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation (e.g., walk, bike) in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 4,528 MTCO₂e.

Implementation Information: SCTA would be the lead agency to implement this measure and would find funding for or subsidize communication channels to provide information on alternate travel means. Local communities would work with SCTA to ensure that consistency in service and information is maintained throughout the county. SMART will also be doing travel marketing for its services.

The communities would provide targeted marketing in various formats to employees, employers, residents, and developers. Agencies would update existing online resources with current TDM strategy information and promote the use of these online resources when implementing other TDM strategies. Marketing materials should provide accurate and timely information regarding commute reduction strategies. Information could be rolled into HR policies for new employee orientation. Real-time transit data could be made available online with trip planning tools, with mobile phone apps as a future development. These marketing efforts could be made mandatory for new residential projects consisting of 25 units or more, and new or expanded projects with 50 employees or more (consistent with SB 1339).

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 2% for all communities (Fehr & Peers 2014a, 2014b). This is about 11.2 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R8. Safe Routes to School

Objective: Create safe routes to school programs for communities where they currently do not exist and actively seek funding to implement programs in all communities. Safe routes to school programs educate parents and school-aged children on how to safely travel to school by transit, walking, biking, or carpooling. Consider expanding school pools⁹ or school bus programs (if there is unserved demand) or other school TDM measures.

Impact on Local Emissions: This measure will increase the use of school buses or school pools in the county, thus reducing personal vehicle use for home-school trips. As a result, the fossil fuel

⁹ School pools are a form of ride-sharing that matches parents to children who cannot walk or bike and do not meet the requirements for busing.

consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 14,234 MTCO₂e.

Implementation Information: SCTA, working with local school districts, would be the lead agency to implement this measure and find funding for or subsidize safe routes to school programs. Local communities and school districts would need to coordinate on bus routes that cross communities. SCTA would partner with local schools to tailor the program to fit each school's needs and help look for funding to support the program.

Assumptions:

- This measure would reduce school (home-to-school) VMT by 4.5% for all communities (Fehr & Peers 2014a, 2014b). This is about 13.1 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- This measure, in conjunction with Measure 5-L5 (Traffic Calming), would also reduce total community-wide VMT by 0.05% to 0.1%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 3 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-school trip percentage to get the amount of VMT reduced by this measure.
3. Total community-wide VMT was multiplied by the corresponding VMT reduction (0.05%–0.10%) to determine the VMT that this measure would reduce in conjunction with Measure 5-L5 (Traffic Calming).
4. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-school trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R9. Car-sharing Program

Objective: Build on the work that the Sonoma County Spare the Air Resources Team has already conducted to implement a car-sharing program. The program would be a large-operator based car-sharing program and could be supplemented with peer-to-peer car-sharing.¹⁰

Impact on Local Emissions: This measure will increase the use of car-sharing in the county, thus decreasing personal vehicle use. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: RCPA/SCTA would be the lead agency to implement this measure, and would work with the Sonoma County Air Resources Team and find funding for or subsidize mobile device infrastructure needed to implement a car-sharing program. This effort will build on the work that the Sonoma County Air Resources Team has already done—which included hosting two focus group meetings to gauge interest and distributing informational door hangers and an online survey—to encourage peer-to-peer car-sharing services to introduce their services to the communities. RCPA/SCTA could consider partnering with commercial car-sharing service providers to identify locations or markets to roll out the service.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-R10. Bike Sharing Program

Objective: A bike-share system would be started in the county to reduce VMT, similar to bike share systems in many cities across the country.

¹⁰ Peer-to-peer car-sharing is similar to other car-sharing business models, but typically involves a transaction between a person who has a car to share and a person who is in need of a car. The person who uses the car pays a fee with a smartphone or other mobile device to use the car for less than an hour up to a whole day or longer. Car-share cars are usually available at the owner's residence and transactions are completed with a mobile device, so little new infrastructure or staffing is required for a community to set-up such a program.

Impact on Local Emissions: This measure will increase the use of bikes for commuting in the county. Increasing bicycle use means that residents and workers will use bicycles instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SCTA would be the lead agency to implement the development of a bike sharing program. SCTA and each community would need to coordinate to find funding sources to implement a bike-share program and to identify the most appropriate service areas. BAAQMD and/or Northern Sonoma County Air Quality District could be a source of funding for such a program.

SCTA would also coordinate with the cities, county transit agencies, and SMART to develop policies and guidelines for the program, identify bike station locations, and implement the program through direct management or selection of a private management company. SCTA and the communities should consider collaborating and integrating with the SF Bay Area Bike Share program to incorporate best practices and lessons learned from the program's recent deployment.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L1. Local Transportation Demand Management (TDM) Program

Objective: Measure 5-R4 includes a mandatory TRO for employers with 50 employees or more. This measure supports voluntary TDM measures for employers with fewer than 50 employees, additional voluntary TDM measures (beyond the minimum TRO requirements) for larger employers, and requirements for TDM measures in new large residential projects. Options would include a suite of strategies, including, but not limited to, those listed below:

- Vanpool or carpool programs
- EV charging stations
- Reduced parking requirements for affordable or senior housing projects
- Reduced cost transit passes
- Unbundled parking costs, priced parking, or parking cash-out
- Bicycle amenities

- Car-share pods (central locations where users can find cars)
- Telecommuting and alternative work schedules
- Ride-matching services
- Emergency ride home

The participation rates for this measure were determined by the communities on an individual basis as follows:

Community	Percentage of Employees in Community that are Eligible	Percentage of Employees Participating
Cloverdale	100%	38%
Cotati	100%	38%
Healdsburg	100%	20%
Petaluma	-	-
Rohnert Park	100%	38%
Sebastopol	100%	38%
Sonoma	-	-
Windsor	-	-
Unincorporated County	100%	38%

Impact on Local Emissions: This measure will reduce single-occupancy vehicle travel and increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county, thus reducing VMT. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 2,975 MTCO₂e.

Implementation Information: Each community will define the threshold for application of the ordinance, the specific TDM measures to be implemented, and methods to methods for monitoring employer compliance. The communities may require certain TDM strategies (beyond the minimum TRO requirements) through the permitting process for businesses with 50 or more employees. Incentives for voluntary TDM by employers with fewer than 50 employees may also be used, such as reduced parking requirements, reductions in fees, and other related items. The communities may also work with RCPA/SCTA.

Assumptions:

- The percentage of employees in each community participating in this program was determined by the communities on an individual basis. Many of the communities chose 38%, per guidance from Fehr & Peers. This assumption stems from an assumption that 75% of employees will not fall under SB 1339 Commute Benefit Policies and a conservative reduction of 50%, which assumes that the programs will not be as aggressive as assumed in CAPCOA methodology. ($75\% \times 50\% = 37.5\% \sim 38\%$).

- This measure would reduce commute (home-to-work) VMT by 1% to 2%, depending on the community (Fehr & Peers 2014a, 2014b) in addition to the reductions due to Measure 5-R4 (Trip Reduction Ordinance). This is about 7.3 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: Each city, the County, and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the TDM program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L2. Carpool Incentives & Ride-Sharing Program

Objective: Create or promote a regional ride-sharing program and encourage participation by local employers through their TDM programs. Focus on large employers to create programs. Actively disseminate information to the community regarding the variety of ridesharing options from 511.org to Zimride, Enterprise Rideshare, and other private companies.

The participation rates for this measure were determined by the communities on an individual basis as follows. Suggested participation rates were provided to each community by Fehr & Peers, and the communities could choose a different rate if desired. Fehr & Peers developed the suggested rates based on current participation rates in similar programs in the communities and

the percentage of people who commute to work alone in each community:

Community	Percentage of Employees in Community that are Eligible	Percentage of Employees Participating
Cloverdale	100%	71%
Cotati	100%	78%
Healdsburg	100%	25%
Petaluma	-	-
Rohnert Park	100%	78%
Sebastopol	100%	78%
Sonoma	-	-
Windsor	-	-
Unincorporated County	100%	78%

Impact on Local Emissions: This measure will reduce single-occupancy vehicle travel and increase the use of carpools in the county, thus reducing VMT. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 5,709 MTCO₂e.

Implementation Information: Each participating community will develop a carpool incentive program attractive to employers, including managing the financial incentives for carpooling. For example, the City of Santa Rosa offers free parking in downtown garages and eligibility for monthly prize drawings to carpool commuters (and employers) registered in the City's Trip Reduction program. Similar incentives could be provided by other communities. Additional strategies include connecting commuters to formal carpool organizers. Communities can consider using 511 ridesharing forums, dynamic rideshare apps (e.g., Carma, Zimride, Ridejoy), or helping to facilitate communication among employers in the same geographic area. Communities can also designate convenient locations as casual carpool pickup spots/park and ride lots. Other possible strategies include making the requirements for ridesharing services less restrictive to reduce the barrier to entry, such as lowering age limits or eliminating affiliation requirements. Connecting vanpool organizers with commuters would also be beneficial.

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 1.3% to 3.9%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 13.9 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L3. Guaranteed Ride Home

Objective: Implement a guaranteed ride home program to provide a free car share, shuttle or taxi ride home in case of an emergency (illness, family crisis, unscheduled overtime) for employees who use an alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency. For example, the City of Santa Rosa has a guaranteed ride home program for employees (or employers) registered in the City's Trip Reduction Program.

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	No
Petaluma	No
Rohnert Park	No
Sebastopol	Yes
Sonoma	No
Windsor	No
Unincorporated County	Yes

Impact on Local Emissions: This measure encourages greater use of commute alternatives by reducing the risk that an employee could become “stranded” at work in the event of an emergency. Increasing alternative transportation modes means employees will do less driving in their personal vehicles. As a result, the total fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: Each community would be responsible for implementing this measure. The communities may work with RCPA/SCTA to implement this program.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: The communities and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the guaranteed ride home program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L4. Supporting Bicycle/Pedestrian Measures

Objective: The following local actions will support bicycle use and pedestrians:

- Identify bicycle/pedestrian route gaps including improving connections across community boundaries. Prioritize funding and construction of routes that close key gaps across community boundaries.
- Encourage implementation of city and County bike/pedestrian master plans. Identify common barriers to implementation of current plans.
- Update municipal codes to require pedestrian and bicycle facilities (if needed).
- Work with transit agencies to increase bike storage on buses, at bus stops, and at transit hubs and ferry terminals.

- Require bicycle facilities at all park-and-ride lots and transit stations.
- Consider implementing bike sharing programs.

AB 1193 will help communities implement this measure by requiring the California Department of Transportation to create engineering standards for protected bike lanes, which, until now, have been discouraged by a complex approval processes and a lack of state guidance. This new class of lane will be separated from motor traffic by using a physical barrier, such as curbs, planters, or parked cars (Streetsblog LA 2014).

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	Yes
Petaluma	Yes
Rohnert Park	Yes
Sebastopol	Yes
Sonoma	Yes
Windsor	Yes
Unincorporated County	Yes

Impact on Local Emissions: This measure will increase the use of bicycles and walking in the county and thereby reduce single-occupancy vehicle travel. As a result, the total fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SCTA will work with the cities and county transit agencies to coordinate the identification and implementation of cross-jurisdictional bicycle and pedestrian corridor projects. Each community will update municipal codes and prepare or update their bike/pedestrian master plan, as needed. As discussed above, the communities will need to identify route gaps and coordinate with the County and SCTA on routes that are cross-jurisdictional. The bike and pedestrian master plans will outline needed improvements and the areas identified for expansion. Communities will also coordinate with transit agencies to improve the bike-transit facilities.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: The communities and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L5. Traffic Calming

Objective: Implement traffic-calming measures in downtown cores, accident hotspot locations, near schools and libraries, etc. Project design will include pedestrian/bicycle safety and other traffic-calming measures that exceed current community requirements. Traffic-calming measures reduce motor vehicle speeds and encourage pedestrian and bicycle trips. Specific measures may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others (CAPCOA 2010).

The percentage implementation of traffic-calming measures on streets and intersections within downtown core area and near applicable schools was determined by the communities on an individual basis as follows:

Community	Percentage of Applicable Area with Traffic Calming
Cloverdale	90%
Cotati	100%
Healdsburg	50%
Petaluma	100%
Rohnert Park	100%
Sebastopol	100%
Sonoma	80%
Windsor	100%
Unincorporated County	100%

Impact on Local Emissions: Providing traffic-calming measures encourages people to walk or bike instead of using a vehicle. This mode shift will result in a decrease in VMT (CAPCOA 2010). This measure will also improve the efficiency of the transportation network, and therefore the efficiency of vehicles traveling in the county. As a result, the total fossil fuel consumption will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 1,205 MTCO_{2e}.

Implementation Information: Each community will develop a strategy to implement this measure appropriate to their community setting. Implementation may include holding public meetings to identify areas of concern for the community, conducting traffic studies to determine where traffic calming is needed, and securing funding to construct traffic-calming features. Traffic-calming measures can be made a condition of new development approvals where appropriate and can be incorporated in General Plans, Area Plans, and Specific Plans. Communities will select specific

measures to implement based on the issues and characteristics of each area. The communities may also work with SCTA.

Assumptions:

- The percentage of applicable area to be affected by this measure was determined by the communities on an individual basis.
- This measure, in conjunction with Measure 5-R8 (Safe Routes to School), would reduce total community-wide VMT by 0.05% to 0.1%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 3 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. Total community-wide VMT was multiplied by the corresponding VMT reduction percentage to determine the VMT that this measure would reduce in conjunction with Measure 5-R8 (Safe Routes to School).
3. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Total community-wide VMT in 2040 and 2050 was multiplied by 0.1% to determine the VMT that this measure would reduce in conjunction with Measure 5-R8 (Safe Routes to School).
2. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: The percentage implementation of traffic-calming measures, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L6. Parking Policies

Objective: Implement additional parking policies to promote reduction in single-occupancy vehicle travel, such as on-street market pricing in downtown core areas. Consider reduced parking requirements, shared parking, and in-lieu fees, in combination with providing transit and bicycle facilities, in appropriate areas.

The percentage increase in parking market-pricing and the percentage of applicable area subject to parking pricing for each community was determined by the communities on an individual basis as follows:

Community	Percentage Increase in Parking Market Prices	Percentage of Applicable Area that Is Subject to Parking Prices
Cloverdale	25%	10%
Cotati	-	-
Healdsburg	25%	50%
Petaluma	-	-
Rohnert Park	-	-
Sebastopol	-	-
Sonoma	-	-
Windsor	-	-
Unincorporated County	25%	10%

Impact on Local Emissions: Parking pricing encourages more efficient use of parking facilities, reduces parking facility costs and land requirements, reduces vehicle traffic and encourages use of alternative modes (Victoria Transportation Institute 2015). This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the total fuel consumption in passenger vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 2,489 MTCO_{2e}.

Implementation Information: Each community would be responsible for implementing this measure. The communities may also work with SCTA. Staff would select parking pricing policies appropriate for their jurisdiction and develop a process for implementation and management, which may include updating municipal codes. The communities would draft new ordinances and/or general plan policies, or offer incentives encouraging reduced parking requirements and increased transit or bicycle facilities. Potential incentives could include tax breaks or deductions, or other rebates.

Assumptions:

The quantification of this measure is based entirely on parking pricing strategies. While this is only a single component of the overall measure, it is the most quantifiable aspect and was thus used as a proxy to estimate emission reductions. Other components of this measure, such as shared parking, prioritized parking, and providing transit and bicycle facilities, are more difficult to quantify accurately and were not included in the quantitative analysis of reductions.

This measure would reduce total community-wide VMT by 0.3% to 1.40%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 6.1 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reductions in passenger vehicle VMT were calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. Total community-wide VMT was multiplied by the corresponding VMT reduction percentage to determine the VMT that this measure would reduce. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Total community-wide VMT in 2040 and 2050 was multiplied by the corresponding VMT reduction percentage to determine the VMT that this measure would reduce.
2. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: The communities and RCPA/SCTA.

Key Progress Indicators: The percentage increase in parking pricing and the percentage of applicable area subject to parking pricing, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L7. Supporting Parking Policy Measures

Objective: Offer prioritized parking for hybrid/EV cars, carpools, vanpools at city-centered corridors, new developments, public parking areas, and municipal facilities. Consider amending zoning code to require new parking lots to provide prioritized parking for carpools, vanpools, hybrids, and EVs, and provide charging facilities.

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	Yes
Petaluma	Yes
Rohnert Park	No
Sebastopol	Yes
Sonoma	Yes
Windsor	Yes
Unincorporated County	Yes

Impact on Local Emissions: This measure will support a reduction in single-occupancy vehicle travel and increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the total fossil fuel consumption in passenger vehicles driven in the communities will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: The communities will identify supporting parking policy strategies appropriate for their jurisdiction and develop specific policies and guidelines to implement and monitor them. Implementation could include new ordinances and/or general plan policies, zoning code amendments, or incentives encouraging prioritized parking requirements for alternatively fueled vehicles or carpools. Potential incentives could include tax breaks or deductions, or other rebates. The communities may also work with RCPA/SCTA.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

C.12 Goal 6: Increase Vehicle and Equipment Fuel Efficiency

Measure 6-S1. Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard (LCFS)

Objective: This measure includes two separate state actions: the so-called Pavley Standards and the low carbon fuel standard (LCFS). Pavley will reduce GHG emissions from automobiles and

light-duty trucks (2009 model years and newer) by 30% from 2002 levels by the year 2016. The state's vehicle efficiency standards have been harmonized with federal vehicle efficiency standards. The LCFS) would reduce GHG emissions by requiring a minimum 10% reduction in the carbon intensity of transportation fuels sold in California by the year 2020.

Impact on Local Emissions: Pavley requires that vehicle manufacturers increase the average fuel efficiency of their new vehicles. As county residents and businesses purchase these vehicles to replace their older, less fuel efficient vehicles, the total fuel consumption in vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. The LCFS requires fuel producers and importers to reduce the carbon content of their fuels. The communities will be purchasing and using these low carbon fuels as they are introduced into the market, offsetting the higher-carbon fuels they were previously using. When combusted, the new low carbon fuels produce fewer GHG emissions, resulting in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions from transportation sources. Total countywide reductions from this measure are anticipated to be 333,030 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions: All assumptions used for the analysis of this measure are identified in Table C-1 and contained within the EMFAC2011 model.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. ARB's EMFAC2011 model provides GHG emission factors that account for the *combined* statewide impact of Pavley and LCFS; the model does not separate these impacts, so the GHG emission reductions were combined. EMFAC2011 estimates the number of new, more fuel efficient vehicles sold and driven in the county, along with the impact of LCFS fuel combusted in vehicles in the county. It then calculates the fleet-wide emission rate based on the penetration of new vehicles and fuels.
2. The new, lower emission rates were used to determine emission reductions in each community (when compared to the BAU emission rates in absence of Pavley and the LCFS).
3. The 2020 VMT forecast for each community was multiplied by the EMFAC2011 emission factors to obtain GHG emissions assuming implementation of Pavley and LCFS.
4. Local GHG emissions reductions achieved by Pavley and LCFS were calculated by subtracting the Pavley and LCFS adjusted emissions from the 2020 BAU emissions from transportation sources.
5. Because Measure 7-R1 (Shift Sonoma County) and Measure 7-L1 (Electric Vehicle Charging Station Program) would promote a larger fraction of electric vehicles in Sonoma County than would occur under BAU, the BAU vehicle emissions associated with the equivalent amount of

electric vehicles added due to these measures were removed prior to calculating the reductions due to Pavley/LCFS (e.g., the Pavley/LCFS reductions were applied to the Sonoma 2020 vehicle fleet after application of the regional and local EV measures).

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: Average fleet-wide vehicle efficiency; the carbon content of fuels sold in the county.

Measure 6-S2. Advanced Clean Cars

Objective: The Advanced Clean Car (ACC) rule will further reduce GHG emissions from automobiles and light-duty trucks for 2017–2025 vehicle model years. The state’s vehicle efficiency standards have been harmonized with federal vehicle efficiency standards.

Impact on Local Emissions: ACC requires that vehicle manufacturers continue to increase the average fuel efficiency of their new vehicles, beyond the Pavley requirements (which only go through 2016). As county residents and businesses purchase these vehicles to replace their older, less fuel efficient vehicles, the total fuel consumption in vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions from transportation sources. Total countywide reductions from this measure are anticipated to be 9,679 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- The ACC rule will reduce statewide emissions from passenger vehicles by 3.8 million MTCO₂e in 2020 (California Air Resources Board 2013). This is a 2.5% reduction in emissions.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The EMFAC2011 model does not include emissions benefits from the ACC rule. Local reductions achieved by the ACC rule were therefore obtained by apportioning expected statewide reductions to the county level.
2. Emissions reductions achieved by the ACC rule within Sonoma County were quantified by multiplying GHG emissions from light-duty vehicles in each community by 2.5%.
3. Reductions achieved by Pavley and LCFS were removed from the light-duty emissions forecast to avoid double counting. Because Measure 7-R1 (Shift Sonoma County) and Measure 7-L1 (Electric Vehicle Charging Station Program) would promote a larger fraction of electric vehicles in Sonoma County than would occur under BAU, the BAU vehicle emissions

associated with the equivalent amount of electric vehicles added due to these measures were also removed from the light-duty forecast prior to calculating the reductions due to ACC.

4. Because the ACC initiative will also promote EVs as will the regional and local EV measures (see discussion below), to avoid double-counting, the ACC reductions were reduced by the fraction of EVs assumed by the state to occur in absence of regional and local action, which is 2.6%.

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: Average fleet-wide vehicle efficiency.

Measure 6-S3. Assembly Bill (AB) 32 Vehicle Efficiency Measures

Objective: The AB 32 scoping plan includes several vehicle efficiency measures that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Heavy-Duty Vehicle Aerodynamic Efficiency Program will increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB-approved technology to reduce aerodynamic drag and rolling resistance. Finally, the Heavy-Duty Vehicle Hybridization Program will reduce GHG emissions through the use of hybrid and zero-emission technology.

Implementation Information: ARB will work with the vehicle industry to implement these measures. The tire inflation and tire program would affect vehicle service facilities such as dealerships, maintenance garages, oil change facilities, tire centers, and smog check facilities, and public education about proper tire inflation will be included. The Heavy-Duty Vehicle Aerodynamic Efficiency Program would require existing trucks/trailers to be retrofitted with the best available technology and/or ARB approved technology. Under the Heavy-Duty Vehicle Hybridization Program, ARB would adopt a regulation and/or incentive program for compliance.

Impact on Local Emissions: These measures will increase the average fuel efficiency for heavy-duty vehicles driven in the county. As average vehicle efficiency increases, the total fuel consumption in vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions from transportation. Total countywide reductions from this measure are anticipated to be 16,010 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- The Tire Pressure Program will reduce statewide emissions from passenger vehicles by 0.6 million MTCO₂e (California Air Resources Board 2013). This is a 0.4% reduction in emissions.

- The Heavy-Duty Vehicle Aerodynamic Efficiency Program will reduce statewide emissions from heavy-duty vehicles by 0.7 million MTCO₂e (California Air Resources Board 2013). This is a 1.7% reduction in emissions.
- The Heavy-Duty Vehicle Hybridization Program will reduce statewide emissions from heavy-duty vehicles by 0.1 million MTCO₂e (California Air Resources Board 2013). This is a 0.2% reduction in emissions.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions achieved by the Tire Pressure and Heavy-Duty Vehicle Programs were quantified by multiplying GHG emissions from light-duty vehicles and heavy-duty vehicles in each community by 0.4% and 1.9% (1.7% + 0.2% = 1.9%), respectively.
2. Reductions achieved by Pavley, LCFS, and ACC were removed from the light-duty emissions forecast to avoid double counting.

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: Average fleet-wide vehicle efficiency; statistics on the implementation of each program in the county.

C.13 Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment

Measure 7-S1. Low Carbon Fuel Standard: Off-Road

Objective: The LCFS will also affect fuels used in off-road vehicles. Refer to Measure 6-S1 for the description of LCFS.

Impact on Local Emissions: The LCFS requires fuel producers and importers to reduce the carbon content of their fuels. Off-road equipment operators (such as construction companies, contractors, etc.) will be purchasing these low carbon fuels as they are introduced into the market, offsetting the higher-carbon fuels they were previously using. When combusted, the new low carbon fuels produce fewer GHG emissions, resulting in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 5,182 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- LCFS will reduce statewide emissions from transportation-based fuels¹¹ by 15 million MTCO₂e (California Air Resources Board 2011a). This is equivalent to an 8.9% reduction in emissions from transportation fuels. Fuels used in off-road vehicles will be affected by this measure

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. GHG reductions achieved by the LCFS for off-road vehicles within each community were quantified by multiplying BAU off-road emissions by 8.9%.

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: The carbon content of fuels sold in the county.

Measure 7-R1. Shift Sonoma County (Electric Vehicles)

Objective: With RCPA/SCTA as the lead, and in partnership with SCP, this measure would implement a regional electric vehicle (EV) promotion program. The specifics of the incentive, financing, and education programs offered will be further developed in the Shift Sonoma County initiative but may include incentives for EV home, commercial or institutional chargers, promotion of EV purchase, preferential public parking, working with employers to provide preferential parking and charging stations, working with the hospitality and wineries to promote an “EV/wine trail,” demonstration projects, education and outreach. The specific goal will be developed through Shift Sonoma County. This analysis assumes that the target will be 5% of the countywide light-duty vehicle fleet.

Impact on Local Emissions: As county residents and businesses purchase EVs to replace their current, diesel and gasoline vehicles, the total fossil fuel consumption in vehicles driven in the communities will be reduced and replaced with electricity. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 11,353 MTCO₂e.

Implementation Information: This measure requires regional and local coordination. RCPA/SCTA will design the program, identify funding sources, and serve as a focal point for implementation in cooperation with SCP.

Assumptions:

- 75% of EV purchasers will apply for the clean vehicle rebates.
- Average annual VMT per vehicle for vehicles replaced by EVs will be 10,000 miles.
- Roughly 40% of the total electric vehicles targeted in this measure will be powered by SCP’s EverGreen electricity.

¹¹ Excludes aviation fuel, residual fuel oil, and lubricants.

- The remaining percentage of vehicles (~60%) will be powered by the countywide mix of electricity (which includes SCP's EverGreen & CleanStart, PG&E, and Healdsburg municipal utility).
- While the ARB Zero Emissions Vehicle (ZEV) program would also promote EVs, this measure does not take any credit for the ZEV program and thus no double-counting would occur.

Analysis Method - 2020: Reductions from this measure were quantified by determining the emissions reduced associated with gasoline and the diesel vehicles replaced by EVs and the increased emissions associated with increased electricity use to identify the net reduction. The following steps were used to quantify emission reductions for this measure:

1. Existing EVs were estimated by identifying the number of clean vehicle rebates (battery electric vehicle [BEV], plug-in hybrid electric vehicle [PHEV], and fuel cell EV) as of April 2015 (~1,672) and assuming that only 75% of EV purchasers apply for the rebate, resulting in a 2015 estimate of 2,229 EVs (Center for Sustainable Energy 2015).
2. According to EMFAC2011, the total number of light-duty vehicles in the county in 2020 is anticipated to be 179,433.
3. 5% of the 2020 light-duty vehicle fleet, including both gasoline/diesel vehicles and existing EVs (179,433 + 2,229) would be 9,083 EVs. This measure would involve 6,854 new EVs (9,083 – 2,229). It was assumed that roughly 40% of these vehicles (3,000) will be powered by SCP's EverGreen electricity. The remaining 3,854 vehicles would be powered by the countywide mix of electricity.
4. Fleet vehicles were apportioned to Healdsburg and the rest of the communities using household counts for 2020, because Healdsburg has a different electricity emissions factor than the rest of the county.
5. Offset 2020 vehicle emissions are based on 2020 BAU vehicle emissions prior to the application of Pavley/LCFS or ACC state measure because vehicles being replaced are likely to be older (hence BAU-type) vehicles.
6. Based on the assumptions listed above, the average amount of fuel-related emissions reductions per vehicle would be 2.6 MTCO₂e/year.
7. 2020 Electricity emissions for the new EVs are based on 2020 electricity emissions factors for SCP EverGreen for the 3,000 vehicles and the countywide mix of electricity (SCP and PG&E [based on assumed share] for all areas except Healdsburg and for the Healdsburg utility for Healdsburg) for the 3,854 vehicles. The emission factors applied after application of the state RPS measure and the regional CCA measure as the 2020 electricity would be obtained from providers compliant with these measures. Using 10,000 miles/EV/year, the average increase in electricity emissions per EV would be approximately 80 kilograms of carbon dioxide equivalent (kgCO₂e) for vehicles powered by EverGreen Electricity, 331 kgCO₂e for other, non-EverGreen electric vehicles in Sonoma County and 353 kgCO₂e in Healdsburg.

8. Other state programs, such as ARB mandates for ZEVs, Pavley/LCFS, ACC, and Cap & Trade induced changes in fuel prices would also increase the amount of EVs in Sonoma County, but the precise influence of such state-wide programs are difficult to ascertain at the county level. Thus, the “full” value of replacing gasoline and diesel light-duty vehicles is credited to this measure, recognizing that growth in EVs may occur due to a combination of Shift Sonoma County, state measures, and other factors.¹² In order to avoid double-counting with reductions accounted for the Pavley/LCFS/ACC state measures, the BAU vehicle emissions offset due to the regional EV measure (and the Local EV measure) were removed prior to estimating the Pavley/LCFS and ACC state reductions (e.g., this regional EV measure was applied first to the BAU vehicle emissions, then the local EV measure and then Pavley/LCFS and ACC were applied to the rest of the fleet).
9. Because the ACC initiative will also promote EVs, to avoid double-counting, the ACC reductions were reduced by the fraction of EVs assumed by the state to occur in absence of regional and local action, which is 2.6%.

Analysis Method – 2040/2050: This measure was not extended to 2040 and 2050 to avoid potential double-counting with state reduction scenarios used in the scenario analysis. However, the region may continue to promote EVs in the post-2020 period depending on the necessity and cost-effectiveness of doing so.

Activity Data Sources: VMT data obtained from SCTA and the number of EV charging stations from RCPA.

Responsible Entities: RCPA/SCTA and SCP in collaboration with the communities.

Key Progress Indicators: The number of EVs registered in Sonoma County, the number of EV charging stations installed, the amount of electricity distributed/sold by the charging stations (kWh), the number of Clean Vehicle Rebate Project rebates issued, and/or gasoline/diesel fuel usage/sales in the county.

Measure 7-R2. Alternative Fuels for Transit Vehicles.

Objective: Work with transit agencies to replace diesel and gasoline buses with hybrid buses, compressed natural gas (CNG) buses, or electric buses. Establish a goal to replace at least 50% of the bus fleet with alternatively fueled buses. This measure may also include the replacement of diesel and gasoline buses with electric buses as feasible.

