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Revised Draft Climate Action Plan – Redline Version

Climate Action Plan
Planning Commission Hearing Date August 15, 2018

A Tradition of Stewardship
A Commitment to Service

REVISED DRAFT

Climate Action Plan

Acknowledgements

Board of Supervisors

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Watershed Information & Conservation Council

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County staff would like to acknowledge and thank all community members who attended Climate Action Plan public workshops and hearings held in 2015-2017 and provided their comments to help shape this plan.

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Acronyms and Abbreviations

ºC	degrees Celsius
ºF	degrees Fahrenheit
AB	Assembly Bill
ABAG	Association of Bay Area Governments
APG	California Adaptation Planning Guide
BAAQMD	Bay Area Air Quality Management District
BAU	Business-As-Usual
BMP	best management practices
CAL FIRE	California Department of Forestry and Fire Protection
CALGreen	California Green Building Standards Code
CalRecycle	California Department of Resources Recycling and Recovery
CAP	Climate Action Plan
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFC	chlorofluorocarbon
CH_4	methane
CNG	compressed natural gas
CNR	California Natural Resources Agency
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
County	County of Napa
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
EV	electric vehicle
FEMA	Federal Emergency Management Agency
F-gases	fluorinated gases
FTE	full-time equivalent
GHG	greenhouse gas
GWP	global warming potential

HCFC	hydrochlorofluorocarbons
HFC	hydrofluorocarbon
HVAC	heating, ventilation, and air conditioning
IPCC	Intergovernmental Panel on Climate Change
m	meters
MCE	Marin Clean Energy
MPO	Metropolitan Planning Organization
MT	metric ton
MTC	Metropolitan Transportation Commission
$MTCO_2e$	metric tons of carbon dioxide equivalent
N_2O	nitrous oxide
NVTA	Napa Valley Transportation Authority
NVWT	Napa Valley Wine Train
O_3	ozone
PACE	property assessed clean energy
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric
$PM_{2.5}$	fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less
ppm	parts per million
RCD	Resource Conservation District
RMP	Refrigerant Management Program
SB	Senate Bill
SCS	Sustainable Communities Strategy
SF_6	sulfur hexafluoride
SLCP	short-lived climate pollutant
TOD	transit-oriented development
UVA	Upper Valley Waste Management Agency
VMT	vehicle miles traveled
ZNE	zero net energy

Napa County Climate Action Plan

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Executive Summary

Source: County of Napa

Executive Summary

This Climate Action Plan (CAP) provides a comprehensive roadmap to address the challenges of climate change in unincorporated Napa County. Acting on climate change means ~~both~~ reducing greenhouse gas (GHG) emissions from local sources ~~in the unincorporated County~~ and helping the community to adapt to climate change and improve its resilience over the long term.

The CAP aims to address climate change by reducing GHG emissions from sources within the unincorporated area, and by identifying ~~threats and~~ strategies for adapting to future environmental conditions caused by climate change.

The scientific consensus is that it is "extremely likely" that global climate change is caused by GHG emissions associated with human activities, and that significant reductions in human-caused GHG emissions are needed by the mid-21st century to prevent the most the catastrophic effects of climate change. To this end, in 2006, the California Global Warmings Solutions Act (Assembly Bill [AB] 32) established the State's first target to reduce GHG emissions, which established a goal of lowering emissions to 1990 levels by 2020. California has been making steady progress and is expected to achieve the 2020 target; however, ongoing reductions in GHG emissions are needed as noted above.

As directed by AB 32 and SB 32, the State aims to reduce annual GHG emissions to:

- 1990 levels by 2020,
- 40 percent below 1990 levels by 2030.

The State's longer-term goal is to reduce emissions down to 80 percent below 1990 levels by 2050.

In 2016, ~~Governor Brown signed~~ Senate Bill (SB) 32 was signed into law, which established a new mid-term target of 40 percent below 1990 levels by 2030. This target aligns with those of leading international governments such as the 29-nation European Union which adopted the same target in October 2014. The new 2030 target places California on a trajectory towards meeting its longer-term goal, which is to bring emissions down to 80 percent below 1990 levels by 2050.

Over the last decade, the County of Napa (County) has taken several steps to begin addressing climate change and achieving reductions in GHG emissions, ~~both~~ in the County's operations as well as the broader community. ~~Dating as far back as~~Since 2007, the County has been involved in various efforts to quantify GHG emissions sources and formulate reduction strategies on both a county and larger regional level. The County's General Plan and Environmental Impact Report (EIR) called for development and adoption of a CAP. This CAP builds upon the County's past efforts and fulfills the requirements of the County's General Plan and EIR.

Source: County of Napa

The key components of the climate action planning process represented in this CAP are briefly summarized below:

1. **A baseline GHG emissions inventory** was prepared for 2014 and is addressed in more detail in Chapter 2 and Appendix A. The key findings from the inventory include:

The Top 5 Emitting Sectors in 2014:

1. Building Energy Use (31%)
2. On-Road Vehicles (26%)
3. Solid Waste (17%)
4. Agriculture (10%)
5. Off-Road Vehicles (9%).

Source: County of Napa

Local governments play an important role in achieving the State's ~~long-term~~ GHG targets for 2020 and 2030, and in making substantial progress on the pathway to longer-term goals established for ~~and~~ 2050. Action and collaboration are needed at all levels to complement and support State level actions.

The CAP contains a total of ~~48~~ 49 local GHG reduction measures. While many of the emission reductions of the measures can be quantified, others are more difficult to quantify. However, the combination of all measures contributes towards achieving 2020 and 2030 targets.

- 484,283 metric tons of carbon dioxide equivalent (CO_2e) were emitted by communitywide sources in the unincorporated County in 2014.
- The largest source of emissions was the Building Energy sector (i.e., residential and commercial/industrial buildings and other facilities), which accounted for 31 percent of the inventory; while the Transportation sector accounted for approximately 26 percent of the inventory.

2. **GHG emissions forecasts and reduction targets** and goals were identified for 2020, 2030, ~~and~~ 2050, consistent with State targets under AB 32 and SB 32.

- Without any future actions (i.e., "business-as-usual" conditions), GHG emissions are expected to increase by 2020, 2030, and 2050.
- GHG emissions reduction targets for the CAP were established for 2020 and 2030, along with a long-term goal for 2050, consistent with the most recent guidance provided by the California Air Resources Board (CARB):
  - 2 percent below 2014 levels by 2020;
  - 40 percent below 2014 levels by 2030; and
  - 77 percent below 2014 levels by 2050.
- ~~Legislative actions by State or Federal agencies help to reduce emissions in the future, but~~future, but are not enough to achieve the 2030 targets.
- Achieving the 2030 target ~~and 2050 targets~~ will require local action to help close the gap between legislative-adjusted emissions forecasts and the emissions limits established by the CAP's targets.
- The CAP is focused on meeting the 2020 and 2030 targets, which are specific planning targets that will put the County on a long-term downward trajectory towards meeting the long-term 2050 goal.

3. **Local GHG emissions reduction strategies and measures** were identified to help the County achieve the 2020 and 2030 targets.

- GHG reduction strategies in the CAP are aligned with each of the eight GHG inventory ~~sectors, and~~sectors and contain a total of ~~48~~ 49 specific local ~~GHG~~ reduction measures. ~~that will achieve GHG reductions.~~
- ~~Some of the~~ The primary GHG reduction measures identified in the CAP will result in measurable, quantifiable reductions in emissions. ~~Others are~~ Supporting measures are qualitative measures that are difficult to quantify, but will still contribute to achieving local GHG reductions, either alone or in combination with legislative actions or other local GHG reduction measures.

- The top five~~5~~ measures in the CAP that will the achieve the most local GHG emissions reductions by the year 2030 include:
  - Measure BE-~~-6~~4: Requiring new or replacement residential water heating systems to be electrically-powered or alternatively-fueled (e.g., solar thermal, ground-source heat pump) will reduce emissions annually by 11,575 metric tons of carbon dioxide equivalent ($MTCO_2e$) by 2030.
  - Measure AG-~~3~~2: Replacing diesel or gasoline-powered agricultural equipment with electric or alternatively-fueled ~~agricultural~~ equipment ~~and pumps~~ will reduce emissions annually by 8,540 $MTCO_2e$ by 2030.
  - Measure OR-2: Replacing diesel or gasoline with alternative fuels in recreational watercraft throughout the County will reduce emissions annually by 7,512 $MTCO_2e$ by 2030.
  - Measure LU-1: Establishing targets and enhanced programs that result in the preservation of oak woodlands and coniferous forests to avoid future carbon storage and sequestration losses, along with mandatory replanting to mitigate for tree loss when land use changes occur, will result in the annual reduction of 4,544 $MTCO_2e$ by 2030.
  - Measure TR-1: Updating and enforcing the County's Transportation System Management Ordinance will result in an annual reduction of 3,582 $MTCO_2e$ by 2030.
- While the measures included in the CAP are generally geared towards reducing GHG emissions, many will also result in environmental or economic "co-benefits," including climate adaptation co-benefits, that will help to increase community resilience and improve public health.

4. A **climate change vulnerability assessment** was prepared, and climate adaptation measures were developed to improve community sustainability.

- The climate change vulnerability assessment (Appendix C) determined that the County is vulnerable to several adverse impact climate change effects, including:
  - Increases in average temperatures and the frequency of heat waves and extreme heat events;
  - Changes to precipitation patterns;
  - Increased risk of wildfire;
  - Increased likelihood of flooding; and
  - Increased risk of coastal flooding from sea-level rise.
- Specific adaptation measures are included in Chapter 4 to address these effects. Many of the measures require the County and other partnering agencies to address climate-related risks as part of existing planning processes, as well as

The total estimated annual GHG emissions reductions from all reduction measures quantified is approximately ~~57,828~~58,327 $MTCO_2e$ in 2030.

Co-benefits are the collateral positive side effects that result from strategies and measures identified in the CAP.

A vulnerability assessment includes identification of localized climate change exposure and related effects, an assessment of potential areas of vulnerability, a review of the County's current capacity to adapt to climate-related impacts, and consideration of how likely and how quickly impacts will occur. See Appendix C for the full vulnerability assessment.

The CAP outlines how County staff will implement measures, and how the CAP will be monitored and updated over time to ensure measures and targets are achieved.

move towards incremental changes in the way that County services and infrastructure and maintained and operated. Community education and awareness-building are also important components of the adaptation strategies.

5. **Implementation and monitoring mechanisms** are identified that will help the County ~~to~~ ensure that the measures and targets are achieved.

- Implementation of the measures in the CAP will require the County to develop and implement new ordinances, programs and projects, or modify existing ones. This will require careful consideration of the operational and capital resources needed, as well as the timing and phasing of implementation. Chapter 5 outlines these assumptions in detail.
- Monitoring is an important aspect of the CAP to ensure that the County is on track to achieve the GHG reduction targets and desired outcomes for increasing resilience in the face of a changing climate. To this end, the County will need to review and update the GHG emissions inventory periodically (every five years), track the community's progress on the implementation status of each measure in the CAP, and report back to the Board of Supervisors and the public at least every two years.
- The County will use the CAP to streamline the analysis of project-level GHG emissions pursuant to California Environmental Quality Act (CEQA) Guidelines Section 15183.5. Projects subject to discretionary review will be required to determine consistency with the CAP Consistency Checklist (see Appendix D).
- Local action on climate change cannot be addressed insularly by one agency or community, but requires active and ongoing partnerships between residents, businesses, the County, and other agencies and organizations in the region. On a community-wide level, individuals and businesses can play an important role in combating climate change. By changing habits to consume less energy; produce less waste through recycling, conserve water, and compost; and drive less by choosing to carpool, take transit, or walk and bike more frequently, individuals and businesses can work towards reducing their carbon footprint. The combination of these small efforts can lead to better outcomes for the environment and the County.

The County's CAP monitoring and reporting activities will include:

- **Evaluate the performance of CAP measures and prepare a progress report to the Board of Supervisors every two years, and**
- **Review and update the GHG emissions inventory every five years.**

Climate change is a global problem, but one that must be addressed on a local level through partnerships and individual actions.

Napa County Climate Action Plan

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Chapter 1

Introduction

(https://upload.wikimedia.org/wikipedia/commons/e/e2/Bay_Trail_in_Napa_County.jpg)
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1.1 Climate Action Plan Overview

There is strong consensus that global climate change is occurring; seasons are shifting, average temperatures are increasing, precipitation levels are changing, and sea levels are rising. These changes will have adverse effects on human health and safety, economic prosperity, provision of basic services, and the availability of natural resources in Napa County.

The CAP provides the County with a roadmap to address two climate change challenges: to reduce GHG emissions from sources within the County and to improve its response to climate change over the long term.

This Climate Action Plan (CAP) sets a course of action for the County of Napa (County) to address global climate change. The CAP, consistent with and complimentary to s~~S~~tatewide legislation and actions, provides a feasible roadmap for the County to both reduce greenhouse gas (GHG) emissions from many sources in the unincorporated County and address the challenges of a changing climate by helping to adapt and respond to climate change over the long term.

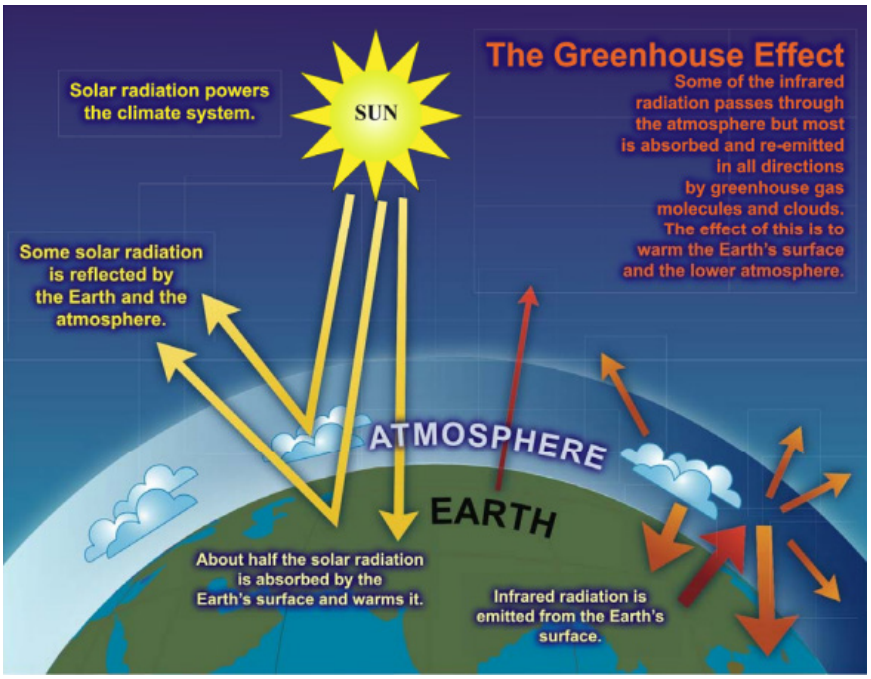
While the CAP uses the best information, research, and techniques available today, technologies and markets are constantly changing. Thus, strategies identified in the CAP may become obsolete considering the development of new technologies that do not yet exist, or as new State and Federal laws are passed. However, the overarching goals of the CAP remain the same: to reduce GHG emissions and prepare for and adapt to climate change.