Impact on Local Emissions: As transit agencies in the county purchase hybrid or alternatively fueled buses to replace their current diesel and gasoline buses, the total fossil fuel consumption in buses driven in the communities will be reduced either through increased fuel efficiency (in the case of hybrid buses) or through the replacement of fossil fuel with cleaner-burning and less emissions-intensive CNG (in the case of CNG buses). Reduced fossil fuel consumption results in

¹² No credit is taken in this plan for the effect of the ZEV requirements or Cap & Trade; as a result there is no potential for double-counting for the state measures.

direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 40 MTCO₂e.

Implementation Information: This measure requires regional and local coordination. SCTA will identify funding sources and serve as a focal point for the transportation agencies involved: Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit. The transportation agencies will also work to find funding opportunities and coordinate with SCTA to procure the new vehicles.

Assumptions:

- For light-duty autos, switching from gasoline to CNG would result in a 25% reduction (average of 0.20 and 0.30). Switching from diesel fuel to biodiesel would result in a 15% reduction (average of 0.10 and 0.20) (California Energy Commission 2007).
- For heavy-duty vehicles/buses, switching from gasoline to CNG would result in a 17% reduction (average of 0.11 and 0.23). Switching from diesel fuel to biodiesel would result in a 12% reduction (average of 0.10 and 0.13) (California Energy Commission 2007).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Reductions from this measure were quantified by first obtaining the number of revenue transit vehicle miles in Healdsburg, Petaluma, and Sonoma. The number of miles by vehicle type were also obtained (i.e., number of bus miles, van miles, light-duty auto miles). These data were obtained from either personal communications with a community contact, or the 2010 National Transit Database.
2. To determine the number of transit vehicle miles in 2020, the 2010 values were scaled using each community's expected growth in total VMT between 2020 and 2010.
3. Appropriate vehicle emission factors for each vehicle type were obtained from the on-road sector of the GHG inventory (from EMFAC2011) and were multiplied by the corresponding number of miles for each vehicle type and for each community to estimate the total transit vehicle emissions in 2020.
4. Reductions in emissions were then determined by multiplying the total transit vehicle emissions by the goal chosen by each community (i.e., 50% of transit fleet to be alternatively fueled) and by the percentage reduction in emissions from switching to alternative fuels (see above).

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Transit VMT in 2040 and 2050 was scaled from the 2010 values using the total community-wide VMT growth between 2010 and 2040/2050.

2. Vehicle emission factors were used from the EMFAC2011 model for 2035, which is the furthest year available.
3. Emissions reductions were then determined by multiplying transit emissions by region-wide goals of 75% for 2040 and 100% for 2050.

Activity Data Sources: Revenue transit vehicle miles from the communities or the 2010 National Transit Database.

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit.

Key Progress Indicators: The number of new hybrid buses or CNG (or other alternatively fueled) buses purchased by each transit agency, the number of gasoline/diesel buses retired by each transit agency, actual fuel consumption for new and existing buses (gallons diesel, gasoline, or CNG), and/or actual fuel savings.

Measure 7-L1. Electric Vehicle Charging Station Program

Objective: Develop local charging stations to support electric vehicles. This measure is in addition to the regional EV measure (Measure 7-R1: Shift Sonoma County).

The number of new charging stations to be installed in each community was determined by the communities on an individual basis as follows:

Community	Charging Stations
Cloverdale	2
Cotati	5
Healdsburg	20
Petaluma	5
Rohnert Park	5
Sebastopol	5
Sonoma	3
Windsor	50
Unincorporated County	5

Impact on Local Emissions: As county residents and businesses purchase EVs to replace their current fossil fuel powered vehicles, the total fuel consumption in vehicles driven in the communities will be reduced and replaced with electricity. Reduced vehicle fossil fuel combustion results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 60 MTCO₂e.

Implementation Information: The communities would work with PG&E and SCP to identify grants and other funding sources to help finance the installation of charging stations throughout the

county. In addition, SCP, ESD (through available PACE financing options), and NSCAPCD would create a package to install and finance charging stations.

Assumptions:

- Installation of Level I and Level II charging stations would serve four PHEV and/or BEV per day.
- The electric vehicle charging stations would output 27 kWh per day, or 9,855 kWh per year.
- The charging station output of 27 kWh per day assumes the following:
 - The stations would be Level 2 AC charging stations
 - Assumed split of PHEV-10, PHEV-20, PHEV-40, and BEVs of 16%/16%/31%/37%¹³
 - Usage would be 4 vehicles per day
 - Charging time would be 2 hours per vehicle
- Charging PHEV and BEV would consume the following quantities of electricity:
 - PHEV 10-mile range: 4.1 kWh per charge
 - PHEV 20-mile range: 4.8 kWh per charge
 - PHEV 40-mile range and BEV 75-mile range: 5.8 kWh per charge
- PHEV and BEV would replace new vehicles with an average fuel economy of 34 miles per gallon.
- The fuel economy of electric vehicles in 2020 is 135 miles per gallon of gasoline equivalent (GGE) (AEO 2014).
- The conversion of gallon of gasoline equivalents to kWh for electric vehicles is 33.7 kWh/gallon.
- The average efficiency of electric vehicles is 4 miles per kWh, calculated by dividing the two assumptions above.
- 20% of total vehicle charging occurs at the public charging stations (80% occurs in the home). Consequently, to be conservative in attributing emission reductions to the action of installing public charging stations, only 20% of total displaced emission reductions from EVs are attributed to this measure (ECotality 2013).
- The charging stations will not be funded by LCFS credits and are therefore in addition to the state's plan for EVs under LCFS.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Because this measure would promote a larger fraction of electric vehicles in Sonoma County than would occur under BAU, the BAU vehicle emissions associated with the equivalent

¹³ PHEV-XX = Plug-in Hybrid Electric Vehicle with a XX mile all electric range, BEV = Battery Electric Vehicle

amount of electric vehicles added due to this measure were removed prior to calculating the reductions due to Pavley/LCFS/ACC (e.g., the Pavley/LCFS/ACC reductions were applied to the Sonoma 2020 vehicle fleet after application of the regional and local EV measures).

2. GHG emissions generated by EVs are attributed to VMT in all-electric mode (i.e., E-VMT) and gasoline mode. The E-VMT calculation was based on the anticipated future fleet mix, vehicle range, and charging times required for Level I and Level II charging stations.
3. Miles traveled in all-electric mode were assumed to displace miles traveled using a gasoline-engine with an average fuel economy of 34 miles per gallon.
4. Emissions reductions were therefore determined as the difference between the emissions attributable to the EV and the emissions that would have otherwise occurred using an average conventional gasoline vehicle.

Total GHG reductions for these new EVs were multiplied by 20% to account for only the percentage of charging that occurs at public stations (versus the 80% of charging that occurs in the home).

Analysis Method – 2040/2050: This measure was not extended to 2040 and 2050 to avoid potential double-counting with state reduction scenarios used in the scenario analysis. However, Sonoma County communities may continue to incentivize expansion of the charging network as necessary and cost-effective in the post-2020 period.

Activity Data Sources: VMT data obtained from SCTA and the number of EV charging stations from each community.

Responsible Entities: RCPA/SCTA, SCP, ESD (through available PACE financing options), NSCAPCD, PG&E, and Healdsburg Electric in collaboration with the cities.

Key Progress Indicators: The number of EV charging stations installed, the amount of electricity distributed/sold by the charging stations (kWh), the number of Clean Vehicle Rebate Project rebates issued, and/or gasoline/diesel fuel usage/sales in the county.

Measure 7-L2. Electrify Construction Equipment

Objective: Establish a goal such that a percentage of construction equipment uses alternative fuels or electricity in place of diesel and gasoline. Equipment could include electric or hybrid-electric dozers, excavators, or loaders, all of which are on the market. Diesel generators could also be replaced with electricity hookups. Construction equipment powered by other alternative fuels, such as CNG, is also available. New development would be required to provide a construction equipment management plan that meets the local community requirements for use of alternative-fueled equipment (including electrical equipment) during project construction.

The electrification goal for construction equipment was determined by the communities on an individual basis as follows:

Community	Electrification Percentage
Cloverdale	-
Cotati	10%
Healdsburg	10%
Petaluma	10%
Rohnert Park	-
Sebastopol	10%
Sonoma	5%
Windsor	5%
Unincorporated County	-

Impact on Local Emissions: As electric construction equipment replaces current diesel and gasoline-powered equipment, the total fuel consumption for construction equipment operation in the communities will be reduced and replaced with electricity. Reduced fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 386 MTCO₂e.

Implementation Information: Each community would work in close cooperation with the air district to draft an ordinance and develop outreach programs to be consistent with current air district rules and California Environmental Quality Act (CEQA) Guidelines. The air district sets air quality related requirements on construction vehicles and also provides mitigation options related to construction vehicles through Voluntary Emission Reduction Agreement programs, which may overlap with this measure.

This measure could be implemented through discretionary approvals and permitting for new projects. Communities could provide incentives for electric and more efficient construction equipment to developers and contractors, such as rebates and subsidies and information on financing for this equipment. Encourage the use of alternative fuels for construction equipment on-site, where feasible, such as CNG, liquefied natural gas, propane, or biodiesel. Require a certain percentage of all construction equipment on new development projects to be electrically powered as a condition of approval; this could be incorporated into the construction contracts.

Assumptions:

- Construction equipment that uses alternative fuel will be divided up equally among alternative fuels, with electric, hybrid electric, CNG, and biodiesel each representing 25% of the replaced gasoline and diesel equipment.
- Switching from gasoline and diesel equipment to hybrid electric equipment would reduce emissions by 25.0% (ForConstructionPros.com n.d.)

- Switching from diesel equipment to CNG equipment would reduce emissions by 18.3% (ARB 2008)
- Switching from gasoline and diesel equipment to biodiesel equipment would reduce emissions by 15.0% (NREL 2008)

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emission reductions from Measure 7-S1, *Low Carbon Fuel Standard*, were subtracted to avoid double-counting reductions.
2. The OFFROAD2011 model calculates vehicle operating emissions and fuel usage by equipment type (industrial equipment, oil drilling equipment, etc.), fuel type (e.g., diesel, gasoline) and average horsepower.
3. It was assumed that 25% of the fuel targeted would be replaced with each of the following: electric equipment, hybrid electric equipment, CNG equipment, and biodiesel equipment.
4. Emissions reductions achieved by the electric vehicle component of this measure were calculated as follows:
 - a. Determining the ratio of construction equipment emissions for each community and fuel type relative to the countywide construction emissions for that fuel type (e.g., Cloverdale gasoline emissions/countywide gasoline emissions), because the OFFROAD model only outputs emissions at the county level.
 - b. That ratio was multiplied by the countywide values for each fuel type to determine the amount and type of fuel consumed in each community (i.e., countywide fuel use was apportioned to each community using the emissions ratios).
 - c. Fuel consumption was then multiplied by the penetration rate chosen by each community to quantify the amount of construction equipment fuel that would be targeted by this measure.
 - d. Emission reductions were estimated by converting the amount of fuel affected by the electric component of the measure into GHG emissions, using fuel emissions factors for gasoline and diesel of 8.85 kg CO₂e/gallon and 10.30 kg CO₂e/gallon, respectively.
 - e. The increase in electricity use from new electric equipment was determined by converting the gallons of reduced fuel into electricity using energy/fuel equivalency ratios of 33.4 kWh/gallon gasoline and 37.7 kWh/gallon diesel.
 - f. The increase in electricity-related emissions was then quantified using the appropriate RPS-adjusted emission factors.
 - g. Net GHG reductions were determined by subtracting the increase in electricity emissions from the reduction in fuel-related emissions.
5. Emissions reductions achieved by switching to hybrid electric, CNG, and biodiesel equipment were quantified as follows:

- a. Multiplying the off-road construction equipment inventory emissions for each community by the penetration rate chosen by each community.
- b. This value was multiplied by 25% to determine the quantity of emissions subject to replacement by each alternative fuel, and then this was multiplied by the specific emission reduction percentage for each fuel type (see assumptions above).

Total costs not quantified. Upfront cost is assumed to be negligible; equipment costs vary significantly based on other features besides energy source.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. The amount and type of fuel consumed in each community was determined using the methods described above for 2020.
2. Fuel consumption was then multiplied by the penetration rate chosen by each community for 2040 and 2050 to quantify the amount of construction equipment fuel that would be targeted by this measure.
3. Emission reductions were estimated by converting the amount of fuel affected by the electric component of the measure into GHG emissions, using fuel emissions factors for gasoline and diesel of 8.85 kg CO₂e/gallon and 10.30 kg CO₂e/gallon, respectively.
4. The increase in electricity use from new electric equipment was determined by converting the gallons of reduced fuel into electricity using energy/fuel equivalency ratios of 33.4 kWh/gallon gasoline and 37.7 kWh/gallon diesel.
5. The increase in electricity-related emissions was then quantified using the appropriate 2020 RPS-adjusted emission factors.
6. Net GHG reductions were determined by subtracting the increase in electricity emissions from the reduction in fuel-related emissions.

Activity Data Sources: Construction equipment fuel usage and operating data from the OFFROAD2007 model.

Responsible Entities: The communities and BAAQMD/NSCAPCD.

Key Progress Indicators: Construction equipment fuel use.

Measure 7-L3. Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching

This local measure has two elements. First, it is a voluntary measure to support farmers wanting to convert equipment to fuels with lower GHG intensity. Second, the City of Petaluma has received a CEC grant for a Biomass to Biofuel Project; emission reductions from this project that occur within the City of Petaluma are included in this measure.

Fuel Switching in Agricultural Equipment

Farmers can reduce fossil fuel use in agricultural equipment by converting equipment currently using gasoline, diesel, or liquefied petroleum gas to alternative fuels with lower GHG intensity (such as natural gas, biofuels, or solar electricity) as feasible, by keeping equipment maintained and in good working order, by replacing old equipment with newer, more efficient equipment, and by using global positioning systems (GPS) to optimize equipment operation. Also, encourage farmers to participate in ARB's Carl Moyer Program, which provides incentives for engines that beat emissions standards. A particular focus may be expanding renewable energy use for water pumps and wind machines.

This measure would set a goal to reduce equipment GHG emissions by 5–10% for equipment that can feasibly be run on renewable fuels or lower GHG-intensive fuels. Reductions for this measure were not quantified due to a lack of a comprehensive inventory of water pumps and wind machines. In addition, this measure may overlap with the 100% Sustainable Wine Region activities. A cost-effectiveness analysis was not conducted.

Petaluma Biogas to Biofuel Project

Overview:

The City of Petaluma currently operates the Ellis Creek Water Recycling Facility. The City continues to improve its Water Recycling Facility and now proposes to modify the Facility to accept high-strength waste from local food and beverage industries and convert it to compressed natural gas (CNG) for use in buses and utility fleets. The City has been awarded a California Energy Commission grant for funding these modifications, which are known as the Biomass-to-Biofuel (B2B) improvements (California Energy Commission 2015).

The B2B improvements would substantially reduce greenhouse gas emissions in three ways: replacement of diesel fuel with CNG (biomethane), reduction of vehicle miles traveled by waste haulers, and elimination of methane flaring at the Water Recycling Facility. At build-out, for the entire project, greenhouse gas emissions would be reduced by 2,200 metric tons of CO₂e per year, due to replacement of diesel fuel with biomethane fuel. In addition to the reduction from fuel replacement, the project would result in 87% fewer vehicle-miles-traveled by the heavy duty diesel haul trucks transporting the feedstock outside of Petaluma and Sonoma County. Three of the four Petaluma businesses that will participate in this Project currently haul their liquid feed stock and food waste 40 to 45 miles to the East Bay (exact mileage varies depending on location of business). Petaluma Creamery takes waste 8 miles outside of Petaluma. Overall, the trucks from all four businesses travel 13,230 miles per month to dispose of waste in the East Bay and Sonoma County. The B2B Project would be conveniently located between 2 and 6 miles from the respective businesses. Once the B2B Project is up and running, the travel distance would be reduced to 1,760 miles per month, resulting in a reduction of 190 metric tons of CO₂e. In addition, the need for the digester flare will be eliminated resulting in a reduction of 620 metric tons of CO₂e per year. The total greenhouse gas savings from implementation of the Project would be 3,011 metric tons per year.

Some of these GHG reductions occur outside of the City of Petaluma and Sonoma County, and are therefore not within the scope of the inventories or CAP. Therefore, only the portion of GHG emission reductions occurring within the city are included in CA2020 for Petaluma. This amount is 2,392 MTCO₂e; the derivation of this value is described below.

For the replacement of diesel fuel with CNG, this includes the full well-to-wheel emission reduction associated with the CNG production, including avoided fugitive emissions at landfills (since the CNG facility is located in Petaluma and the waste that would otherwise go to landfill is generated in Petaluma). It also includes avoided emissions from diesel fuel combustion for the replaced diesel fuel, but only the tank-to-wheel component of diesel fuel, because the well-to-tank component (such as fuel refining and transport) occurs outside the boundaries of the county. GHG emissions occurring within the county would be reduced by 2,018 MTCO₂e per year due to replacement of diesel fuel with biomethane fuel.

For the reduction in VMT for heavy duty diesel haul trucks transporting the feedstock, only the emission reduction associated with the portion of the trips occurring within the City are included. Approximately 20% of the trips occur within the boundaries of the county (from the businesses in Petaluma to the County line), while the remaining 80% of the trips occur outside the boundaries of the county (from the County line to the East Bay). The B2B Project will reduce the travel distance within the county from 2,902 miles to 1,760 miles per month, for a reduction in GHGs of 20 MTCO₂e.

For the flare, 100% of the emission reductions (353 MTCO₂e) are included in CA2020, since the flare is located in the County. The flare emission reductions were updated using the methods described below.

Assumptions:

- Replacement of diesel fuel with CNG
 - Typical diesel fuel use for waste trucks are 152,000 (Gaspar pers. comm.)
 - The total expected CNG production is 150,000 gasoline gallon equivalents (Gaspar pers. comm.)
 - Average fuel efficiency for waste trucks is 5.57 miles/gallon (EMFAC2014)
 - 10.21 kg of CO₂ are emitted per gallon diesel (Climate Registry 2016)
 - 0.0093 grams of CH₄ are emitted per mile traveled by diesel waste trucks (EMFAC2014)
 - 0.3316 grams of N₂O are emitted per gallon diesel (EMFAC2014)
 - -4.6 grams of CO₂e are emitted per mega joule of biomethane combusted by the B2B plant; this value is a well-to-wheel value, and includes avoided landfill gas emissions from the diversion of food waste to the digester, the emissions associated with the combustion of biomethane in the new waste trucks, and other components of the CNG fuel production process (Gaspar pers. comm.)

- Reduction in VMT
 - The total reduction in monthly truck VMT is 11,216 for heavy-duty trucks and 256 for light-duty trucks (Gaspar pers. comm.)
 - For heavy duty trucks, approximately 20% of the reduced VMT occurs within Sonoma County; 100% of the light duty truck VMT reductions occur within the county (Google Maps).
 - The following emission factors were used for heavy duty trucks (EMFAC2014):
 - 1,726.82 grams of CO₂
 - 0.0093 grams of CH₄
 - 0.0595 grams of N₂O
 - The following emission factors were used for light duty trucks (EMFAC2014):
 - 596.31 grams of CO₂
 - 0.0105 grams of CH₄
 - 0.0198 grams of N₂O
- Removal of digester flare
 - The flare currently consumes 11,912 MMBtu of biogas (Gaspar pers. comm.)
 - The energy content of biogas (captured methane) is 0.000655 MMBtu per standard cubic foot (scf), or 655 Btu per scf (Climate Registry 2016)
 - 52.07 kg of CO₂ is released per MMBtu of gas (Climate Registry 2016)

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Replacement of diesel fuel with CNG
 - a. Miles traveled for waste trucks was calculated by dividing total gallons by the average fuel efficiency (see assumptions above)
 - b. Emissions for existing diesel trucks were estimated by multiplying total gallons diesel by the combustion emission factors for CO₂ and N₂O, and total miles were multiplied by the emission factor for CH₄ (see assumptions above)
 - c. Emissions for new CNG trucks were estimated by multiplying total GGE of CNG produced by the well-to-wheel emission factor for biomethane (see assumptions above)
 - d. Total emission reductions = b + c
2. Reduction in VMT

- a. Emission reductions for heavy duty trucks were estimated by multiplying reduced VMT by the heavy duty emission factors (see assumptions above)
 - b. Emission reductions for light duty trucks were estimated by multiplying reduced VMT by the heavy duty emission factors (see assumptions above)
3. Removal of flare
- a. Emission reductions were calculated by multiplying 11,912 MMBtu of gas by 0.000655 Btu per scf to determine MMBtu (6,787) and then by 52.07 kg of CO₂ per MMBtu = 353 MTCO₂e (see assumptions above)

Analysis Method – 2040/2050: Emission reductions were assumed to be constant to 2040/2050

Activity Data Sources: B2B activity data obtained from the CEC grant application and GHD (California Energy Commission 2015; Gaspar pers. comm.).

Responsible Entities: The City of Petaluma and the CEC.

Key Progress Indicators: Gallons of CNG produced, gallons of diesel saved, VMT reduced, flare emissions reduced, landfill tonnage reduced.

C.14 Goal 8: Reduce Idling

Measure 8-L1. Idling Ordinance

Objective: Limit idling of all commercial vehicles to 3 minutes except as necessary for the loading or unloading of cargo within a period not to exceed 30 minutes.

The idling limit in each community was determined by the communities on an individual basis as follows:

Community	Idling Time (min)
Cloverdale	3
Cotati	3
Healdsburg	3
Petaluma	3
Rohnert Park	3
Sebastopol	3
Sonoma	3
Windsor	5
	(State law only – no additional action)
Unincorporated County	3

Impact on Local Emissions: Reduced idling means that commercial vehicles will be running their engines for a smaller amount of time while stopped, reducing fossil fuel use. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Emission reductions for this measure were not quantified or included in the CAP due to a lack of local idling activity data and due to vehicle model inconsistencies. Local idling activity data (such as idling hours per vehicle type per day within each jurisdiction) were unavailable for the County; therefore idling emissions were not included in the emissions inventory or forecasts. Mobile source emissions in the inventory represent running emissions only (e.g. vehicle travel) and are based on jurisdiction-specific VMT data from the SCTA model. Jurisdiction-specific vehicle idling activity was not available from the SCTA model.

In practice, this measure will result in actual emission reductions from vehicles because reduced idling times will result in reduced fuel consumption and reduced emissions. It will also result in co-benefits such as reduced air pollution and public health.

To support implementation of this measure, a quantitative analysis of potential GHG reductions was conducted for informational purposes only (these reductions were not included in the CAP). According to the EMFAC2011 model, idling emissions would be approximately 5,800 MTCO₂e in 1990, 4,400 MTCO₂e in 2010, and 9,200 MTCO₂e in 2020 under BAU conditions. State measures (such as 6-S1), transportation measures that reduce vehicle trips, and 8-L1 could reduce 2020 BAU emissions by approximately 3,700 MTCO₂e. Adding these emissions and reductions to the CAP would not impede the County's ability to meet the regional target of 25% below 1990 emissions; the County would still exceed the regional target by over 10,000 MTCO₂e.

However, these emissions and reductions were not included partially due to concerns regarding the EMFAC model data. According to EMFAC2011, the model used in the CAP, countywide idling emissions nearly double from 2010-2020. For heavy-duty diesel vehicles, the primary source of idling emissions, emissions increase by 154% (a 2.5x increase), while vehicle population only increases by 40%. According to ARB's more recent model EMFAC2014, countywide idling emissions increase by 46% from 2010-2020 for all vehicles; for heavy-duty diesel vehicles, idling emissions increase by 75% while the vehicle population stays constant. These trends in idling emissions for heavy-duty diesel vehicles are anomalous and do not represent the trends for other truck types. If the increase idling emissions for heavy-duty vehicles was a result of increasing roadway congestion, the same trend should be visible regardless of vehicle type, which is not the case. It is possible that ARB validated the EMFAC2014 model for newer vehicle model years but did not adjust past model years, which may produce a comparability problem between years.

It is unclear why idling emissions increase so much within the EMFAC models. It is also unclear why the two models differ so significantly in their estimates of idling emissions. Given these notable differences between models, the model data is likely not representative of actual on-the-ground activity within the county. Because of the inexplicable increase in idling emissions along with the anomalous results between EMFAC models, idling emissions and associated emission reductions for measure 8-L1 were not included in the CAP. Including these emissions and

reductions may also over-count reductions for the CAP given this data inconsistency; thus, the chosen approach is more conservative. And, as noted above, if these emissions and reductions were included in the CAP, the County would still exceed the regional target by over 10,000 MTCO₂e.

Future inventories and CAP updates should include idling emissions if local idling activity data are available and the EMFAC modeling discrepancies are resolved.

Implementation Information: Each community would adopt and implement a new commercial vehicle idling ordinance. The communities could also work with RCPA and/or BAAQMD and NSCAPCD to implement the ordinance.

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: Participating cities and the County, working with BAAQMD and NSCAPCD.

Key Progress Indicators: The idling limits in each community and/or diesel fuel usage/sales in the county.

Measure 8-L2. Idling Ordinance for Construction Equipment

Objective: Adopt an Ordinance limiting idling time for heavy-duty construction equipment beyond ARB or local air district regulations and if not already required as part of CEQA mitigation. CAPCOA (2010) recommends a 3-minute idling limit. Encourage contractors as part of permitting requirements or city contracts to submit a construction vehicle management plan that may include idling time requirements, hour meters on equipment, or documenting the horsepower, age, and fuel of all onsite equipment. California state law currently requires all off-road equipment fleets to limit idling to no more than 5 minutes.

The heavy-duty construction equipment idling limit in each community was determined by the communities on an individual basis as follows:

Community	Idling Time (min)
Cloverdale	5 (state law only)
Cotati	5 (state law only)
Healdsburg	5 (state law only)
Petaluma	3
Rohnert Park	3
Sebastopol	3
Sonoma	5 (state law only)
Windsor	5 (state law only)
Unincorporated County	3

Impact on Local Emissions: Reduced idling means that construction vehicles will be running their engines for a smaller amount of time while stopped, reducing fuel use. Reduced vehicle fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 163 MTCO₂e.

Implementation Information: Each community will adopt and implement a new construction vehicle idling ordinance. The ordinance may require contractors to submit a construction vehicle management plan as part of the permitting process for new development or in connection with contracts with the cities or the County. The communities could also work with RCPA and/or BAAQMD/NSCAPCD to implement the ordinance.

Assumptions:

- The following fuel idling rates were assumed:
 - High idle: 1.2 gallons/hour (EPA 2009).
 - Low idle: 0.6 gallons/hour (EPA 2009).
 - Average idle: 0.9 gallons/hour (average of 1.2 and 0.6).
- The idling rate of a tractor trailer truck is 17.23 kilograms CO₂ per hour (CalEEMOD)
- The fuel consumption rate for is 1.69 gallons/hour (17.23 kg/hr / 10.21 kg/gallon)
- The in-use time for heavy-duty construction equipment vehicle would be 480 minutes per day (8 hours/day)
- The BAU percentage of time spent idling for commercial vehicles, including construction equipment, would be 9.4%, based on the average of various vehicle and equipment types (UC Davis 2006).
- Idling time for heavy-duty construction equipment vehicles is 45 minutes per day (480 minutes * 9.4%)
- Idling fuel consumption is 0.68 gallons of diesel per day (0.9 gallons/hr * 1 hr/60 minutes * 45 minutes)
- Running (vehicle in motion) fuel consumption is 12.23 gallons of diesel per day [(480 minutes – 45 minutes idling) * 1.69 gallons/hour]
- Fuel consumption due to idling is 5% [0.68 gallons / (0.68 gallons + 12.23 gallons)]

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions from Measure 7-S1, *Low Carbon Fuel Standard*, were subtracted from the BAU emissions to avoid double counting reductions.

2. ARB's regulations for heavy duty vehicles (5 minutes) was used a proxy to determine the percentage reduction in potential idling emissions from implementing this measure in each community.
3. Reducing idling time from 5 minutes to 3 minutes, for example, is a 40% reduction $((5-3)/5 = 40\%)$.
4. Emissions savings associated with this measure were therefore calculated by multiplying BAU idling emissions by the community's corresponding reduction percentage (e.g., 0.40, for a 3-minute idling limit).

Idling emissions were quantified using off-road construction equipment inventory emissions and fuel consumption assumptions shown above and fuel emission factors for diesel shown in Table C-1 (see assumptions specific to OFFROAD).

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions in 2040 and 2050 were calculated by multiplying 2040 and 2050 idling emissions by the community's corresponding reduction percentage chosen for 2040 and 2050, based on the number of idling minutes.
2. Idling emissions were quantified using the same method as described above for 2020.

Activity Data Sources: N/A

Responsible Entities: Each city and the County, and BAAQMD/NSCAPCD.

Key Progress Indicators: The idling limits in each community and/or off-road diesel fuel usage/sales in the county.

C.15 Goal 9: Increase Solid Waste Diversion

Measure 9-R1. Waste Diversion Goal

Objective: Create a waste diversion goal for the entire county, such as increasing the waste diversion rate to 80% of the total waste stream by 2020. This measure could include any of the following:

- A sector-by-sector approach to waste diversion, focusing on certain sectors at a time.
- Recycling and composting programs/services as supporting measures.
- Ongoing participation in the countywide ordinance that bans the distribution of plastic carryout bags and imposes a fee on paper bags.
- A local ordinance to increase diversion of construction and demolition (C&D) waste.
- Continuation of the Waste Reduction Education and Outreach Program

Impact on Local Emissions: This measure will divert waste from landfills, which avoids the methane emissions associated with waste decomposition in the landfill. The actual emission reductions will occur at the landfill locations, which may or may not be within the county. The emissions associated with waste generated within the communities will be reduced, regardless of the actual location of the physical emission reductions. This measure does not include upstream lifecycle emission reductions associated with raw material manufacture, recycling processes, etc., because these reductions will occur outside of the community boundaries and are not already captured in the GHG emission inventories. The emission reductions for this measure reflect only the reductions that will show up in the inventory in future years (e.g., direct landfill emissions). Total countywide reductions from this measure are anticipated to be 26,217 MTCO₂e.

Implementation Information: As the agency responsible for waste management in the county, the Sonoma County Waste Management Authority (SCWMA) would be the lead agency for implementing this measure. SCWMA could create a fund for new and expanded waste collection programs that the communities could contribute money to, and facilitate countywide or individual community waste ordinances. Local communities would work with waste providers to identify baseline diversion rates, opportunities for additional waste diversion, and achievable diversion goals before a certain time period, all of which can be incorporated into the waste provider's contract with a community.

Assumptions:

- The BAU diversion rate for all communities is 72%
- The proportion and type of waste disposed and the corresponding emissions rate of each waste type (i.e., MTCO₂e/ton) would be constant between 2010 and 2020.

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Implementation of this measure would increase the BAU diversion rate for each community by 2020.
2. The 2020 BAU waste-related GHG emissions were determined in the GHG inventory, and adjusted by subtracting GHG reductions from overlapping measures.
3. Then, a waste emission factor was calculated for each community by dividing the adjusted 2020 BAU waste emissions by the 2020 BAU waste tonnages.
4. The amount of additional waste that would be diverted under this measure was determined by subtracting the amount of waste diverted under a BAU scenario (and also including waste diverted from Measure 9-L1, to avoid double counting reductions) from the multiplication product of each community's 2020 BAU waste tons and the chosen new diversion rate (i.e., 80%).
5. To determine emission reductions, each community's new amount of BAU diverted waste was then multiplied by the corresponding waste emission factor.

Costs for this measure were estimated using an incremental cost per ton of \$11.25, which is based on cost data for a variety of waste types from a report on the City of Santa Monica's Zero Waste Strategic Operations Plan (City of Santa Monica 2013). The Santa Monica report considers a suite of program options for residential single-family, multi-family, and commercial sources, and estimates the incremental change in the annual cost for each program per ton diverted. Costs include collection, handling and processing costs, as well as administrative and overhead costs; savings include avoided disposal costs. Some programs—such as weekly organics and recyclable collection, biweekly refuse collection, and wet/dry collection for single- and multi-family residences, and behavior change market and wet/dry collection for commercial customers—were found to be highly cost effective, resulting in net cost savings on an annual basis. Other programs—such food scrap collection—were less cost effective, resulting in net annual costs. The cost per ton value was multiplied by each community's expected additional waste diversion tons to determine the annual net costs/savings.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Waste tons in 2040 and 2050, determined as part of the GHG inventory, were multiplied by the 80% diversion rate to estimate the amount of waste that would be prevented from entering landfills because of this measure.
2. Then, the waste tons were multiplied by the communities' waste emission factors (see Analysis Method – 2020) to determine the amount of GHG reductions that would result from the additional diverted waste.

Activity Data Sources: Waste tonnage data and diversion rates from SCWMA and CalRecycle.

Responsible Entities: SCWMA in collaboration with the communities.

Key Progress Indicators: The waste diversion rate in each community, the tonnage of waste sent to landfills, the tonnage of waste recycled, the tonnage of waste composted, and the tonnage of waste diverted to other ends.

Measure 9-L1. Create Construction and Demolition Reuse and Recycling Ordinance

Objective: Implement consistent countywide goals for C&D waste. This could follow the Petaluma model, which requires development projects to have a Construction Phase Recycling Plan that addresses the reuse and recycling of major waste materials, creates a minimum diversion rate for C&D waste on all projects (such as 75%), and requires an inventory of usable materials prior to any demolition.

Some communities already have C&D waste reduction or diversion policies or programs; this measure intends to implement consistent policies throughout the county.

The diversion rate for C&D waste selected by each community is shown in the following table. Communities that chose no further action for this measure have a diversion rate that is equal to the BAU diversion rate (72%):

Community	C&D Waste Diversion Rate
Cloverdale	75%
Cotati	75%
Healdsburg	72% (existing diversion rate – no further action)
Petaluma	75%
Rohnert Park	72% (existing diversion rate – no further action)
Sebastopol	75%
Sonoma	72% (existing diversion rate – no further action)
Windsor	72% (existing diversion rate – no further action)
Unincorporated County	75%

Impact on Local Emissions: This measure will divert C&D waste from landfills, which avoids the methane emissions associated with that waste decomposing in the landfill. The actual emission reductions will occur at the landfill locations, which may not be within the boundaries of the county. The emissions associated with waste generated within the communities will be reduced, regardless of the actual location of the physical emission reductions. The emission reductions for this measure reflect only the reductions that will show up in the inventory in future years (e.g., direct landfill emissions). Total countywide reductions from this measure are anticipated to be 5 MTCO₂e.

Implementation Information: Each community will implement this measure through a C&D ordinance, with assistance from SCWMA. SCWMA could assist by drafting a model ordinance for use/adaptation by local communities.

Assumptions:

- The C&D diversion rate was determined by the communities on an individual basis.
- C&D waste emits 0.06 MT of CH₄ per short ton of waste (ICLEI 2012)
- Residential C&D waste consists of the following materials in the following proportions (Sonoma County Waste Management Agency 2007):
 - Concrete 0.5%
 - Asphalt paving 0.1%
 - Asphalt roofing 0.1%
 - Clean recyclable wood 0.6%
 - Other untreated/recycled wood 0.4%
 - Treated wood waste 1.3%

- Clean gypsum board 0.6%
- Rock, soil & fines 2.1%
- Remainder/composite C&D 2.0%
- The oxidation rate for C&D waste is 0.10. Waste totals were multiplied by 0.90 (1–0.10) for the emissions calculations (ICLEI 2012).
- The methane collection efficiency for Redwood Landfill is 90% (Waste Management n.d.)
- The default methane collection efficiency for all other landfills is 75% (ICLEI)

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The amount of C&D waste recycled in each community was determined by first estimating the amount of total C&D waste generated by each community by using the total amount of waste (all waste types) generated in each community.
2. Because the methane collection rate at Redwood Landfill differs from the rate assumed at the other landfills, the amount of C&D waste was estimated for two categories: waste sent to the Redwood Landfill and waste sent to all other landfills.
3. The waste totals for each community were multiplied by the percentage of C&D waste generated in each community for the residential (see above) and commercial (see Table C-1) sectors.
4. Then, GHG emissions associated with C&D waste were estimated by multiplying the C&D waste totals by the C&D waste emission factor, oxidation rate, and the collection efficiencies for Redwood and all other landfills (see above).
5. To determine emission reductions for this measure, the total C&D waste emissions were multiplied by the difference between the C&D waste diversion goal chosen by each community and the overall waste diversion goal chosen for Measure 9-R1 (Waste Diversion Goal).

Analysis Method – 2040 and 2050: The following steps were used to quantify emission reductions for this measure:

1. The amount of C&D waste recycled in 2040 and 2050 was determined using the same method described above for 2020.
2. The amount of C&D waste was estimated for two categories: waste sent to the Redwood Landfill and waste sent to all other landfills.
3. The waste totals for each community were multiplied by the percentage of C&D waste generated in each community for the residential (see above) and commercial (see Table C-1) sectors.

4. Then, GHG emissions associated with C&D waste were estimated by multiplying the C&D waste totals by the C&D waste emission factor, oxidation rate, and the collection efficiencies for Redwood and all other landfills (see above).
5. To determine emission reductions for this measure, the total C&D waste emissions were multiplied by the difference between the C&D waste diversion goal chosen by each community for 2040 and 2050 and the overall waste diversion goal chosen for Measure 9-R1 for 2040 and 2050 (Waste Diversion Goal).

Activity Data Sources: Waste tonnage data and diversion rates from SCWMA and CalRecycle.

Responsible Entities: Each city, the County, and SCWMA.

Key Progress Indicators: The C&D waste diversion rate in each community, the tonnage of C&D waste sent to landfills, the tonnage of C&D waste recycled, the tonnage of waste composted, and the tonnage of C&D waste diverted to other ends.

C.16 Goal 10: Increase Capture and Use of Methane from Landfills

Measure 10-R1. Increase Landfill Methane Capture and Use for Energy

Objective: As appropriate, install methane capture technology and associated monitoring systems on all landfills without methane capture and that are not otherwise required to install or upgrade equipment under the state rule, with a goal of reaching the highest feasible methane capture rate (i.e., approaching 100%). Increase methane capture at landfills that already capture methane by expanding existing collection wells. Support the development of new waste-to-energy (WTE) projects. Electricity generation capacity at the Central Disposal Site will increase from about 3 MW to about 3.25 MW to produce an additional 1.8 GWh by 2020.

Impact on Local Emissions: This measure will capture methane that would otherwise be emitted into the atmosphere from landfills, reducing direct emissions from the landfills themselves. The actual emission reductions will occur at the landfill locations, which may or may not be within the county. The emissions associated with waste generated within the communities will be reduced, regardless of the actual location of the physical emission reductions. Grid electricity will be replaced with WTE-generated electricity, which is carbon neutral. A reduction in the demand for grid electricity is associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Reductions from this measure reduce emissions from building energy sources. Total countywide reductions from this measure are anticipated to be 39,140 MTCO₂e.

Implementation Information: As the agency responsible for waste management in the county, SCWMA would be responsible for implementing this measure. SCWMA could create a fund for the

installation of new and expanded WTE facilities at county landfills, and each of the communities could contribute money toward this fund. SCWMA and the communities will also work with the landfill owners and operators to install increased methane capture and WTE facilities at landfills serving the county.

Assumptions:

- The BAU methane capture rate at all key landfills that receive waste from the county is 75% except for Redwood Landfill, which has a capture rate of 90%.
- All key landfills that handle Sonoma County waste would increase methane capture rates to the following values:
 - Redwood Landfill: 95%
 - Potrero Hills Landfill: 99%
 - Keller Canyon Landfill: 90%
 - Hay Road Landfill: 90%
 - Central Disposal Site: 90%

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions associated with this measure were estimated by first using the BAU waste emissions for each community from waste sent to the key landfills listed above, the assumed BAU methane capture rates of 75% for each of the above landfills, and the measure goal methane capture rates for each landfill, in the following equation:

$$(BAU \text{ emissions from waste sent to each landfill}) / (1-75\%) * (1-\text{new capture rate } \%)$$

2. Using the equation above results in the emissions that would result if each landfill implemented the new capture rate.
3. To determine the reduction in emissions, the calculated emissions from each landfill (assuming the new capture rate) were subtracted from the corresponding BAU waste emissions.
4. The emissions reductions that would result from the WTE facilities at Central Disposal Site were calculated using the equation below. Reductions would occur because the methane-generated energy would offset the need for energy to be provided by PG&E and prevent GHG emissions from being generated.

$$\begin{aligned} & \text{Total methane captured (grams)} \div 662 \text{ grams methane per cubic meter} * 35.3 \text{ cubic feet per} \\ & \text{cubic meter} * 1,012 \text{ btus per cubic feet of methane} * 0.85 \text{ (combustion efficiency factor)} * 0.00009 \\ & \text{kWh generated per btu of methane combusted} = 1.8 \text{ GWh of electricity generation} \end{aligned}$$

5. GHG emissions reductions were then determined by multiplying the resulting electricity production for each community by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. To calculate reductions in 2040 and 2050 for this measure, landfill emissions in 2040 and 2050 quantified for the GHG inventory were used in conjunction with the equations above.
2. The methane capture rates assumed in 2040 and 2050 are 99% for all landfills except for Redwood Landfill, for which a 95% capture rate was assumed.
3. GHG reductions from new WTE facilities were quantified using the equation above.

Activity Data Sources: Waste tonnage data and diversion rates from SCWMA and CalRecycle.

Responsible Entities: The SCWMA and the landfill owners/operators would be the primary responsible entities. Collaboration between SCWMA and the landfill owners/operators, and the communities may also be warranted.

Key Progress Indicators: The number of WTE projects implemented in each community, the quantity of methane captured at each WTE facility (or the methane capture rate), and/or the electricity generation capacity (kW) and actual generation (kWh) for each new WTE facility.

C.17 Goal 11: Reduce Water Consumption

Measure 11-R1. Countywide Water Conservation Support and Incentives

Objective: Sonoma County Water Agency will continue to work with local communities to incentivize local water conservation measures. Conservation measures could include water fixture retrofits at municipal buildings, and mandatory water conservation at large water users, such as golf courses or wineries.

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.
3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the

physical emission reduction depends on the location of the wastewater treatment plants (WWTPs); some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

Implementation Information: The Sonoma County Water Agency (SCWA) is responsible for implementing this measure in cooperation with the local communities. SCWA would identify areas where additional conservation would be most effective and develop conservation goals. The local communities would work with SCWA to identify conservation opportunities, and to develop new ordinances or general plan policies pertaining to water conservation.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: SCWA in collaboration with the communities.

Key Progress Indicators: Gallons of water saved in each community (or total water consumption to reflect reduced usage) and/or energy savings associated with water usage (or total energy consumption associated with water usage to reflect reduced water usage).

Measure 11-L1. Senate Bill SB X7-7 – Water Conservation Act of 2009

Objective: Meet (or exceed) the state-established per-capita water use reduction goal¹⁴ for 2020 as identified by SB X7-7 (2009). This statute requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per-capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the “20X2020 goal”). Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target (in terms of gallons per capita per day, or GPCD) to meet this goal. Specific per-capita water use reduction goals vary by water agency.

¹⁴ The state goal is a 20% reduction in per-capita water use compared to baseline levels.

The SB X7-7 goal for each community was determined using the appropriate Urban Water Management Plan. The reduction goals are as follows:

Community	Baseline GPCD	Target GPCD	Percentage Reduction ¹
Cloverdale	111	88	20%
Cotati	158	127	20%
Healdsburg	202	162	20%
Petaluma	170	136	20%
Rohnert Park	162	119	37%
Sebastopol	136	109	20%
Sonoma	204	173	10%
Windsor	152	129	15%
Unincorporated County ²	121	107	12%

¹ Not all water retailers will reduce GPCD by 20%. Per SB X7-7, water retailers can choose from one of four methods to establish their targets: (1) 80% of Base Daily Per Capita Use; (2) performance standards based on actual water use data for indoor residential water use, landscaped area, and commercial, industrial and institutional (CII) water use; (3) 95% of the San Francisco Bay hydrologic region; and (4) savings by water sector (indoor residential and CII) and landscape and water loss savings. For example, Windsor elected to use method 3, which specifies its target as 129 GPCD, which is only 15% lower than its baseline GPCD.

² Average reduction goal of Sweet Water Springs Water District and Valley of the Moon Water District

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.
3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the WWTPs; some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

This measure reduces emissions from building energy and wastewater sources in addition water conveyance. Total countywide reductions from this measure are anticipated to be 16,540 MTCO₂e.

Implementation Information: Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target to meet this goal and is responsible for

implementing this measure. The communities would also need to work with the water retailers to implement water-saving measures at the local level. Water cutbacks would require the communities to engage their communities and encourage residents and businesses to find ways to save water.

Assumptions:

- All communities must implement this measure.
- Implementation of SB X7-7 will reduce per-capita water use, relative to BAU conditions.
- The percentage of residential water heated is 33% (AquaCraft 2014)
- The percentage of nonresidential water heated is 22% (Calculated from Yudelso 2010 and Aquacraft 2014)
- The percentage of residences with electric water heaters is 40.3% (EIA 2009)
- The percentage of commercial buildings with electric water heaters is 39.89% (EIA 2003 Pacific Region, table B32)
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009)
- The percentage of commercial buildings with natural gas water heaters is 60.11% (EIA 2003, Pacific Region, table B32)
- The amount of electricity required to heat gallon of hot water is 0.18 kWh/gallon (EPA 2010a)
- The amount of natural gas required to heat gallon of hot water is 0.009 therms/gallon (EPA 2010a)
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Water reductions achieved by SB X7-7 were calculated by multiplying the community population by the per-capita baseline water usage, and subtracting from that the product of the community population and the 2020 target per-capita water usage.
2. Water reductions were estimated for each source (groundwater, recycled water, municipal water) and end use (single family, multi-family, commercial etc.) using the inventory and forecast data.
3. Reductions in outdoor and indoor water use were determined using assumptions above and the reduction percentages for each community (see table above).

4. Electricity savings from reduced water movement and treatment were quantified by multiplying the estimated water reductions by the appropriate energy intensities.
5. Reductions in building energy consumption were calculated by multiplying the water reductions by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.
6. Total energy reductions from water movement and hot water heating were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.
7. Reductions in emissions from wastewater treatment were also quantified by multiplying the water reduction by the wastewater treatment emissions for each community in 2020.

Although costs were not quantified for this measure, costs would include up-front costs of installing low-flow fixtures and other water saving appliances in homes and businesses, and savings would include reduced water bills.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Water reductions in 2040 and 2050 achieved by SB X7-7 were calculated by first multiplying the 2040 and 2050 community populations by each community's per-capita 2020 water usage and a reduction of 20% in 2040 and an additional 20% in 2050.
2. Savings were estimated by subtracting the 2040 and 2050 consumption based on the reduced per-capita rates from the baseline water consumption (determined by multiplying the baseline year per-capita consumption by the 2040 and 2050 populations).
3. Water reductions were estimated for each source (groundwater, recycled water, SCWA-provided water) and end use (single family, multi-family, commercial etc.) using the inventory and forecast data.
4. Reductions in outdoor and indoor water use were determined using the assumptions above and the reduction percentages for each community (see table above).
5. Electricity savings from reduced water movement and treatment were quantified by multiplying the estimated water reductions by the appropriate energy intensities.
6. Reductions in building energy consumption were calculated by multiplying the water reductions by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.
7. Total energy reductions from water movement and hot water heating were multiplied by the 2020 RPS-adjusted utility emission factors to estimate emissions reductions.
8. Reductions in emissions from wastewater treatment were quantified by multiplying the water reductions percentage by the wastewater treatment emissions for each community in 2040 and 2050.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: The cities and the County, in collaboration with water providers.

Key Progress Indicators: The actual GPCD rates for each water retailer/community, and/or gallons of water saved in each community (or total water consumption to reflect reduced usage).

Measure 11-L2. Water Conservation for New Construction

Objective: Implement a water reduction target for new development that exceeds the SB X7-7 20% reduction target, such as a 30% reduction in water use for each community. To satisfy this goal, require adoption of the Voluntary CALGreen Tier 1 water efficiency measures for new residential and nonresidential construction. CALGreen voluntary measures recommend use of certain water-efficient appliances, and plumbing and irrigation systems, as well as more aggressive water savings targets.

The percentage of new homes and new nonresidential buildings participating in this measure in each community is as follows:

Community	Residential Participation	Nonresidential Participation
Cloverdale	-	-
Cotati	-	-
Healdsburg	-	-
Petaluma	100%	50%
Rohnert Park	100%	50%
Sebastopol	100%	50%
Sonoma	50%	50%
Windsor	100%	50%
Unincorporated County	-	-

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will

directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the WWTPs; some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

This measure reduces emissions from building energy and wastewater sources in addition to water conveyance. Total countywide reductions from this measure are anticipated to be 252 MTCO₂e.

Implementation Information: The communities will update building standards and codes for new buildings to require adoption of voluntary CALGreen Tier 1 water efficiency measures, including:

- Use of low-water irrigation systems
- Installation of rainwater systems
- Installation of water-efficient appliances and plumbing fixtures
- A 30% to 40% reduction over baseline indoor water use, and a 55% to 60% reduction in outdoor potable water use (CALGreen Tier 1 or 2).

The communities will use the Energy Watch partnership and work with SCP and PG&E to help implement this measure. The communities will also encourage “pay as you save” programs for energy and water efficiency.

Communities could apply for State Water Board’s grant money for the water-energy “standard offer” pilot project.

Assumptions:

- The following water use breakdown by end use was assumed (ConSol 2010; Yudelso 2010):

End Use	Percentage
Residential Outdoor Water Use	57%
Residential Indoor Water Use	43%
Nonresidential Outdoor Water Use	35%
Nonresidential Indoor Water Use	65%

- The following breakdown of water use by end use was assumed (CAPCOA 2010, Table WUW-1.1 and Table WUW-1.2):

End Use	Residential Percentage	Nonresidential Percentage
Toilet	33%	48%
Urinals	-	11%
Showerhead	22%	5%
Bathroom Faucet	-	3%
Kitchen Faucet	-	4%
Bathroom/Kitchen Faucet	18%	-
Standard/Compact Dishwasher	1%	2%
Top/Front-Loading Clothes washer	14%	-
Leaks, other	12%	-
Ice	-	1%
Laundry	-	0%
Other	-	26%

- The following fixture flow rates were used (California Building Standards Commission 2013):

Fixture Type	Baseline Flow	CALGreen Tier 1 flow	Flow Units
Residential			
Lavatory and Kitchen Faucets	1.8	1.5	gal/min
Dishwashers - Standard	6.5	4.3	gal/cycle
Dishwashers – Compact	4.5	3.5	gal/cycle
Toilets	1.28	0	gal/flush
Nonresidential			
Lavatory Faucets	0.5	0.35	gal/min
Kitchen Faucets	2.2	1.6	gal/min
Toilets	1.28	1.12	gal/flush

- The percentage of residences with electric water heaters is 40.3% (EIA 2009)
- The percentage of commercial buildings with electric water heaters is 39.89% (EIA 2003 Pacific Region, table B32)
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009)
- The percentage of commercial buildings with natural gas water heaters is 60.11% (EIA 2003, Pacific Region, table B32)
- The amount of electricity required to heat gallon of hot water is 0.18 kWh/gallon (EPA 2010a)
- The amount of natural gas required to heat gallon of hot water is 0.009 therms/gallon (EPA 2010a)

- All new residential and nonresidential buildings would comply with CALGreen Voluntary Tier 1 measures.
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Water savings were calculated on a per-fixture basis for new residential and nonresidential water use using the difference between the mandatory CALGreen flow requirements and the voluntary Tier 1 requirements.
2. Fixtures included lavatory and kitchen faucets, dishwashers, clothes washers and toilets/urinals.
3. Electricity savings from reduced water movement and treatment were quantified by multiplying the estimated water reductions by the appropriate water source energy intensities.
4. Reductions in building energy consumption were calculated by multiplying the water reductions by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.
5. Water savings from overlapping state and local strategies were removed from the energy forecast to avoid double counting.
6. Total energy reductions from water movement and hot water heating were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.
7. Reductions in fugitive emissions from wastewater treatment were quantified by multiplying the percentage reduction in indoor water (i.e., water that will be treated as wastewater) by the 2020 wastewater treatment emissions in 2020.
8. GHG savings from electricity and natural gas reductions were then calculated by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Costs were estimated for upgrading to low-flow plumbing fixtures for bathroom and kitchen faucets, toilets, and dishwashers in new residential and commercial buildings. Incremental costs per fixture were assumed to be negligible for residential toilets and faucets. Incremental costs for a residential dishwasher were estimated at \$12. To estimate total initial capital costs, this incremental cost was multiplied by the estimated number of plumbing fixtures per home and the number of new homes between 2017 and 2020.

Annual cost savings were calculated by multiplying the mitigated electricity, natural gas, and water usage—as calculated in the GHG Analysis—by the average residential utility rates. An average lifetime of 10 years was assumed for this measure, based on the effective useful life reported by CPUC (2009) for faucet aerators and low-flow showerheads.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. GHG reductions for this measure in 2040 and 2050 were estimated by applying the water reduction percentage achieved in 2020 to the water emissions in 2040 and 2050, which were quantified as part of the GHG inventory.
2. The 2020 reduction percentage was determined by dividing the reductions achieved in 2020 (methods described above) by the total water emissions in 2020.
3. Reductions that would be achieved by this measure for other GHG sources in 2040 and 2050 (i.e., wastewater and building energy) were determined by using the ratio of wastewater reductions in 2020 to the water reductions in 2020.
4. This ratio was applied to water reductions in 2040 and 2050 to determine wastewater reductions in these years.

The same process was used for building energy reductions that would be achieved by this measure, through the reduced use of hot water and the associated energy required to heat water.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (municipal water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: Each city and the County, in collaboration with water providers and RCPA.

Key Progress Indicators: Gallons of water saved in each community (or total water consumption for new development to reflect reduced usage) and/or energy savings associated with new development water usage (or total energy consumption associated with water usage to reflect reduced water usage).

Measure 11-L3. Water Conservation for Existing Buildings

Objective: Achieve a water reduction target for existing development that exceeds the SB X7-7 20% reduction target, such as a 30% reduction in water use by implementing a program to renovate existing buildings to achieve higher levels of water efficiency. Encourage existing buildings (constructed before 2015) to adopt voluntary CALGreen Tier 1 water efficiency measures.

The percentage of existing homes and existing nonresidential buildings participating in this measure in each community is as follows (as estimated each community):

Community	Residential Participation	Nonresidential Participation
Cloverdale	-	-
Cotati	-	-
Healdsburg	-	-
Petaluma	25%	50%
Rohnert Park	25%	50%
Sebastopol	25%	50%
Sonoma	25%	10%
Windsor	25%	10%
Unincorporated County	-	-

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.
3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the WWTPs; some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

This measure reduces emissions from building energy and wastewater sources in addition to water conveyance. Total countywide reductions from this measure are anticipated to be 2,425 MTCO₂e.

Implementation Information: The communities could require water conservation upgrades for all existing buildings that undergo major remodels or renovations and/or incentivize water efficiency upgrades outside the permitting process. Education and outreach programs will help educate residents and businesses on the importance of water efficiency and how to reduce water use. Rebate programs will help promote installation of water-efficient plumbing fixtures. The program could include:

- A Water Audit Program in collaboration with efforts by local water purveyors that offer free water audits.
- Development plans to ensure water conservation techniques are used (e.g., rain catchment systems, drought tolerant landscape).
- Requirements for water efficiency upgrades when permitting renovations or additions of existing buildings.
- Use of water conservation pricing (e.g. tiered rate structures) to the extent allowed by law to encourage efficient water use.
- Incentives for projects that demonstrate significant water conservation through use of innovative technologies.

The communities will use the Energy Watch partnership and work with SCP and PG&E to help implement this measure. The communities will also encourage “pay as you save” programs for energy and water efficiency.

Assumptions: The assumptions for this measure are similar to those described for Measure 11-L2, *Water Conservation for New Construction*. Analysis Method - 2020: The approach for calculating water and emissions reductions and costs is similar to what is described for Measure 11-L2, *Water Conservation for New Construction*. However, this measure applies to existing developments constructed before 2017.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020, because this measure applies to existing development.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (municipal water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: Each city and the County, in collaboration with water providers and RCPA.

Key Progress Indicators: Gallons of water saved in each community (or total water consumption for new development to reflect reduced usage) and/or energy savings associated with existing development water usage (or total energy consumption associated with water usage to reflect reduced water usage).

C.18 Goal 12: Increase Recycled Water and Greywater Use

Measure 12-R1. Recycled Water

Objective: Create a recycled water use goal to offset a certain percentage of potable water and agricultural water use by using recycled water for appropriate uses. For example, a community could aim to replace 20% of its total water use with recycled water, or aim to replace 80% of landscaping water use (or other uses of non-potable water, such as dust control or fire suppression) with recycled water. The communities could set an example by using only recycled water for landscaping at municipal facilities and parks. Develop public educational materials that support and encourage the use of recycled water.

Impact on Local Emissions: Reducing the demand for potable water through the use of recycled water will reduce the amount of electricity needed to supply that water to the communities because recycled water generally has a lower energy intensity than other sources of water. Because SCWA has a carbon neutral electricity supply to power its system (see Measure 14-R1), this measure would not reduce emissions for potable water already supplied by SCWA. As such, reductions consider the other water supply sources (such as groundwater supplied by other water agencies).

Electricity reductions will occur for water supply, treatment, distribution, and conveyance. These electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 48 MTCO₂e.

Implementation Information: The wastewater treatment providers in the county and the communities would coordinate to implement this measure. Funding sources would need to be identified for capital improvements for any new equipment. Wastewater treatment providers and the communities could also coordinate on the following strategies for implementation of this measure. Responsibilities would vary based on the nature of the strategy.

- Inventory potential non-potable uses of water for substitution by recycled water.
- Encourage the retrofit of irrigation systems to promote the use of recycled water at golf courses, parks and open spaces owned and operated by other entities, and take the lead in implementing these modifications at municipal government operated facilities.
- Encourage the retrofit of single-family and multi-family homes to promote the use of recycled water for landscaping and irrigation.
- Consider programs to collect stormwater for on-site reuse for landscape irrigation.

Assumptions:

- The analysis assumes SCWA-provided water is carbon neutral, so recycled water use reduces GHG emissions only to the extent that it replaces other water sources.
- The increase in recycled water would result in a proportional reduction of water from a community's other water sources (e.g., a community with 50% SCWA-provided water and 50% local groundwater in the BAU case would now have 40% SCWA-provided water, 40% local groundwater, and 20% recycled water after this measure is implemented).
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

- Annual operations and maintenance costs assumed to be 1% of capital costs (City of Los Angeles 2006).
- Up-front capital costs assumed to range from \$30,000–\$60,000/MG recycled water (City of Los Angeles 2006).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. The methods used to determine emissions reductions from this measure are based on altering the assumptions in the water sector of the GHG inventory. Each community has a certain water source profile (e.g., 49% SCWA water, 32% groundwater). These source profiles were altered for this measure to assume that the communities will increase the proportion of recycled water to 20% (from their current recycled water proportion).
2. This measure results in a reduction in water-related electricity consumed by each community because recycled water has a lower energy intensity than other sources of water conveyance (e.g., imported water).
3. Electricity savings from reduced water conveyance were quantified by multiplying the estimated water reductions by the appropriate energy intensities. Total energy reductions from water movement were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.

Up-front capital costs to expand the recycled water infrastructure (purple pipes) are based on cost estimates in the City of Los Angeles Recycled Water Master Plan (2006). One-time costs include the capital cost for new pipeline as well as costs for system accessories, including pumping, diurnal storage, and end-user retrofits.

Up-front costs are scaled for the county based on the estimated cost per million gallons (MG)—ranging from about \$30,000–\$60,000/MG, and the increased recycled water capacity calculated by the GHG Analysis. These costs can vary significantly depending on terrain, pipe size, and a host of other factors. Annual operating and maintenance costs are estimated at 1% of capital costs,

based on engineering cost analysis undertaken for recycled water projects in Los Angeles (City of Los Angeles 2006).

Annual savings to utilities were estimated based on the difference between avoided electricity costs (due to reduced water conveyance) and an increase in distribution electricity costs. Avoided water costs for utilities are not estimated, although this may represent an additional significant cost savings.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. To estimate 2040 and 2050 reductions associated with this measure, the method used in 2020 of adjusting the amount of recycled water in the GHG inventory was used.
2. The recycled water goals in 2040 and 2050 were assumed to stay constant at 20%.
3. Water-related energy reductions were multiplied by the 2020 RPS-adjusted utility emission factors to estimate GHG reductions.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: RCPA, Cloverdale, Petaluma, SCWA, and other wastewater treatment providers in collaboration with the communities.

Key Progress Indicators: The percentage of recycled water used in each community, gallons of recycled used, and/or gallons of potable water saved in each community (or total potable water consumption to reflect reduced usage).

Measure 12-L1. Greywater Use

Objective: Establish a goal to replace a certain percentage of potable water that was previously being used for residential non-potable uses (landscaping, toilet water, etc.) with greywater, such as 50%.

The greywater target penetration rate for residential non-potable water uses in each community is as follows:

Community	Residential Percentage Greywater (non-potable uses)
Cloverdale	-
Cotati	-
Healdsburg	1%
Petaluma	2%
Rohnert Park	-
Sebastopol	25%
Sonoma	2%
Windsor	-
Unincorporated County	10%

Impact on Local Emissions: Reducing the demand for potable water through the use of greywater will reduce water demand, which in turn will reduce the amount of electricity needed to supply that water. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions will not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 26 MTCO₂e.

Implementation Information: Each participating community will establish a greywater goal for this measure, and will work with water providers to assess progress toward the goals.