The County will monitor, review, and update the CAP to ensure continued effectiveness and relevance of the document.

1.2 Introduction to Climate Change Science

The greenhouse effect, as outlined below in Figure 1-1, results from a collection of atmospheric gases called GHGs that insulate the Earth and help regulate its temperature. These naturally occurring gases, mainly water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3), all act as effective global insulators, reflecting Earth's visible light and infrared radiation to keep temperatures on Earth stable. Without the greenhouse effect, Earth would not be able to support life as we know it.

Source: County of Napa



Source: IPCC 2007

Figure 1-1: The Greenhouse Effect

However, human activities (e.g., burning of fossil fuels for transportation and energy, and increasing rates of deforestation and development) have contributed to the elevated concentration of these gases in the atmosphere. Human-caused (i.e., anthropogenic) emissions of GHGs above natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change, or global warming. There is strong scientific consensus that it is "extremely likely" that most of the changes in the world's climate during the last 50 years are a result of anthropogenic GHG emissions (Intergovernmental Panel on Climate Change [IPCC] 2014:3, 5).

It is "extremely likely" that in the last 50 years, most of the changes in the world's climate are a result of anthropogenic, or human-generated, activities.

Furthermore, short-lived climate pollutants (SLCPs), which are GHGs that remain in the atmosphere for a much shorter period than long-lived climate pollutants (i.e., CO_2 and N_2O), are powerful climate forcers that have an outsized impact on climate change in the near term. Despite their relatively shorter atmospheric lifespan, their relative potency in terms of how they heat the atmosphere (i.e., global warming potential [GWP]) can be tens, hundreds, or even thousands of times greater than that of CO_2. SLCPs include CH_4; F-gases, including hydrofluorocarbons (HFCs), perflurocarbons (PFCs), and sulfur hexafluoride (SF_6); and, black carbon.

Global climate change, is causing changes in precipitation patterns, shrinking polar ice caps, rises in sea level, and other impacts to biological resources and humans. Chapter 2 of the CAP summarizes the County's GHG emissions that are contributing to global warming.

Climate change is a global problem and can lead to significant fluctuations in regional climates. While there is consensus that global climate change is occurring, and is influenced by human activity, there is less certainty as to the timing, severity, and consequences of climate change phenomena, particularly at specific locations. Chapter 4 of the CAP discusses the predicted climate change effects in the County in more detail, while also outlining specific vulnerabilities the County faces because of these effects.

The CAP represents an important step in acknowledging global climate change effects on the County. Chapters 3, 4 and 5 of the CAP includes strategies, specific measures, and implementation programs and monitoring tools to reduce GHG emissions and plan for climate change impacts.

1.3 Regulatory Background

Source: County of Napa

In response to the threat of global climate change, the State and County have already taken several steps to both reduce GHG emissions and adapt to climate change. These efforts, briefly summarized below, provide important policy direction and context for the CAP.

1.3.1 California

In 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which directed the State of California to reduce GHG emissions to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. A year later, in 2006, the Global Warming Solutions Act (Assembly Bill [AB] 32) was passed, establishing regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions. AB 32 put a cap on GHG emissions, setting a target of reducing GHG emissions to 1990 levels by 2020. As part of its implementation of AB 32 and Executive Order S-3-05, the California Air Resources Board (CARB) developed a Scoping Plan in 2008. The 2008 Scoping Plan, along with ~~its Update~~ the first update~~s~~ in 2014, describe~~d~~s the approach California ~~will~~ is taking~~e~~ to reduce GHGs to achieve reduction targets and goals for 2020 established under AB 32. According to CARB, California is currently on track to meet or exceed the AB 32 ~~current~~ target of reducing GHG emissions to 1990 levels by 2020.

As directed by AB 32, SB 32 and Executive Orders B-30-15 and S-3-05, the State aims to reduce annual GHG emissions to:

- **1990 levels by 2020,**
- **40 percent below 1990 levels by 2030, and**
- **80 percent below 1990 levels by 2050.**

On April 20, 2015 Governor Edmund G. Brown Jr. signed Executive Order B-30-15, establishing a new GHG emissions reduction target 40 percent below 1990 levels by 2030. This target aligns with those of leading international governments such as the 29-nation European Union which adopted the same target in October 2014. Executive Order B-30-15 also directed CARB to update the ~~AB 32~~ Scoping Plan to ~~reflect the~~identify pathways to achieving the 2030 target. In September 2016, Governor Brown also signed Senate Bill (SB) 32,

which codified into statute the mid-term 2030 target established by Executive Order B-30-15.. The 2017 Scoping Plan, adopted by CARB in December 2017, lays out the framework for achieving the mandate of SB 32 to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030. The new 2030 GHG emissions reduction target places California on a trajectory towards meeting the goal of reducing statewide emissions to 80 percent below 1990 levels by 2050.

Specific to SLCPs, SB 605, which was signed in September 2014, required CARB to develop a plan to reduce emissions of SLCPs. SB 1383, signed in September 2016, requires CARB to approve and begin implementing the plan by January 1, 2018. SB 1383 also sets targets for statewide reductions in SLCP emissions of 40 percent below 2013 levels by 2030 for methane and F-gases and 50 percent below 2013 levels for 2030 for anthropogenic black carbon. CARB adopted the SLCP Reduction Strategy in March 2017 pursuant to SB 605 and SB 1383, laying out options to accelerate SLCP emissions reductions in California through enacting regulations, creating incentives, and other market-supporting activities. SB 1383 also establishes statewide targets to reduce statewide disposal of organic waste by 50 percent below 2014 levels by the year 2020, and a 75 percent reduction below 2014 levels by 2025. Pursuant to the authority granted in SB 1383, the California Department of Resources Recycling and Recovery (CalRecycle) will develop and adopt new statewide regulations by 2019 to achieve the organic waste disposal reduction targets.

In addition to legislation setting statewide GHG reduction targets, SB 375, signed by the Governor in 2008, better aligned regional transportation planning efforts, regional GHG emissions reduction targets, and land use and housing allocations. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy, showing prescribed land use allocations in each MPO's Regional Transportation Plan. CARB, in consultation with the MPOs, provides each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in their respective regions for 2020 and 2035.

To effectively address the challenges that a changing climate will bring, the State also prepared the 2009 California Climate Adaptation Strategy, which highlights climate risks and outlines possible solutions that can be implemented throughout the State. This Strategy was updated in 2014 and is now known as Safeguarding California. In 2015, the State developed the Safeguarding California Implementation Action Plans. The Safeguarding California Plan: 2018 Update was released in January 2018. The plan provides an updated programmatic survey of existing efforts to combat climate change throughout the sState.

1.3.2 Napa County

Over the last decade, the County has taken several steps to begin addressing climate change, sustainability, and reductions in GHG emissions. ~~Dating as far back as~~Since 2007, the County has been involved in various efforts to quantify GHG emissions sources and formulate reduction strategies on both a county and larger regional level. This CAP builds upon these past efforts by creating a GHG inventory for 2014 and forecasting emissions for 2020, 2030, and 2050 to comply with new legislation. Other notable County efforts are highlighted below.

Source: County of Napa

- **GHG Reduction Plan for County Municipal Operations:** In 2007, the Napa County Department of Public Works, together with Kenwood Energy, performed a separate inventory and prepared a reduction plan for the GHG emissions associated with the County's municipal operations. The Emissions Reduction Plan identified a suite of actions that would result in reducing emissions from government operations by 15 percent by 2020 compared to 2008 levels (Napa County 2007). In 2016, the County updated the 2008 GHG emissions inventory for County operations (Napa County 2016). A 10 percent reduction has been achieved so far.

- **Napa County General Plan (2008):** The County General Plan provides the foundation upon which all future land use and public investment decisions are based. It is a guide for the development of all planning documents, including this CAP, which must be consistent with General Plan Policies. The General Plan includes policies aimed at reducing local contributions to global climate change and encouraging sustainable building practices, sustainable vineyard practices, and ecological stewardship. The General Plan's Environmental Impact Report (EIR) specifically directed the County to develop a CAP as an implementation action and mitigation measure to reduce GHG emissions in the County and address climate change impacts (Mitigation Measure M-4.8.7a).

The CAP is not a part of the General Plan, but must be maintained consistent with the General Plan. This allows the County to update the CAP on an ongoing, as-needed basis, without amending the General Plan. It also ensures that County climate action efforts can be adjusted over time to reflect new legislation and technologies.

1.4 Climate Action Plan Purpose and Objectives

The CAP outlines a course of action for the County to reduce community-wide GHG emissions in the County, as well as prepare for and adapt to climate change.

The GHG reduction targets for the County in the CAP have been established ~~are established~~in accordance with CARB's 2017 Scoping Plan recommendations for developing community-wide, plan-level reduction targets. ~~in proportion to CARB's Draft 2030 Target Scoping~~

AB 32, SB 32, and Executive Orders B-30-15 and S-3-05 use 1990 levels as a benchmark to identify statewide reduction targets and long-term goals. Because the County's 1990 emissions level were not estimated, proportional targets for the County's CAP were developed for 2014 that are consisted with CARB's ~~Draft 2030 Target~~2017 Scoping Plan and the State's 2014 GHG emissions inventory.

~~Plan's community-wide GHG reduction targets.~~ Consistent with the Scoping Plan targets and the State's 2014 GHG emissions inventory, the CAP aims to achieve the following local community-wide GHG reduction targets for 2020 and 2030, and a longer-term goal for 2050:

- 2 percent below 2014 levels by 2020;
- 40 percent below 2014 levels by 2030; and
- 77 percent below 2014 levels by 2050.

Source: County of Napa

To achieve these objectives, the CAP identifies the following:

- A summary of baseline GHG emissions and the potential growth of these emissions over time;
- The expected climate change effects on the County, including areas of vulnerability;
- GHG emissions reduction targets and goals to reduce the community's contribution to global warming; and
- Identification and evaluation of strategies and specific primary and secondary measures to comply with statewide GHG reduction targets and goals, along with measures to help the community adapt to climate change impacts.

As part of CAP implementation, each strategy and measure must be continually assessed and monitored. Reporting on the status of implementation of strategies, conducting periodic updates to the GHG emissions inventory, and performing other monitoring activities will help to ensure that the CAP is making progress towards established goals. See Chapter 5 for more information on administering, implementing, and monitoring the CAP.

1.5 Co-Benefits

Co-benefits are the collateral positive side effects that result from strategies and measures identified in the CAP.

While the measures included in the CAP are generally geared towards reducing GHG emissions, many will also result in environmental or economic "co-benefits." Environmental co-benefits include improved air quality, water supplies, biological resources, public health outcomes, and beneficial outcomes for other resources. For example, a significant co-benefit of implementing ~~CAP~~ GHG measures related to reductions in motor vehicle use and associated fuel combustion will result in fewer toxic air contaminants, leading to better air quality and improved health for everyone. Other strategies focus on improving energy and water-use efficiency in new and existing buildings, which often contribute to ~~lowering~~ reducing overall housing and operational costs for residents and businesses. Another key GHG reduction measure focuses on improving the sustainability of wineries in the County, which is a large economic driver. By incentivizing wineries in the County to participate in the Napa Green Program, wineries could expand their facilities while also reducing the amount of GHGs their facilities emit.

Furthermore, several reduction measures encourage transit-oriented development and siting of affordable housing in the County, which allow residents to live closer to jobs, schools, and services, as well as help to reduce housing costs. The CAP also supports the development of increased interregional transit solutions, as well as the construction of more park and ride facilities. ~~These~~ Other transportation measures including encouraging~~e~~ the use of active modes of transportation, which can have public health benefits and allow people to drive less, save money, and use their time more constructively.

More detailed discussion of reduction measures, along with their co-benefits, can be found in Chapter 3, Greenhouse Gas Emissions Reduction Strategies and Measures. Further details on the co-benefits analysis can be found in Appendix B. Adaptation co-benefits can be found in Chapter 4, Climate Change Vulnerability and Adaptation.

Co-Benefits identified in the CAP:

- Improved Air Quality
- Reduction in Black Carbon Emissions
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Improved Quality of Life
- Reduced Fossil Fuel Reliance
- Protection of Structures and Assets
- Increased Public Awareness of Climate Change
- ~~Lowered~~ Reduced Energy Demand
- ~~Lowered~~ Reduced Building and Operating Costs
- ~~Lowered~~ Reduced Energy, Water~~,~~ and Sewer Bills

1.6 Community Action and Public Involvement

1.6.1 Community Action

While global change is happening worldwide, local efforts to reduce human-induced GHG emissions and build resilience in the face of adverse climate change effects can make a difference. Local action on climate change cannot be addressed individually by one agency or community, but requires active and ongoing partnerships between residents, businesses, the County, and other agencies and organizations in the region. By beginning to plan now and engage in more sustainable practices, communities will be better suited to adapt and respond to climate change in the future.

Climate change is a global problem, but one that must be addressed on a local level through partnerships and individual actions.

Effective and long term climate action and resiliency in the County can only be achieved through efforts that continue to change the way individuals interact with the environment. The CAP serves as a resource and starting point to support long term sustainability efforts.

1.6.2 Summary of Public Involvement

The CAP was prepared with the involvement and engagement of key internal and external stakeholder groups from various public, private, and nonprofit sectors; as well as individual citizens and residents of the County. ~~A total of~~ The County has held several ~~four~~ outreach meetings and public hearings ~~occurred~~ at key milestones in the process to ~~,~~ engage ~~ing~~ the community and interested stakeholders.

Source: County of Napa

The first meeting, which occurred in November 2015, introduced the CAP process, provided a history of County actions to date on climate change, and provided an explanation of methods used in GHG emissions inventories. The second meeting took place in February 2016 and presented the results of both the draft GHG emissions inventory and emissions forecasts for the County. There was also time allotted for public comments and questions. The third meeting, occurring in June 2016, presented the draft emissions reductions targets, measures, and gap analysis. ~~The final~~At a fourth meeting, held in February 2017, staff presented the Draft CAP to the public and the County Watershed Information and Conservation Council. Public comments on the Draft CAP were accepted from January 26, 2017 through March 10, 2017.

The Planning Commission ~~will hold~~held a public hearing on the Final CAP on July 5, 2017. The Planning Commission received public comments at this hearing and provided comments and questions to staff, but the Commission did not take action in forwarding a ~~and will be requested to forward a~~ recommendation for adoption to the Board of Supervisors.

In response to public comments received in 2017, the County has since prepared a Revised Draft CAP that will be circulated for public review in the Summer of 2018. Public comments will be accepted on the Revised Draft CAP and the Planning Commission will hold a public hearing on the plan during the comment period. The County is also preparing an EIR for the CAP pursuant to the California Environmental Quality Act (CEQA). The EIR will be released for public review following the public review period for the Revised Draft CAP.

The Final Revised CAP will be brought forth to the Planning Commission for a public hearing and they will be requested to forward a recommendation to adopt the plan to the Board of Supervisors. The Final Revised CAP proposed for adoption will be considered by the County Board of Supervisors at a public hearing.