Assumptions:

- Residential outdoor water use is 57% of total residential usage (ConSol 2010).
- Residential indoor water use is 43% of total residential usage; of that percentage, 33% is toilet water use (ConSol 2010; CAPCOA 2010, Table WUW-1.1).
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The amount of water consumed for non-potable uses was determined for each community using the GHG inventory, water forecast data, and standard assumptions for outdoor and toilet water use (non-potable water) in residences.
2. The amount of non-potable water was then multiplied by the measure goal chosen by each community.

3. Typically, potable water is used for purposes that don't require potable water (e.g., landscaping).
4. The goal chosen by each community represents the amount of non-potable water that will be used for landscaping and other non-potable uses relative to the amount of water that is used for purposes that don't require potable water.
5. A theoretical 100% goal would imply that a community uses non-potable water for all purposes that do not necessitate potable water.
6. Water reductions by water source (groundwater, recycled water, SCWA-provided water) were determined using inventory and forecast data in order to adequately determine electricity reductions.
7. Electricity reductions from reduced water movement were quantified by multiplying the estimated water reductions by the appropriate water source energy intensities.
8. GHG savings from electricity reductions were then calculated by multiplying the electricity reductions by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. The amount of water consumed for non-potable uses in 2040 and 2050 was determined for each community using the GHG inventory, water forecast data, and standard assumptions for outdoor and toilet water use (non-potable water) in residences.
2. The amount of non-potable water was then multiplied by the measure goal chosen by each community for 2040 and 2050.
3. Water reductions by water source were determined using inventory and forecast data in order to adequately determine electricity reductions.
4. Electricity reductions from reduced water movement were quantified by multiplying the estimated water reductions by the appropriate water source energy intensities.
5. GHG savings from electricity reductions were then calculated by multiplying the electricity reductions by the 2020 RPS-adjusted utility emission factors.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: Each city and the County, in collaboration with water providers and RCPA.

Key Progress Indicators: The percentage of greywater used for residential non-potable water uses in each community, gallons of greywater used, and/or gallons of potable water saved in each community (or total potable water consumption to reflect reduced usage).

C.19 Goal 13: Increase Water and Wastewater Infrastructure Efficiency

Measure 13-R1. Infrastructure and Water Supply Improvement

Objective: Encourage SCWA and other water and wastewater service providers to reduce energy demand from their operations. This could include installing more efficient pumps or other equipment, install systems to enable off-peak pumping times, and improving the water conveyance infrastructure. The County and cities should also investigate new water supply sources, strive to reduce imported water by expanding and protecting local surface water and groundwater sources, and increase local water production by building new wells. Work with water agencies to maximize water pump efficiency to achieve a 20% reduction in energy use by 2020.

Impact on Local Emissions: This measure will reduce the amount of electricity consumed for water service operations within the Sonoma County communities. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 230 MTCO₂e.

Implementation Information: RCPA and communities would work with SCWA and other water providers to identify funding sources for capital improvements for the necessary water conveyance equipment upgrades. SCWA and other water providers would be responsible for installing and maintaining the new or upgraded equipment.

Assumptions:

- Energy use for water pumping and conveyance would be reduced region-wide by 20% in 2020, 30% in 2040, and 40% in 2050.
- Electricity associated with SCWA-provided water, groundwater and recycled water would be affected by this measure.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings were calculated by multiplying the 2020 BAU electricity use (from the GHG inventory and forecast data) for water pumping and conveyance by 20%. This was performed for each water source and the corresponding provider of electricity (SCWA, PG&E, Power and Water Resources Pooling Authority [PWRPA], Healdsburg Electric, etc.)
2. SCWA will be carbon-free by 2020, so electricity reductions associated with SCWA-supplied water will yield zero GHG emission reductions.
3. Total energy reductions due to the increase in efficiency were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.

Although costs were not quantified for this measure, costs would include up-front costs of installing more efficient pumps, and savings would include reduced utility bills for the water districts.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. BAU electricity in 2040 and 2050 for water pumping and conveyance was multiplied by 30% and 40%, respectively, to determine electricity reductions.
2. Electricity reductions were multiplied by the 2020 RPS-adjust utility emission factors to estimate GHG reductions.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: SCWA and RCPA in collaboration with the communities and retail water providers.

Key Progress Indicators: Implementation information on efficiency upgrades (such as the number and type of projects), actual water-related energy savings (kWh) from SCWA and other water service providers (or total water-related energy usage to reflect reduced energy usage), and/or water supply source information (such as percentage or gallons of SCWA water, groundwater, recycled water, etc.).

Measure 13-R2. Wastewater Treatment Equipment Efficiency

Objective: Work with wastewater treatment providers to reduce energy demand from their operations. This could include installing more efficient pumps or other equipment, installing systems to enable off-peak pumping times, and improving the wastewater conveyance infrastructure. Require all pumping and treatment equipment to be 25% more energy efficient at the time of replacement. Use best management practices for the treatment of wastewater.

Impact on Local Emissions: This measure will reduce the amount of electricity consumed for wastewater treatment operations. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 529 MTCO₂e.

Implementation Information: RCPA and communities would work with wastewater treatment providers to encourage increased efficiency in wastewater treatment operations. All involved

parties would coordinate and seek to identify funding sources for capital improvements on wastewater equipment.

This measure reduces emissions from building energy sources, because utility-provided electricity is replaced with renewable electricity from the combustion of wastewater methane. However, because this measure applies specifically to wastewater treatment equipment it is categorized as wastewater measure.

Assumptions:

- The region-wide energy intensity for wastewater treatment is 1,911 kWh/million gallon wastewater treated (CAPCOA 2010). This value was used as a proxy for all WWTPs.
- Region-wide equipment efficiency would improve by 25% in 2020, 50% by 2050, and 60% by 2050
- Upfront installation costs range from \$0.50-\$0.25 per kWh in 2020 (California Energy Commission and the U.S. Department of Energy 2002; EPA 2010b).
- Annual maintenance savings assume to range from \$0.00-\$0.04 per kWh saved (California Energy Commission and the U.S. Department of Energy 2002; EPA 2010b).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The amount of electricity required to process total wastewater generated in 2020 by each community (provided in the GHG inventory) was determined by multiplying the 2020 wastewater volumes by CAPCOA's default value for wastewater treatment energy intensity (1,911 kWh per million gallon of wastewater).
2. To estimate the energy savings associated with this measure, the 2020 wastewater processing energy was multiplied by 25% for all communities, as this measure assumes that wastewater equipment will improve in efficiency by 25% region-wide.
3. The amount of electricity saved was then multiplied by the RPS-adjusted utility emission factors to determine the amount of GHG reduction.

WWTPs incur up-front installation costs to install energy efficient pumping systems. The upgrade of the equipment is a one-time event, and the implementation would be complete once the upgraded equipment begins operating.

WWTPs incur annual energy savings from offset energy production from the installed energy efficient pumping systems. Additionally, in the lower cost scenario, the WWTP incurs annual maintenance savings, while the higher cost scenario assumes no net change to maintenance costs with the new equipment upgrades.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. 2040 and 2050 wastewater treatment energy was estimated by multiplying the 2040 and 2050 wastewater values, quantified as part of the GHG inventory, by the CAPCOA default value for wastewater treatment energy intensity.
2. Energy savings were estimated by then multiplying the wastewater treatment energy in 2040 and 2050 by 50% and 60%, respectively, which represent the improvements in efficiency that are assumed to occur.

Activity Data Sources: Wastewater generation and treatment data from SCWA, Cloverdale, Petaluma, and other wastewater service providers.

Responsible Entities: RCPA, Cloverdale, Petaluma, SCWA, and other wastewater treatment providers in collaboration with the communities.

Key Progress Indicators: Implementation information on efficiency upgrades (such as the number and type of projects) and/or actual wastewater-related energy savings (kWh) from SCWA and other wastewater service providers (or total wastewater-related energy usage to reflect reduced energy usage).

C.20 Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems

Measure 14-R1. Sonoma County Water Agency Carbon Free Water by 2015

Objective: In 2015, SCWA has contracted to procure 100% of its electricity needs through renewable and carbon free resources, thus achieving a carbon neutral electricity supply for its system.

Impact on Local Emissions: This measure will reduce the carbon intensity of electricity used by SCWA to deliver water to its contractors. Grid electricity will be replaced with carbon-neutral electricity. A reduction in the demand for grid electricity is associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 2,145 MTCO₂e.

Implementation Information: SCWA is responsible for implementing this measure. According to SCWA (Sonoma County Water Agency 2015):

“The SCWA is actively working to diversify its energy portfolio and reduce its energy and fuel needs through efficiency and renewable energy production. The Water Agency has three solar photovoltaic projects totaling almost 2 MW which account for 6% of its total electricity needs. The Water Agency

procures local geothermal energy from Sonoma Clean Power's EverGreen program for 5% of its electricity needs. The remainder of its energy needs are met through PWRPA carbon free sources of the Sonoma County Landfill Gas to Energy project, Lake Sonoma Warm Springs Dam hydropower, and other non-local hydropower sources in the Sierra Nevada mountains."

Assumptions:

- 100% of SCWA-provided water will be carbon-free by 2020

Analysis Method: The following steps were used to quantify emission reductions for this measure:

1. The amount of electricity used by SCWA to supply the communities with water (from the GHG inventory) was assigned to PG&E and PWRPA based on the percentage of electricity that each utility supplies to SCWA.
2. The full verified impact of SCWA's carbon free water initiative includes some facility energy use that is not allocated to water delivery, but would appear as a reduction in building energy emissions.
3. This electricity was multiplied by the appropriate RPS-adjusted utility emission factors to determine emission reductions.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: SCWA.

Key Progress Indicators: SCWA electricity consumption, electricity generation portfolio, and/or electricity emission factors.

Measure 14-L1. Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale

Objective: Healdsburg would use green energy (100% renewable) sources for a certain percentage of their water production and/or conveyance. Cloverdale has implemented solar energy arrays at the city water and wastewater plants.

Impact on Local Emissions: This measure will reduce the carbon intensity of electricity used by Healdsburg and Cloverdale for water production and/or conveyance. Grid electricity will be replaced with carbon-neutral electricity. This will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions will not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 412 MTCO₂e.

Implementation Information: Healdsburg will be responsible for implementing green energy projects at its water production and wastewater processing facilities. Cloverdale has already implemented solar arrays at its water and wastewater plants and will be responsible for continuing to ensure that the arrays are used to their maximum potential.

Assumptions:

- Healdsburg's goal for the percentage of water conveyed using green electricity is 100% by 2020.
- In 2020, the expected solar production at the Cloverdale water and wastewater treatment plants are projected to be 668,621 kWh and 886,601 kWh, respectively.
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. To estimate the reductions associated with Healdsburg's green energy plans for water conveyance, the following steps were taken:
 - a. The projected BAU water consumption in 2020 from the water sector of the GHG inventory was first adjusted to account for water reductions from overlapping measures.
 - b. The adjusted 2020 water consumption was multiplied by the energy generation target chosen by Healdsburg to estimate the amount of water in 2020 that will be conveyed using renewable electricity.
 - c. The amount of renewable electricity required to convey this water was determined by multiplying the amount of water by the water conveyance energy intensities.
 - d. To determine emission reductions, the amount of renewable electricity was multiplied by the appropriate RPS-adjusted utility emission factors.
2. To determine the emission reductions associated with Cloverdale's water and wastewater plant solar arrays, the projected amount of solar electricity that will be generated at the facilities was multiplied by the RPS-adjusted PG&E emission factors. Solar electricity projections were provided by the City of Cloverdale.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. 2040 and 2050 water consumption in Healdsburg was multiplied by the energy generation target chosen by Healdsburg in 2040 and 2050 and then by the water conveyance energy intensity to determine electricity reductions.

2. GHG reductions were estimated by multiplying the electricity reductions by the 2020 RPS-adjusted utility emission factors.
3. Emissions reductions at Cloverdale's water and wastewater plants were determined by multiplying the projected amount of solar electricity that will be generated in 2040 and 2050 by the 2020 RPS-adjusted PG&E emission factors.

Activity Data Sources: For Cloverdale, solar output data (kWh) for the Cloverdale Water Treatment Plant from the city. For Healdsburg, water use data and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans and water energy intensity values for each source of water obtained from SCWA and CAPCOA (2010).

Responsible Entities: Cloverdale and Healdsburg.

Key Progress Indicators: Solar electric generation capacity (kW) or electricity generation (kWh) for Cloverdale's projects and the renewable portfolio for Healdsburg's electricity (or their electricity emission factor).

C.21 Goal 15: Reduce Emissions from Livestock Operations

Measure 15-L1. Livestock Manure Management

This voluntary measure would encourage manure management techniques that reduce emissions from the decomposition of manure at dairies. Strategies include on-site management approaches that reduce methane emissions, like dry composting or pasturing, as well as opportunities to convert methane to fuel using some form of methane digestion.

GHG emissions from manure can be reduced either through improved manure management strategies, or using a methane digester to capture methane that would otherwise be emitted into the atmosphere from dairies, thereby directly reducing GHG emissions.

Dry manure management approaches, such as scrape and vacuum systems and dry composting, result in dramatically lower methane emissions compared to anaerobic wet handling systems. (Owen, J.J. and W.L. Silver. 2015). Likewise, well-managed pasture based systems (either as an alternative to or complementary with a confined animal system), allows manure to decompose aerobically along with plant material, reducing the amount of methane generated. The carbon from this process is sequestered in the soil. Increased soil carbon not only results in lower net GHG emissions from the farming system but also results in healthier, more productive soil. In addition, converting fields that had previously grown cattle feed to perennial grasslands for grazing can also dramatically improve carbon sequestration levels.

Methane digesters capture the methane that would otherwise be released to the atmosphere and convert it to fuel for generating electricity. One example is on-site methane digesters that would

convert the methane to fuel used to generate electricity for on-site use. Another example is “co-digestion,” which is the anaerobic digestion of dairy waste with additional organic waste streams, such as food waste, green waste or poultry waste. Some co-digestion facilities in other states are regional in scale, allowing multiple dairy operations to contribute manure. In either approach, grid electricity would be replaced with methane-generated electricity, which is carbon neutral, thus reducing GHG emissions from electricity use as well as emissions from dairy manure. Neither of these approaches have been implemented successfully in Sonoma County to date, mainly due to the substantial capital investment that is required.

Under this measure, the County would work with local partners, like the RCDs, and with dairies to discuss relevant incentives and the feasibility of alternative manure management strategies, including installing methane capture equipment.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

Measure 15-L2. Reduce Emissions from Enteric Fermentation

This voluntary measure would encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation (both methane and nitrous oxide). Potential methods for reducing these emissions include manipulating animal diet to inhibit a rumen environment favorable to methanogens. A range of potential emission mitigation options include dietary oils (such as whole cottonseed oil, sunflower oil, coconut oil, and palm oil), the use of corn or legume silage in place of grass silage, use of concentrate feeds, nitrates, ionophores, tannins, and improving forage quality and the overall efficiency of dietary nutrient use. Potential use of pomace from wine-making should also be explored.

Under this measure, the County would work with dairy and livestock operators to test potential feasible and cost-effective approaches suitable for application in Sonoma. The County would help to identify grant sources of funding to help in piloting and demonstrating promising approaches with voluntary dairy/livestock operator participation.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

C.22 Goal 16: Reduce Emissions from Fertilizer Use

Measure 16-L1. Optimize Fertilizer Use

Objective: Implement a policy to encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer). Work with growers to provide incentives for organic fertilizers as an alternative. Create an outreach program to help growers optimize nitrogen application rates, decrease overall fertilizer inputs and cost, maintain current crop yields, and reduce emissions of nitrous oxide.

Impact on Local Emissions: This measure will reduce fugitive N₂O emissions associated with fertilizer application, a direct reduction in GHG emissions. Emission reductions will occur at the location where fertilizer is reduced. Total countywide reductions from this measure are anticipated to be 1,759 MTCO₂e.

Implementation Information: Sonoma County would lead this measure, given that the vast majority of agricultural activity is in the unincorporated county. Individual communities with agricultural activity in their community could cooperate with the County to implement this measure. The County would develop voluntary policies that encourage alternatives to synthetic fertilizers. The County would need to work with growers to discuss what incentives would be relevant and what levels of reduction would be feasible.

Assumptions:

- Fossil fuel-based fertilizer would be reduced by 20% in 2020, 40% in 2040, and 60% in 2050.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Fertilizer emissions (quantified as part of the GHG inventory) for each community were multiplied by the reduction goal percentage in 2020 to determine the amount of GHG reductions that would be achieved (i.e., fertilizer emissions were multiplied by 0.20).

Analysis Method – 2040 and 2050: The method described above to quantify emission reductions in 2020 was used to estimate reductions in 2040 and 2050 as well. Fertilizer emissions were multiplied by the participation rates for these years (see assumptions above) to determine GHG reductions.

Activity Data Sources: Acres of agricultural land by crop type from the Sonoma County Agricultural Commissioner.

Responsible Entities: The County and the agriculture industry in collaboration with the communities.

Key Progress Indicators: The amount and type of fossil fuel-based fertilizer applied to crops in each community.

C.23 Goal 17: Protect and Enhance the Value of Open and Working Lands

Measure 17-R1. Conserve Open Space and Working Lands

Under this measure, the communities would continue to preserve natural open space, working timberlands, and agricultural lands to prevent conversion of such lands to urban uses, thereby reducing associated GHG emissions associated with the loss of vegetation and maintaining ongoing carbon sequestration on these lands.

Natural and working lands are essential assets for Sonoma County as it prepares for climate change impacts because of the many ecosystem services these lands provide as well as their support for a healthy economy and the local quality of life, including recreational opportunities in many open space areas. Many adaptation objectives, as outlined in Chapter 6, are advanced through the preservation and enhancement of natural and working lands, including trees, vegetation, and soils.

Natural and working lands also help reduce carbon in the atmosphere by sequestering and storing carbon. Various ecological processes transfer carbon between the atmosphere, vegetation, and the soil, including photosynthesis, respiration, and decomposition. This terrestrial, or biological, carbon sequestration can be classified in three general categories across Sonoma County.

- Agricultural carbon stock
- Non-agricultural rural lands
- Urban forest carbon stock

Preservation of open space and working lands will help to preserve existing carbon stocks and annual sequestration and will provide opportunities for enhanced sequestration under existing and future programs such as those described under Measure 18-R1 (Certification Programs) and Measure 19-R1 (Carbon Farming). Preservation of these lands also avoids GHG emissions associated with conversion to more intensive uses and complements Measure 4-L1 by avoiding transportation emissions associated with travel to new development outside of existing urban areas. This measure will also help support attainment of the increased carbon sequestration goal outlined in Measure 19-R2.

Implementation strategies for this measure include supporting the efforts of the Sonoma County Agricultural Preservation and Open Space District to protect open and working lands through acquisition and easements, management of regional park lands by Sonoma County Regional Parks, and acquisitions and easements undertaken by local land trusts and similar organizations. The County's continued participation in the state Land Conservation Act (Williamson Act) is another important tool for implementing this measure. Maintaining urban growth boundaries and maintaining or expanding Community Separators (see Measure 4-L1) will also contribute to the success of this measure.

This is a supporting measure and potential reductions were not quantified at this time, but may be in the future (See Measure 19-R2).

Measure 17-R2. Enhance Natural Resources on Open and Working Lands through Climate Beneficial Management Practices

Objective: Under this measure, the communities and regional partners would remove continue to work to enhance the natural resources of open and working lands, including agricultural and timber lands.

Impact on Local Emissions: Enhancement of natural and working lands provides an essential opportunity to mitigate and adapt to the impacts of climate change. For example, enhancing riparian areas mitigates climate change by sequestering carbon, and also provides adaptive benefits such as flood attenuation, protecting cold-water fisheries by providing shade to waterways, and providing corridors for wildlife whose migration patterns must be altered in response to climate change. Forest restoration and improved forest management activities promote tree growth, thus removing carbon from the atmosphere through increased carbon sequestration. Improved forest management also reduces fire risk, which both minimizes emissions and improves the county's climate readiness.

Implementation Information: Since the 1940s, the Sonoma and Gold Ridge Resource Conservation Districts (RCDs) and the Natural Resources Conservation Service (NRCS) have been partnering with landowners on a voluntary basis, both to implement traditional BMPs and to adapt to changing natural resource conditions, such as water quality, endangered species, water quantity, and now climate change. The RCDs now carry out this work through a regional program called LandSmart®, with the goal of supporting productive lands and thriving streams. These activities help to keep working lands working by protecting the natural resources on which agriculture depends and supporting the profitability of local farms. In open space settings, these activities enhance the ecosystem service values of the land. And on rural residential lands, they can aid residents in adapting to a changing climate and leveraging their backyards as part of the solution to climate change.

Implementation tools for forest restoration and enhancement include the Sonoma County Agricultural Preservation and Open Space District's Climate Action Through Conservation (CATC) program, affirmative easements through the District or land trusts, and partnerships with private land managers and state agencies (like CalFire and the Department of Fish and Wildlife).

Strategies defined in Measure 18-R1 (Certification Programs) and Measure 19-R1 (Carbon Farming) will also support the enhancement of open and working lands.

This measure leads to GHG reductions through BMPs that save water, reduce the use of fuel in farm equipment, improve manure and nutrient management, and increase terrestrial carbon capture and sequestration. It complements Measure 17-R1 by building upon existing carbon stocks and annual sequestration levels. By keeping working lands working, it also helps to avoid the loss of carbon stocks and annual sequestration capacity that would result from conversion to other land uses.

This is a supporting measure and potential GHG impacts were not quantified. It is also important to note that land management measures like carbon farm plans, BMPs and forest management practices are voluntary and rely on ongoing commitments from landowners. As such, these measures may not have the same long-term benefit as other measures such as land acquisition or affirmative easements.

Implemented by: Resource Conservation Districts and partners

Key Progress Indicators: Number and types of conservation plans, carbon farm plans, and BMPs.

C.24 Goal 18: Promote Sustainable Agriculture

Measure 18-R1. Sustainable Agriculture Certification Programs

Objective: Support sustainable agricultural certification programs that promote practices that will reduce GHG emissions and/or enhance carbon stocks and sequestration. Support rigorous standards in documenting, tracking, and disclosing sustainability practices that reduce GHG emissions.

There are a variety of agricultural certification programs that have been developed or are being developed. A few of the certification programs being used by Sonoma County farmers include the following:

- *Certified Organic:* Certified organic foods are produced according to federal standards set by the USDA National Organic Program in 2002. Organic standards address many factors: soil quality, animal raising, pest and weed control, and use of input materials. The National Organic Program developed regulation and guidance on certification, production, handling and labeling of USDA organic products. The California Department of Food and Agriculture (CDFA)'s Organic Program is responsible for enforcement of the federal Organic Foods Production Act of 1990, and the California Organic Products Act of 2003.
- As one of the first organic certification agencies, California Certified Organic Farmers (CCOF) was instrumental in advocating for federal organic legislation. CCOF organic certification standards were used as a foundation for the USDA National Organic Program, finally making "certified organic" a federally regulated claim. CCOF continues to support farmers with the organic certification process from developing an organic system plan to remaining compliant and adding products or acreage down the road. Sonoma County has a large organic farming sector including organic vineyards, dairies, vegetable farms, and other products.
- *Certified Biodynamic.* Biodynamics is a spiritual-ethical-ecological approach to agriculture, gardens, food production and nutrition. Biodynamics was first developed in the early 1920s based on the spiritual insights and practical suggestions of the Austrian writer, educator and social activist Dr. Rudolf Steiner (1861–1925). Most biodynamic initiatives seek to embody triple bottom line approaches (ecological, social and economic sustainability), taking inspiration from Steiner's insights into social and economic life as well as agriculture. Biodynamics also emphasizes generating farm inputs from within a farm itself, reducing dependence on external sources and the corresponding GHG emissions associated with production and transportation. Biodynamics has an independent certification system managed by Demeter USA. Demeter certification in the United States uses the USDA organic standards as a foundation but goes beyond them in several important ways including the integration of crops and livestock on the farm, as well as a certain amount of wild or uncultivated land as part of its biodiversity requirement. It also requires use of the biodynamic preparations. In addition, whereas organic certification can be applied to just one part of a farm, certification must encompass the whole farm. Sonoma County reportedly has the highest number of certified Biodynamic farms of any county in the nation.

- *Certified California Sustainable Winegrowing*: The California Sustainable Winegrowing Alliance (CSWA) developed a third-party certification program related to the California Sustainable Winegrowing Program (SWP) to increase the sustainability of the California wine industry by promoting the adoption of sustainable practices and ensuring continual improvement. The goals of the certification program, Certified California Sustainable Winegrowing (CCSW-Certified), are to enhance transparency, encourage statewide participation and advance the entire California wine industry toward best practices in environmental stewardship, conservation of natural resources and socially equitable business. Sustainable practices that are part of the CCSW program are designed to conserve water and energy, resulting in a reduction of GHG emissions. There are many Sonoma County vineyards and wineries that are certified or planning certification through the CCSW program.

This is not an exhaustive list of certification programs but only an example of some of the certification programs being used in the county. Through this measure, the County is not endorsing any specific certification program but is rather seeking to support the practices included in certification programs that are reducing or will reduce GHG emissions. A case study of one initiative is described below, but this measure would equally apply to other certification efforts.

100% Sustainable Wine Region Case Study: The Sonoma County Winegrape Commission, also known as Sonoma County Winegrowers (SCW), announced on January 15, 2014, that Sonoma County is committed to becoming the nation's first 100% sustainable wine region through a three-phased program to be completed within the next five years.

The first phase of this effort will focus on helping winegrowers assess their sustainable vineyard practices through trainings and educational sessions focused on over 200 best management practices such as land use, canopy management, energy efficiency, water quality assessments, carbon emissions; healthcare and training for employees and being a good neighbor and community member. Although many vineyards and wineries are already implementing sustainable practices, the goal is to assess, and collect the assessment data of 15,000 vineyard acres per year for the next four years until every acre of planted vines are under assessment for sustainability. As vineyard acres are assessed, phase two will involve the Sonoma County Winegrowers working with vineyard owners to achieve certification. Once the winegrower program has kicked off, focus will be expanded to work with wineries and winemakers to roll out sustainability assessments and certification all with a goal of 100% sustainability for the wine industry in Sonoma County by 2019. The key of sustainability is continuous improvement. Once all of the county's vineyards and wineries are recognized as sustainable, improvement plans will be developed to provide access to new production models, techniques and approaches.

To ensure the validity of the achievements, third-party verification and certification programs will be used such as the California Sustainable Winegrowing Alliance's Code of Sustainability that involves 15 chapters and over 200 best practice assessments for growers and wineries, focused on environmental, social and economic viability and continuous improvement with verification by a third-party certifier. Another critically important factor to this initiative is transparency, which will

be accomplished through regular progress updates, an annual Sonoma County Wine Region Sustainability Report Card and a vineyard and winery real-time tracker on the SCW website.

Impact on Local Emissions: Sustainability measures may reduce emissions in a variety of ways, such as through a reduction in energy use (electricity, natural gas, or other fuel) or a reduction in fugitive GHG emissions associated with the winemaking process. For electricity reductions, emission reductions will occur at the power plants that would otherwise generate this electricity. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. For natural gas reductions, direct emission reductions from combustion occur within the geographic boundaries of the communities. For fugitive emission reductions, emission reductions will occur at the location where the practice occurs.

Implementation Information: SCW is voluntarily leading the 100% sustainable wine partnership with county wineries and vineyard owners and operators. Sonoma County would support this private initiative, given that the vast majority of vineyards and wineries are in the unincorporated county.

The County would provide support to the vineyard owners and operators and wineries to implement sustainability measures by cooperative development of a sequestration baseline for soil carbon in vineyards, by collecting data and quantifying the carbon reductions due to vineyard and winery measures implemented under this project and update the plan to demonstrate the GHG benefits of sustainable winegrowing and winemaking. The County would conduct outreach to the wine industry to identify if there are obstacles posed from County or other regulations to implementing sustainability measures and seek to provide regulatory relief where appropriate and effective. The County would also assist vineyard owners/operators and wineries in obtaining grant funding where necessary to provide support to identify and implement measures.

The County would also work with the Agricultural Commissioner, the Resource Conservation Districts (RCDs), the Natural Resources Conservation Service (NRCS), UC Cooperative Extension and/or other parties in identifying research, analysis, study, and extension services that may assist in supporting certification efforts.

Assumptions: N/A

Analysis Method - 2020: The GHG reductions for this program overall have not been identified as the inventory of existing conditions and practices and the identification of specific practices to be implemented has not yet been completed. Cost analysis was not conducted.

Analysis Method – 2040 and 2050: Reductions for 2040 and 2050 were not calculated.

Activity Data Sources: N/A

Responsible Entities: SCW, County wineries and vineyard owners and operators are participating in the 100% sustainable wine region initiative.

Sonoma County, the Agricultural Commissioner, RCD, NRCS, UC Cooperative Extension, and/or other parties would work with this initiative and other certification initiatives as they progress.

Key Progress Indicators: Acres of farmland certified under third-party verified sustainable certification programs. Specific data, if available, on energy reductions, increased soil carbon content, and other improvements.

Measure 18-R2. Promote the Sale of Local, Sustainable, and Organic Grown Foods and/or Products

Under this measure, the County and local communities would support local farmer's markets to provide community residents with local, sustainable, and organic (or equivalent) sources of food. If the food sold at the local farmer's market is produced organically, it can displace carbon-intensive food production practices. While local food would result in a reduction in transportation emissions compared to food from further away, the transportation share of overall lifecycle emissions for most food is usually quite small compared to food production emissions. Thus the focus should be on reducing the carbon footprint of locally produced food.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

Measure 18-R3. Urban Agriculture

Under this measure, participating communities would amend zoning code to allow for small-scale urban farming areas and gardens in the cities. Having urban farming areas can educate the public about the benefits of urban agriculture (both environmental and economic). Under this measure, participating communities could partner with farming agencies and organizations to provide training programs and/or seminars for urban farming. This measure would need to avoid areas that are suitable for infill and transit-oriented mixed land uses.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

C.25 Goal 19: Increase Carbon Sequestration

Measure 19-R1. Carbon Farming

This measure complements Measure 17-R2 with focus on Sonoma County's working agricultural lands. The objective is to increase carbon sequestration on Sonoma County's working rangelands and croplands, an approach known as "carbon farming." Carbon sequestration in vegetation and soils can be increased by a variety of actions including, adding compost (produced on-farm or from local community organic waste) or manure to the soil, planting hedgerows, windbreaks, shelterbelts and riparian corridors, cover cropping, prescribed grazing, range and critical area planting, minimum or no-tillage practices, filter strips and other measures.

The NRCS has approved a wide range of conservation practices that increase soil organic matter (aka “soil carbon”) in agricultural and rangeland soils (see COMET-Planner.com). These measures not only increase soil carbon but also have a wide range of other environmental benefits, including reducing erosion, preventing compaction, managing nutrients, conserving water, improving water quality, managing pests (weeds, insects, diseases), increasing agricultural productivity and soil water holding capacity, and providing food and cover for wildlife. The Gold Ridge RCD and Sonoma RCD have supported sustainable agricultural systems and the implementation of many of these measures in Sonoma County, and are currently developing carbon farm plans with producers.

Carbon Farm Plans developed by the Marin Carbon Project on three pilot farms in West Marin County have identified 20-year carbon sequestration benefits ranging from 5,000 to 8,000 MTCO₂e (Marin Carbon Project 2015).

An estimate of the potential for carbon sequestration in agricultural soils of Sonoma County, including a subset of the county’s grazing lands, is presented below. Agricultural land acreage is from the CA Department of Conservation Farmland Mapping and Monitoring Program data for Sonoma County.

Using baseline soil carbon values from USDA-NRCS SSURGO data, soil carbon to a depth of 30 cm on agricultural land and grazing land is estimated to be equivalent to 52 and 78 MTCO₂e per acre (TNC 2015), respectively (just over 0.88% soil organic carbon (SOC) on agricultural land and 1.32% SOC on grazing land).

Table 0-4. DOC 2010 Land Classification Data, Sonoma County Agricultural Lands

Land Category	Acres
Prime Ag Land	29,939
Ag Land of State Importance	17,192
Unique Ag Land	32,924
Ag Land of Local Importance	80,195
Total Ag Land	160,250
Grazing Land ¹⁵	417,773
TOTAL Ag and Grazing Lands	578,023

On agricultural land (crop land), USDA-NRCS (NRCS nd, 2013) has suggested a soil organic matter content of 5% (2.5% SOC¹⁶) as an indicator of a “healthy” soil. Increasing soil organic carbon on 160,250 acres of Sonoma County agricultural land from its estimated baseline of 0.88% to 2.5% would sequester an additional 15,252,241 metric tons of CO₂e.

¹⁵ An acreage correction factor of 0.25 was used to derive a conservative estimate of 104,443 grazing land acres in Sonoma County suited to enhanced management for soil carbon increase.

¹⁶ Soil Organic Matter (SOM) is approximately 50% carbon (Pribyl 2010).

Table 0-5. Carbon Sequestration Implications of Increasing Agricultural Soil Carbon from 0.88 % to 2.5%

Ag Acres	Metric Tons C/acre @ 0.88%	Metric Tons C/acre @ 2.5%	Metric Tons CO₂e @2.5%	Increased sequestration/acre (MTCO₂e)	Total Increased Sequestration (MTCO₂e)
160,250	14.17	40.1	147.18	95.18	15,252,241

This increase in soil organic carbon can be accomplished rapidly on individual acres through off-farm inputs of organic soil amendments, particularly compost, or more gradually through enhanced carbon capture through on-farm soil carbon enhancing practices, or through a combination of these approaches (Lal 2004, Delonge et al 2013, Swan et al 2014, Lal 2015, Ryals et al 2015, Chambers et al 2016).

In grazed grassland ecosystems, increased soil carbon in response to altered management has been robustly demonstrated (Conant et al 2001, Ryals and Silver, 2013, Delonge et al 2013, Ryals et al 2015). However, compared with crop lands, achieving soil carbon increases in grazing lands can prove more challenging due to the naturally lower productivity of these systems. Consequently, a more modest soil carbon increase goal of 0.5% above baseline is used in this example (e.g., an increase from 1.32% to 1.82% SOC).

Using these figures, increasing soil carbon on 25% of the grazing land in Sonoma County (104,443 acres) would achieve an additional 1,759,377 metric tons of CO₂e sequestered.

Table 0-6. Carbon Sequestration Implications of Increasing soil carbon in grazing land from 1.32% to 1.8%

Grazing Acres	Metric Tons C/acre @ 1.32%	Metric Tons C/acre @ 1.82%	Metric Tons CO₂e @1.82%	Increased sequestration/ acre (MTCO₂e)	Total Increased Sequestration (MTCO₂e)
104,443	21.25	25.84	94.85	16.85	1,759,377

Under these analyses, agricultural land and grazing lands in Sonoma County have the potential to sequester an additional 17 million metric tons of CO₂e while providing a host of co-benefits, including enhanced productivity and water holding capacity in these soils. This represents more than double current agricultural land carbon stock and a near doubling of existing grazing land carbon stock. Assuming a conservative average annual CO₂e sequestration rate of 1 metric ton per acre, this gradual increase in Sonoma County SOC could continue for several decades. Extensive experience among regional agricultural practitioners suggests this annual rate of gain can be met or exceeded under realistic land management scenarios.

Under this measure, the County will work with local agricultural entities to develop and implement education and outreach programs about carbon farming to increase carbon sequestration, increase soil health, climate resilience, and crop productivity. The County and local

partners, including the RCDs and NRCS and others, will assist farmers and ranchers in implementing and expanding carbon-farming practices that have already been adopted by some local ranchers and farmers as well as new practices that have been supported by local, regional, and national conservation efforts and peer-reviewed research. The County will support these efforts where possible, for example through programs that increase the availability of local compost, or by assisting in procuring grant funding for these activities.

This is a supporting measure and potential GHG impacts were not quantified at this time, but will be in the future.

Measure 19-R2: Establish a Target for Increased Carbon Sequestration

Under this measure, the RCPA will work with local partners to establish short- and long-term targets for increasing carbon sequestration throughout the County. Targets would be established for 2020, 2030 and 2050. The target setting process will also include measurement and tracking countywide carbon sequestration over time.

The centerpiece for this measure is the Climate Action Through Conservation (CATC) project, a collaboration between the Sonoma County Agricultural Preservation and Open Space District and The Nature Conservancy (The Nature Conservancy & Sonoma County Agricultural Preservation and Open Space District, 2015). Among other things, the CATC project includes a carbon inventory and baseline projections for 1990, 2010, 2030 and 2050, as well as analytic tools for developing a county-scale GHG accounting and monitoring framework for carbon emissions and sequestration from forests, grasslands and urban forests. The CATC analytic tools (known as “C-CAT”) also allow modeling of how changes in land use and land management affect carbon sequestration and conservation values over time. The RCPA, working with other local partners including SCAPOSD, Resource Conservation Districts, the NRCS, land owners and the community at large, will use data from the CATC initiative and additional data anticipated from newer, advanced remote sensing efforts to establish quantified targets for increasing carbon sequestration in Sonoma County and to measure attainment of those targets in the future.

This is a supporting measure and potential GHG impacts were not quantified at this time, but will be in the future.

C.26 Literature Cited

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Appendix D

Funding and Financing Options

This appendix provides information on funding and financing options available to support implementation of the emissions reduction strategies. The funding options may be available to Sonoma County (County), the cities, local and regional public agencies, community members, businesses, non-profit agencies, or a combination of entities, as noted below. The communities will pursue a number of financing strategies to support overall management of the Community Climate Action Plan (CAP). The communities may also promote several of the community-oriented funding options described below as part of CAP incentives, outreach, and education.

D.1 Federal and State Funding Options

D.1.1 California Air Resources Board Programs

The California Air Resources Board (ARB) manages a variety of air pollution incentives, grants, and credit programs that could be used to help fund local transportation strategies. The following programs offer grant opportunities over the next several years. Residents, businesses, and fleet operators may be eligible to receive funds or incentives, depending on the program rules.¹

- Air Quality Improvement Program (Assembly Bill 118).
- Enhanced Fleet Modernization Program (Assembly Bill 118).
- Carl Moyer Program—Voucher Incentive Program (administered by California Air Pollution Control Officers Association).
- Goods Movement Emission Reduction Program.
- Loan Incentives Program.
- Lower-Emission School Bus Program/School Bus Retrofit and Replacement Account.
- Providing Loan Assistance for California Equipment (PLACE) Program.
- Clean Vehicle Rebate Project (CVRP)
- California Capital Access Program (CalCAP)

D.1.2 California Cap-and-Trade Funding

The California Cap-and-Trade Program, a key element of AB 32, established greenhouse gas (GHG) emissions trading including allowances and offset. It is possible that in the future, agricultural soil sequestration (aka “carbon farming”) may qualify for offsets for the state’s cap and trade system,

¹ For more information on the ARB incentive programs, please visit: <http://www.arb.ca.gov/ba/fininfo.htm>.

generating a revenue source for farmers and ranchers who conduct qualifying actions.² In addition, the cap and trade program is generating proceeds through the sale of allowances and some of the proceeds are being used to fund transit and other improvements that reduce GHG emissions. There are also cap and trade offset credits derived from qualifying methane gas digester projects as well as Low Carbon Fuel Standard (LCFS) credits that may be used for installation of electric vehicle charging infrastructure.

D.1.3 California Department of Resources Recycling and Recovery Grant Program

California Department of Resources Recycling and Recovery (CalRecycle) grants are authorized by state legislation to assist public entities in the safe and effective management of the waste stream. Funds are intended to reduce, reuse, and recycle all waste; encourage development of recycled-content products and markets; protect public health; and foster environmental sustainability.³ There may also be options for state funding of agricultural composting measures as part of waste management and reduction.

D.1.4 Energy Upgrade California

Energy Upgrade California is funded by the American Recovery and Reinvestment Act, California utility ratepayers, and private contributions. It is administered by participating utilities, like PG&E. Under this program, a homeowner selects one of two energy upgrade packages, basic or advanced, with each offering different enhanced options. The program connects homeowners with home energy professionals, including participating contractors and Whole-House Home Energy Raters. It also offers rebates, incentives, and financing. For instance, homeowners can get up to \$4,000 back on an upgrade through a local utility. In addition, the County offers a \$1,000 incentive for homeowners who have completed an Advanced Upgrade Package and who host a Home Showcase Event.⁴

D.1.5 Energy Efficient Mortgage

Energy Efficiency Mortgages (EEMs) may be available to some county residents. An EEM credits a home's energy efficiency upgrades and gives borrowers the opportunity to finance cost-effective, energy-saving measures as part of a single mortgage. Borrowers typically need to have a home energy rater conduct a home energy assessment before financing is approved. This rating verifies that the home is energy-efficient. EEMs are typically used to purchase a new home that is already energy efficient, such as an ENERGY STAR-qualified home.⁵

² If local soil sequestration efforts are funded through offsets from the cap and trade system, such reductions cannot be counted as "local" GHG reductions because they would be allowing other GHG emissions covered by the cap and trade system, such as stationary source or mobile fuel emissions to continue occurring.

³ For more information on the CalRecycle Recycling and Recovery grants, please visit:
<http://www.calrecycle.ca.gov/grants/>

⁴ For more information on Energy Upgrade California financial programs, please visit:
<http://www.energyupgradeca.org/en/find-programs-and-assistance>

⁵ For more information on Energy Efficiency Mortgages, please visit:
https://www.energystar.gov/index.cfm?c=mortgages.energy_efficient_mortgages

D.1.6 Federal Tax Credits for Energy Efficiency

Federal government tax credits are available to county residents through 2016. The tax credits provide a discount of 30% of cost with no upper limit for geothermal heat pumps, small wind turbines (residential), and solar energy systems. The 2016 tax credits also include 30% of the cost up to \$500 per 0.5 kilowatt (kW) of power capacity for fuel cells in a principal residence.⁶

D.1.7 State Funding for Infrastructure

The State's Infill Infrastructure Grant Program may be used by the County to help fund strategies that promote infill housing development. Grants are available to support funding for infrastructure improvements necessary for specific residential or mixed-use infill development projects.⁷

D.1.8 Strategic Growth Council Funding

The Strategic Growth Council (SGC) of the State Department of Conservation (DOC) manages competitive grants for cities, counties, and designated regional agencies that promote sustainable community planning and natural resource conservation. The DOC has allocated approximately \$18 million of Proposition 84 funds for competitive grants to support development, adoption, and implementation of Sustainable Community planning elements, including, but not limited to, CAPs and general plan amendments. The grants awarded from this solicitation will cover up to a 3-year project period. Grant requests for amounts from \$100,000 to \$1,000,000 will be considered.⁸

The Council's mission is to help make California's communities more sustainable by reducing GHG emissions, improving air and water quality, protecting natural resources and agricultural lands, improving transportation, encourage sustainable land use plans, etc. The Council offers the following grant programs:

- **Affordable Housing and Sustainable Communities (AHSC).** This program funds land-use, housing, transportation, and land preservation projects to support infill and compact development that reduces GHG emissions. These projects facilitate emission reductions by improving mobility options and increasing infill development, which decrease vehicle miles traveled, and by reducing land conversion.
- **Sustainable Agricultural Lands Conservation (SALC) Program.** This program supports the protection and management of California's agricultural lands. Through planning and permanent protection of farm and ranch lands via agricultural easements, the SALC program will prevent increases in GHG emissions by limiting opportunities for expansive, vehicle dependent forms of development in favor of more focused, compact, and transit oriented

⁶ For more information on federal tax credits for energy efficiency, please visit: https://www.energystar.gov/?c=tax_credits.tx_index

⁷ For more information on the State's Infill Infrastructure Grant Program, please visit: <http://www.hcd.ca.gov/fa/iig/>

⁸ For more information on Planning Grants from the Strategic Growth Council, please visit: http://sgc.ca.gov/m_grants.php

development within discrete growth boundaries. The SALC program will also support farm-scale conservation management practices that further promote reductions in GHG emissions and increases in soil carbon sequestration.

- **Urban Greening Grant (UGG) Program.** California voters passed the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Proposition 84) on November 7, 2006. Among its provisions, the bond authorized the Legislature to appropriate \$70 million for urban greening projects and plans that reduce energy consumption, conserve water, improve air and water quality, and provide other community benefits.
- **Sustainable Communities Planning Grants and Incentives Program.** The Sustainable Communities Planning Grant is funded by Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006. It added Division 43 to the Public Resources Code, Chapter 9, Sustainable Communities and Climate Change Reduction Section 75065(a), authorizing the Legislature to appropriate \$90 million for planning grants and planning incentives that reduce energy consumption, conserve water, improve air and water quality, and provide other community benefits. This grant program implements the vision of the Governor and Legislature to foster the development of sustainable communities throughout California. It is designed to help local governments meet the challenges of adopting land use plans and integrating strategies in order to transform communities and create long term prosperity. Sustainable communities shall promote equity, strengthen the economy, protect the environment, and promote healthy, safe communities.
- **Modeling Incentive Awards.** Funds for data gathering and model development necessary to comply with SB 375 (2008).

D.1.9 Transportation-Related Funding

The following funding sources that may be utilized to fund strategies related to transit, bicycle, or pedestrian improvements. Residents, businesses, and fleet operators can receive funds or incentives depending on the program.

- Safe, Accountable, Flexible, Efficient Transportation Equity Act—Legacy for Users (SAFETEA-LU)
- Surface Transportation Program (STP) Fund, Section 1108
- Congestion Mitigation and Air Quality Improvement Program(CMAQ), Section 1110
- Transportation Enhancement Activities (TEA)
- National Recreational Trails Program
- National Highway System Fund (NHS)
- National Highway Safety Act, Section 402
- Transit Enhancement Activity, Section 3003

- Section 3 Mass Transit Capital Grants
- Bridge Repair & Replacement Program (BRRP)
- Federal Transit Administration (FTA) 5309
- FTA Small Starts
- FTA Section 5311(f)
- California's Bicycle Transportation Account
- Environmental Enhancement and Mitigation (EEM) Program
- Safe Routes to School (SR2S)
- Office of Traffic Safety (OTS)
- Transportation Development Act (TDA) Article III
- Transportation Funds for Clean Air (TFCA, formerly AB 434)
- Flexible Congestion Relief (FCR) Program
- State Highway Operations and Protection Program (SHOPP)

D.1.10 USDA Natural Resources Conservation Service

NRCS provides financial and technical assistance programs that help eligible agricultural producers:

- Construct or improve water management or irrigation structures
- Improve resource conditions such as soil quality, water quality, water quantity, air quality, habitat quality, and energy
- Implement conservation practices, or activities, such as conservation planning, that address natural resource concerns on their land

D.2 Regional and Local Funding Options

D.2.1 Bay Area Air Quality Management District

Bay Area Air Quality Management District (BAAQMD) offers several grant programs related to air quality improvement, as noted below. The air district also promotes state programs offered by ARB, such as the Carl Moyer Program. Residents, businesses, and fleet operators may be eligible to receive funds or incentives, depending on the program rules.⁹

- Mobile Source Incentive Fund (MSIF)

⁹ For more information on the incentive programs, please visit: <http://www.baaqmd.gov/Divisions/Strategic-Incentives/Funding-Sources.aspx>.

- Transportation Fund for Clean Air (TFCA) (County Program Manager Fund and Regional Fund)
- Cash for Retiring Vehicles - California Consumer Assistance Program (administered by the California Bureau of Automotive Repair)
- Environmental Justice Small Grants Program (administered by the California Environmental Protection Agency)
- Hybrid Electric Vehicle Purchase Vouchers (HVIP) (administered by CALSTART)
- Zero-Emission Agricultural Utility Terrain Vehicle (Agricultural UTV) Rebate Program (administered by the San Joaquin Valley Air Pollution Control District)
- Strategic Incentives Division (SID) Program
- The air district may be able to provide grants and other funds to support waste-related measures in the county.

D.2.2 Bay Area Regional Energy Network (BayREN) Energy Efficiency Programs

BayREN offers additional rebates for the Energy Upgrade California program, commercial PACE financing, codes & standards programs and a multi-family program. The PAYS On-Bill Efficiency Program is a joint effort of Bay Area cities and counties and their water agencies to partner in the implementation of a unique on-bill program that allows municipal water utility customers to pay for efficiency improvements through a monthly charge attached to their meter, with no up-front costs and the assurance that their utility bill savings will exceed the program charge.¹⁰

D.2.3 Golden Gate Transit

Golden Gate Transit is funded through tolls at the Golden Gate Bridge. Tolls could be altered to provide supplemental funding for expansion of transit.

D.2.4 Northern Sonoma County Air Pollution Control District Programs

NSCAPCD is the regional agency responsible for developing and implementing air quality plans for the northern part of Sonoma County. NSCAPCD also sponsors various air quality programs that can support implementation of several energy efficiency, transportation, and renewable energy strategies.

D.2.5 Sonoma County Energy Independence Office Programs

The Sonoma County Energy Independence Office (SCEIO) is a County of Sonoma Energy and Sustainability Division program that serves county residents and businesses as a central clearinghouse of information about energy efficiency, water conservation, and renewable energy generation. The office is designed to assist property owners and tenants find the information,

¹⁰ For more information on BayREN programs, please visit: <https://www.bayareaenergyupgrade.org/get-fit-fast-upgrades>

resources, rebates, contractors and financing that fits their situation. SCEIO offers the following services.

- **Action Plan Tool:** A self-energy analysis tool that provides behavioral and upgrade recommendations, energy saving tips and group competitions for homeowners.
- **List of Contractors:** Property owners can use filters to search for the right participating contractor for the job.
- **Information on Rebates and Incentives:** Property owners can search for currently available rebates and incentives for the improvements they are planning.
- **Resources for Contractors:** Contractors may borrow tools from the on-line Building Performance Tool Lending Library, find out about education and training opportunities, participate in our monthly contractor forums, and access an array of contractor-oriented information and resources.
- **PACE Financing:** The County provides its own Property Assessed Clean Energy (PACE) financing program to property owners for energy efficiency, renewable generation, and water conservation upgrades, payable back to the County through the owner's property tax bill. The County PACE financing product is the SCEIP.
- **Financing Marketplace:** In addition to PACE financing provided by the County, SCEIP, there are other PACE financing programs available through the Sonoma County Energy Independence Office to property owners for financing upgrades.

D.2.6 Sonoma Energy Watch

Sonoma County Energy Watch (SCEW) is a local government partnership between the County of Sonoma and Pacific Gas and Electric Company (PG&E) designed to help save money and energy while reducing harmful impacts on the climate. SCEW provides energy efficiency services to local governments, nonprofit organizations, small businesses, and special districts in the County of Sonoma who are served by either PG&E or Sonoma Clean Power (SCP). SCEW provides the following services.¹¹

- **Free Energy Audits.** SCEW, in partnership with The Energy Alliance Association, provides no-cost, no-obligation lighting audits to determine opportunities for savings.
- **Incentives and Rebates.** SCEW offers rebates for direct install projects that are much higher than if customers were to approach PG&E directly. Core program rebates are also available for projects that reduce natural gas use. Building retrofit measures, including HVAC, boiler, chiller, and other improvements may also receive rebates.
- **Energy Efficiency Consulting.** SCEW can provide no-cost technical consultation and best practices advice in the areas of energy efficiency and conservation.

¹¹ For more information on the Sonoma Energy Watch Partnership, including a list of available resources and incentives, please visit: <http://www.sonoma-county.org/gs/energy/scew/>

- **Financial Consultation.** There are several zero and low interest loans available to help pay for energy efficiency projects. SCEW can assist customers in finding funding and financing for project implementation.

Between the program's inception in 2009 and the end of 2014, nearly \$2 million in incentives have been paid for over 470 projects. The resulting energy savings are estimated to be 11,717,829 kWh/year.

D.2.7 Sonoma Clean Power

SCP is the community choice aggregator in the county and will be the lead for seeking to expand participation rates over time and increase the renewable portfolio for electricity generated to serve the county. As SCP gathers momentum and capacity, the members will fund local energy efficiency programs as well as local renewables for CleanStart and EverGreen revenue. SCP could also offer incentives and rebate programs to encourage energy efficiency and distributed renewable energy and could also play a part in supporting increases in electric vehicles (EVs) and EV infrastructure. SCP may be able to offer energy efficiency programs and financing for multi-family, single-family, and commercial properties, a feed-in-tariff, solar rebates, green home and green property loans, and energy audits and assessments. Resources offered by SCP could reduce program implementation and administration costs. There may also be opportunities for cooperation on community-scale alternative energy installations (e.g., solar).

D.2.8 Sonoma County Transportation Authority

SCTA administers funds from Measure M¹² generated within Sonoma County through a local sales tax for specific transportation projects in the county. SCTA also seeks and obtains state and federal funding for transportation projects.

D.2.9 Sonoma County Transit, Petaluma Transit, and Santa Rosa CityBus

These transit agencies aren't sources of funds themselves, but they monitor funding sources and grant opportunities to improve their service and network. Transit prices (such as bus fares) could be used to provide funding for expansion and improvement of transit services.

D.2.10 Electric Vehicle Fleet National Demonstration Project

The Sonoma County Water Agency, County of Sonoma, and City of Santa Rosa have joined a coalition of Bay Area local governments to participate in a grant through the Metropolitan Transportation Commission to fund fleet electric vehicles and charging infrastructure. The \$2.8 million grant will supplement the purchase of 90 electric vehicles and accompanying electric vehicle charging stations.

¹² "To maintain local streets, fix potholes, accelerate widening Highway 101, improve interchanges, restore and enhance transit, support development of passenger rail, and build safe bike/pedestrian routes, shall the Sonoma County Transportation Authority be authorized to levy a 1/4 cent retail transactions and use tax for a period not to exceed 20 years, spend money raised by the tax on the projects proposed, and issue bonds to finance the projects." See: <http://www.smartvoter.org/2004/11/02/ca/sn/meas/M/>

D.2.11 United States Department of Agriculture Natural Resources Conservation Service

The USDA NRCS provides financial and technical assistance programs that help eligible agricultural producers:

- Construct or improve water management or irrigation structures
- Improve resource conditions such as soil quality, water quality, water quantity, air quality, habitat quality, and energy
- Implement conservation practices, or activities, such as conservation planning, that address natural resource concerns on their land

D.2.12 Utility Programs

PG&E and the local water service providers offer a variety of rebates and incentives for single-family homes, multi-family homes, and commercial and industrial developments. PG&E programs apply to energy efficiency improvements and renewable energy projects, whereas the water service provider programs apply to water conservation efforts.¹³ Resources offered by PG&E may reduce program implementation and administration costs. PG&E can also play a role in expanding EV infrastructure.

PG&E and SCP also offer net energy metering to customers who have solar or other small renewable generation systems. Participants who generate more electricity than they use get credited for that excess electricity.¹⁴

On-bill financing (OBF), offered by both PG&E and SCP, can be used to support commercial energy-efficiency retrofits. Funding from OBF is a no- or low interest loan that is paid back through the monthly utility bill. Lighting, refrigeration, heating ventilation and air conditioning, and energy efficient streetlights are all eligible projects.¹⁵

D.2.13 Local CEQA Mitigation

If the County establishes a local protocol that validates GHG reductions from voluntary agricultural activities, these reductions could be sold as local CEQA mitigation credit to projects

¹³ For more information on available PG&E incentive programs and rebates, please visit: <http://www.pge.com/myhome/saveenergymoney/rebates/> and <http://www.pge.com/en/mybusiness/save/rebates/index.page>. For more information on available water service provider programs, please visit: <http://www.marinwater.org/163/Rebates> and <http://www.nmwd.com/conservation.php>.

¹⁴ For more information on net energy metering, please visit: <http://www.pge.com/en/b2b/energytransmissionstorage/newgenerator/netenergymetering/index.page> and <https://sonomacleanpower.org/netgreen/>

¹⁵ For more information on On-bill financing, please visit: <http://www.pge.com/en/mybusiness/save/rebates/onbill/index.page?>

requiring GHG reductions.¹⁶ In concept, this approach could also be used to fund other GHG reduction measures wherein a new development project could pay an “in-lieu” fee to fund other GHG reduction measures instead of project-specific mitigation measures.

D.2.14 Water and Sewer Rates

Revenue from water and sewer rate increases can be used to fund water conveyance infrastructure and wastewater treatment plant improvement programs. Rates can also be used to fund water conservation programs.

D.3 Privately-Sponsored Funding Options

D.3.1 Property-Assessed Clean Energy

Property-Assessed Clean Energy (PACE) finance programs are intended to finance energy and water improvements within a home or business through a land-secured financing, and funds are repaid through property assessments. Municipalities are authorized to designate areas where property owners can enter into contractual assessments to receive long-term, low-interest financing for energy and water efficiency improvements and renewable energy installation on their property.

D.3.2 Power Purchase Agreements

Power purchase agreements (PPAs) involve a private company that purchases, installs, and maintains a renewable energy technology through a contract that typically lasts 15 years. After 15 years, the company would uninstall the technology, sign a new contract, or sell the system at fair market value.

D.3.3 Private Equity Loans

Builders who own and operate buildings (i.e., commercial buildings or apartment complexes) can use private equity to finance these improvements, with returns realized as future cost savings (e.g., reduced energy expenditures). As market conditions improve over time, rents can be increased to reflect improved facilities and defray the investment costs.

D.3.4 Voluntary Carbon Offset Market

Apart from the regulated cap and trade system, there are voluntary carbon offset systems where qualifying sellers of carbon credits can sell credits to willing buyers. Additionally, the RCPA could consider creation of a locally administered Fund for buyers to invest in local GHG reduction projects.

¹⁶ If GHG reductions are used as mitigation credits, then care would need to be taken to avoid double-counting local reductions. For example, if a residential project were to purchase mitigation credits from a qualifying agricultural GHG reduction effort to meet a local performance standard requirement, then the reductions could only count once for reducing residential emissions (not once for the residential project and a second time for the agricultural sector).

D.4 Future Funding Options for Implementation Costs

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

D.4.1 Community Facilities District Special Taxes

Creating special district taxes would require voter approval and should be directed towards strategies that achieve broad benefits for the community (e.g., transit, pedestrian, and bicycle facilities). Any increase of tax rates will need to be highly sensitive to current local economic conditions and overall local, state, and national economic and financial context.

D.4.2 Development Impact Fees

New development impact fees may have some potential to provide funding, but such fees are best implemented when the real estate market and overall regional economic conditions are strong.

D.4.3 General Obligation Bond

A general obligation bond is a form of long term borrowing and could be utilized to fund municipal improvements.

D.4.4 Local Sales or Parcel Tax

Increasing local sales or parcel taxes could help fund ongoing implementation, operations, and maintenance efforts. Any increase of tax rates will need to be highly sensitive to current local economic conditions and overall local, state, and national economic and financial context.

D.4.5 Utility User Tax Increase

Increasing utility taxes could help fund ongoing implementation, operations, and maintenance efforts. Any increase of tax rates will need to be highly sensitive to current local economic conditions and overall local, state, and national economic and financial context.

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Appendix E

Municipal Greenhouse Gas Reduction Measures

E.1 Example Municipal Measures

Although municipal GHG reduction measures are not included in this countywide plan, a description of potential municipal measures are provided as an informational resource for communities interested in updating or developing strategies to reduce GHG emissions from local government operations.

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Measure Number ¹	Measure Name	Measure Description
Building Energy		
E Energy-1	Green Municipal Buildings	Retrofit municipal buildings to reduce energy, water, waste, and resource use. Improvements could be made to lighting, HVAC, pumps/motors, insulation, windows, etc. Establish a goal to reduce energy use by a certain percentage (e.g., 20%) in all municipal facilities by 2020.
N Energy-1	Green Building Ordinance for Municipal Buildings	All new municipal buildings must exceed 2014 Title 24 Energy Efficiency Standards by at least 15%. Incorporate green building principles and practices into the planning, design, construction, management, renovation, operations, and demolition of all municipal facilities.
N Energy-2	Install solar panels on municipal facilities	<p>Install solar photovoltaic (PV) panels on municipal buildings with the goal to offset a certain percentage of all electricity consumed by municipal buildings and properties. Require that, where feasible, new or major rehabilitation of municipal buildings are constructed to allow for easy, cost effective installation of solar energy systems in the future. In line with the CPUC's Zero Net Energy Goals incorporate solar on all new municipal buildings. Implement a goal for the total kW of solar installed on government buildings in each city and county-wide. Potential goals might be:</p> <ul style="list-style-type: none"> • Aggressive – 100% of all electricity use will be generated by solar • Medium – 50% of all electricity use will be generated by solar • Low commitment – 25% of all electricity use will be generated by solar
N Energy-3	Install energy-efficient street lights	Require that all streetlights use energy-efficient lamps or fixtures. Replace all mercury vapor or high pressure sodium lights with LEDs or Induction. Also install lighting meters on streetlights at key distribution points. Lighting meters will enable jurisdictions to track electricity consumption more accurately and target specific locations for efficiency upgrades.
N Energy-4	Existing Building Retrofit Program	<p>Conduct energy efficiency retrofits of existing municipal buildings. Set a target to retrofit a certain percentage or total number of municipal buildings (such as 75% or 10 buildings) by 2020. Require these retrofits to improve building-wide energy efficiency by 20%. Retrofits should target lighting, heating and air conditioning units, and overall building energy use. In addition, each jurisdiction will require that newly leased buildings improve energy consumption by 20% over 2012 levels. These retrofits could be accomplished by a variety of actions, including:</p> <ol style="list-style-type: none"> 1. Energy inspections and audits 2. Active Lighting Management System (including LED lighting retrofits, lighting controls, etc.) 3. Major Equipment Procurement Standards: Require all major equipment purchases be more energy-efficient than the equipment it replaces.