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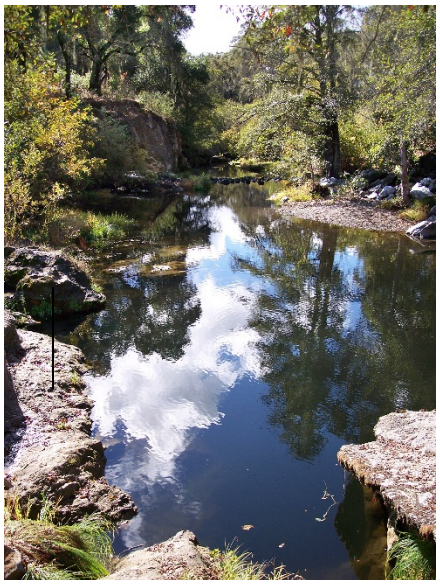
Chapter 2

Greenhouse Gas Emissions Inventory, Forecasts, and Reduction Targets

(https://upload.wikimedia.org/wikipedia/commons/4/48/Rolling_hills_of_the_Napa_valley.jpg)By nigelpepper (Rolling hills of the Napa valley) [CC BY 2.0 (http://creativecommons.org/licenses/by/2.0)], via Wikimedia Commons

2.1 Introduction

This chapter summarizes the community's contribution to global warming by offering a detailed accounting of greenhouse gas (GHG) emissions within the unincorporated areas of Napa County. It includes a discussion of the primary sources and annual levels of GHG emissions for 2014 (i.e., inventory); describes likely trends if emissions are not reduced for 2020, 2030, and 2050 (i.e., forecasts); and sets a path forward to reduce emissions for specific target years (i.e., 2020, 2030), ~~and~~ in view of a longer-term reduction goal for 2050 ~~(i.e., targets)~~. Emissions from communitywide activities are discussed in Sections 2.2 through 2.4.



Source: County of Napa

2.1.1 Why Prepare a Greenhouse Gas Emissions Inventory?

Recent increases in global temperatures are highly correlated with elevated GHG emissions resulting from human activities. Per the scientific community, to avoid "dangerous climate change" in the Earth's climate system, GHG emissions will need to be stabilized so that global temperatures do not increase more than 3.6 degrees Fahrenheit (°F) (2 degrees Celsius [°C]) above pre-industrial levels. To achieve this outcome, global carbon dioxide (CO_2) emissions must be stabilized between 300 and 350 parts per million (ppm).

One of the main objectives of this climate action plan (CAP) is to identify and reduce local contributions to global GHG emissions. This chapter is intended to serve as a foundation for the strategies and measures that will implement the commitment of the County of Napa (County) to reducing GHG emissions. Measuring GHG emissions is a critical first step in developing the CAP for several reasons. First, the GHG inventory identifies major sources and quantities of GHG emissions associated with the activities and choices currently made by residents, businesses, and public institutions. Second, the inventory provides the baseline that is used to forecast emissions trends and to develop an accurate near-term reduction target and interim goals consistent with State objectives. Finally, the inventory sets the baseline for the County to develop, evaluate, and implement strategies and measures to achieve its near-term target and interim goals.

The GHG emissions inventory also plays a role in ensuring that the County stays on course to meet the GHG reduction targets. After the CAP is adopted, the County will prepare regular GHG emissions inventories that will be compared to the baseline inventory and be used to track progress in reducing emissions as the CAP is ~~CAP measures are~~ implemented.

The inventory establishes 2014 as the baseline year from which the County determines GHG reduction targets.

The inventory baseline is used to:

- **forecast emissions,**
- **develop reduction targets, and**
- **develop, evaluate, and implement strategies to achieve the targets.**

Assembly Bill (AB) 32, Senate Bill (SB) 32, and Executive Orders B-30-15 and S-3-05 use 1990 levels as a benchmark to identify statewide reduction targets. Because the County's 1990 emissions level was not estimated, proportional targets for the County's CAP were developed for 2014 that are consistent with guidance provided by CARB in the 2017 ~~'s Draft 2030 Target~~ Scoping Plan and the State's 2014 GHG emissions inventory.

2.1.2 Overview of GHG Emissions Inventory Characteristics

The emissions inventory is limited to gases that are generated locally in the County or within the region from a defined set of sources (e.g., transportation, electricity use, waste) that can be readily monitored and reduced through County actions.

A local community GHG emissions inventory is an estimate of a defined set of gases emitted to the atmosphere from local or regional sources that contribute to climate change. The six primary GHG emissions typically included in a community GHG emissions inventory are carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); and, three types of fluorinated gases (F-gases), including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

~~Two common terms used when discussing climate change are "carbon footprint" and "GHG emission inventories." While related, these concepts are not synonymous.~~ The community emissions inventory prepared for this CAP is limited to production- and activity-based emissions that are generated from local and regional activities within the unincorporated County or the surrounding region (i.e., San Francisco Bay Area), from a defined set of sources (e.g., transportation, electricity use, waste). ~~These include emissions that can be readily estimated, monitored and reduced by County measures that support the efforts of residents and businesses, and are within local jurisdictional control.~~ The County's inventory was prepared in accordance with the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (International Council for Local Environmental Initiatives [ICLEI] 2012). According to this Protocol, local governments retain discretion regarding the scope of emissions to be included in a local community emissions inventory. Furthermore, as part of the scoping process for preparing a community emissions inventory, local governments need to consider what GHG accounting reporting framework is appropriate for preparation of their local CAP. Like many other local governments in California, the County prepared an emissions inventory using a framework consistent with the Protocol that accounts for emissions sources over which the County would have "significant influence." These sources primarily include community-wide activities that generate emissions within the boundaries of the unincorporated County; however, in the case of transportation, on-road vehicle trip origins and destinations may be located within the County (as a whole) or the broader region (i.e., the San Francisco Bay Area).

Source: County of Napa

Two common terms used when discussing GHG~~greenhouse gas~~ emissions and climate change are "carbon footprint" and "GHG emission inventories." While related, these concepts are not synonymous.

The emissions inventory does not comprehensively address everyone's "carbon footprint" or attempt to quantify life-cycle or consumption-based emissions on a global scale that could be generated from all economic activities associated with the County (e.g., purchasing imported goods, global goods exports, or air travel

to and from the County). Unlike a GHG emissions inventory, a carbon footprint is not limited to a defined geography or to a set of activities and sources ~~that~~ over which the County ~~can~~ has significant influence. A carbon footprint is based on a life-cycle analysis of GHG emissions that result from numerous activities of residences, businesses or organizations, such as the energy required to grow and ship food; the energy required for various forms of travel or goods movement far beyond the County's borders (e.g., trains, planes, ships); or the embodied energy to manufacture, market, and dispose of the products we use.

On a community-wide level, individuals and businesses can play an important role in combating climate change. By changing habits, residents and businesses can work towards reducing their carbon footprint

Local community GHG emissions inventories are focused on emissions that occur within the physical boundaries of the local community or its surrounding region and over which local agencies have significant influence. Attempting to account for the global, life-cycle carbon footprint of the community in the context of a GHG emissions inventory for a local CAP could result in double counting emissions that are within the inventories of other jurisdictions in California or elsewhere. Furthermore, the State of California's GHG emissions inventories are not based on global, life-cycle emissions analysis; and, the GHG reduction targets established under Assembly Bill (AB 32) and Senate Bill (SB 32) do not assume that achievement of those targets applies to the State's global carbon footprint. Thus, considering the scoping guidance provided in the U.S. Community Protocol and consistent with the State's emissions inventories and efforts to reduce statewide GHG emissions, the preparation of the 2014 GHG emissions inventory for the County's CAP does not include the calculation of the community's global ~~"~~carbon footprint.~~"~~

This CAP includes strategies and measures that will help achieve the County's objectives to reduce GHG emissions as documented in the GHG emissions inventory. Many of the measures could also help residents, businesses, and organizations reduce their carbon footprint; however, achieving the targets in the context of the community's broader carbon footprint is beyond the scope of this CAP.

It should be noted that residents, businesses, and organizations make choices daily that produce GHG emissions that may be beyond the influence of the County and the CAP. This does not mean that individual residents or business in the County should feel limited to only those measures identified in this CAP, which are focused primarily on the County's inventoried emissions. Rather, members of the community can still make climate-friendly choices, such as buying locally-grown foods and locally-manufactured products that reduce electricity and energy use, to further reduce the local carbon footprint and further contribute to helping reverse global warming trends on a global scale.

The County's 2014 GHG Emissions Inventory has Nine Sectors:

1. **Building Energy Use**
2. **On-Road Vehicles**
3. **Solid Waste**
4. **Agriculture**
5. **Off-Road Vehicles**
6. **High GWP Gases**
7. **Wastewater**
8. **Land Use Change**
9. **Imported Water Conveyance**

2.2 Inventory

The first step in the County's climate action planning process is to understand the sources and amounts of GHG emissions generated from activities within the County.

The County's 2014 inventory of GHG emissions is broken down into the following nine sectors, shown in decreasing order by level of contribution:

- **Building Energy Use:** Building Energy sector emissions include CO_2, CH_4, and N_2O emissions generated as the result of electricity and natural gas consumption in residential, commercial, and industrial buildings and stationary equipment, including water pumps for private wells.

Black carbon emissions associated with diesel exhaust will continue to be reduced through state actions.

- **On-Road Vehicles:** On-road transportation emissions include CO_2, CH_4 and N_2O emissions associated with gasoline, diesel and other fossil fuel consumption from motor vehicles on local and regional roadways.

- **Solid Waste:** Solid Waste sector emissions include waste-in-place CH_4 emissions generated from the decomposition of previously-landfilled waste in existing landfills operating in the County, as well as CH_4 emissions from the decomposition of waste generated by residences and businesses in the County in at landfills in various locations.

- **Agriculture:** Agriculture sector emissions include CO_2, CH_4 and N_2O generated during fuel combustion in farm equipment operations; CH_4 and N_2O emissions from livestock; and, N_2O from fertilizer use.

Source: County of Napa

- **Off-Road Vehicles:** Off-road vehicles and equipment generate CO_2, CH_4 and N_2O emissions associated with combustion of gasoline, diesel and other fossil fuels.

- **High global warming potential (GWP) gases**: High GWP gas emissions are generated as the result of the use or leakage of refrigerants, electrical insulators in transmission lines, fumigants, and other materials. Emissions in this sector include F-gases such as HFCs, PFCs, and SF_6.

- **Wastewater:** Wastewater treatment results in CO_2 emissions associated with the electricity consumed during treatment, as well as fugitive CH_4 emissions resulting from the treatment process for domestic sewage and industrial wastewater. Fugitive CH_4 accounts for most of the emissions in this sector.

- **Land Use Change:** Lost carbon sequestration and storage potential from conversion of natural lands such as oak

woodlands, forests, and shrublands to developed uses, such as agriculture or urban development.

- **Imported Water Conveyance:** Water-related emissions include CO_2 associated with energy and fuel used to convey imported water into the unincorporated County for domestic, irrigation, and industrial purposes.

An important aspect of GHGs is the unit of measurement used to inventory and estimate emissions. CO_2 is the most prevalent and recognized GHG; however, there are five other primary GHGs that must be addressed to meet State-mandated reduction targets, including: CH_4, N_2O, SF_6, HFCs, and PFCs. To simplify discussion and comparison of these emissions collectively, climate action plans use a measurement known as carbon dioxide equivalent (CO_2e).

CO_2e measurement translates each GHG to an equivalent volume of CO_2 by weighting it by its relative global warming potential (GWP). For example, per the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment, CH_4 and N_2O are approximately 25 and 298 times more potent, respectively, than CO_2 in their ability to trap heat in the atmosphere (IPCC 2007). The County's 2014 GHG emissions inventory uses the IPCC's Fourth Assessment Report values to maintain consistency with the latest statewide inventory prepared by the California Air Resources Board (CARB). Converting all six classes of GHG emissions into "carbon dioxide equivalents (CO_2e)" using GWP values allows us to consider all the gases in comparable terms and makes it easier to communicate how various sources and types of GHG emissions contribute to global warming using a standard unit of measurement. A metric ton of CO_2e ($MTCO_2e$) is the standard unit of measurement of the amount of GHG emissions produced and released into the atmosphere.

See Section 1.3 Regulatory Background for a more detailed summary of the legislation pertinent to short-lived climate pollutants (SLCPs).

Some GHG emissions can also be referred to as "short-lived climate pollutants" (SLCPs) because they remain in the atmosphere for a much shorter period than long-lived climate pollutants and have much higher ~~global warming potential (~~GWP~~)~~ values than longer-lived climate pollutants. SLCPs include CH_4, F-gases, and black carbon.

The GHG emissions inventory prepared for this CAP includes the most common and prevalent SLCPs (i.e., CH_4 and F-gases); however, black carbon emissions are not quantified in the inventory. Pursuant to ~~Senate Bill (~~SB~~)~~ 605 and 1383, CARB adopted the SLCP Reduction Strategy in March 2017, which outlines how the State will reduce emissions of SLCPs. CARB notes in the SLCP Reduction Strategy that there are considerable difficulties in developing accurate black carbon estimates at the statewide level because they depend on a variety of factors with ~~very~~ high rates of variability and uncertainty (CARB 2017b). Thus, because of this uncertainty and known difficulties in developing reliable methods for black carbon inventories, black carbon emissions are not included in the 2014

On a local level, certain measures related to on-road transportation and wildfire, will have a co-benefit of reducing black carbon emissions.

emissions inventory. Nevertheless, the State is leading the way in reducing black carbon emissions. The SLCP Strategy states that while mobile sources (primarily from diesel exhaust) and wildfire are the primary statewide sources of black carbon, black carbon emissions from mobile sources have been reduced by 90 percent since the 1960s and the State's air quality policies will virtually eliminate black carbon emissions from on-road diesel engines within 10 years. Additionally, wildfires are now the largest statewide source of black carbon, and the ~~state~~ State will continue to explore the actions needed to decrease emissions (CARB 2017b).

Transportation sector GHG reduction measures contained in this CAP are aimed at reducing fossil fuel combustion, increasing the use of alternative fuel and zero-emissions vehicles, and reducing vehicle miles traveled (VMT). These measures will help to further reduce fine particulate matter ($PM_{2.5}$) from diesel fuel combustion and other sources, which will complement the State's efforts under the SLCP strategy and result in co-benefits of reducing black carbon emissions in the County. Less black carbon would also be emitted into the atmosphere in the County through wildfire-related climate adaptation measures contained in this plan. For a complete list of measures related to on-road transportation and wildfire, see Chapters 3 and 4.

The Top Five Emitting Sectors in 2014:

1. **Building Energy Use (31%)**
2. **On-Road Vehicle (26%)**
3. **Solid Waste (17%)**
4. **Agriculture (10%)**
5. **Off-Road Vehicles (9%).**

Further details on the methodology for the inventory can be found in Appendix A.

2.2.1 Napa County's 2014 GHG Emissions

The County's 2014 emissions are equal to the emissions of a car driving 1.4 billion miles, or driving to the moon and back 2,851 times.

In 2014, communitywide activities in the County accounted for 484,283 $MTCO_2e$. Most emissions were due to building energy use and on-road vehicle activity. Thirty-one percent of these emissions were due to energy used in buildings for heating, cooling, and powering devices, equipment, and other energy loads. Emissions from gasoline and diesel consumption related to vehicles and trucks on local and regional roads accounted for another 26 percent of the County's emissions in 2014.