Measure Number ¹	Measure Name	Measure Description
		4. Building energy management system (such as requiring all occupied rooms maintain an ambient temperature of 71 degrees during the summer months)
N Energy-5	Install Cool Roofs on Retrofitted Buildings	Require installation of cool roofs on buildings that are retrofitted. This would occur on buildings that are not already installing solar panels. Installation will implement CALGREEN's voluntary cool roofs measure for non-residential development (A5.106.11.2).
N Energy-6	Energy Efficiency Measures for Computers Vending Machines, and Printers.	<p>This measure includes five separate actions to improve energy efficiency at municipal facilities:</p> <ol style="list-style-type: none"> 1. Replace one-third of computers with thin clients, which use 96% less energy than traditional desktops, or other energy-star computers. 2. Require that computers, screens, printers, and copiers be turned off every night before employees go home and before weekends. Explore and/or pilot programs that turn off PCs after hours when not in use. Require all PCs to be set at the highest energy-saving mode for regular use. 3. Retrofit all vending machines with energy monitors 4. Improve printing energy efficiency by installing one shared system per 15 printers throughout all departments 5. Install IT remote access systems for employees that allow them to access the server without leaving their desktops on.
N Energy-7	Install Higher Efficiency Public Area Outdoor Lighting	Adopt outdoor lighting standards to reduce electricity consumption for outdoor public area lighting at municipal properties. Requires 75% of outdoor lighting fixtures to use LED lamps (or other high efficiency technology such as induction bulbs or CFLs) by 2020. Establish an energy reduction goal such that full implementation would reduce municipal outdoor lighting energy use by 50%. Install automatic timers to control the operation of lighting systems. When outdoor lighting is no longer needed, the timers can be programmed to automatically turn off lights.
N Energy-8	Replace Traffic Lights with LED Traffic Lights	Replace 100% of the traffic indications with LEDs by 2020. LEDs consume about 90% less energy than traditional incandescent traffic indications while still providing adequate light when viewed. Also install lighting meters on traffic signals at key distribution points. Lighting meters will enable the jurisdictions to track electricity consumption more accurately and target specific locations for efficiency upgrades
N Energy-9	Shade Tree Planting at Municipal Buildings	Promote the planting of shade trees around municipal facilities. Consider a goal of 200 new trees to be planted each year as part of this goal. Promote California natives or low water trees and include irrigation upgrades to support tree health until established.

Measure Number ¹	Measure Name	Measure Description
N Energy-10	Solar Water Heating	Install solar water heating on municipal facilities with a target of offsetting water heating energy usage by 25% all municipal facilities by 2020 (for the County this isn't possible with the current CCFP plans. It is a great goal for new facilities at the County. Cities might be able to adopt it though). The goal should be increased over time coincident with updates to the CCAP. Implementation of this measure will require an initial study including at a minimum: an inventory of all facilities that require hot water; annual water usage and electricity usage for each facility; equipment type and age; and available space for solar water heating installation. This measure may lend itself to implementation at the facility or department level
N Energy-11	Solar Panel Carports and Parking Areas	Install solar panels on unused stacked parking roofs, ground space, and over carports and parking areas by 2020. If carports include plug-in-electric stations, PV shall be installed to offset 80% of the electric station's expected energy use. Renewable energy generated by ground-level PV panels can be sold as an offset or used to power adjacent buildings or stand-alone plug-in charging stations.
N Energy-12	Development of Other Renewable Resources	Explore options for small scale wind projects, biofuels, or other types of renewable generation where feasible.
N Energy-13	Employee Outreach and Education	Institute an employee awareness program to educate personnel on energy efficiency steps such as indoor temperature controls, turning off printers, copiers, heaters and other appliances.
N Energy-14	Encourage Paperless Billing	Encourage online paperless billing as an option for such revenues as traffic tickets and other fines. Make a goal of reducing the number of payments by mail by 50% by 2020. This reduces printing energy use as well as energy required to handle physical payments. This measure will also reduce paper waste generated by municipal facilities.
N Energy-15	Energy-Management Software	Utilize energy management software to track and manage energy use. Utilize energy "dashboards" that provide real time energy data for management, building operators, and Facility Operations staff. Determine how certain conservation actions within buildings affect real time energy use
N Energy-16	HVAC Settings	Adjust building temperature set points to the OSHA recommended levels of 76 degrees F in the summer and 68 degrees F in the winter to reduce heating and cooling costs. Request that employees dress appropriately to support comfort and productivity needs
N Energy-17	Energy-Star Equipment	Select Energy Star when acquiring energy or water using equipment. For product groups where Energy Star labels are not yet available the County (or city) shall select products that are in the upper 15 percent of energy efficiency for their respective product categories

Measure Number ¹	Measure Name	Measure Description
N Energy-18	Direct Access Energy Purchases	Pursue Direct Access energy purchases for facilities where utility costs and associated GHG emissions can be reduced
N Energy-19	Benchmark Norms	Establish the regional index for GHG project results: index as a factor of building square footage and energy intensity of building section use to give a per building and a cumulative portfolio index for year over year progress tracking versus absolute number of pounds of emission.
On-Road Transportation		
E Trans-1	Alternative Fuels – Municipal Fleet Vehicles	A few local governments have fleet replacement strategies to reduce fuel use by purchasing hybrids and other alternative fuel vehicles to replace conventional fuel vehicles. Existing countywide programs include the Sonoma County Local Government Electric Vehicle Partnership, the Zero Emission Dedicated Electric Vehicles Program, and the Electric Vehicle Charging Station Program.
N Trans-1	Purchase fuel efficient (e.g., hybrid) and/or smaller fleet vehicles	Replace 25% of municipal-owned vehicles (passenger/light-duty, medium-duty, and heavy-duty) with the most efficient vehicles (hybrid, compressed natural gas, or other alternative fuels) available by the year 2020.
N Trans-2	Guaranteed Ride Home	Provide a free shuttle or taxi ride home to municipal employees in case of an emergency (illness, family crisis, unscheduled overtime). Would apply to any employee who use any alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency.
N Trans-3	Transit Reimbursement Program	Allow municipal employees to purchase public transit fares with pre-tax dollars up to IRS limits. Provide employees with low-cost monthly transit passes.
N Trans-4	Electric Vehicles	Require the replacement of 50% of non-emergency gasoline powered sedans with electric vehicles by 2020.
N Trans-5	Vehicle Idling	Limit idling of municipal vehicles to 3 minutes.
N Trans-6	Trip Reduction Target and Monitoring	Implement a program to reduce vehicle trips by employees. Adopt a vehicle trip reduction goal of 20% by 2020. Require the program complete annual employee commute surveys. This measure will be supported by existing City/County measures to increase carpooling and transit use by City/County employees. Expand commute marketing and outreach regarding alternative modes of transportation to employees. Provide weekly monthly email tips and strategies to City/County employees. Emphasize trip reduction strategies and alternative mode options during new employee orientation.

Measure Number ¹	Measure Name	Measure Description
N Trans-7	Employee Vehicle Purchasing Policy	Establish a Vehicle Purchasing Services Program. The program will provide pre-negotiated pricing agreements and discounted rates for City/County employees to purchase green vehicles, such as hybrids. Set a target for this program to achieve an average purchase rate of 5 new green vehicles per year (or similar target).
N Trans-8	Municipal Parking Management	Implement a Municipal Parking Management Program to discourage private vehicle use.
N Trans-9	Clean Energy Fuels Program Infrastructure	Provide/encourage construction of refueling infrastructure for alternative-fueled vehicles. This measure will support the measures above.
N Trans-10	Smart Global Positioning Systems	Participate in a pilot program to install smart GPS on municipal vehicles. Smart global positioning systems (GPS) support trip planning actions by mapping optimal routes to reduce VMT. Through this measure, the City/County will continue to seek funding to install additional GPS units. This measure will support the measures above.
N Trans-11	Fuel Tracking System	Provide an up-to-date fuel tracking system of municipal fleet. This measure will support the measures above.
N Trans-12	Vehicle Maintenance Program	Evaluate and enhance the any current vehicle maintenance program to reduce fuel consumption. This measure will support the measures above.
N Trans-13	Bicycle Safety Program	Provide a bicycle safety program and information about safe routes to work.
N Trans-14	Business Travel Planning	This measure will reduce employee work-related travel between various city/county work locations by emphasizing the co-location of compatible and interrelated services. City/County departments will also be encouraged to schedule employee field routes to minimize back and forth travel between the office and field locations.
N Trans-15	Clean Commuting	Support mobile work, telework, and/or compressed work week arrangements for employees at the discretion of management to balance the impacts of cost, delivery of services to the public.
N Trans-16	Smart Campus Design	Explore opportunities to co-locate services on the County campus when developing the Comprehensive County Facilities Plan
Off-Road Transportation		
N Off-Road-1	Electric Equipment	Replace 15% of municipal off-road vehicles, construction equipment, and stationary engines with electric equipment.

Measure Number ¹	Measure Name	Measure Description
N Off-Road-2	Electric Landscaping Equipment	Require 75% of municipally-owned landscaping equipment be alternatively fueled or electric by 2020 and 100% by 2030. Install outdoor electrical outlets on municipal buildings as appropriate
Solid Waste Management		
N Waste-1	Municipal Purchasing Policies	Develop and implement a municipal Environmentally Preferable Purchasing Program. Such policies would require the purchase of materials with the highest post-consumer recovered material available whenever possible, prohibit or limit the purchase of bottled water, consider the ability of the product/packaging to be reused or recycled, and prefer products and packaging that are designed to minimize waste and other toxic by-products in their manufacture, use, and disposal.
N Waste-2	Municipal Waste Diversion Goal	Implement a waste diversion goal for municipal facilities, such as a diverting 85% of all municipal waste by 2020 through reuse, recycling, and composting
N Waste-3	Electronic and Universal Waste Recycling	Require that all electronic and universal waste from municipal buildings and facilities be diverted from landfills and be recycled instead. Support SB 20 and SB 50 by banning electronic/universal waste from land-filling.
N Waste-4	Recycled Paper Purchasing	Require departments to purchase paper with a minimum of 30% recycled content. All paper should be encouraged to be multipurpose, rather than copy paper quality.
Water Conveyance		
N Water-1	Water Conservation for Existing Buildings	Implement a program to renovate existing buildings to require a higher level of water efficiency. At a minimum, require a 30% savings in indoor water use (consistent with CALGREEN Tier 1 standards for Non-Residential development: A5.303.2.3.1) and a 30% savings in outdoor water use. Develop a master plan of municipal facilities to address water efficient landscape, irrigation, and maintenance practices. Replace all fixtures with low-flow fixtures. Install smart landscaping irrigation controls and drip irrigation. Replace existing vegetation with drought-tolerant vegetation where feasible.
N Water-2	Water Conservation for New Buildings	Require new City buildings to achieve a 40% reduction in baseline water use through a higher level of water efficiency. Meet 2010 CALGREEN Tier 1 standards (as listed above), and meet Tier 2 (A5.303.2.3.2) or 3 (A5.303.2.3.3) standards where feasible.
N Water-3	Water-Efficient Landscaping at County Facilities	Promote site appropriate, low-water use, and drought tolerant native plants in public facilities.

Measure Number ¹	Measure Name	Measure Description
N Water-4	Irrigation Monitoring and Management System	Consider installing and or using a water monitoring and management system for all of the city's/county's irrigation needs. This could be accomplished by participation in the California Irrigation Management Information System (CIMIS), such as by installation of a climate station in the city/county or by using CIMIS irrigation scheduling tools. Other monitoring and irrigation management tools should be considered, as appropriate, to best meet the city's/county's specific needs. Conduct water audits on municipal facilities and expedite repairs.
N Water-5	Collect Rainwater	Install rainwater collection systems at municipal facilities and parks to collect rainwater for appropriate non-potable water uses.
N Water-6	Reduce Energy use in Irrigation Pumping for Agriculture	Encourage farmers to install solar irrigation return pumps, which replace and supplement diesel/natural gas/electric pumps, and perform repairs to pump bowl components to make sure pumps are operating as efficiently as possible. Partner with agricultural organizations to incentivize and encourage solar irrigation pumps and pump repairs.
Wastewater Treatment		
N Wastewater-1	Recycled Water at Municipal Facilities and Properties	Consider requiring all new parks and schools or other public facilities to use 100% recycled or on-site rainwater harvesting water for non-potable outdoor uses as feasible depending on existing and planned recycled water infrastructure. Adopt a municipal goal to use recycled water for 100% of non-potable uses (such as landscaping and fire suppression). Implementation will likely require coordination with regional WWT and recycled water providers.
N Wastewater-2	Reduce Wastewater Generation in Municipal Facilities	Implement a goal to reduce wastewater generation in municipal facilities by a certain percentage by 2020, such as 30%. This would be supported by water conservation measures that seek to reduce indoor water use in buildings. This can also be accomplished by cities that have combined wastewater and storm sewer systems. Municipalities (such as Petaluma) and agencies with combined systems shall implement water retention strategies and best practices to reduce the quantity of water entering the storm drainage system. Best practices such as bioswales, retention ponds, and pervious pavement can reduce stormwater flow and therefore impacts to waste water treatment plants.
Agriculture		
N Agriculture-1	Local Food Purchasing	Support local farmers by purchasing local food for municipal events, cafes, and other sites where employees will be eating. Support local organic farmers when seasonally appropriate and available.
Notes: ¹ “E” represents existing measures; “N” represents new measures.		

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Appendix F

Community Involvement

For the Final Draft Climate Action Plan (CAP), written comments on the Public Review Draft CAP were received via hard copy, email, and through a website form. A record of oral comments received at public meetings is available from the jurisdiction that hosted each meeting.

Many of the comments received helped to better clarify greenhouse gas (GHG) reduction measures, and were incorporated into in this CAP. In general, comments supported local government actions, and urged further action to combat climate change. Other comments included suggestions on improving and bolstering language around past efforts and previous goals and targets, suggested language and figure changes around measure identities, specifically solid waste, sustainable agriculture and land use policies – including compost and carbon farming. Comments also included recommendations from implementation partners for goals, stressing equality and equity throughout the plan, suggestions to add carbon pricing, a desire for more discussion around funding and implementation, examining the use of the consistency checklist in Appendix A, the need for more staff to facilitate robust implementation, and comments around emissions included or not included in the inventory. This summary is not exhaustive of all comments received, a list of which can be provided upon request.

During development of the Public Review Draft of the Climate Action Plan, comments were received at community open houses and from the Stakeholder Advisory Group appointed by the Regional Climate Protection Authority (RCPA) Board are documented in this appendix. Comments were recorded verbatim and are presented here as originally provided by the commenters.

Many of the comments received support greenhouse gas (GHG) reduction measures that are now included in this Climate Action Plan (CAP). For example, enhanced transit service, expanded bike and pedestrian networks, and promotion of electric vehicles were strongly supported as part of the Climate Action 2020 (CA2020) strategy to reduce transportation emissions. Likewise, many comments supported building energy retrofits, distributed renewable energy generation, and sustainable agricultural practices. The full range of GHG reduction approaches suggested in public comments is, not surprisingly, extremely varied and generally very forward looking. The measures included in this CAP represent a subset of the ideas heard from the community. As noted throughout this plan, CA2020 is one step on a long-term path to dramatically reduced GHG emissions. Some of the suggestions gathered as part of the community outreach effort that are not included in this CAP may very well find a place in future climate action planning in Sonoma County.

Lastly, it is important to acknowledge that a small segment of the community disagrees with the scientific consensus about the threat posed by global climate change and opposes governmental action to reduce emissions.

Climate Action 2020 and Beyond Public Meetings—March 21, 2016–June 6, 2016

Public meetings were held in the following cities.

City of Sonoma, March 21, 2016

6:00PM, City Council Meeting, Community Meeting Room

177 First Street West, Sonoma CA 95476

County of Sonoma, March 31, 2016

1:00PM, Planning Agency Meeting, Sonoma County Permit and Resource Management Department
2550 Ventura Avenue, Santa Rosa, CA 95403

City of Santa Rosa, April 5, 2016*

4:00PM, City Council Meeting, Santa Rosa City Hall
100 Santa Rosa Ave, Santa Rosa, CA 95401

* Santa Rosa adopted a Community CAP in 2012. CA2020 will not alter Santa Rosa's adopted plan.

City of Sebastopol, April 12, 2016

6:00PM, Joint City Council and Planning Commission Meeting, Sebastopol Youth Annex
425 Morris Street, Sebastopol, CA 95472

County of Sonoma, April 19, 2016

2:00PM, County of Sonoma Board of Supervisors
575 Administration Drive, Room 102A
Santa Rosa, CA 95403

City of Cotati, April 26, 2016

7:00PM, City Council Meeting, Cotati City Hall
201 W. Sierra Avenue, Cotati, CA 94931

City of Petaluma, May 2, 2016

6:30PM, City Council Meeting, Petaluma City Hall Council Chambers
11 English Street, Petaluma, CA 94952

Climate Action 2020 Public Meeting, April 20, 2016

5:00-7:00PM, Sonoma County Permit and Resource Management Department
2550 Ventura Avenue, Santa Rosa, CA 95403

Town of Windsor, May 4, 2016

6:00PM, Joint Town Council and Planning Commission Meeting, Council Chambers
9291 Old Redwood Highway, Bldg. 400,
Windsor, CA 95492

City of Rohnert Park, May 10, 2016

5:00PM, City Council Meeting, City Hall
130 Avram Avenue, Rohnert Park, CA

City of Sonoma, May 11, 2016

6:30PM, Community Services and Environment Commission (CSEC), EOC Room
175 First Street West, Sonoma CA 95476

City of Healdsburg, May 16, 2016

6:00PM, City Council Meeting, City Hall Council Chamber
401 Grove Street, Healdsburg, CA 95448

City of Cloverdale, May 24, 2016

6:30PM, City Council Meeting, Cloverdale Performing Arts Center
209 N. Cloverdale Boulevard, Cloverdale, CA 95425

City of Healdsburg, May 24, 2016

6:00PM, Planning Commission Meeting, City Hall Council Chamber
401 Grove Street, Healdsburg, CA 95448

City of Sonoma, June 6, 2016

6:00PM, City Council Meeting, Community Meeting Room
177 First Street West, Sonoma CA 95476

Climate Action 2020 Public Open House Workshops— December 2, 2013–January 14, 2014

Countywide Public Comments by Sector

Climate Action 2020 and Beyond is a collaborative effort among all nine cities and the County of Sonoma to take further actions in reducing GHG emissions communitywide and respond to the threats of climate change. Working with all Sonoma County communities, RCPA will develop a comprehensive and detailed plan for each community that will identify measures to reduce GHGs from sources including building energy (electricity and natural gas), transportation, water use and transport, waste, wastewater, and agriculture. This detailed plan is called CA2020.

Public open house workshops were held in the following cities.

Town of Windsor, December 2, 2013
6 p.m.–8 p.m., Town Hall, Council Chambers

City of Sonoma, December 10, 2013
6 p.m.–8 p.m., Sonoma Community Center

City of Rohnert Park, December 3, 2013
5 p.m.–7 p.m., City Hall, Council Chambers

City of Sebastopol, December 11, 2013
6 p.m.–8 p.m., Sebastopol Veterans
Building/Center for the Arts

City of Healdsburg, December 4, 2013
6 p.m.–8 p.m., City Hall, Council Chambers

City of Petaluma, January 7, 2014
6 p.m.–8 p.m., Petaluma Community Center,
Conference Room 2

City of Cotati, December 9, 2013
6 p.m.–8 p.m., City Hall, Council Chambers
201 West Sierra Avenue, Cotati, CA 94931

County of Sonoma, January 8, 2014
6 p.m.–8 p.m., PRMD meeting room

City of Cloverdale, January 14, 2014
6 p.m.–8 p.m., Cloverdale Regional Library

City of Santa Rosa

There were no public meetings for the City of Santa Rosa. Santa Rosa adopted a Community CAP in 2012. CA2020 will not alter Santa Rosa's adopted plan.

Purpose

The purpose of the workshops was to provide the public with general information about the CA2020 project, reveal the draft versions of the GHG inventory, and solicit feedback and input on possible GHG reduction measures. Prior to the meetings, RCPA issued a press release to all news and media outlets listed in the Communications and Media Plan. The dates and information were published in the Press Democrat editorial page, Community Voice, Windsor Times, Healdsburg Tribune, Cloverdale Reveille, Sonoma Index Tribune, The Bohemian, and on many city websites and Facebook pages.

Workshops were held open house style, with various stations around the room so that individuals could view information, provide comments, and talk to staff. The first set of boards contained pie charts and graphs with the draft GHG emission inventory by sector and city. The other remaining boards were divided by emissions sector: agriculture, water use, solid waste, building energy, transportation, and other (stationary sources, wastewater treatment, and off-road transportation). Attendees were asked to read the sample list of possible GHG reduction strategies for each sector and provide their comments related to three prompt questions.

- What are you already doing to reduce greenhouse gases?
- What do you suggest we do to further reduce GHG?
- What are your existing barriers to reducing GHG?

Attendees had access to Post-it notes and pens to attach their comments to the boards. RCPA staff were available for one-on-one conversations while attendees worked around the room.

Results

An estimated 115 members of the public attended the workshops in total and provided over 600 comments. Attached is all of the public comments that were received by sector and by question. Comments with a “plus [#]” notation are those that were agreed upon by more than one attendee. Comments that were difficult to read are marked with a (?).

Agriculture—What are you doing to reduce GHG?

- Supporting Farmers Markets. Talking about food security and reducing food transport.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Grow organic gardens. Buy organic. [plus 3]
- We buy as much as possible meat and produce from local sources. This includes 2 different farm boxes and, soon, a meat CSA. We compost as well with the green bin that the county provides.
- Composting [plus 3]
- Limit monoculture
- Buying local food, organic food, less wine, more cider. [plus 4]
- We have organic gardens and an orchard [plus 2]
- Buying local and organic. Growing food.

Agriculture—What do you suggest we do to reduce GHG?

- Eliminate fossil fuel equipment. Capture all methane.
- I am working at reducing my personal waste to one quart. I still need to pay same amount for garbage. Some reduction would be great.

- Help the public K-12 schools to have classroom level recycling programs. This is not happening in the schools. Issue is classroom infrastructure to make this easy on the teacher.
- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Incentivize the use of local manures and composts. Tax petrochemical based fertilizers, herbicides and pesticides. Incentivize no till agriculture.
- Leave it up to each individual what fuel they will choose to use
- Create a financing or grant program to help local dairies/livestock operations/ag implement these changes while remaining competitive.
- Does our Ag industry produce enough raw material for bio-gas generation?
- Get vineyards to use compost for fertilizer rather than calcium nitrate. This could improve the vineyards as well as reduce harmful runoff.
- Agriculture is a sacred part of the fabric of life. It is currently under assault, all part of U.N. Agenda 21 implementation.
- Create Sustainable Ag zoning with no till and other low carbon farming
- Incentivize non-petroleum-based fertilizer use in vineyards and ban pesticide use in same
- Encourage use of vermicomposting to reduce use of pesticides
- Locavore ag is not affordable to the working class, they have to drive to Santa Rosa to buy food. The wine economy is elite, a bubble that's going to pop. Need diversity.
- Generate accurate methane inventory (not just ag).
- Plan vineyard maintenance with mules vs. tractors.
- Encourage composting. Encourage cover crops. Discourage soil tilling.
- Make sure Sonoma County does not adopt the policies of UN Agenda 21/Future Earth.
- How does extorting money by GHG Credits change carbon emissions?
- Use acorns as food source
- A mandate that all wineries be 100% Organic or biodynamic by 2015!!
- Solar installations on wineries and dairies.
- Methane digesters. Biochar soil treatment.
- A moratorium for no more wineries in Sonoma County and convert 50% of wineries to forests and wildlife.
- Put a cork in your cow's butt.
- What a joke! Going after cow fart now? I suppose we should all stop drinking milk or eating meat. Food Nazi's at it again!

- Home scale ag, permaculture food forest, aquaponics.
- Set a goal of 80% organic farming countywide
- Continue with cost of garbage regardless of reduction
- Shift from increasing livestock facilities to promote plant-based agriculture for diets. Go vegan.
- Work towards sustainable grape growing (talk with Altieri lab at ULB). Intercropping with flowers, water filtering, dry farming, grey water, educate farmers and provide incentives for them to apply alternative practices.
- Small scale biodigesters to energy as part of a methane management program.
- Incentivize reduced water use. Implement drought measures for conservation?
- We also dump waste at Novato Dump. Was it expanded? Is it doing methane digest 'cause I see the gas going into our air. It is in the Petaluma wetlands.
- Eat with friends more rather than cooking for just our partners or ourselves.
- Incentivize those with lawns to switch with cash/local store gift cards.
- Methane: when animal and food waste is digested to produce methane, the more valuable “product” may be the digestate: biologically stable soup of micronutrients that are known for ability to restore the tilth and drainage and health of soil (as opposed to relatively strong industrial chemicals). This is important for restoring cycled, local systems; closing many now open nutrient (keys?).
- Methane digesters for manure and financial incentives for farmers doing this.
- Install grey water systems that irrigate landscaping/local farms (water use). Install urban ag infrastructure with community gardens and urban planting in medians/other public spaces.
- Gas/methane to energy production should be done within a methane control and reduction program. Be careful to not incentivize things that could result in more methane producing activities.
- R & D for local perennial food crops in combination with animals. Silvapasture Permaculture
- Would like to see some commercial possibly urban aquaponic installations. Get Dept. of Fish and Game to approve tilapia for home aquaponic use.
- Make Sonoma County an organic county—ban pesticides/herbicides.
- Mandatory solar new construction in county (unincorporated)
- Compost: Promote/encourage/incentivize vineyards and farms to compost on-site. Increase current compost facility’s daily load. Provide opportunities for carbon-offsets.
- Oh no! Food Nazis at it again—going after cow farts now? No meat, no milk for you!

- Small scale biodigesters gas to energy as part of a methane control program to reduce methane. Make sure incentives don't increase methane-producing activities.
- To go organic there needs to be financial incentives for farmers (large and small) and vintners
- Pay farmers to do measures that reduce GHG's: hedgerows, pump retrofits, water conservation, etc.
- Petrochemical agriculture on large scales is not sustainable.
- Organic milk production has been devastating for cows. The vets cannot give antibiotics for dairy cows that get mastitis, so the cows suffer immensely and many get sent to slaughter. They could have been saved if antibiotics had been used.
- Can waste from local lumber yard be used with other waste vegetation to provide material for biofuels—possibly bring that industry here to create jobs?
- Reward sustainable practices—dry farm
- Put caps on agricultural industries (i.e., wine) that consume inordinate amounts of water to realize product (?) raising of processing
- Require mulching instead of weed control. Instead of burn days at vineyards, implement program to collect and chip.

Agriculture—What are your existing barriers to reduce GHG?

- Eliminate the cattle horses (?) and a few people.
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- People composting horse and goat waste are being cited.
- Electric vehicle and re-charging stations—we had to encourage those development.
- Require smart meters on all homes for remote turn on and turned off by our carbon foot print a false science.
- Learn who they lead consultant really is ICF Jones and Stokes Intl. Consulting with IRS to improve the image.
- China, India, Russia “denialists”
- Limit use of pesticides
- Generally (?) concerned ‘solutions’ that address too small a piece to gain the big efficiencies needed to make a significant difference. Among (?) remind us that a good solution is one that solves all problems at once! Something to reach for! Need game-changing, dramatic, courageous, grounded approaches to try!
- Big ag companies shaping agriculture policy. Farmers need support and general education/ a place to share ideas. Encourage small/new farms with land grants.
- Conservation burns of Ag waste to produce Biochar see for Biochar Web Site

- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights....Not!
- Incentives to use compost instead of calcium nitrate
- Lack of regulation controlling field burns. Lack of service to vineyards to help chip and haul waste. Lack of groundwater regs.

Building Energy—What are you doing to reduce GHG?

- Title 24 already requires energy code minimum standards for major renovations.
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Use of energy efficient bulbs, LED lights.
- Lamp use when necessary.
- We have a solar array and are adding more panels for a future electric car.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Good insulation, Active building temperature management, solar dryer for washing.
- Define “major renovation”
- C.A.P. Controlling All People
- Have solar panels and love it.
- Double paned windows, insulation, sweaters.
- Drip irrigate. Photo voltaic panels. Energy audit. Replaced old windows.
- Reducing Electricity and Natural gas use
- Air drying laundry as much as possible. Compost/have chickens to feed some scraps to and provide food for us. Reduce thermostat and wear a lot of layers at home.
- Turned off pilot lights on gas stove to use a sparker (it only sparks and uses no fuel) to light the burners. (saves 50% of gas use each year)
- Remodeling old inefficient house to near passive house standards. 3.0 kw PV system. Solar water. Passive solar. Cool roof.
- We can reduce energy use by 50% to 70%. My 1950 built home has reduced energy use by 90% and meets Thousand Home Challenge. See aimgreen.com (Talk to George Beeler).
- I live in a small house. Use LEDs. Keep temperatures moderate. Use passive heat sources (windows).
- Solar water, solar electric, electric vehicle, bicycle, avoid plastics, shop for local products, etc.
- Don’t buy stuff from China. Don’t shop at Costco, Target, Walmart, etc. Don’t buy cars with highly toxic batteries.

- We have solar hot water and solar panels for electricity. We monitor our electrical use.
- Using a clothesline. Everybody should be able to!
- Clothes line, solar powered attic fans

Building Energy—What do you suggest we do to reduce GHG?

- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Leave it up to each individual whether to install a smart meter or make any other “energy efficient” plans. It’s not your place to regulate our choices.
- Building stock inventory to determine energy use profiles by sector, building type, etc. Develop do-it-yourself weatherization educational materials. Create a financial incentives program for building owners to undertake energy efficiency measures. Incentivize specific energy efficiency measures that yield the greatest benefit by building sector and type. Create a behavior modification program to save energy. Promote passive heating and cooling techniques for both new construction and retrofit construction. Conduct a countywide microclimate assessment for prescriptive energy efficiency measures.
- Contests with reward/prize at schools for students who can document influencing their families towards new energy efficiencies.
- Provide renewable energy green job training at RP high schools. [plus 1]
- Encourage Rohnert Park to join Sonoma Clean Power. Provide incentives for RP residents to retrofit their homes.
- Encourage Rohnert Park to join Sonoma Clean Power
- Let’s have some large scale solar projects for Healdsburg. Solar is a very small part of the energy mix now. Including every flat roof in Sonoma Co (with enough sun).
- Install neighborhood solar gardens.
- Do not require the use of smart meters and force people to buy new appliances. CO2 is .04% of the total atmospheric gases and replacing appliances will have zero effective changes to this number.
- Community Solar projects
- Encourage/incentivize a reduction of bld energy use of 15% by 2016. if target is not met, new construction and major remodels to exceed Title 24 by 20% by 2020.
- Make available tools for estimating building energy usage based on different insulation scenarios.
- A mandate that all cars be 100% electric and solar powered.
- Home sales should require energy efficiency audit before occupancy.