To put the County's emissions into perspective, 484,283 $MTCO_2e$ is equivalent to combusting 54.5 billion gallons of gasoline, combusting 258,388 tons of coal, or a year's worth of carbon sequestration from 458,424 acres of U.S. forests. Assuming an average car gets about 25 miles to the gallon, the County's 2014 emissions is same as a single car driving 1.4 billion miles, or driving to the moon and back 2,851 times (U.S. Environmental Protection Agency 2016).

Additional detail related to the specific emission sectors, data sources, assumptions, and methodology can be found in Appendix A. Figure 2-1 and Table 2-1 below show the breakdown of Napa County's GHG emissions 2014.

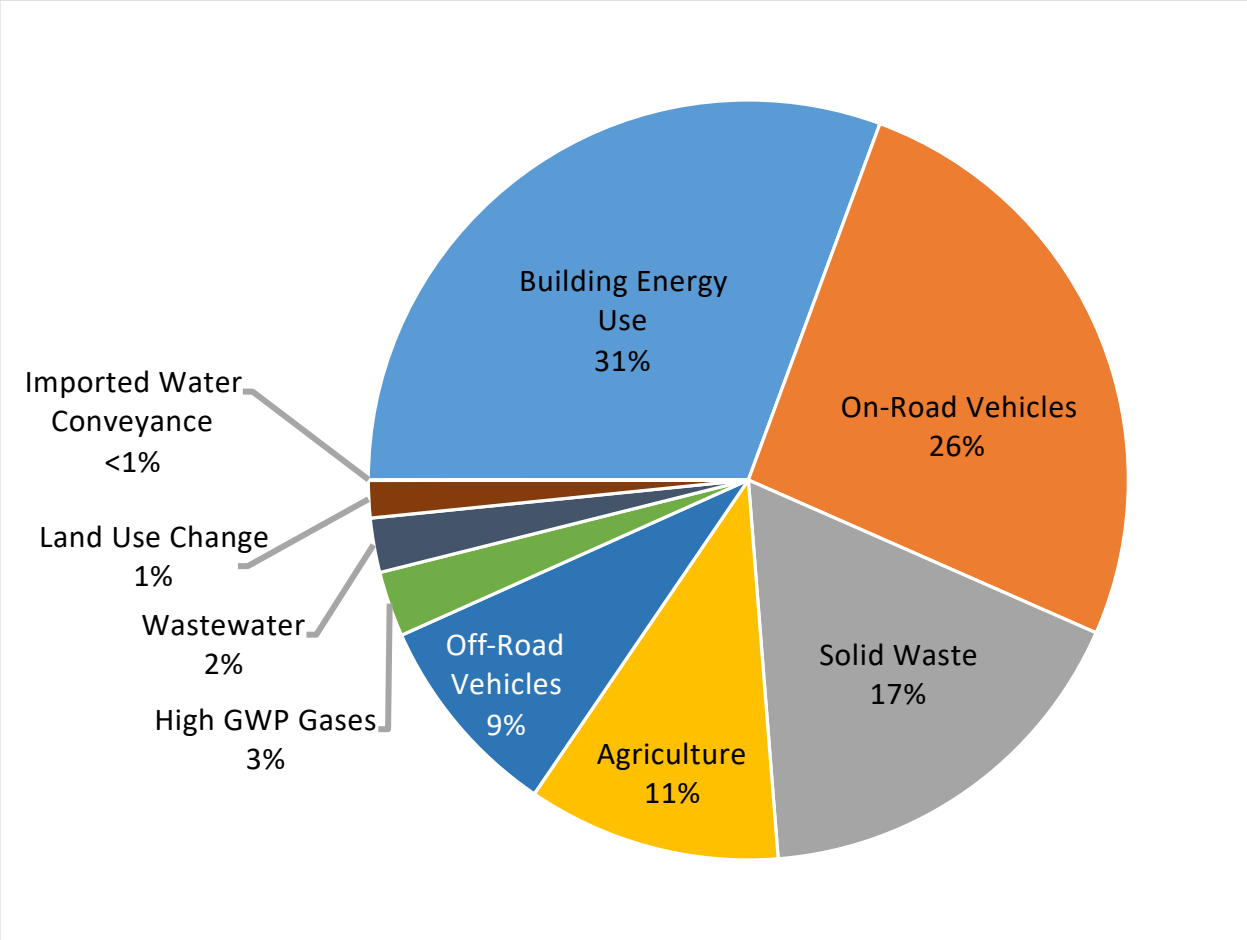


Figure 2-1: Napa County 2014 GHG Emissions

Table 2-1 2014 Unincorporated Napa County Greenhouse Gas Inventory

Emissions Sector	$MTCO_2e$	Percent
Building Energy Use	148,338	31
On-Road Vehicles	125,711	26
Solid Waste	83,086	17
Agriculture	52,198	11
Off-Road Vehicles	42,508	9
High GWP Gases	13,481	3
Wastewater	11,189	2
Land Use Change	7,684	1
Imported Water Conveyance	88	<1
Total	**484,283**	**100**

Source: Ascent Environmental 2016

2.3 Forecasts

GHG emissions forecasts provide an estimate of future emission levels based on a continuation of current trends in activity while also accounting for known regulatory actions by State or Federal agencies (i.e., "legislative" actions) that could reduce emissions in the future. Forecasts provide insights into the scale of local reductions needed to achieve the GHG emissions reduction targets, in addition to legislative actions.

The BAU GHG emissions forecasts in the CAP assume a continued increase in population, housing units, employment and vehicle activity. Projections are based on Metropolitan Transportation Commission (MTC) and the Napa County General Plan.

The first step in preparing GHG emissions forecasts is the preparation of a "business-as-usual" (BAU) forecast, which assumes that no additional efforts or legislative actions beyond what have already been adopted will be made to reduce GHG emissions in the future. The BAU forecast also assumes that population, housing, employment, and transportation activity will grow over time, consistent with County projections. Finally, the BAU forecast does not account for GHG emissions reductions associated with implementation of the CAP or legislative actions.

Details on how the forecasts were developed and the indicators used to estimate each sector can be found in Appendix A.

2.3.1 Demographic Trends

From 2014 levels, population in the County is expected to increase by:

- **7 percent by 2020,**
- **19 percent by 2030, and**
- **44 percent by 2050.**

GHG emission forecasts were estimated for 2020, 2030, and 2050 using County-specific demographic and vehicle activity projections through 2040 from the Metropolitan Transportation Commission (MTC). Based on MTC's projections, the County's unincorporated population is expected to increase by 7 percent by 2020, 19 percent by 2030, and 44 percent by 2050 from 2014 levels. Growth in employment is expected at a lower rate than population, with jobs growing by 3 percent by 2020, 8 percent by 2030, and 17 percent by 2050. This is likely because of the continued agricultural character and associated employment characteristics in the unincorporated area.

The number of households in the unincorporated area is also anticipated to grow by 5 percent by 2020, 12 percent by 2030, and 28 percent by 2050 from 2014, a significantly lower rate than population. Housing growth is anticipated to be concentrated in the cities and towns to accommodate future population increases, highlighting planning efforts to reduce sprawl and achieve denser development.

The forecasts also consider anticipated changes in land use based on Napa County's General Plan. These land use change forecasts not only affect housing and population, but they also indicate losses in natural vegetation, such as oak woodlands and forests, that sequester CO_2 from the atmosphere.

2.3.2 Legislative Reductions

Source: County of Napa

The County's GHG forecasts account for a variety of legislative actions that will reduce future emissions from the County, without any additional local government action called for in this CAP. The applied legislative reductions include:

- improved vehicle fuel efficiency standards;
- a Federal ban on certain high-GWP gases;
- adopted improvements to the State's Building Energy Efficiency Standards;
- adopted statewide targets to reach 33 percent renewable mix in statewide electricity generation by 2020 and 50 percent by 2050;
- a statewide target to double energy efficiency in existing buildings by 2030 (i.e., ~~Senate Bill [~~SB~~]~~ 350);
- a 75 percent statewide waste diversion goal by 2020;
- planned landfill gas capture projects pursuant to State regulations; and
- participation in Marin Clean Energy (MCE).

The legislative reductions described above do not assume that the stringency of GHG emissions reductions will increase beyond 2030. A detailed description and analysis of how specific legislative reductions are included in the County's BAU GHG emissions forecast can be found in Appendix A. Table 2-2 and Figure 2-2 below show the breakdown of the County's forecasted BAU GHG emissions, including a comparison to total annual emissions that will occur without any legislative reductions.

Table 2-2 Unincorporated Napa County BAU GHG Emissions Forecasts: With and Without Reductions ($MTCO_2e$/yr)

Sector and Subsector	2014	2020	2030	2050
Building Energy	148,337	131,643	59,150	67,184
Transportation	125,711	112,854	84,846	85,735
Solid Waste	83,086	62,345	56,711	48,854
Agriculture	52,198	52,521	53,589	57,446
Off-Road Vehicles and Equipment	42,508	45,164	49,592	58,474
High-GWP Gases	13,481	11,828	13,169	15,867
Water and Wastewater	11,277	11,858	12,959	14,335
Land Use Change	7,684	35,608	18,239	21,669
Total BAU with Legislative Reductions	**484,283**	**463,821**	**348,253**	**369,563**
Percent change from 2014 (%)	*0%*	-4%	-28%	-24%
Total BAU without Legislative Reductions	484,283	523,645	522,248	557,379
Percent change from 2014 (%)	*0%*	*8%*	*8%*	*15%*
Reductions due to Current Legislative Actions	0	59,824	173,995	187,816

Notes: Columns may not add to totals due to rounding.
BAU = business as usual
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Ascent Environmental 2016

2.3.3 BAU GHG Forecasts with Legislative Reductions

Taking legislative reductions into account, emissions are projected to decrease in the BAU forecast. However, these reductions in emissions are not, in and of themselves, enough to meet State mandates.

The legislative actions listed above will help to lower GHG emissions in the unincorporated County, as shown in Table 2-2. Despite a 44 percent increase in population between 2014 and 2050, and without the strategies and measures included in this CAP (see Chapter 3), it is estimated that GHG emissions will decrease by 4 percent from 2014 levels to 463,821 $MTCO_2e$/year by 2020. By 2030 and 2050, emissions will decrease by 28 and 24 percent below 2014 levels, respectively. The overall decrease in emissions is primarily because of substantial increases in renewable electricity generation, improved energy efficiency in existing buildings, and more efficient vehicles. As shown in the legislative-adjusted forecasts in Table 2-2, transportation will replace building energy as the largest emissions sector in the future, accounting for 23 percent of emissions through 2050. On the other hand, emissions from building energy accounted for 31 percent of the County's emissions in 2014, but will account for less than 18 percent of emissions by 2050 in the legislative-adjusted forecasts.

2.4 Reduction Targets

This CAP primarily focuses on reducing emissions by 2020 and 2030, consistent with State mandates. While setting goals beyond 2030 is important to provide long-term objectives, it is difficult to establish targets beyond a 15-year time frame for which defensible reduction assumptions can be made. This is primarily because of uncertainty around future technological advances and future changes in State and Federal law beyond 2030.

Source: County of Napa

As directed in ~~Assembly Bill (~~AB~~)~~ 32, SB 32, and Executive Orders B-30-15 and S-3-05, the State aims to reduce annual statewide GHG emissions to:

- 1990 levels by 2020;
- 40 percent below 1990 levels by 2030; and
- 80 percent below 1990 levels by 2050.

CARB developed the *First Update to the Climate Change Scoping Plan (Scoping Plan Update)* pursuant to AB 32. It indicated that reducing the State's emissions to 80 percent below 1990 levels by 2050 would be consistent with the IPCC's analysis of the global emissions trajectory needed to stabilize atmospheric concentrations at 350 ppm or less, to reduce the likelihood of catastrophic global climate change (CARB 2014).

To determine an equivalent reduction target at the local level, CARB's ~~Draft~~ 2017 Scoping Plan Update recommends community-wide GHG reduction goals for local climate action plans that will help the State achieve its 2030 target and longer-term 2050 ~~targets~~ goal (CARB 2017a). These goals consist of reducing emissions to 6 $MTCO_2e$ per capita and 2 $MTCO_2e$ per capita by 2030 and 2050, respectively. Considering the overall statewide emissions in 2014 and the estimated statewide population for 2014 through 2050, CARB's recommended per-capita goals are equivalent to reducing 2014 emissions by 40 percent by 2030 and 77 percent by 2050 (CARB 2016, Department o~~O~~f Finance 2014). Thus, consistent with CARB's recommended community-wide targets and recent updates to the State's 2014 GHG emissions inventory, the following adjusted reduction targets should be achieved in the County:

- 2 percent below 2014 levels by 2020;
- 40 percent below 2014 levels by 2030; and
- 77 percent below 2014 levels by 2050.

Attaining a 2 percent reduction in GHG emissions will require that annual emissions be reduced to approximately 474,598 $MTCO_2e$/year in 2020, which is about 9,686 $MTCO_2e$/year lower than 2014 levels. Forecasts in Table 2-2 show that the County will meet and exceed

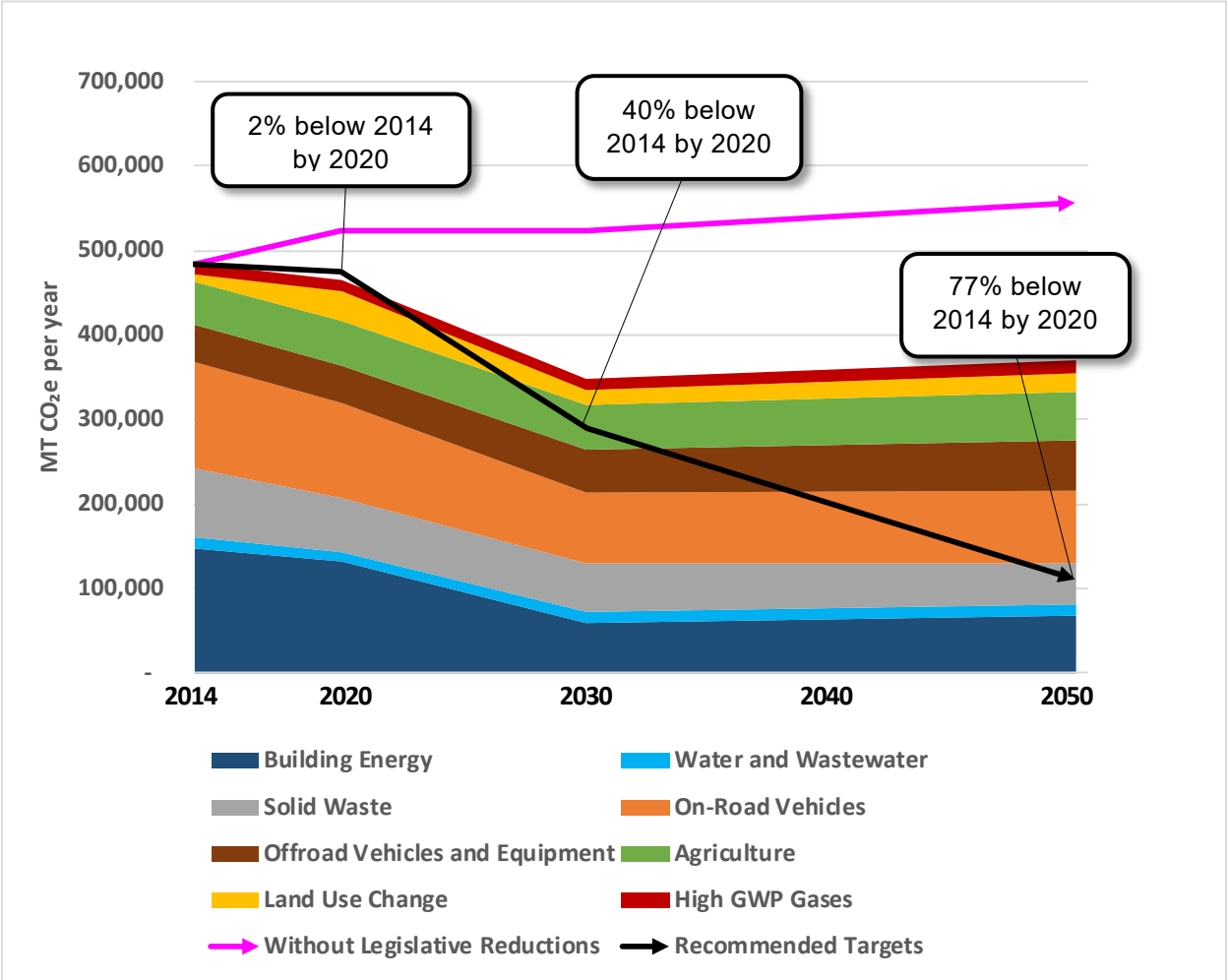
The County's reduction targets are consistent with CARB's ~~Draft~~ 2017 Scoping Plan~~'s~~ recommendations for developing ~~ed~~ community-wide targets and long-term goals, as well as the State's 2014 GHG emissions inventory.

To meet reduction targets, the County will need to reduce emissions to:

- **474,598 $MTCO_2e$/year in 2020,**
- **290,570 $MTCO_2e$/year in 203, and**
- **111,385 $MTCO_2e$/year in 2050**

this reduction target by over 10,000 $MTCO_2e$ through existing legislative reductions.

To achieve long-term GHG reductions, the County will need to reduce emissions to 290,570 $MTCO_2e$/year by 2030, or about 193,713 $MTCO_2e$ (40 percent) below 2014 GHG emissions levels. To achieve a 77 percent reduction in GHG emissions from 2014 levels by 2050, the County will need to reduce its emissions to about 111,385 $MTCO_2e$ per year in 2050, which is about 372,898 $MTCO_2e$ lower than 2014 levels. A detailed technical analysis of the County's emissions reduction target and goals can be found in Appendix B. Figure 2-2 below shows the GHG reduction targets alongside the breakdown of the County's emissions over time discounting any actions and measures proposed in this CAP.



Source: Ascent Environmental 2016

Figure 2-2: Napa County BAU GHG Emissions Forecasts, ~~and~~ Targets and Goals without CAP Measures

Napa County Climate Action Plan

A Tradition of Stewardship
A Commitment to Service

Chapter 3

Greenhouse Gas Reduction Strategies and Measures

Source: County of Napa

3.1 Introduction

This chapter outlines strategies and specific measures to be implemented by the County of Napa (County) to achieve its greenhouse gas (GHG) reduction targets for 2020 and 2030 and longer-term 2050 goal over the coming decades. The strategies and measures focus on locally-based actions to reduce GHG emissions in various sectors as a complement to legislative actions taken by the State or Federal government.

The strategies mainly focus on community-scale strategies, but also include municipal operations strategies – to address both public and private responsibility for climate change. Through partnerships with and among residents, businesses, and other organizations, these measures will provide net benefits for everyone, such as an improved environment, long-term cost savings, conserved resources, a strengthened economy, and greater quality of life, while also making a difference in the world.

Strategies are organized under ~~seven~~ eight GHG emissions sector-based strategies and one multi-sector strategy.

Measures ~~identify specific locally based-actions to reduce GHG emissions.~~ are also further organized into two categories: primary measures and supporting measures.

In addition to defining new measures, the Climate Action Plan (CAP) accounts for existing plans, programs, and activities that the County has already undertaken to reduce GHG emissions. The CAP acknowledges these efforts and, in some cases, builds or expands on them.

Many of the strategies and measures to reduce GHG emissions will also have important co-benefits, such as improved air quality, improved water quality, improved conditions for biological resources, and beneficial public health outcomes, which are discussed in this chapter. Further details on the co-benefits analysis can be found in Appendix B. Climate change adaptation and building community resilience are important co-benefits of many GHG reduction measures, and this is discussed in further detail in Chapter 4, Climate Change Vulnerability and Adaptation.

Co-benefits are the additional~~,~~ beneficial effects that will result from implementation of strategies and measures identified in the CAP, above and beyond the direct benefits of reducing GHG emissions. Co-benefits include improved air quality, water quality, biological resources, and public health outcomes, and beneficial outcomes for other ~~non-renewable energy~~ resources.

3.2 Summary of Greenhouse Gas Reduction Strategies

As described in Chapter 2, the County has established a 2020 GHG emissions reduction target (2 percent below 2014 levels), ~~and~~ 2030 ~~and 2050~~ target~~s~~ (40 percent ~~and 77 percent~~ below 2014 levels), and long-term emissions reduction goal for 2050 (77 percent below 2014 levels ~~respectively~~) to reduce annual emissions levels, consistent with State laws and guidelines. If communitywide emissions in the county were to continue growing under business-as-usual (BAU) practices and activities, the County's GHG emissions will meet and exceed the 2020 reduction target by just over 10,000 metric tons of carbon dioxide equivalent ($MTCO_2e$), but would fall short of the 2030 ~~and~~

The County aims to reduce annual GHG emissions to:

- 2 percent below 2014 levels by 2020,
- 40 percent below 2014 levels by 2030, and
- 77 percent below 2014 levels by 2050.

~~2050~~ target~~s~~ by 57,683~~ and 258,178 $MTCO_2e$ per year, respectively.~~ With the measures included in the CAP and anticipated legislative reductions, the County's GHG emissions will exceed 2020 and 2030 targets by 57,255~~102~~ and 644~~264~~ $MTCO_2e$ per year, respectively, but would still need to reduce emissions by 156,751~~7,460~~ $MTCO_2e$ per year to meet the longer-term 2050 ~~target~~goal consistent with the State's long-term goal.

The quantifiable measures in the CAP currently fall short of meeting the County's long-term 2050 reduction goal; however, demonstration of achievement of the 2050 goal in a local government CAP is considerably challenging due to the extended time horizon and the County's limited jurisdiction over numerous sources of emissions. In the coming decades, new innovations and technologies will likely become available that will enable further GHG reductions beyond 2030 on the path to achieving the long-term 2050 goal. New or more reliable methods may also become available to quantify measures that are currently unquantifiable. Finally, new Federal and State laws may further reduce emissions in sectors currently addressed primarily by local County measures. As climate change science and policy continues to advance, the County will be able to apply new reductions toward meeting the long-term 2050 ~~GHG emissions reduction target~~ goal in future CAP updates.

Over time, the County will also monitor, review, and update the CAP with new reduction measures to ensure continued effectiveness and progress towards meeting the long-term 2050 emissions reduction ~~target~~goal.

Table 3-1 below shows the annual GHG reductions attributable to the measures included in this Plan. Table 3-2 shows how the anticipated reductions will help the County meet its GHG reduction targets and goals. See Appendix B for detailed calculations and an explanation of how the measures in the CAP work towards achieving the 2020 and 2030 targets~~, and 2050 targets~~.

Table 3-1 Annual GHG Reductions by Sector due to Proposed Reduction Strategies and Measures ($MTCO_2e$/year)

Strategy	2020	2030	2050
Building Energy	13,361	16,999	20,412
On-Road Transportation	5,753~~5,599~~	4,514~~4,198~~	4,745~~4,083~~
Solid Waste	1,807	3,731	4,433
Off-Road Vehicles and Equipment	1,687	7,867	23,014
Agriculture	3,512	10,816~~10,752~~	22,336~~22,288~~
Land Use Change	18,576	8,657	20,751
Wastewater[1]	1,783	5,743	5,737
Total Reductions	46,479~~46,325~~	58,327~~57,947~~	101,427~~100,718~~

Notes: Columns may not add to totals due to rounding.
[1] Reduction attributed only to Action MS-2, a multi-sector strategy.
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Ascent Environmental ~~2016~~2018

Table 3-2 Effect of Plan Measures on County Emissions, ~~and~~ 2020 and 2030 Targets, and 2050 Goal ($MTCO_2e$/year)

Emissions Source	2020	2030	2050
Legislative-Adjusted BAU Napa County Emissions	463,821	348,253	369,563
Reductions from CAP Measures	46,479~~325~~	58,327~~7,947~~	~~100,718~~101,427
Napa County Emissions with CAP	417,342~~41 7,496~~	289,926~~29 0,306~~	268,136~~26 8,845~~
Napa County GHG Reduction Targets (Percent below 2014)	-2%	-40%	-77%
Maximum Emissions allowed with Targets / Goal	474,598	290,570	111,385
Additional GHG Reductions Needed to meet Targets / Goal	-57,255[a]~~10 2~~	-~~264~~644[a]	156,751~~7, 460~~

Notes: Columns may not add to totals due to rounding.
[a] Negative values represent that the reductions meet and exceed the targets.
BAU = Business-As-Usual
CAP = Climate Action Plan
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Ascent Environmental ~~2016~~2018

3.3 Strategies and Measures to Reduce Greenhouse Gases

To help close the gap between the County's future BAU emissions and State targets, the CAP ~~proposes~~ includes 49~~488~~ GHG-reducing measures which are organized under ~~eight nine~~ eight GHG emissions sector-based strategies and one multi-sector strategy.

There are 49~~488~~ GHG reduction~~-reducing~~ measures, organized under ~~eight nine~~ eight GHG emissions sector-based strategies and one multi-sector strategy.
Measures are also further organized into two categories: primary measures

The measures were developed based on a combination of factors, including:

- the feasibility of the measure to be implemented by the County;
- the need for greater reductions in the sectors with the most emissions, especially in building energy and transportation (See Figure 2-1 in Chapter 2);
- existing policies, actions, or programs that can be expanded or proposed policies yet to be adopted;
- feedback from community and other stakeholders; and
- technological innovations.

While many of the emission reductions of the measures can be quantified, others are more difficult to quantify. However, the combination of all measures contributes towards achieving 2020 and 2030 targets.

Under each sector, m~~M~~easures have been further categorized as either **primary measures** ~~and~~ or **supporting measures**.

Under the provisions of CEQA Guidelines Section 15183.5, if a project can show consistency with applicable GHG reduction measures in a CAP, the level of analysis for the project required under CEQA with respect to GHG emissions can be streamlined and reduced considerably. See Chapter 5 for more information on how new development projects can show consistency with the CAP.

Primary measures are specific programs, policies, and actions that the County will carry out to achieve its climate action strategies. These measures include those for which GHG reductions have been quantified and are the primary measures that the County will rely upon to meet the GHG reduction targets for 2020 and 2030. Many of the primary measures include specific and enforceable components that could be applied to future projects seeking to tier and streamline from the CAP in the future; however, not all primary measures are regulatory in nature. Some of the primary measures that will result in quantifiable GHG reductions do not rely on County regulation or are the responsibility of other local agencies or organizations, either solely or in partnership with the County. All primary GHG reduction measures were quantified wherever substantial evidence and reasonable assumptions were available to support calculations.

As part of the CAP implementation process, all GHG ~~supporting~~ reduction measures will be tracked and monitored for effectiveness. If future data and/or quantitation methods become available, supporting measures could be quantified in future updates. See Chapter 5 for more information on implementing and monitoring primary and supporting

Supporting measures are qualitative measures that are not identified as part of the primary set of quantifiable GHG reduction measures needed to meet CAP targets. Some supporting measures were not quantified to avoid double-counting of GHG reductions achieved by other primary measures that are similar in nature, while others were not quantified because of a lack of available data and/or lack of methods to quantify emissions reductions. However, over time, implementation of supporting measures may still result in GHG reductions and could be quantified in future CAP updates if data or quantification methods become available. Additionally, supporting measures included in the CAP are still considered important complementary actions to State or other County measures. Finally, supporting measures are also important to include in the CAP because they will achieve other important co-benefits.

~~The discussion below~~ Each sector-based ~~describes each~~ strategy is described in detail in this chapter, including a summary of ~~y,~~ primary measures and ~~, and~~ associated GHG emissions reductions, and supporting measures under each strategy~~s, to the extent that they are quantifiable~~. Additional technical details for all measures, including ~~and~~ supporting calculations for primary measures and the results of the GHG measures analysis (including co-benefits), can be found in Appendix B. Chapter 5 further describes how both primary and supporting measures will be implemented under each strategy.

~~. Some of the measures are not quantifiable due to data limitation or lack of available method to quantify emissions reductions; however, these qualitative measures are still important to include in the CAP.~~

~~Additional detail and calculations can be found in Appendix B. Chapter 5 further describes how measures will be implemented.~~

3.3.1 Building Energy

Source: County of Napa

The energy used in buildings is a significant contributor to GHG emissions in the C~~c~~ounty, accounting for ~~more than~~ 31~~0~~ percent of total emissions (10 percent from residential and 21 percent commercial/industrial) in 2014. Although legislative reductions related to State actions will help to reduce building energy emissions by 60 percent from 2014 levels by 2030, and 55 percent by 2050, additional reductions can help the County meet State GHG reduction targets.

The Building Energy strategy offers the greatest opportunity to achieve emissions reductions across the eight strategies. Measures under the Building Energy strategy will reduce building energy emissions by an additional 1~~4~~1 percent, resulting in a 72 percent reduction from 2014 levels by 2030, and a 68 percent reduction by 2050 when combined with legislative reductions. The building energy measures included in the CAP aim to further reduce emissions by improving energy efficiency earlier than or beyond State requirements, streamlining access to renewable energy, and increasing the supply of renewable energy for homes and businesses within the county. The success of these measures relies on coordination with local utilities and organizations, participation from the community, and administration of new or revised local policies and programs. Major co-benefits of building energy measures include improved air quality, reduced reliance on fossil fuels, and monetary savings. Furthermore, California Green Building Standards Code ~~CalGreen~~(CALGreen) Tier 1 ~~Building~~ standards include stipulations regarding low-VOC materials and building ventilation, leading to improved indoor air quality and health outcomes. These benefits are discussed in greater detail in Appendix B.

Legislative reductions contribute greatly to emission reductions in the Building Energy sector. Beyond legislative reductions, ~~M~~measures under the Building Energy will reduce emissions by an additional:

- **1~~4~~1 percent in 2030, and**
- **1~~3~~4 percent in 2050.**

The Building Energy strategy includes 1~~1~~1 measures, seven of which ~~were quantified~~are primary measures and ~~. Four Three~~ four of which ~~measures under this strategy~~ are supporting measures~~could not be quantified due to the uncertainty of the energy reductions that could occur, but are addressed qualitatively~~. ~~Two major~~ The primary measures include a new water heater replacement program and ~~a~~ formal adoption of new construction standards to help achieve the State's zero net energy (ZNE) goals. Combined, these two measures will reduce emissions by 13,612~~7,137~~ $MTCO_2e$ per year by ~~2050~~2030. The seven primary measures together are expected to reduce emissions by 16,999 MT CO_2e by 2030.