- Sebastopol Carbon Neutral Town
- Require all buildings, dwellings, apartments be 75% solar and wind powered by 2015.
- Who is going to pay for all (of the above)? This will make new homes more expensive to buy and hurts those trying to achieve the “American Dream” of owning a new home!
- Passive solar building codes.
- Benchmark all public (city and county) buildings using Energy Star Portfolio Manager. Track energy usage, costs and GHG over time using Portfolio Manager. Encourage all commercial buildings to benchmark using Portfolio Manager.
- Feed in Tariff. Go with Sonoma Clean Power. Incentivize roof top and parking lot PV installations.
- Dark Skies Ordinance/Reduce outdoor lighting. Big side benefit for reducing light pollution (seeing the Milky Way again!).
- More publicity on win/win retrofits. Incentivize low-cost residential improvements like whole-house fans (attic), window tints, etc. to reduce need for A/C.
- Education on how energy efficiency isn’t conservation and sacrifice, it’s the triple bottom line.
- LEED is a joke. You can build a 10,000 square foot LEED certified house. i.e. build smaller houses. Put up more PV panels, and use feed in tariff to (?) given by Sonoma Clean Power. Promote energy efficiency programs to reduce use.
- Suggest that HOA, plants, (office parks), factories require energy efficient outdoor lighting.
- Have a public big splash project with a recognized building and do an energy audit, publicize it, then fix it! (awareness raising).
- 50% or more reduction in overall energy use is possible. Talk to George Beeler.
- Partnerships with local for-profit solar installation companies. Subsidize part!
- Create zoning that allows for smaller lots and smaller homes, penalties for new homes over 2500 square feet
- Provide solar in all homes and get the money from the military industrial complex.
- Tell the true story of what happens on the other end (i.e. power plant) when one turns on the light switch (i.e. when one uses power).
- Mandate solar installations on new buildings (see Sebastopol solar mandate).
- It took only 4 hours for the city to approve my solar permit—keep that up! Education campaign on passive, LED lighting.
- Show the benefit to the economy of energy-efficient building, and retrofits.
- Upgrade Petaluma street lights

- Have all rentals disclose energy use and HERS rating. Require sales of buildings to show HERS rating
- Conservation incentives, incentives for school building efficiency, mandate all govt buildings to have high energy efficiency.
- Shared and multi-use spaces. Smart energy efficient buildings and starting by planning how multiple buildings work together more efficiently—not just individual buildings.
- Mandate “Living Buildings Challenge” for new buildings
- Meet national 2030 challenge by 2020 for zero net energy buildings
- Need solar thermal hot tubs to be offered to augment or retire all the electric powered hot tubs
- Help consumers do the energy efficiency thing by educating them and providing incentives. I want to do the right things but I can’t afford it.
- Require new construction to be self-sustaining LEED certified. Incentivize alternate energy programs.
- Require energy audits for all properties when they are sold.
- Find a model house and put it on the web with icons showing all its energy saving, green tech and water saving tech. “Model Home” same with commercial.
- Incentivize insulation efficient windows, higher standards for new buildings.
- Exempt small businesses who have less than 200 on payroll
- Incentivize alternate energy in homes and schools
- Solar panels on all municipal buildings
- Expand the Sebastopol solar ordinance to be countywide (require solar on new buildings)
- Prioritize implementation of community-behavioral changes requiring little material investments (e.g., having smaller initial “steps backwards” with GHG emissions) For example: ride sharing over vehicle-replacement; bus services over building TOD; buses on existing road network over new rail systems.
- Green affordable housing development
- Create some kind of “happy competition” program where residents and businesses can compare and compete on energy use reduction.
- Green Building (Cal Green Requirements) have created an environment of building only for the wealthy. Regular people can not afford the cost of compliance.
- Requiring solar on all buildings does not make sense. Some are not oriented appropriately for solar.
- Support on bill repayment for energy efficiency and renewable power installations.

- Incentives matter for results!
- Educate that an energy tight house is a must before you install solar.
- Try to put a moratorium on fracking so it doesn't use our limited water resources downstream.
- Incentives for energy efficiency retrofits. Energy audits as step #1
- Incentivize the permitting process for residents to do it right. Get the energy testing needed.

Building Energy—What are your existing barriers to reduce GHG?

- Carbon dioxide is what we breathe out/what plants use to make oxygen. So, without it we cease to exist. How is this consistent with a harmful substance? Your proposal includes diminishing the population?
- Is this a component of Agenda 21, Plan Bay Area?
- Knowledge: People don't have enough info on incentives.
- China, India, Russia
- Put solar on every flat roof in the county—use geysers since they are here
- Provide economic incentives for green building design/retrofit & don't make them "requirements"
- China
- Permitting for solar. Financing options for solar.
- Old house is cost prohibitive to insulate walls
- Disconnect on commercial Buildings—owner vs. tenant—need to align incentives
- Get a competition going between/among the cities and county to see who can set higher goals and meet them fastest.
- Solar not practical due to trees around the house. Energy audits should be free.
- Solar System not cost effective without feed in tariff and/or electric car.
- Need: more educational incentives to upgrade major energy losses (ex. Windows). I own a small home and know the windows need to be replaced to save energy, yet I have a hard time finding any financial incentives, aids to make the big investment.
- Need: A website with city- centric information, resources, incentives.
- Mindset of entitlement to earth's resources without sharing with future generations.
- We live in a rental. We can't afford to do much more than switch to LEDs, hang clothes on line during summer to dry. Not owning the home means we can't change our home to be more energy-efficient.

- Why are we pretending our input matters here? Cal Green Standards are already law and have astronomically driven up the cost of construction.
- Real costs must be reflected in cost of construction including invisible energy use costs.
- Biggest barrier: availability of viable alternatives, bus frequency and evening services, local delivery services, groceries...
- Some of us fought really hard to get an opt out of the Smart Meters so we could have the freedom to have one or not. It was a 2-year battle. Under the Climate Action Plan, they will be mandated.
- We will also be mandated to change all of our appliances so the smart meter can speak to the RF chip in the appliances and turn it off. Is that fair? Is that freedom?
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights...Not!
- Money for funding the projects
- Time and money to do upgrades. Fear of regulations and fees.
- Ignorance

Other Sectors (Off-road equipment, stationary sources, wastewater treatment)—What are you doing to reduce GHG?

- I have solar panels
- Waste water wetland designs: plants have been used globally to treat greywater and blackwater. Pervious surface to allow rainwater drainage and restore water levels and aquifers. Removing home lawns, reducing mower use, increasing edible and native tree planting. Retrofitting City recreational parks to receive storm water runoff.
- Educate! Join Green Groups, talk to the public, hit the street
- Drive less
- Plant fruit trees and vegetables in yard instead of grass
- I use drip system voluntarily. Do not need to be forced!
- Electric mower, chainsaw, weedeater.
- I use drip irrigation and grey water.
- Plant trees, mostly natives and shrubs. We do not grow lawns.
- Use rakes. Get rid of leaf blowers.
- No lawn. Mulch in place. Front loading washer. Low water use.
- Use electric landscaping and hand mower.
- We use an electric weed trimmer

- Implemented a 5min idling policy
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Discuss why geoengineering is not being discussed since Harvard and Kennedy School are creating international policies for large scale manipulation of the weather.
- Solar, drive less, turn off appliances/energy using item (lights), tree planting.
- Support open space and habitat restoration

Other Sectors (Off-road equipment, stationary sources, wastewater treatment)—What do you suggest we do to reduce GHG?

- Plant a bunch of trees with waterboxes like in demo project off Overlook Trail—bond (?) the boxes to ensure a higher survival rate
- Ban two cycle leaf blowers and other two cycle engines where handwork could do the same job—two cycle engines = worst greenhouse gas emissions per use of any
- Advertise Climate Action 2020 Website on Utility Bills
- Sponsor a leaf blower exchange contract to get gasoline powered blowers off the streets and electric on for noise, dust, and pollution reduction.
- Include youth in outreach
- Require electrical outlets outside. Plant trees and include signage near trees about species and info about trees
- Idling ordinance for all cars etc. and busses
- Outlaw new turf lawn
- Education starting early (pre-K) but continuing through grade 12. Incorporate into the curriculum.
- Upcycle education. Community “Assets” that you can borrow (e.g., mower, power washer, etc.). Promote community education. Try summer films in park (e.g., Cradle to Cradle).
- Outlaw gas powered leaf blowers or limit to a few specific hours per week.
- Increase wetlands
- Gas leaf-blower bans
- Electricity is not a reduction to GHG. Solar is essential.
- Gray water
- Community gardens, more local food, new developments built around farms/gardens, promote CSAs.
- Get manufacturers of electric equipment to provide demonstrations at fairs or public events.
- Push mowers! Remove/reduce lawns (food not lawns)

- Get local climate groups to help educate about green house gas reduction and ways individuals can make a difference. Maybe this is their contact or collaboration between agency and non-profits.
- Improved urban storm water treatment plan: utilizing LID techniques home scale, incentivizing programs for “greenscaping” and other LID techniques, down spout disconnect with rain gardens, curb cuts, rainwater harvesting. Mandatory business compliance of improved techniques, greywater.
- Support local business and the development of local communities to reduce commuting, keep money in the community, enable more economic diversity and turn bedroom communities/suburbs into sustainable hubs of business, food production, cultural events, etc.
- Open space protection and enhancement. Conservation easement
- Strengthen information about how to plant native species and drought-tolerant species
- Plant more trees. Conserve, protect, and restore the trees/forests we have, as well as do free farms and urban forestry.
- Protect creeks from toxic material from drains. Restore riparian borders.
- Lawn mower/power tool exchange
- Stronger immigration policy
- Start a tree planting program in schools for children to plant a tree as part of their education/citizenship.
- Grass (?) is water consumer rather than trade lawn mowers—encourage native plantings without grass.
- graywater for residential and commercial water efficiency programs.
- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Leave it up to each individual what they will do and not do. It’s not your job to regulate my choices when it comes to a lawn mower or anything else.
- Establish a goal that Windsor becomes carbon neutral within a certain time period.
- Can lawn mowers, etc. be retrofitted to be electric so that old gas-powered ones aren’t scrapped completely when only one aspect needs to be replaced?
- Encourage water saving and practices that reduce amount of toxins that go into the water.
- Creative an incentive program to save water. Tree planting as organized by city group. Bike paths, encourage cycling.
- Diesel generator last many years, but we should require all new generators to be much cleaner. Almost all 2-stroke engines can be replaced with electric tools. Tree planting is always a good idea.

- Carbon dioxide is 0.04% of the total greenhouse gases. Therefore, this sector says the emission is 0.0016% of GHG. I would not worry about this and leave people alone.
- Distraction of economy “the means justify the end”
- Stop running our vehicles on gasoline. Switch to locally produced, ecologically sourced feedstock, appropriate scale ethanol production and use E50 and E85.
- All electricity become solar and wind generated by 2015.
- Locally owned and controlled power plants owned by the public and solar powered.
- Electric power is not “cleaner” than natural gas appliances—the majority comes from coal!

Other Sectors (Off-road equipment, stationary sources, wastewater treatment)—What are your existing barriers to reduce GHG?

- There needs to be a local (and national) discussion about growth. The talk is always about “projected growth.” How about a smaller population? How about preserving all open space as it exists now? Many aspects of the ecosystem are already maximized/at capacity. Fewer humans, not more. Focus on sustainability, not consumption and growth and GDP and more jobs, greater tax base, etc. It has a limit. Why not stop well short of the limit?
- Government involvement, laws that prohibit large scale, access to funding, building codes.
- Petaluma will be Sonoma County’s hardest hit city for sea level rise. We will lose our downtown!
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights
- Send code energy enforcement out to all properties to fine if not CAP compliant
- Rules against gray water use.
- Actually, Laundry 2 Landscape is legal as of 2009, only need a permit for cutting into existing plumbing.
- Knowing more effective strategies
- Time and resources to install greywater system.
- Landlord requires an irrigation system in backyard. Replanting more energy efficient plants would be preferable.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Global warming caused by man is the biggest snake oil hoax invented by man. Oil is abiotic, and a renewable resource, a fact established by scientific research.
- Stop addictions to fossil fuels and convert to a peace based, ecologically sustainable economy and lifestyle!

- Our addiction to fossil fuels

Solid Waste—What are you doing to reduce GHG?

- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- CAP Plan = Controlling All People
- Buying bulk food, using glass container we reuse, and food not packaged in plastic. Working on zero waste.
- We do not buy much processed foods; we carry bags (cloth) for purchasing goods.
- Buy used/minimally packaged goods, compost, grow my own food (as much as possible), buy meat from butcher with minimal packaging, reuse and recycle, rechargeable batteries.
- City Composting green bin [plus 1]
- Compost
- Recycle. Compost. Reuse.
- Recycle. Consider waste in all purchases. Never use plastic bags.
- Read the Santa Rosa CAP and understand what impacts on all local business will cost owners.
- Recycle
- Composting. Reduced purchase of “stuff.” Reduced use of processed/packaged foods.
- In our family, we try to buy in bulk as much as possible, reuse plastic bags till they fall apart, reduce purchasing of high waste products, grow veggies and some fruit at home, always use reusable bags, make food as much as possible for meals on the go, use reusable containers more than most.
- I print nothing and encourage others to print less.
- Require consumers to pay packaging deposits and stores and manufacturers to take back their packaging waste. Make stores and manufacturers accountable for their waste and incentivize reductions.
- Compost, home green bins, don’t buy many clothes/reuse materials.
- I run the school compost and recycling program at Apple Blossom and Orchard View schools in Sebastopol: compost on site at school (fruits and vegetables) and yard waste bin for paper and other food products.
- Composting, thrift store shopping ABC PEF (Alphabet Thrift Store, PEF funded)
- Compost, buy little to no plastics, recycle (though I don’t believe it really is an answer), use cloth bags, cook from Whole Foods, not processed, packaged foods.

Solid Waste—What do you suggest we do to reduce GHG?

- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Increase cost to dispose of garbage. Educate that compost can go to yard waste bin. Provide recycling cans to all homes (not just those who pay for garbage). Provide compost yard waste to all homes.
- More clearly label recycling cans on plaza.
- In the City of Sonoma, the garbage company contract needs to be revised to require separation of compostable, kitchen and food waste, from commercial and (illegible writing), so that it can be handled properly. All County pick up via Ratto has that, Sonoma (city) does not. Needs to be changed.
- Can you provide materials to post over wastebaskets, etc. to show people what is recyclable and what isn't.
- Zero waste as a goal. Education needed.
- Solar generation at landfill sites. Capturing of methane.
- Ban plastic bags. Ban individual use water bottles.
- Provide composting toilet services (education, maintenance, and pickup services) to centralized hi-temperature composting facility (to reduce water use).
- Develop neighborhood-level composting to reduce “long-distance” hauling of compostables.
- Establishment of widespread plant waste to biogas conversion. (Straus dairies are a good example).
- Incentives for community/individual reduction measures for businesses. Fewer regulations on businesses to allow for ease implementation.
- Goal = nonwaste society. Repair not replace.
- Reverse cycle of less expensive to replace than repair
- Incentivize repair not replace, incentivize low maintenance, low water landscape, reduce city grass to ballfields only.
- Create a county-wide composting program.
- Educate people about how to compost in their own yards.
- Have all schools and businesses over a certain size be required to compost. Montgomery high is an example that has greatly reduced landfill waste.
- Have an education program with incentives for residents re: waste. Have students participate.

- Climate has never been static in the entire history of the globe. We have had ice ages, times when the north pole was tropical, etc. Now “we” are saying climate change must not happen. What data point for static climate are we aiming for?
- Provide open debate for Sonoma County Climate Action Plans before any adoption of plans. Real public debate meetings with all sides represented.
- Recycling is good but don’t make the kids sort through garbage at school. My kids have been regularly sorting through garbage at school to pick out the recyclables. They should be learning math instead.
- Reduce garbage bin sizes so more people will need to recycle since the garbage cans will fill faster.
- More incentives/education to compost
- Pay people for other recyclable materials like what we do with glass.
- Encourage/incentivize methane capture, and clean burning for electrical generation.
- Recycle waste for Ag use
- Zero waste philosophy. Upstream redesign.
- Waste reduction—eliminate an ever expanding Federal government: FCC, FDA, EPA, etc.
- No wineries. Composting toilets.
- Yes composting toilets everywhere. But that’s a water/energy saving measure, not solid waste.
- Food waste reduction before it goes to compost or anything else. At farms, at processing plants, at restaurants and grocery stores, etc. Make it so the food can be eaten, not composted.
- Make it more difficult to sell products in packaging that is not recyclable...like illegal.
- large-scale vermicomposting (worms)
- Municipal composting for meat and grease waste
- Methane production from food waste at municipal level
- School system to be a big source of single use plastic trash. This requires parent education. Focus on schools to reduce their waste. Grant programs or support for schools to transition away from single use plastics.
- Require businesses to recycle. Set up mandatory food waste recycling citywide. Penalize households for not sorting.
- Outlaw plastic bags and carry out and one-use plastic water bottles.
- Free compost pick up days for county residents (look at Berkeley for a model). Require food businesses to compost.

- Establish a program that reduces waste of edible food by making it available to people who want it, not composting it. Eating it! Especially at restaurants and grocery stores.
- Financial incentives for business, schools, residences to compost food and yard waste.

Solid Waste—What are your existing barriers to reduce GHG?

- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights...Not!
- The rules about Blue Can eligible items are too hard to understand.
- Political will to ban single use plastic bags/bottles
- More items need to be efficiently recycled. Ban plastic bags!
- It would be helpful to have composting at work.
- Solar is not reliable and must not be required. People need to know with the large scale weather manipulation program—climate is solved. www.toxicsky.org
- Ignorance. Lack of interest.
- Dealing with people in denial
- I question its relationship, if any, to climate change.
- In schools, over-worked teachers, political barriers (it's too much we can't change HS students). Funding to implement waste reduction programs
- Schools need paid positions for running compost and recycling programs and education (b/c no funds available currently)

Transportation—What are you doing to reduce GHG?

- Carpool to work
- Bike to work
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Driving a Hybrid Car [plus 1]
- I biked to work this summer.
- Require RFID chips on all children for NSA Tracking—that will work along with the RFID chipped smart meter appliances.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Drive a Prius
- Electric/Hybrid vehicles, walk when in town.

- Create a program to incentivize making and keeping commitment to becoming 3% more sustainable with an emphasis on VMT.
- I live near my grocery store/walk and ride to the bars in Sebastopol.
- walk places
- Now bicycle about 80% of my local trips (work, shop, etc.) since 2009
- Use webinars for about 70% of my business meetings.
- Considering using Carma for remaining share of business trips to S.F.
- I recently experienced a 2 1/2-hour trip to downtown SF during morning rush hour. There needs to be a recognition that current business practice is unsustainable, including the tourist economy. The Smart Train will help, but we need more local sharing businesses, IT commenting (?)/ Transit oriented development.
- Walking and Cycling for errands in town [plus 1]
- Have office 4 blocks from home. Recreation 1/2 block from home, café 1/2 block from home by Design! Get to walk everywhere (or bike), get to know my neighbors. It's great!
- Have an EV charger with roof solar, and installed heat pump water heater, and use an "instant pot" to cook, and installed mini split heat pump-zone heating and cooling.
- Car sharing, walking, biking, working from home.
- Ride Sharing, driving electric vehicles (we have solar panels), trying to use less trips to town so that less miles are travelled.
- Riding a bike to work (in town). Walking.
- Living where it is easy to walk or bike.
- Tax heavily SUVs and other gas-guzzling vehicles. If people want to drive them make them assume the associated costs to the environment.
- Hybrid car. Minimizing driving.
- Driving electric vehicles—I don't own a gas vehicle.
- I drive a Prius—walk as frequently as possible.
- I compost but it creates greenhouse gas.
- Ride and bus and walk
- Leasing a Nissan Leaf
- I have purchased a Volt and much of my driving in the county is zero emission. I charge my car with PV solar panels.
- Vehicle tuned and tires inflated. Reduce meat intake.

- Home-based business. One car. Garden. Trip linking. Carpool when possible. Occasionally take bus. Only heat rooms we're using. Walk.
- Riding a bike
- Trying harder to commute with people

Transportation—What do you suggest we do to reduce GHG?

- Enhance transit. Better public transit.
- EV for transit.
- Create a program to increase the production of local food thereby offsetting transport and distribution related pollution.
- Make city and county more horse friendly.
- Require employers to hire locally.
- Provide lanes of travel for horses that cars and bikes can't go in.
- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- More bike lanes.
- Provide more bus routes, and live bus times, aka real time. More incentives for carpooling. More bike lanes in RP.
- Public transportation—more routes.
- Doesn't electric power cause gas emissions?
- Remove the carpool lanes. I work part time and can't carpool, and I have to sit in traffic which causes gas emissions.
- Roundabouts at intersections like Snyder and RPX, Snyder and Southwest
- Use smaller buses when passenger loads are low.
- Hybrid car, electric motorcycle, more charging stations, free parking for electric vehicles, install real time intelligent grid.
- Increase safety in neighborhoods around schools so parents don't worry about letting children walk or bike to school.
- how does mixed use construction reduce greenhouse gases? The upstairs apartments require constant conditioned air, elevators, energy required to bring water in and waste out. And no one ever works in the downstairs units and still drive to work in other locations.
- Safe bike paths all the way from the north to south end of town.
- Look at the data for EV and hybrids per 1,000 of population in Sonoma County and compare to rest of state for GHG credit under AB32.

- Connect the GHG reduction incentives and penalties through SCTA to EV being charged by SCP local clean power assets.
- Electric vehicles need to be more affordable before they can make an impact
- A public transportation system of buses and rails that are solar powered and controlled by the citizens and voters.
- 55 mph limit require cars dealers display most efficient speed
- Reconsider mass transit! Making an electric/biofuel affordable and frequent bus/train system. Increase safe bike trails
- Open all lanes to traffic instead of making people idle in two lanes. We all paid for the roads.
- Figure a way to alert motorists to turn off ignition during long periods of stopped traffic.
- “C-Control, A-All, P-People”
- Integration of Sonoma Clean Power with the electrification of transportation
- Need bike able routes: Cotati-Sebastopol. Sebastopol-coast.
- Subsidize/incentivize a local trolley running along HWY 12
- Incentivize more EV charging stations (shopping center lots, hotels)
- Could a nice community pool reduce the number of private (residential) pools? Encourage higher density, more walkable, infill development—with shared/common open spaces.
- Create attractive, one story, low-income housing.
- Traffic control—traffic on Napa Street is solid, even in the middle of the day—are some abatement plans in the works?
- Give stipend on incentive for people to build bamboo bicycle carts—> go shopping with a bike cart and not drive.
- Emphasize and expand bike lanes and bike infrastructure — plans to park bikes, incentivize bamboo carts so people shop with bikes vs carts.
- County buses should be diesel hybrids. More electric car charging stations.
- Smaller shuttle buses to meet transportation needs for shopping—try to use some mass transit principles to get individual driver’s trips down.
- Institute a carbon tax. Carbon trading will become another Wall Street scam.
- County of Sonoma needs to address infrastructure. Areas off highway 101 have poor public transportation and poor road quality. Best intentions can’t be implemented. Poor biking conditions, poor walking conditions. Useless bus schedules.
- Require Bicycle lights @ night. Require helmets. More people will ride bikes if it is safer.

- Bikeway planning needed that goes beyond recreation biking. If bicycle paths related more to (?) places or residence to employment destinations (and schools) more people would use them instead of vehicles.
- Close the plaza to autos one Sunday a month. Let folks see how wonderful it could be!
- Electric Smart Train locomotive or at least biogas fueled fuel cell hybrid engine for heaven's sake! To demonstrate our intention.
- City Bike Share. Connect east side and west side! Bike path updates! Connecting east and west under 101!
- Convenient energy efficient transit!
- Get solar cars, as electric cars use the same carbon footprints
- Web and cell phone based carpooling/sharing.
- Let's start a once a month bike ride, with kids on bikes, during daylight hours, to raise awareness of bike options in Petaluma.
- Pass a No Idling law like they have in Vermont. Outside St. Vincent's elementary school every day parents run their SUVs (AC, heat, etc.) for up to 20 minutes waiting for their kids!
- Get local non-profits to educate general public in "how, what, where, when" we can lower our personal GHG use.
- Drastically increase EV chargers at all county institution parking lots and offer reduced charging rates.
- Complete streets to accommodate all forms of active transportation starting in City coves (?)
- Get public schools to offer better transportation for students so that there is less Am/PM traffic to and from schools
- Education about electric bikes. Increase parking fees to discourage car driving and use money to build bike paths.
- Develop story-based, consciousness-raising positive images of successful alternative modes of transportation.
- Business provide more work from home opportunities
- Is it possible to bypass the diesel parked Smart Train and go for lower emission...hydrogen fuel cell? At least diesel fuel cell, electric motor. Something to make a statement that we're serious about this!
- Support progressive technology in Sonoma County with business incentives for small businesses that create say fuel cells or green water systems.
- Walkable, attractive, vibrant neighborhoods with services seems like the key over the long haul!
- Safe bike ways throughout town. Children should be safe to bike to school!

- Bike path infrastructure linking cities along 101, i.e., Petaluma to San Rafael.
- Integrate E.V. infrastructure development and E.V. promotion with Sonoma Clean Power. SCP incentivizes E.V.s with special rate. RCPA coordinate charging station department with Solar PV, in coordination with SCP.
- Require new land-uses to be sustainable, walkable, not vehicle dependent. Improve public transit infrastructure.
- Pay for street parking to pay for GHG programs.
- Green streets narrow with green curb strips slow, spread, sink water, plant trees!
- Walkable development, upgrade bike infrastructure especially east of the river, encourage/incentivize driverless cars
- Safer bike paths throughout Petaluma, more secure places to lock up a bike, more enforcement of zero tolerance for cell phone use while driving.
- Increase public transit hours into the evenings.
- Consider compatibility with autonomous vehicles. How will they affect parking needs, commuting patterns, etc.?
- More commute options to rural county/cross county. Ex. Petaluma to Point Reyes. Mass transit/commuter bus for these lesser used routes with a few options (times). This is my #1 carbon emission: going to work.
- More east-west Public Transportation in Sonoma County.
- More streets with permeable paving.
- Prefer “GHG-based” taxes (such as existing gas taxes) over “VMT-based” new revenue-raising schemes (which would be more difficult to administer and risk “gaming” abuse).
- Incentivize ownership of clean energy vehicles
- Bike lanes need to be coordinated throughout the county.
- More frequent bus service and more room for bikes on buses
- Require larger set back from rural roads so there is room to safely walk alongside the roads and to later have sidewalks. Livable communities.
- Adopt legislative and financial incentives to encourage using EVs. GHGs could be reduced by 20% if 50% of the miles driven in Sonoma County were in an EV.
- Transportation options: bike sharing, streetscape plans that help encourage walking.
- Oil and gas are abiotic, therefore are already a renewable resource!
- Shuttle service from SMART stations to employment/shopping centers and other destinations
- True transit-oriented developments of housing and mixed use near rail stops.
- Just like Agenda 21

- Consider eliminating parallel parking on certain thoroughfares to make room for safe bicycling. Clearly paint bike lanes and “left turn” lane positions for bicyclists on multi-lane streets. Good example exists on Rohnert Park Expressway/101 off-ramp.
- Some of these stickers seem to be “pranks” posted by the “tea-party” visitors.
- “Generalize” dial-a-ride services for use by “everyone” in each neighborhood for use as “feeders” to larger bus system. (To allow people to leave cars at home—avoid short car trips to “local” bus terminal or Park & rides). These services could be “Neighborhood-managed.”
- Dynamic rideshare program could encourage installation of bike racks on private vehicles participating in ride share system to allow bicyclists to utilize R.S. system. Secure bike parking at major neighborhood bus stops plus bike share/rental/repair services at “downtown”
- “Community built” bus shelters: each shelter displaying unique character. Creative re-use of materials. “Adopt-A-Bus Stop.” Added value via “welcoming” neighborhood; added feeling of “safety.” Neighborhood might provide lounge-chairs, Wi-Fi, use of bathroom....
- Extend Bus route hours to 10/11pm (most now end around 7pm). This would allow people to use public transit to evening events such as JC classes, musical performances, etc. Good for local economy.
- EV charging stations opportunities for hybrids. Alternate mode incentives, including money. Eliminate drive-thrus.
- More tax incentives for ownership of electric and fuel economy vehicles.
- Nuance public transportation
- There is a new app for car sharing gaining numbers.
- Do not allow city employees to keep vehicles idling while stationary, including police.
- Interconnected public transportation bus/train/zip car connectivity.
- Get the Smart Train to Cloverdale ASAP
- People who believe in one-world government conspiracy and talk your head off about chem trails
- Promote cleaner transportation
- Incentivize/encourage EV charging in all new residential construction. Require conduct for future installation. For all new D.U.S. Require new multifamily and commercial to install EV charging stations and link to renewable power.
- More sidewalks, bike lanes, more bike parking/racks in town.
- Development of transit for commuters (e.g. Smart Train) should reduce emissions for Sonoma/Marin.
- More “cold in place” asphalt recycling—Major GHG reduction in road maintenance.
- Get better bike lanes!

Transportation—What are your existing barriers to reduce GHG?

- People with their own agendas that will never believe people can harm our earth.
- Why is there no talk about the international global policies for the large scale weather program now affecting our climate change?
- Mexico, Africa, South America.
- Electric cars are a scam—they plug into “dirty” power (coal). Batteries are more of a carbon footprint than reg batteries and more toxic (nickel).
- Lack of robust transit system frequency. Range anxiety for alternative cars.
- The anti-Agenda 21 people/tea party.
- Get SSU and the Casino on board as new “cities” since their jurisdictions are outside traditional political structures.
- China, India, Russia
- Car-sharing. Better/more bicycle routes.
- Narrow bridge makes walking from Springs dangerous
- Parents fear kids’ safety if bike to school—also heavy backpacks etc.
- My shop is 7 1/2 miles via hwy. I need my truck for work.
- Exorbitant taxes
- Distances in county—requires more charging stations.
- Increase local economy; co-working/mixed-use/community office space.
- Batteries are arguably worse than a car that uses gasoline. Do we really want everyone in an electric car? What are we going to do with all the wasted batteries? Our infrastructure is already built—
- More fast changers needed
- Money—I can’t afford an electric car. Lack of municipal infrastructure. No bike paths.
- Bike safety issues. Lack of bike infrastructure.
- I would love to purchase a hybrid or electric car. After barely recovering from the 2008 recession, we can’t afford to buy a more energy-efficient car. These are our biggest energy guzzlers: home and car. Husband commutes to SF. Would love to make commute use less gas.
- Open up all the lanes for traffic, then you won’t have two lanes of idling cars with a completely empty commute lane.
- Underfunded Bus Service. Redesign and improve the service
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights....Not!

- My limited ability and capacity to affect energy policy.
- Lack of safe bike lanes and sidewalks.
- “Free” parking
- I am discouraged from using bicycling due to parallel parking door hazard and lack of secure bike parking and uncertainty of having available bus-bike rack space.
- Incentivize businesses to put electric chargers into business parking lots and to install more solar for electricity and hot water.
- There are not enough jobs in Cloverdale and those of us who still work must travel by car to larger cities to work
- There should be a variety of stores to provide everyday needs so we don’t have to travel to cities where lower prices are available.
- Jobs and high speed internet infrastructure will reduce daily car trips to jobs outside of Cloverdale.
- Ban drive thru businesses where cars can sit and idle while waiting.

Water Use—What are you doing to reduce GHG?

- Low-Flow Fixtures-Shower in a pan and reuse the greywater. Use washing machine water as greywater. Grow a garden instead of grass and use greywater more than not. Did not replace 3rd vehicle, use Sonoma County Transit one time per week on average. Attempt to drive between 55 & 60 mph rather than 65 to 70. Turn off ignition when waiting for long red lights. Use cold water for dishes and no dishwasher. Carpool with wife as much as possible. Reuse building materials and buy used/previously owned things.
- Our entire county should be better informed on all this so we can decide if we want it.
- I bike to work. I’m in the process of removing my front lawn to get a waterwise landscape.
- Developing a lawn removal plan.
- Why is there no talk about the international global policies for the large scale weather program now affecting our climate change?
- Taking shorter showers
- Low flow fixtures. Drip irrigation. Grey water.
- I do not want a smart meter on my water or power!
- The smarter the better.
- Shower less often.
- Drip irrigation

- Improve/change water system to be more efficient; and return used water sooner in natural environment. Educate people about better water-use (less shower/bath=healthier). Use more efficient equipment (laundry machine).
- Founding Member Slow Money. Activism., Climate issues inventory in global Fortune 100 Company. Incubating/Mentoring small green biz.
- Installing grey water to landscape system. Installing 2000 gallon rainwater catch. Installing perennial landscape. Low flow, low flush etc.
- Own hybrid vehicle. Limit heating in home. Sign petitions. Member many climate groups.
- Building own farm. Eating/sharing what we grow. Drip irrigation. Building our resilient grange.
- Drip irrigation, drought planting
- Replacing appliances and heater, water heater energy Star
- Conserving water, grey water system
- Water efficient washing machine, dishwasher, toilets, showers. Drip irrigation, low water landscape.

Water Use—What do you suggest we do to reduce GHG?

- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive. We need to stigmatize the FF industries.
- Keep GHG emissions reduction always on one's mind. Think before acting.
- Incentivize building soil organic matter content to reduce water use and incentivize vegetable gardens, permaculture crops.
- You are basing everything on a false premise (man caused gw) and pseudo "science."
- Cut unnecessary lawns in Rohnert Park and support permaculture and more native plants.
- These measures won't fix the problem. You can't regulate behavior.
- Mandate no lawn landscaping on all new house construction.
- Educational events on catching rainwater and graywater.
- Healdsburg should have a water conservation public program with incentives for low-flow toilets, front load washers and the materials for folks to check the flow.
- Require all schools and large businesses to install rainwater harvesting and greywater systems.
- Better, harsher penalties for wasting water
- Evaluate and incentivize 'net zero increase' in water use for large projects.

- Convert 10% of all Sonoma County land and agriculture to Wildlife Sanctuaries and native plant preserves.
- Re-use waste-water for Ag and human consumption
- If it's yellow let it mellow, if it's brown flush it down.
- Agriculture crops that are perennial, native to the area and drought tolerant.
- Curb illegal immigration! Just teach immigrants about birth control.
- Need compostable toilet.
- Drip & grey water systems. Conscious water use maybe contract Daily Acts or Permaculture Centers to teach how to capture water, do greywater systems, plant water efficient plants.
- Rebates for toilets and washing machines
- Provide rebates on high efficiency toilets, landscaping that saves water and commercial food service equipment
- Outlaw new turf lawns. Market faucet governors that shut off after ten seconds.
- Not all water comes from a centralized system. Wells and new well developments need to be better planned and regulated. Preventative action is too timid in this rapid acceleration
- Have Sonoma annex all of the valley from Boyes Hot Springs south to the Bay—gain efficiencies plus have better representation for 1000s of voters and citizens.
- Have a water bottle refilling station on the plaza (for public education to our visitors)
- Make the water bill easier to understand and have a year by year-month by month comparison.
- Give away/rebate water wise faucets. Install smart meters. Rebate drip irrigation.
- Transform lawns with sheet mulching! Provide more incentive programs to support landowners in converting to more waterwise landscapes.
- GHG is not the only consideration! “Water, water everywhere, but not a drop to drink.” Energy is stored as pumped water. Water treatment is energy intensive, water is next to air as a necessity!
- Encourage drought tolerant landscaping and native plants. Discourage lawns.
- Incentivize graywater/rainwater reuse. Incentivize perennial landscape. Education campaign on both of the above.
- Water rationing now!
- Playgrounds and public parks w/ native plant/drought resistant landscaping. Rework water rates (residential and commercial) to encourage conservation.
- New Development require greywater systems. Fee to have “non drought tolerant” landscape/yards. Clean up the Petaluma River.

- Provide county-wide incentive programs for greywater reuse (provide homeowners with free parts for systems)
- Promote on-bill repayment for financing improvements
- Penalize those who use excess in comparison to the average
- Realistically determine to fund marginal cost of water/ wastewater/energy; consider investing instead when less expensive in converting turf to biologically helpful native landscapes as a way to grow reliable water capacity.
- Incentivize rainwater collection systems for public schools and buildings as well as homes.
- Efficient waste water treatment and usage for agriculture in particular
- Create workshops on graywater systems—installation, health, maintenance
- Low impact development i.e. bio sources, rain gardens, cisterns, etc.
- Yes require large new developments to perform a water demand analysis before getting permit approvals—and deny permits for developments with unacceptable impacts
- Conservation and education about water issues. Groundwater, stormwater retention basins and measures.
- The grape business is water intensive. Reeducating the vintners to go to dry farming is crucial.
- Focus on pump testing and retrofits. Addresses water and energy.
- Allow/Encourage/Educate use of composting toilets including developing of maintenance service and hi-temp composting facilities to safely recycle.
- More water storage!
- Tax rain like they do in MD (Not!)
- Stop selling water to Marin County!
- Shut down all government and municipal buildings during water shortages
- Incentives for solar hot water on demand
- Provide educational means to raise consciousness of public of water usage.
- Incentivize in-line hot water, greywater installation
- Tertiary use of water on ag lands. Campaign to educate applicability of tertiary water.
- Give help and incentives to get rid of lawns and plant native.
- Provide water audits for residents to find the leaks throughout their water lines (home, irrigation).
- Educate to let people know the energy/water nexus.
- Have more greywater workshops and provide CAKE! Everyone loves cake. Food brings people together, as well as music.

Water Use—What are your barriers to reduce GHG?

- Knowing where I (we) stand relative to other people.
- People with their own agendas violating people's ability to work.
- Mother Nature always corrects itself. GHG is a man-made expression.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- There is still an image of plenty thru spraying reclaimed water (?)
- Adaptation issue: Sebastopol needs to care for recharge areas in the west.
- Cost—are rebates available for star washing machines
- The cost of a new washing machine
- Mentality that yards without lawns are unattractive
- Ignorance, denial, true education needed.
- Industry/contractor expertise and familiarity with graywater/rainwater permaculture.
- Institutional challenge in understanding/comparing the cost and risk of traditional sources of water vs reducing demand.
- Smart meters are a threat to our liberties. The last thing the government needs to be tracking is my water usage. Requiring all new buildings to have water smart meters will create more electromagnetic radiation, further killing off the bee population.
- The city continues to water a patch of grass on Callfield between McDowell and Ely. This patch has been there for over 40 years. Let's turn this patch into an educational corner, sheet mulch the grass, landscape with drought-tolerant plants, and educate homeowners in this area about moving away from hydrangeas and juniper. Buy a rainwater tank to catch (currently non-existent rain) and put some raised garden beds there, and put Petaluma Bounty in charge of the beds. This could raise awareness about 1) water conservation, 2) locally-grown food, 3) the awesomeness that is Sonoma Compost, 4) the power of education! Go City of Petaluma!
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights...Not!
- Cost
- Deciding most efficient use of water in garden.
- Regulate water consumption of industries of high water usage: wine, breweries, use lots of water to produce product.

Climate Action 2020 Stakeholder Advisory Group Meeting— January 22, 2014

The Stakeholder Advisory Group (SAG) is a group of volunteer community members selected by the RCPA board based on their understanding of, interest in, and commitment to community leadership and the goals and objectives of RCPA in developing CA2020.

The first group meeting was held at the City of Santa Rosa Utilities Department, 35 Stony Point Road, Santa Rosa, CA 95401, on January 22, 2014 from 4 p.m.–7 p.m. The purpose of the first meeting was to introduce the project and present an overview and expectations of the plan and of the SAG, to hold a session for questions and answers, and to discuss potential GHG reduction strategies in smaller break-out groups.

The group was divided into four groups of 9–10 and each group rotated talking about the different sectors related to agriculture, water and waste, building energy, and transportation. Staff prompted and recorded comments on each sector following four discussion points:

- Are there any measures not on the list that you think we should consider? [NEW IDEAS]
- What information about these measures is more important for you to know? [INFORMATION]
- Do you have any concerns about these measures? [CONCERNS]
- What measures do you think are most important/least important to consider? [PRIORITIES]

Below is a list of all the comments received from SAG members.

(* = more than one group said this)

BUILDING ENERGY-Ideas

- Energy Efficiency upgrades required for residential at Point of sale- **
- Using online energy usage behavioral tracking programs to tell me how much energy I am using compared to neighbors (e.g. OPOWER)
- Use of real time energy monitors with specific recommendations on how to reduce energy consumption
- Smart appliances
- Rebate programs or financing for Energy Efficiency
- Require tree/landscaping of new development as an energy strategy*
- Cool paving/roof
- Financing –fixes to PACE issue, lower rates: creative solutions
- Use Sonoma Clean Power as a vehicle for variety of programs: energy efficiency, distributed energy, microgrid, feed-in tariff, small investor program **
- Incentives to build smaller homes on smaller lots
- Ease down a path towards tighter requirements for residential energy efficiency by: 1. Disclosure/labeling for Energy Efficiency of home at time of sale 2. More detailed disclosure (i.e. component efficiency ratings) 3. Voluntary retrofits towards a certain goal with incentives and funding 4. Mandatory retrofit towards a certain goal
- Passive solar, passive design*
- Expanding benchmarking/disclosure (AS1103) to res.
- “MPG” of a house—HERS, Green Point Rated
- Solar thermal
- Incentives
- Focus in more on HVAC strategies
- Strategies for new development should also look at existing strategies
- Explore combined heat and power using fuel cells
- Encourage Net Zero Energy: i.e. fuel switching
- Propane incentives
- Revisit sidewalk replacement policy (tree protection)

BUILDING ENERGY–Information Needed

- Cost/benefit overall if tightening standards
- Relative benefits of LCE (levelized cost of energy)
- Selection methodology
- Co-benefits and impact scores
- Total long term GHG
- Opportunities within SCP (RESCO)
- Cal Green standards and existing buildings
- Look at MLS data on high home value for rated
- Previous examples: success or failures
- Costs, CBA
- Different businesses models
- Any current regulatory barriers
- Solar panels—what happens at end of life?
- Existing barriers
- Better clarity around SCP decisions
- How to prioritize?
- What is causing growth in GHG?

BUILDING ENERGY–Concerns

- Code is getting too restrictive so people are not getting permitted, pushing impacts elsewhere
- Messaging around energy efficiency is banal, hard to be a signal that stands out given how much information people have to consume
- Existing buildings are a big source of GHG
- Many measures (voluntary measures) lack teeth*
- Perfect is the enemy of the good
- Ability to include consumption based measures
- Spanish language outreach
- Not penalizing early actors
- Need to avoid unintended consequences, e.g. requiring solar even on shaded sites
- Follow through on tree programs, i.e. Keep them alive
- Not enough incentives
- Leakage of impacts—if it's too difficult to build here, owners and developers will go elsewhere
- True impact of county energy ordinance
- Tension between landscape conversion and shade trees. Misinformation.
- How to prioritize?
- Regional consistency is essential

BUILDING ENERGY–Priorities

- Public health
- GHG, cost savings, energy savings
- Air quality
- Adaptation benefits
- Marketing/info
- Performance based programs
- Incentivizing GHG reduction*
- Carrot and stick approaches
- All cities and departments get on board with tree program

TRANSPORTATION–Ideas

- Localizing low-income housing/all ages in downtowns/work places
- Require new development to put in EV chargers
- Provide EV charging at work places and multifamily units
- EV Carshare-EV car trading between EV owner and regular car owner for long distances
- Public-private partnerships
- Marketing including Social marketing*
- Zoning codes—no drive thru*
- Government lead by example
- Housing located near transit
- Maintain Urban Growth Boundaries
- Incentivizing measures
- SMART connectivity (last mile especially), bring SMART all the way to Cloverdale*
- Lowering parking requirements (incentivize) for flexibility
- Subsidies for adult bus passes
- Road pricing
- Roundabouts
- Stop light sensors – change light—less idling
- Incentivize Ridesharing—locations, Casual Commute/Carpool **
- Telecommute*
- Transit Integration/coordination with bus*
- Bus Rapid Transit—run buses like trains
- There needs to be better (more frequent) connections between the rural areas of the county and the cities (transit).
- Increase service—local buses, Golden Gate Transit, evening service, increase service along major arteries, i.e. BART line*
- Should have a countywide goal for EV (# of people who own EV) – this comment also could have been related to EV charging stations (or both).
- Work with Sonoma Clean Power to secure a lower electricity rate for charging an EV.
- Provide countywide incentives to residents who want to buy an EV.
- Transfer development rights—create density where you want it
- Bike Sharing
- Bike/ped safety on city roads*
- School district involvement—School @ home day *
- Tax incentives for businesses who use EVs in fleet
- Make EV infrastructure a Condition of approval, similar to the ADA requirements
- Showers/lockers for bikers
- Parking: Pricing, centralized parking, walk paths into the center of eateries
- Free bus passes from employer
- Allow all EVs/Hybrids access to carpool lanes

TRANSPORTATION–Information Needed

- Impact per measure
- More specificity in measures
- Polling/crowd sourcing = getting info from people
- Current system/gaps
- Funding drives our decisions
- Cross-check CPC’s plan for inclusion in this plan
- More info on bike/ped measures

TRANSPORTATION–Concerns

- We tend to think of new measures arbitrarily rather than in terms of one’s daily life
- This is the largest sector, yet measures not strong/aggressive enough
- Make sure to cross-inform to measures in related areas
- Proper accounting
- Carpool timing

TRANSPORTATION–Priorities

- EV (keeping funding here) get more charge stations**
- More requirements, less “encourage”
- Telecommuting
- Carrots and sticks = finding the right balance (connect to land use)
- Car-share
- Short-term vs. long-term
- Schools—districts
- Parking—pricing
- Marketing: Press Democrat
- SMART bike path

WATER–Ideas

- Work with Water Control Board to allow storage for greywater
- Integration of waste water use plan
- Require Smart irrigation on new development
- Incentives for Turf conversion-”Cash to grass”*
- Outlaw turf on new development
- Rainwater harvesting-incentives/demonstration projects
- Water audits for residential/commercials
- Have Board of Supervisors implement NSCIRWP EIR. Hindering county from getting funding.
- Expand PAYS program in Windsor to other communities throughout Sonoma County
- Encourage “chilipepper” type device to bring hotwater to the faucet
- Smart technology for water tracking at time of use
- Education—more education on water conservation: water, lawns, educate on greywater, it doesn’t have to be complicated
- Greywater—Simple/same policy across entire county**
- Greywater—Incentives for installing greywater systems: discount on water bill?
- Greywater—Shower to toilet opportunities

WATER–Concerns

- Regulatory barriers for greywater
- Water conservation programs—penalties for early adopters
- Greywater-permitting hindering adoption
- Well water—uniform standards
- Water conservation—no slack in system. Low hanging fruit has been done.
- Greywater—Regulations for greywater force permit avoidance, Hard to do the right thing. *
- Storage issues with water
- Water billing by 1,000 gal increments. Need to allow for conservation to be seen, so should move to 1gallon increments

WATER–Priorities

- On bill financing for turf conversion
- Turf conversion
- Policies/incentives for water conservation incentives and measures for existing buildings
- Greywater incentives = permitting, streamlining incentives make it easier to permit.

WASTE–Ideas

- Stop burning waste
- Biochar
- Decentralized MURFs (multi-reuse facilities)
- Waste to energy with MURFs and methane capture**
- Educate people that food waste can go into green bin
- Require Compost at multi-family properties
- Worm composting on large scale
- Explore the Marin carbon project, and its accessibility to Sonoma County
- Polystyrene ban*
- Mandates for recycling/composting
- Composting toilets: permits, barriers?

- Education on greywater
- Ability to have greywater: simple and recycled water
- Greywater: Rate payer wins! Municipality wins!
- Consider adaptation as much as mitigation
- Break down the barriers
- Talk about co-benefits, not just GHG reduction

- Restaurant composting options—how can we use worms?
*
- Ban plastic bags
- Construction waste, recycling, Tier 2—increase regulations
- Zero waste
- Choice of smaller recycling bin, would people purchase less products? Incentives for not picking up?
- Behavior change for waste
- Targeted marketing to specific groups—more meaningful marketing, even though it is to a smaller number of people. Could create Champions – awards, show, appreciate those that reduce waste have green bins?

WASTE–Concerns

- Single-stream recycle = increased waste
- More composting could increase GHG emissions

WASTE–Priorities

- Green bins for composting for commercial
- Incentivize restaurants to compost
- Find other uses for organic waste—don’t burn
- Behavior change = rebate programs? Incentives?

WATER & WASTE–Information Needed

- Provide Policy Gap spreadsheet to SAG
- Emissions data broken out by sector

AGRICULTURE–Ideas

- Incentives – equipment BAAQMD/USDA*
- Community gardens—AB551 (2014) chickens and bees
- Improving Ag processes not eliminating
- Cost opportunity for Logen (?)
- Improve the Soil, Look at as a system (not “reducing fertility” but fossil fuel, nitrogen)**
- “Credit” for organic dairies.
- Feed option (dairy poultry)

- Zero waste is costly

- Waste to energy exploration
- Compost: make it easy. Permits to take care of it locally.
- Additional education for waste. Support SC Waste Authority.
- Educate—targeted information maybe to fewer people

- What happens to compost in green bin? Does it stay in or go out of county?
- Many waste measures already happening

- Biochar*
- Integration between forest, fire and ag
- Incentives for alternative fuel (Red Dye Diesel)
- Sustainable farming/viticulture
- Alternatives to burning mulch, compost, etc.
- Composting (efficient)

AGRICULTURE–Information Needed

- Forecast dairies accurately
- Feedback structure (less than 5 years)
- What is meaningful?
- Listen to people in the industry
- Uncertainty on sequestration
- Cross-feed cattle and GHG (pumice) (reuse)
- Land value—concerns about conversion
- Make measures ready for sectors
- Good waste
- Alternative fertilizer (use compost/ food waste)

AGRICULTURE–Concerns

- Permanence of sequestration (Ag soil, biochar)
- Cost of digesters for small dairies
- Small margins/Small dairies*
- Challenges to quantify sequestration
- Be cautious of a fixed goal
- SCACF x goal (methane)
- Lack of incentives for no till/ etc.
- Water availability—increase? Feed?

AGRICULTURE–Priorities

- Comparison of scale
- Breakdown inventory
- Methane capture—mixed ideas
- Alternatives to fertilizer
- Sequestration opportunities
- Adaptation as much as mitigation

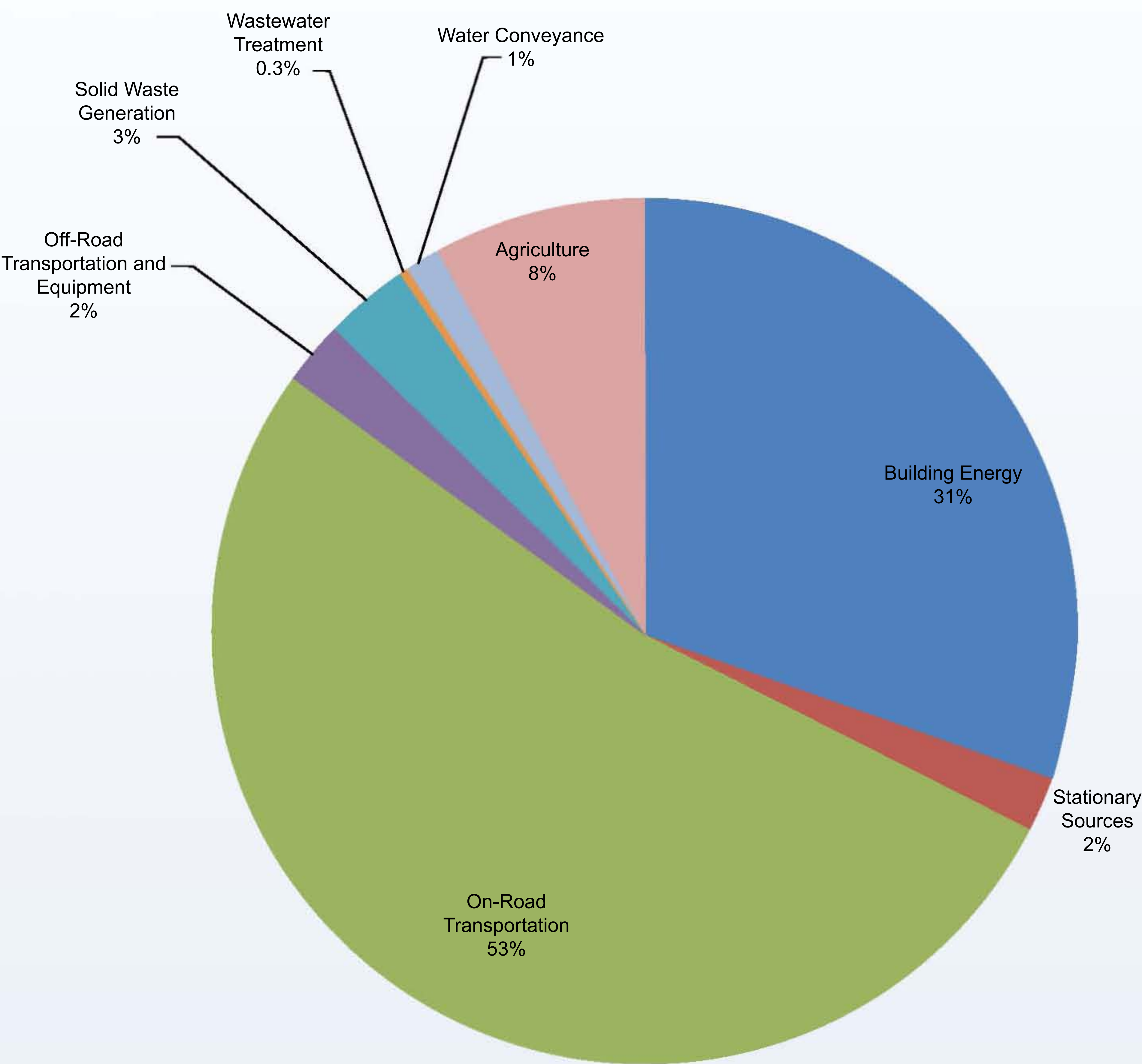
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A Regional Program for Sonoma County Communities

Shaping vibrant and resilient communities in a changing climate

DRAFT Countywide Emissions by Sector for 2010



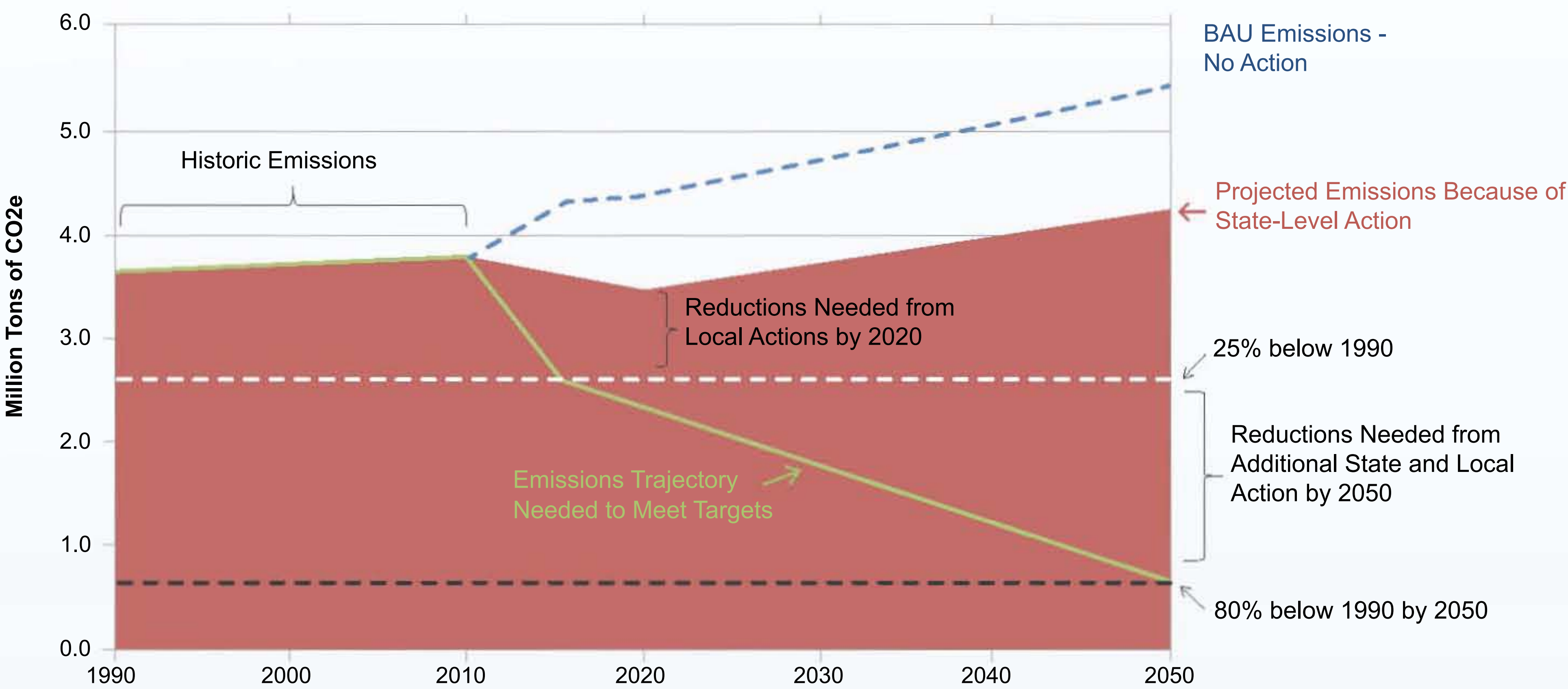
Note: Carbon sequestration is not included in the inventory totals. The U.S. Community Protocol (October 2012) recommends that sequestration emissions not be added to inventories of anthropogenic emissions.



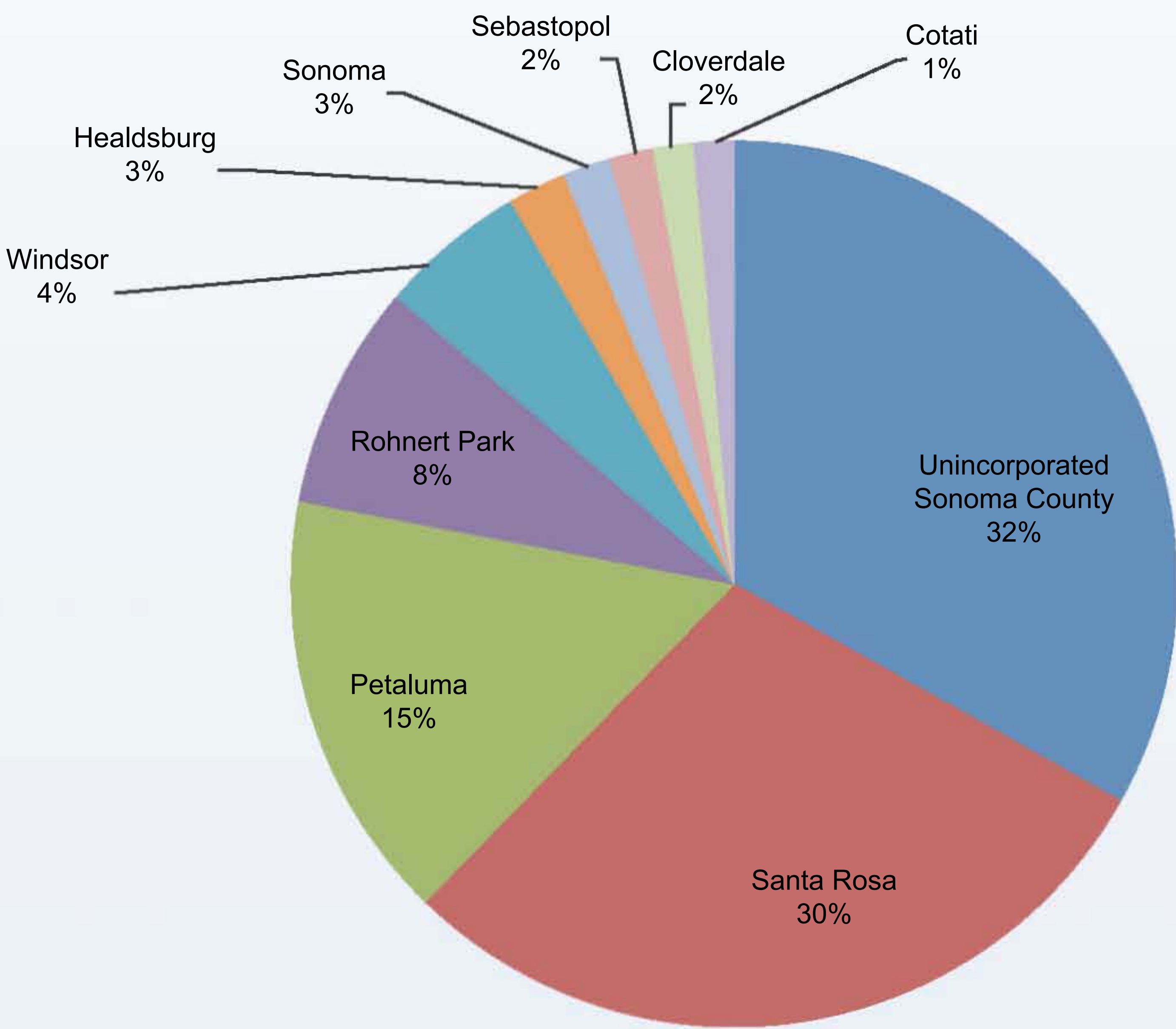
A Regional Program for Sonoma County Communities

Shaping vibrant and resilient communities in a changing climate

DRAFT Countywide Emission Reductions: Greenhouse Gas Emission Reduction Targets and State and Local Action



DRAFT Countywide Emissions by Jurisdiction for 2010



Note: Carbon sequestration is not included in the inventory totals. The U.S. Community Protocol (October 2012) recommends that sequestration emissions not be added to inventories of anthropogenic emissions.