All Building Energy measures also serve as adaptation measures by reducing overall energy demand and increasing the ability of the community and local economy to weather future change. For a complete list of adaptation measures, see Chapter 4.

Table 3-3 summarizes ~~the annual reductions anticipated from~~ building energy primary and secondary measures. Each measure is described in further detail below.

Table 3-3 Summary of Building Energy Measures				
Measure Number	Measure Description	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Primary Measures				
BE-1~~BE-1~~	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings~~Require compliance with CALGreen Tier 1 green building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings~~~~Work with PG&E, PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings~~	28~~NA~~	23~~NA~~	24~~NA~~
BE-2~~BE-2~~	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction ~~beginning in 2020~~, beginning with residential in 2020 and non-residential by 2030.~~Require compliance with CALGreen Tier 1 standards for all new construction, and phase in ZNE requirements for new construction beginning in 2020~~~~Require energy audits for major additions to or alterations of existing buildings~~	1,361~~NA~~	2,037~~NA~~	4,587~~NA~~
BE-3~~BE-3~~	Increase participation in MCE's Deep Green (100% renewable) option~~Require compliance with CALGreen Tier 1 green building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings~~	4,005~~28~~	1,384~~23~~	1,338~~24~~
BE-4~~BE-4~~	Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.~~Require new or replacement residential and commercial[1] water heating systems to be electrically powered and/or alternatively fueled systems~~~~Require compliance with CALGreen Tier 1 standards for all new construction, and phase in ZNE requirements for new construction beginning in 2020~~	6,096~~1,361~~	11,575~~2,037~~	12,550~~4,587~~
BE-5~~BE-5~~	Expand current renewable energy and green energy incentives and update local ordinances~~Increase participation in MCE's Deep Green (100% renewable) option~~	1,479~~4,005~~	1,806~~1,384~~	1,703~~1,338~~
BE-6~~BE-6~~	Select MCE's Deep Green Option for all County~~y Owned~~ Facilities~~Require new or replacement residential and commercial[1] water heating systems to be electrically powered and/or alternatively fueled systems~~	382~~6,096~~	1701~~1,575~~	2051~~2,550~~
BE-7~~BE-7~~	Support Waste-to-Energy Programs at Unincorporated Landfills~~Expand current renewable energy and green energy incentives and update local ordinances~~	10~~1,479~~	5~~1,806~~	5~~1,703~~
~~**BE-8**~~	~~**Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings**~~	~~**NA**~~	~~**NA**~~	~~**NA**~~
Supporting Measures				
BE-8	Work with PG&E, BayREN, MCE, PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	NA	NA	NA
BE-9	Require energy audits for major additions to or alterations of existing buildings	NA	NA	NA
BE-10	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	NA	NA	NA

~~BE-11~~BE-9	~~Encourage Solar Panel Installations on Warehouse Roof Space~~Select MCE's Deep Green Option for all County-Owned Facilities	~~NA~~382	~~NA~~170	~~NA~~205
~~BE-10~~	~~Support Waste-to-Energy Programs at Unincorporated Landfills~~	~~10~~	~~5~~	~~5~~
BE-11	Encourage Solar Panel Installations on Warehouse Roof Space	NA	NA	NA
TOTAL		13,361	16,999	20,412

Notes: Columns may not add to totals due to rounding.
[1] Emissions reductions quantified under BE-6 only apply to residential water heating systems.
BAU = Business-As-Usual
BayREN = Bay Area Regional Energy Network
CALGreen = California Green Building Standards Code
CAP = Climate Action Plan
GHG = greenhouse gas emissions
MCE = Marin Clean Energy
$MTCO_2e$ = metric tons of carbon dioxide equivalent
NA = Not Available
PACE = property assessed clean energy
ZNE = zero net energy
Source: Ascent Environmental 2018~~2016~~

Primary Building Energy Measures

~~Measure BE-1 Work with PG&E, PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings~~

~~The County will provide information on County-, State- and utility-based energy efficiency programs and funding opportunities (e.g., Pacific Gas and Electric's [PG&E's] Energy Watch Program, Sustainable Napa County, property assessed clean energy [PACE] financing). Information sharing can be done through providing informational brochures at County offices, updating the County website, and other methods.~~

~~Measure BE-2 Require energy audits for major additions to or alterations of existing buildings~~

~~The County will amend the County Code to require energy audits when a building permit application is submitted for a substantial addition to or alteration to an existing building. Audits could be triggered by an alteration or addition greater than or equal to 50 percent of a lot's total building square footage. According to permit records, the County issued or finalized an average of 300 permits per year for additions, alterations, and replacements for inhabited residential and commercial land uses between 2010 and 2015.~~

~~This measure could be combined with BE-1 to inform permit applicants of available incentives and financing available to cover efficiency upgrades pursuant to audit recommendations.~~

Co-Benefits (BE-1 and BE-2)
- **Improved Air Quality**
- **Reduced Fossil Fuel Reliance**

Co-Benefits (BE-~~3~~ 1 and BE-~~4~~2)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Reduced Fossil Fuel Reliance
- Reduced Building and Operating Costs

Measure BE-~~3~~ 1 Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings.

The County will amend County Code to require compliance with ~~California Green Building Standards Code (~~CALGreen~~)~~ Tier 1 standards (Title 24, Part 11), as well as Tier 1 building energy efficiency standards (Title 24, Part 6), for alterations and additions over 1,000 square feet, in addition to requiring energy audits (see Measure BE-9~~2~~). The County may also consider incentivizing compliance with CALGreen Tier 2 standards for eligible buildings, such as through expedited permitting or reduced permit fees (see Measures BE-5 and BE-8 below). ~~-~~ CALGreen Tier 1 also requires all appliances to be EnergyStar rated.

Measure BE-~~4~~ 2 Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards ~~standards~~ for all new construction, and phase in ZNE standards for new construction ~~beginning in 2020,~~ beginning with residential in 2020 and non-residential by 2030.

Source: County of Napa

The County will amend the County Code to require compliance with CALGreen Tier 1 green building standards (Title 24, Part 11), as well as Tier 1 building energy efficiency standards (Title 24, Part 6), for all new construction. These "reach code" standards include green building measures that can reduce GHG emissions beyond mandatory CALGreen requirements in several categories, including Energy Efficiency, Planning and Design, Water Efficiency and Conservation, Materials Conservation and Resource Efficiency, and Indoor Air Quality. Compliance with these green building measures can lead to increased use of green and recycled materials, turf area limits, reduction of construction waste through recycling, and other important features that achieve important sustainability and public health co-benefits.

Under Tier 1 standards, new construction will be required to exceed minimum building energy efficiency standards by 15 percent or more. The County may also consider additional incentives for new construction projects meeting or exceeding Tier 2 standards which will have energy efficiencies of 30 percent above current standards (see Measures BE-5 and BE-8 below).

The State is considering, but has not formally adopted, a mandatory ZNE[1] standard for all new residential construction starting in 2020 and new commercial construction starting in 2030. Under this measure, the County will also revise the County's building code to phase in and formally adopt the State's proposed ZNE standard in 2020. The State has demonstrated that ZNE can be achieved through a combination of high-performance energy efficient design and maximizing on-site renewable energy production (e.g., solar and storage).

[1] A ZNE building is one that produces as much renewable energy on-site as it consumes in one year.

To phase in the ZNE requirements, the County will amend the local building code to require compliance with ZNE standards for all residential and commercial construction starting in 2020 and 2030, respectively.

Under this measure, CALGreen Tier 1 measures for green building categories other than energy efficiency (Planning and Design, Water Efficiency, Material Conservation and Resource Efficiency, and Indoor Air Quality) will continue to be required after ZNE requirements have been phased in.

Also, with respect to Water Efficiency and Conservation standards under CALGreen Tier 1, the County will develop a program to provide incentives through the permitting process, including:

- incentivize installation of commercial and residential rainwater capture systems,
- incentivize installation of commercial and residential graywater capture and reuse systems for discharge to irrigation applications, and
- require ultra-low flow fixtures and toilets in new construction.

Measure BE-3~~5~~ Increase participation in MCE's Deep Green (100 percent renewable) option

The County will develop and provide incentives for residents and businesses to adopt Marin Clean Energy's (MCE's) Deep Green Option, which provides 100 percent renewable electricity. The County will consider subsidizing the extra cost of opting into Deep Green (e.g., $0.01 per kilowatt hour) for low-income households, and will develop incentives for wineries, hotels, and other businesses that opt into Deep Green. The County will also work with MCE to promote awareness of the Deep Green Option.

Co-Benefits (BE-~~5~~ 3 and BE-~~6~~4)
- **Improved Air Quality**
- **Reduced Fossil Fuel Reliance**

Measure BE-~~6~~ 4 Require new or replacement residential and commercial water heating systems to be electrically powered and/or alternatively fueled (e.g., solar water heating) for all residential land uses~~systems~~

As part of a new ordinance or revisions to existing County Code, the County will act to require all new or replacement residential ~~and commercial~~ water heaters to be either electrically-powered or alternatively fueled systems, such as solar thermal or geothermal heat pump systems. Replacement of natural gas-fueled water heaters with electric or alternatively fueled heating allows for more opportunities to reduce emissions by displacing on-site fossil fuel combustion with electricity that is at least 50 percent renewable under MCE, on-site renewable energy, or a combination thereof.

This measure will be enforced through the County's current permitting process and will initially apply to residential properties first. New or replacement residential natural gas water heaters would typically no longer be permitted under this ordinance unless they meet stringent

annual fuel efficiency ratings (i.e., 95 or higher). Examples of eligible replacement types could include solar thermal water heaters, tankless on-demand and storage-type electric water heaters, geothermal heat pumps, and electric heat pump systems. Electric water heaters could be paired with a solar water heating system to provide backup hot water. Heat pump systems could also include air or ground-source heat pump systems. The County will later phase in requirements for new or replacement commercial water heaters to develop an effective program that can accommodate the variations in size, cost, and capacity of commercial-grade water heaters.

As part of this measure, the County will also consider offering financial incentives if the conversion to electric would require substantial work beyond the unit replacement cost. Financial incentives would also help to offset the incremental cost of electric or solar thermal systems compared to natural gas water heaters for eligible homeowners ~~and commercial owners~~. The County could also expedite or reduce permitting fees associated with electric or solar water heating installations; however, no incentives would be provided for natural gas systems. This could be achieved in coordination with implementation of Measures BE-5~~1~~ and BE-8~~7~~.

Co-Benefits (BE-~~7~~5)
- Improved Air Quality
- Reduced Fossil Fuel Reliance

Measure BE-~~7~~ 5 Expand current renewable energy and green energy incentives and update local ordinances

The County will continue to provide expedited permitting incentives for installing solar panels, electric vehicle charging stations, and wind turbines. The County will also consider expanding incentives to other green technologies (e.g., solar water heating systems, geothermal ground-source heat pumps, micro-turbines, and battery storage). The purpose of the ordinance update would be to ensure that ground-based solar systems would not count against residential acreage limits on agricultural land uses. Any modifications to ordinances under this measure will ensure that ground-based solar panels will not change residential acreage limits on agricultural land uses.

The County will also work with Google, National Renewable Energy Laboratory, or other information providers to help communicate the customized cost-benefits associated with solar opportunities for each resident and business. The County will set a goal of approving 20,000 kW worth of solar permits by 2030, periodically review progress of permit applications, and adjust incentives and outreach efforts accordingly.

Co-Benefits (BE-~~9~~6)
- Improved Air Quality
- Reduced Fossil Fuel Reliance

Measure BE-6 Select MCE's Deep Green option for all County facilities

The County will select MCE's Deep Green option for all County-owned facilities within the County's operational control.

Co-Benefits (BE-~~10~~7)
- Improved Air Quality
- Improved Water Supply and Quality
- Improved Public Health
- Reduced Fossil Fuel Reliance

Measure BE-~~10~~7 Support waste-to-energy programs at unincorporated landfills

The County will encourage landfills located in the county to pursue waste-to-energy programs that convert waste-based fuel to usable energy that can offset a facility's non-renewable energy usage.

Supporting Building Energy Measures

Measure BE-~~8~~1 Work with PG&E, BayREN, MCE, PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings

The County will provide information on County-, State-, ~~and~~ utility-based, and other local or regional energy efficiency programs and funding opportunities (e.g., Pacific Gas and Electric's [PG&E's] Energy Watch Program, Bay Area Renewable Energy Network [BayREN], MCE, Sustainable Napa County, and various property assessed clean energy [PACE] financing programs). Information sharing can be done through providing informational brochures at County offices, updating the County website, and other methods.

Co-Benefits (BE-~~1~~8 and BE-~~2~~9)
- Improved Air Quality
- Reduced Fossil Fuel Reliance

Measure BE-9 Require energy audits for major additions to or alterations of existing buildings

The County will amend the County Code to require energy audits when a building permit application is submitted for a substantial addition to or alteration to an existing building. Audits could be triggered by an alteration or addition greater than or equal to 50 percent of a lot's total building square footage. Permit applicants would be required to incorporate all cost-effective improvements into the project to increase energy efficiency per the recommendations of the audit.

According to permit records, the County issued or finalized an average of 300 permits per year for additions, alterations, and replacements for inhabited residential and commercial land uses between 2010 and 2015.

This measure could be combined with BE-8~~1~~ to inform permit applicants of available incentives and financing available to cover efficiency upgrades pursuant to audit recommendations.

Measure BE-~~8~~10 Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings

The County will establish a program that allows new development to offset construction or operational GHG emissions by setting up a funding mechanism into which developments pay and, indirectly, finance residential energy efficiency retrofits in local existing income-qualified homes or buildings. The County will need to determine how the offset funds will be used to fund retrofits. Emissions benefits may be quantifiable once program details are established. The County could consider pairing funds from the retrofit program with other funding sources or financing mechanisms to allow for even greater energy efficiency improvements in existing buildings (see Measure BE-8~~1~~).

Co-Benefits (BE-~~8~~10)
- Improved Air Quality
- Improved Water Supply and Quality
- Improved Public Health
- Reduced Fossil Fuel Reliance

~~***Measure BE-9 Select MCE's Deep Green option for all County facilities***~~

~~The County will select MCE's Deep Green option for all County-owned facilities within the County's operational control.~~

~~***Measure BE-10 Support waste-to-energy programs at unincorporated landfills***~~

~~The County will encourage landfills located in the county to pursue waste-to-energy programs that convert waste-based fuel to usable energy that can offset a facility's non-renewable energy usage.~~

Co-Benefits (BE-11)

- **Reduced Fossil Fuel Reliance**
- **~~Lowered~~ Reduced Energy Demand**
- ~~Reduced~~ Energy, Water, and Sewer bills
- ~~**Lowered Energy, Water, and Sewer Bills**~~

Measure BE-11 Encourage solar panel installations on ~~warehouse~~ commercial roof spaces

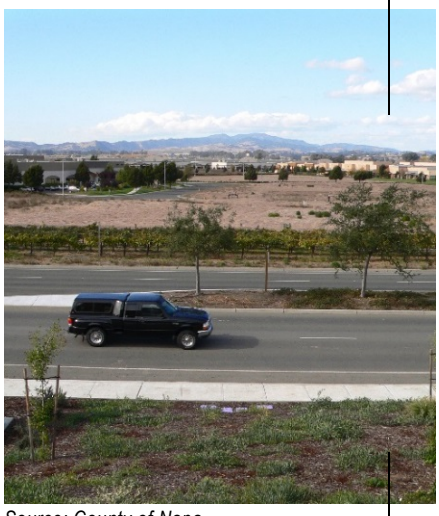
The County will work with MCE and commercial & industrial ~~warehouse~~ building owners to encourage solar panel installations on ~~warehouse~~ roof spaces. The County would develop a program to incentivize these installations by expediting permitting ~~(see Measure BE-7)~~ or reducing permit fees associated with installations on existing facilities (see Measure BE-5). The County could also work with interested stakeholders in developing a program to encourage solar panel installations for Feed-in-Tariff arrangements.

3.3.2 On-Road Transportation

Legislative reductions contribute greatly to emission reductions in the On-Road Transportation sector. When combined with legislative reductions, on-road transportation measures will reduce annual GHG emissions by:

- **36 percent by 2030, and**
- **3~~5~~6 percent by 2050.**

Like building energy, on-road transportation is also a significant contributor to the County's GHG emissions. Emissions from on-road transportation sources accounted for 26 percent of the County's total emissions in 2014. Legislative reductions outside of the County's jurisdiction will reduce 2014 transportation emissions by 33 percent by 2030 and 32 percent by 2050 despite population growth, mainly due to improvements in State and Federal vehicle fuel efficiency standards. These legislative reductions apply to the fuel efficiency of vehicle operations, while measures that affect the frequency or distance of vehicle travel are within local or regional control and can be addressed in a local CAP.



Source: County of Napa

The Plan's on-road transportation measures together with legislative reductions will reduce 2014 emissions from this sector by 36 percent by 2030 and a 3~~5~~6 percent by 2050 ~~when combined with legislative reductions~~. The transportation-related measures proposed under this strategy aim to further reduce emissions by reducing vehicle trips through consolidation of vehicle trips and non-motorized solutions, encouraging the use of electric and alternative fuel vehicles, and reducing vehicle miles traveled (VMT) through smarter land use planning. Emissions reductions from these measures rely on successful coordination with and participation from local and regional transportation and planning agencies, incorporated cities in the county, residents, and businesses. These measures will also help to reduce criteria pollutants such as fine particulate matter ($PM_{2.5}$) from diesel fuel combustion and other sources, which will result in the additional co-benefits of reducing black carbon emissions, improved air quality, and improved public health outcomes. These benefits are discussed in greater detail in Appendix B.

This strategy includes 15~~4~~ measures, five of which are primary measures and 10 of which are supporting measures. ~~five of which can~~

~~be quantified. Nine measures were qualitatively addressed and could not be quantified due to the uncertainty related to participation rates and variability of external factors.~~ One major measure included in this strategy is an update to the County's transportation system management ordinance that will establish a policy mechanism that ~~addresses~~ reduces commute trips and VMT. Measures under this strategy will also encourage and support the development of active transportation projects in the County.

Table 3-4 summarizes the ~~annual reductions anticipated from~~ on-road transportation primary and secondary measures. Each measure is described in further detail below.

Table 3-4 Summary of On-Road Transportation Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
~~TR-1~~	~~Update Transportation System Management Ordinance (for employers)~~	~~4,818~~	~~3,582~~	~~3,547~~
Primary Measures				
TR-1	Update Transportation System Management Ordinance (for employers)	4,818	3,582	3,547
TR-2	Adopt ~~P~~parking reduction ordinance revisions	78	58	57
TR-3	Increase affordable housing, especially workforce housing, in Napa County	31	23	23
TR-4	Support efforts to allow commuter service to operate on railroad ~~the Napa Wine Train~~ rights-of-way	542~~389~~	605~~289~~	948~~286~~
TR-5~~TR-5~~	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to use CNG~~.Support efforts of transit agencies to increase availability and accessibility of transit information~~	284~~NA~~	247~~NA~~	169~~NA~~
~~TR-6~~	~~Support alternatives to private vehicle travel for visitors~~	~~NA~~	~~NA~~	~~NA~~
~~TR-7~~	~~Support Napa County's incorporated cities in developing transit oriented development unique to the needs of the Napa Region~~	~~NA~~	~~NA~~	~~NA~~
~~TR-8~~	~~Support interregional transit solutions~~	~~NA~~	~~NA~~	~~NA~~
~~TR-9~~	~~Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers~~	~~NA~~	~~NA~~	~~NA~~
~~TR-10~~	~~Promote existing ride-matching services for people living and working in the unincorporated county~~	~~NA~~	~~NA~~	~~NA~~
~~TR-11~~	~~Increase the supply of electric vehicle charging stations~~	~~NA~~	~~NA~~	~~NA~~
~~TR-12~~	~~Promote telecommuting at office based businesses~~	~~NA~~	~~NA~~	~~NA~~
~~TR-13~~	~~Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to use CNG.~~	~~284~~	~~247~~	~~169~~

Supporting Measures				
TR-6	Support efforts of transit agencies to increase availability and accessibility of transit information	NA	NA	NA
TR-7	Support alternatives to private vehicle travel for visitors	NA	NA	NA
TR-8	Support Napa County's incorporated cities in developing ~~transit oriented~~transit-oriented development unique to the needs of the Napa Region	NA	NA	NA
TR-9	Support interregional transit solutions	NA	NA	NA
TR-10	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers	NA	NA	NA
TR-11	Promote existing ride-matching services for people living and working in the unincorporated county	NA	NA	NA
TR-12	Increase the supply of electric vehicle charging stations	NA	NA	NA
TR-13	Promote telecommuting at ~~office based~~office-based businesses	NA	NA	NA
TR-14	Develop and implement active transportation projects	NA	NA	NA
TR-15~~4~~	Require new development projects to evaluate and reduce VMT~~Encourage and support the development of active transportation projects~~	NA	NA	NA
	TOTAL	5,753~~5,599~~	4,514~~4,198~~	4,745~~4,083~~

Notes: Columns may not add to totals due to rounding.
CNG = compressed natural gas
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
NVTA = Napa Valley Transportation Authority
PG&E = Pacific Gas and Electric
NA = Not Available
Source: Ascent Environmental ~~2016~~2018

Primary On-Road Transportation Measures

Measure TR-1 Update Transportation System Management Ordinance (for employers)

Co-Benefits (TR-1)

- **Improved Air Quality**
- **Reduction in Black Carbon Emissions**
- **Improved Public Health**
- **Reduced Fossil Fuel Reliance**

The County will revise, adopt, and enforce the existing Transportation System Management ordinance. The updated ordinance will include measures to reduce commute trips to workplaces within the county as well as a program to oversee implementation of these measures at businesses. The County may consider a point-based system that allows employers with more than 20 employees to choose the best trip reduction measures that work for them. The County may recommend a list of trip reduction measures, such as preferential parking for carpools/vanpools or providing shuttle service. The ordinance could also establish a measurable target (e.g., percent increased vanpool ridership and number of transit pass sales). See example trip reduction ordinances from the U.S. Environmental Protection Agency ~~EPA~~ and Code 17.94.060 (Transportation Control Measure) for the City of Rocklin (U.S. Environmental Protection Agency 2011). The ordinance will be integrated with current Bay Area Air Quality Management District (BAAQMD) and Metropolitan Transportation Commission (MTC) programs and regulations.

Measure TR-2 Adopt ~~P~~parking reduction ordinance revisions

The County will develop, adopt, and enforce ~~consider~~ reductions in visitor and employee parking requirements, and requir~~e~~ing ~~ing~~ minimum carpool/vanpool/tour bus or shuttle parking spaces, consistent with CALGreen Tier 1 measures (see CALGreen Tier 1 requirements for applicable projects in Measures BE-1~~3~~ and BE-2~~4~~ above). The County will also consider allowing dedicated electric vehicle (EV)-only parking in lieu of parking reductions. Reductions in standard parking requirements will be made to the standards in Napa County Code 18.66.280.

Co-Benefits (TR-2, T-3, and TR-4)

- Improved Air Quality
- Reduction in Black Carbon Emissions
- Improved Public Health
- Reduced Fossil Fuel Reliance

Measure TR-3 Increase affordable housing, especially workforce housing, in Napa County

The County will ~~-~~increase affordable housing (including workforce housing) through implementation of policies and programs in the County's Housing Element, and by promoting and encouraging ~~e~~ the development of affordable housing and transit-oriented development (TOD) in priority development areas in the County as allowable under the County's jurisdiction. Also, the County will encourage the development of housing closer to jobs and services. The Napa Valley Transportation Authority's (NVTA) Countywide Transportation Plan (Vision 2040) predicts growth in low-wage employment throughout the County. Given the many low-wage jobs already located in the county, VMT from commuting will increase without sufficient affordable housing in the County.

Measure TR-4 Support efforts to allow commuter service to operate on railroad ~~the Napa Wine Train~~ rights-of-way

The County will support efforts to allow commuter rail service to operate on railroad ~~the Napa Valley Wine Train (NVWT)~~ rights-of-way in the County, so long as it does not worsen traffic congestion and associated vehicular emissions. The NVTA has already explored the possibility of having such a service, but no action has yet been taken to implement such a service. Enhancing connection services, such as shuttles, between stations and nearby employment destinations, in both incorporated and unincorporated areas, will improve the effectiveness of this measure.

Source: County of Napa

According to the 2014 Napa County Travel Behavior Study Survey, 66 percent of workers in the County live in Napa County cities and could be serviced by the commuter rail service on the Napa Valley Wine Train~~NVWT~~ line (NCTPA 2014:109). Twelve percent of workers in the C~~c~~ounty work in the unincorporated area. This measure will reduce more trips associated with VMT to and from incorporated cities and the unincorporated county.

Co-Benefits (TR-~~12 and TR-13~~5)
- Improved Air Quality
- Reduction in Black Carbon Emissions

Measure TR-5~~13~~ Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to use compressed natural gas

The County will support and encourage solid waste services to convert diesel and gasoline solid waste collection vehicles to compressed natural gas (CNG) or other alternative fuels, thereby reducing fleet-wide emissions.

Supporting On-Road Transportation Measures

Measure TR-6~~5~~ Support efforts of transit agencies to increase availability and accessibility of transit information

The County will support efforts to improve overall availability and accessibility of transit information. NVTA is currently working with Google to provide up-to-date transit information online.

Co-Benefits (TR-~~5~~6, TR-~~6~~7, and TR-~~7~~8)
- Improved Air Quality
- Reduction in Black Carbon Emissions
- Improved Public Health
- Reduced Fossil Fuel Reliance

Measure TR-7~~6~~ Support alternatives to private vehicle travel for visitors

The County will improve access to available travel alternatives for visitors. The ways the County will support travel alternatives include:

- subsidizing shuttles for visitors;
- offering winery travel trip route plans that reduce trips and VMT;
- providing information of public and private multi-modal options (e.g., bike tour, van tour, motorcycle tour);
- participating in an industry-wide transportation demand management program (such as a “hop-on hop-off” shuttle programs);
- exploring driverless technology solutions, as they become available;
- requiring dedicated parking space for eligible car-sharing vehicles at major destinations;
- providing cost comparisons to tourists to show monetary and safety benefits of driving vs. using a shuttle service; and
- offering additional subsidies for commercial fleets that are more than 50 percent alternatively fueled.

Measure TR-~~7~~ 8 Support Napa County’s incorporated cities in developing transit-oriented development unique to the needs of the Napa Region

The County will work with the City of Napa and other incorporated cities in exploring the possibility of making the recently-built Soscol Gateway Transit Center, other planned transit hubs, and surrounding areas more visitor-friendly and not just serve commuters. Transit facilities can be marketed as attractions in and of themselves. The County will also support and encourage development of restaurants, hotels, and other attractions within walking distance of the transit center throughout the County, as its jurisdiction allows. One example

of such a development is a "grand station" district concept with easy and walkable access to major downtown destinations (e.g., downtown Napa, Riverfront green). This will encourage transit and other non-automobile ridership for visitors traveling to and from the county. This measure should be enacted in tandem with vanpool, shuttle, and increasing transit service in the county (e.g., stops along Vine's Route 10). In addition to funding, the County could install wayfinding signage to promote uses of these developments.

Measure TR-~~8~~ 9 Support interregional transit solutions

The County will support and work with NVTA, Association of Bay Area Governments (ABAG), MTC, and Bay Area tourism bureaus to develop transit solutions for interregional passenger travel between San Francisco/East Bay and Napa County, including the unincorporated areas. In addition to expanding connections with ferries, Bay Area Rapid Transit, and Amtrak, the County will consider supporting improvements to existing transit/rail connections to Sonoma County via the Sonoma-Marin Area Rail Transit (SMART) system, and with Solano County,~~ies~~ to increase ridership. This could help offset employee commuter trips to and from the county. The County will also work with NVTA to implement or support applicable measures for interregional travel already included in NVTA's Short Range Transit Plan and Vision 2040.

Co-Benefits (TR-~~8~~9, TR-~~9~~10, TR-1~~0~~ and TR-~~11~~12)

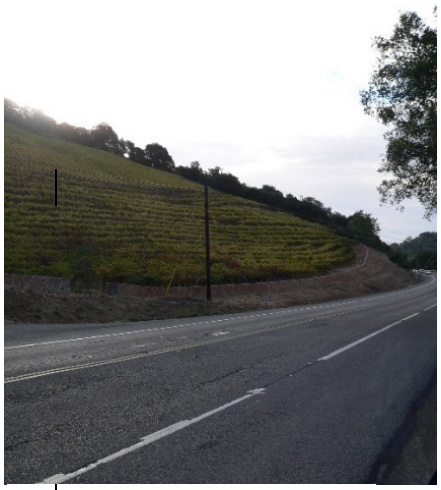
- **Improved Air Quality**
- **Reduction in Black Carbon Emissions**
- **Improved Public Health**

Measure TR-~~9~~ 10 Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers

The County will work with the incorporated cities, neighboring jurisdictions, and NVTA to install additional park and ride facilities near major unincorporated residential centers, where feasible. Currently, there are only a handful of park and ride facilities in the County, all of which are located in three incorporated cities: Yountville, the City of Napa, and American Canyon. The additional park and ride facilities will help consolidate and reduce vehicle trips through carpooling, vanpooling, and transit.

Measure TR-~~10~~ 11 Promote existing ride-matching services for people living and working in the unincorporated county

The County will support NVTA and the Solano Transportation Authority to promote awareness of the ride-matching services provided through the Solano Napa Commuter Information website and other organizations. The County will work with local businesses, especially winery, vineyards, and hospitality, to provide information to employers and their employees on ridesharing or shuttle options to transport seasonal workers to and from home. The County will consider offering monetary and non-monetary incentives.



Source: County of Napa

Measure TR-~~11~~ 12 Increase the supply of electric vehicle charging stations

The County will promote or incentivize installation of ~~electric vehicle (~~EV~~)~~ charging stations at wineries, industrial centers, hotels, major visitor attractions, and multifamily complexes. Charging stations will also be required at park-and-ride facilities. Stations should have clear and obvious signage, require some form of payment to allow for availability, be near amenities, easily accessible, and enforced. The County will also ensure consistency with plans already made under Vision 2040.

Additionally, as noted in Measures BE-13 and BE-2~~4~~, new construction projects or major additions or alterations to existing buildings will be required to implement CALGreen Tier 1 measures. Tier 1 measures under the Planning and Design section of the code require a minimum number of on-site, dedicated EV parking spaces and pre-wiring dedicated spaces for EV charging stations. This will also contribute to increasing the supply of EV charging.

Co-Benefits (TR-13~~2 and TR-13~~)
- Improved Air Quality
- Reduction in Black Carbon Emissions

Measure TR-~~12~~ 13 Promote telecommuting at office-based businesses

To reduce commute vehicle miles traveled, the County will work with local office-based businesses to encourage telecommuting. Telecommuting should not impede on normal business practices and, thus, may not be suitable for businesses that require physical employee attendance, such as at retail storefronts and warehouses.

~~***Measure TR-13 Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to use compressed natural gas***~~

~~The County will encourage solid waste services to convert diesel and gasoline solid waste collection vehicles to compressed natural gas (CNG) or other alternative fuels, thereby reducing fleet wide emissions.~~

Measure TR-14 Develop and implement active transportation projects

Co-Benefits (TR-14)
- Improved Air Quality
- Reduction in Black Carbon Emissions

The County will develop and implement active transportation projects in the unincorporated County, such as roadway modifications to install bike lanes, sidewalks (in small lot residential areas), or other infrastructure that encourages and facilitates walking and bicycling. The County will work with NVTA to implement the current countywide Pedestrian and Bicycle Master Plans and will prioritize improvements in areas where residential uses are within reasonable walking or biking distance to retail, parks, employment, or other key destinations. The County will also support existing efforts to develop multi-use trail systems (e.g., the Napa Valley Vine Trail).

Measure TR-15~~4~~ Require new development projects to evaluate and reduce VMT

Upon approval of Policy CIR-39 in the pending update to the County's Circulation Element, all new development projects shall be required to evaluate and reduce unmitigated VMT associated with the project by

at least 15 percent. Accompanying this policy in the pending Update to the Circulation Element is Action Item CIR-39.1, in which staff will update the County's Local Procedures for Implementation of CEQA to develop screening criteria for projects that would not be considered to have significant impacts to VMT.

3.3.3 Solid Waste

The solid waste sector accounted for 17 percent of the County's emissions in 2014. Solid waste is one of the primary sources of methane (CH_4) emissions, which are classified SLCPs. Legislative reductions outside of the County's jurisdiction will reduce 2014 solid waste emissions by approximately 32 percent by 2030 and 41 percent by 2050 despite population growth, mainly due to the State's 75 percent waste diversion goal and a planned landfill gas collection project at Potrero Hills landfill, which accepted 98 percent of the County's waste in 2014. The California Department of Resources Recycling and Recovery (CalRecycle) will also begin the formal rulemaking process in 2018 to develop regulations that reduce statewide organic waste disposal by at least 50 percent below 2014 levels by 2020 and 75 percent by 2025.

When combined with legislative reductions, solid-waste measures will reduce annual GHG emissions by:
- **36 percent by 2030, and**
- **47 percent by 2050.**

The CAP's solid waste measures, in combination with legislative reductions, will reduce 2014 emissions in this sector by 36 percent by 2030 and 47 percent by 2050. The two primary solid waste measures ~~included in the CAP~~ aim to further reduce emissions by encouraging expansion of current composting programs in the County and exceeding the State's waste diversion target. Landfills located within the County already have landfill gas capture operations in place. Major co-benefits of solid waste measures include improved water quality and preservation of biological resources. Waste diversion and composting would reduce the need for landfill expansion, protecting natural ecosystems and habitat.

Solid w~~W~~aste emissions reductions depend on participation from landfills; expansion of County waste reduction, recycling, and composting programs; and participation from County residents and businesses to reduce waste and increase recycling.

Table 3-5 summarizes the ~~annual reductions anticipated from~~ solid waste primary measures, with more detailed descriptions of the measures following.

Table 3-5 Summary of Solid Waste Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Primary Measures				
SW-1	Encourage expansion of composting program for both residential and commercial land uses	629	1,106	1,270
SW-2	Meet an 80 percent Waste Diversion Goal by 2020 and a 90 percent Waste Diversion Goal by 2030	1,179	2,625	3,163
TOTAL		1,807	3,731	4,433

Notes: Columns may not add to totals due to rounding.
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
PG&E = Pacific Gas and Electric
Source: Ascent Environmental 2018~~6~~

Primary Solid Waste Measures

Measure SW-1 Encourage expansion of composting programs for both residential and commercial land uses

Co-Benefits (SW-1)
- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats

The County will encourage expansion of current composting programs that serve the county to exceed requirements under AB 1826. Under AB 1826, no more than 50 percent of the amount of commercial organic waste landfilled in 2014 can be landfilled starting in 2020. Under this measure, the County will target a composting rate of 85 percent of all food waste and 100 percent of yard waste generated by the County by 2030.

Additionally, CalRecycle will initiate a formal rulemaking process in 2018 to develop and adopt statewide regulations to reduce organic waste as required by SB 1383. Expansion of local composting programs described under this measure could complement or be included in potential compliance mechanisms for future SB 1383 regulations, which are scheduled for adoption in late 2018 or early 2019.

Measure SW-2 Meet an 80 Percent Waste Diversion Goal by 2020 and a 90 Percent Waste Diversion Goal by 2030

Co-Benefits (SW-2)
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

The County will establish a target to meet an 80 percent waste diversion goal by 2020 and a 90 percent waste diversion goal by 2030. This will exceed the State's 2020 75 percent waste diversion target by 5 percent. Key steps include:

- completing an updated waste characterization study to analyze the distribution of waste types in the County's generated waste and identify major waste reduction opportunities. The last waste characterization profile available for the county was available for 1999,
- supporting and expanding existing composting and recycling programs and incentives for residences and businesses, and

- supporting and incentivizing private waste collection and landfills in reducing landfilled waste.

According to Napa Recycling, recycling rates are already at 70 percent in the City of Napa and the southern county. These actions apply to waste management areas under the County's control. Waste in Zone 3 (most areas north of Yountville) is managed by a Joint Powers Authority, the Upper Valley Waste Management Agency (UVA). The County can encourage UVA to adopt these ~~goals, but~~goals but cannot itself mandate them.

3.3.4 Agriculture

As a leading center for viticulture, the County greatly values the contribution of the agricultural sector to the County's economy and livelihood. Accordingly, the high level of agricultural activity also presents a significant emissions reduction opportunity. Emissions from the agriculture sector, including emissions from livestock, fertilizer use, and equipment, accounted for 11 percent of the County's total emissions in 2014. No applicable legislative actions were assumed to reduce GHG emissions from agriculture; thus, agricultural emissions are anticipated to increase by about 3 percent by 2030 and 10 percent by 2050 from 2014 levels, proportional to the forecasted growth in agricultural acres.

Source: County of Napa

The CAP's measures that address agricultural emissions would prevent emissions increases from this sector and reduce 2014 emissions from this sector by about 18 percent by 2030 and 3~~1~~3 percent by 2050. The agriculture-related measures proposed under this strategy aim to reduce emissions from agricultural equipment, fertilizer use, and residue burning and to promote carbon sequestration through carbon farming and other sustainable agricultural practices. Emissions from agricultural equipment accounted for over 60 percent of agricultural emissions in 2014. Actions to reduce emissions from other agricultural operations were not included due to limitation in the County's jurisdiction over activities such as CH_4 generated from cattle (enteric fermentation) and fertilizer use necessary for cultivation. The agriculture-related measures cover the whole spectrum of co-benefits. Reduced application of inorganic nitrogen fertilizer would lead to less pollutant runoff from agricultural fields and protection of local ecosystems. Several measures would reduce the use of fossil fuels, leading to improved air quality, health benefits, and decreased reliance on non-renewable resources. These benefits are discussed in greater detail in Appendix B.

Agriculture-related measures will reduce annual GHG emissions by:
- **18 percent by 2030, and**
- **3~~1~~3 percent by 2050**

This strategy includes four primary measures and two supporting measures~~that are quantified~~. The primary measure with the most future reductions ~~in~~ under this strategy supports the usage of electric or alternatively-fueled equipment in lieu of gasoline- or diesel-powered equipment.

Table 3-6 summarizes the ~~annual reductions anticipated from~~ measures ~~affecting~~ under the agriculture sector. Each measure is described below Table 3-6.

Table 3-6 Summary of Agriculture Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Primary Measures				
~~AG-1~~	~~Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris~~	~~NA~~	~~NA~~	~~NA~~
AG-~~2~~1	Support the conversion of ~~all~~ stationary diesel or gas-powered irrigation pumps to electric pumps	1,696	1,792	2,009
AG-2~~3~~	Support use of electric or alternatively- fueled agricultural equipment	1,617	8,540	19,149
AG-3~~4~~	Support the use of Tier 4 final diesel equipment for off-road agricultural equipment	0	64	48
AG-4~~5~~	Support reduced application of inorganic nitrogen fertilizer	199	420	1,130
Supporting Measures				
AG-5	Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris	NA	NA	NA
AG-6	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	NA	NA	NA
	TOTAL	3,512	10,816~~10,752~~	22,336~~22,288~~

Notes: Columns may not add to totals due to rounding.
BAAQMD = Bay Area Air Quality Management District
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
NA = Not Available
RCD = Resource Conservation District
Source: Ascent Environmental 2018~~6~~

Primary Agriculture Measures

Co-Benefits (AG-1)
- **Improved Air Quality**
- **Protection of Natural Ecosystems and Habitats**
- **Improved Public Health**

~~Measure AG-1 Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris~~

~~The County does not have regulatory control over open burning. The County will support BAAQMD in encouraging farmers and County public services to find alternatives to open burning of agricultural, forest, and other removed biomass. Potential alternatives could include converting agricultural and forest waste to compost, mulch, or biochar for reapplication on cropland (see Measure AG-6 below); or, converting to biomass to energy at waste to energy facilities. The County may also be willing to contribute funds to support a wood waste to energy plant, should a viable project be proposed by another party. There may be instances where open burning is still the most effective tool to prevent the spread of pests and disease, and for this reason the County will support ongoing use of open burning where appropriate and in compliance with BAAQMD regulations.~~

Measure AG-~~2~~ 1 Support the conversion of ~~all~~ stationary diesel or gas-powered irrigation pumps to electric pumps

The County will work with PG&E, MCE, or other utilities to provide incentives to convert stationary diesel or gas-powered irrigation pumps to electric pumps that are connected to the grid or use off-grid alternative/renewable energy sources, ~~,~~ such as solar. Electric pumps are up to 2.5 times more efficient than diesel pumps. This measure will apply to all crop types and assumes that solar alternatives to diesel and gasoline irrigation pumps are mostly viable. This measure assumes that the majority of ~~all~~ pumps ~~will be~~ in the County will converted to electric by 2020 and that any new pumps associated with growth in agriculture will be electric.

Measure AG-~~3~~ 2 Support use of electric or alternatively-fueled agricultural equipment

Farm equipment other than irrigation pumps accounted for 60 percent of agricultural emissions in 2014 and is anticipated to increase through 2050. Under this measure, the County will support the use of electric or alternatively-fueled equipment in place of gasoline or diesel equipment. The County will work with BAAQMD or the California Air Resources Board (CARB) to promote or provide financial or regulatory incentives to encourage the switch to electric or alternatively-fueled equipment. Currently-available electric equipment includes vineyard tractors, mulchers, and chainsaws; however, the range and types of such equipment will likely increase as low- or zero-emission technology advances in the future.

Co-Benefits (AG-~~2~~1, AG-~~3~~2, and AG-43)

- Improved Air Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

Measure AG-~~4~~ 3 Support the use of Tier 4 final diesel equipment for off-road agricultural equipment

The County will work with Napa Green and other entities to encourage vintners and other grower to use Tier 4 final diesel equipment[2]. Equipment manufacturers claim that Tier 4 final equipment may increase fuel efficiency by up to 5 percent from Tier 4 interim and Tier 3 level equipment (Caterpillar 2016, Empire Renewable Energy 2011).

Measure AG-~~5~~ 4 Support reduced application of inorganic nitrogen fertilizer

The County will work with farmers to either reduce or replace the use of nitrogen-based fertilizers. Reductions can be achieved through better fertilizer management, and examples of recommended replacements include compost production from local waste management or manure from local ranches and dairies. This measure targets a fertilizer reduction rate of 5 percent by 2020, 10 percent by 2030, and 30 percent by 2050 from 2014 levels of inorganic nitrogen applied in the County. To track the progress of this measure, the

Co-Benefits (AG-~~5~~4)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

[2] In 1994, EPA established tiered rulings for diesel equipment to meet certain emission standards to be phased in over a period of time. The most recent ruling was for Tier 4 equipment, signed in 2004, which would reduce emissions of particulate matter and nitrogen oxides by over 90 percent from Tier 1 equipment.

County will work with the farming cooperatives or industry associations, such as the Napa Valley Grapegrowers or Napa Valley Vintners, to determine the amount of inorganic and organic nitrogen fertilizers applied per year. Measure AG-6 below will also contribute to achieving these reductions.

Supporting Agriculture Measures

Measure AG-~~1~~5 Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris

Co-Benefits (AG-~~1~~5)

- Improved Air Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

~~The County does not have regulatory control over open burning.~~ The County will support BAAQMD in encouraging farmers and County public services to find alternatives to open burning of agricultural, forest, and other removed biomass. The County does not have regulatory jurisdiction over open burning. Potential alternatives could include converting agricultural and forest waste to compost, mulch, or biochar for reapplication on cropland (see Measure AG-6 below); or, converting to biomass to energy at waste-to-energy facilities. The County may also be willing to contribute funds to support a wood waste to energy plant, should a viable project be proposed by another party. There may be instances where open burning is still the most effective tool to prevent the spread of pests and disease, and for this reason the County will support ongoing use of open burning where appropriate and in compliance with BAAQMD regulations.

Measure AG-6 Encourage and support the use of carbon farming and other sustainable agricultural practices in the County

Co-Benefits (AG-6)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Increased Public Awareness of Climate Change

The County will work with the Napa County Resource Conservation District (RCD), farmers, and other stakeholders to encourage and support the use of carbon farming and other sustainable agricultural practices in the County. The County can encourage and promote, through partnerships and education and outreach, the use of best management practices (BMPs) in farming operations to reduce emissions and sequester carbon. These BMPs include, but are not limited to, low carbon farming, low impact farming including minimizing tractor passes, low- or no-till farming, cover cropping strategies, low nitrogen usage, low water usage, composting, and use of fuel efficient equipment.

The County will set a goal to engage 10 percent of Napa County's working lands in carbon farming by 2030. To support the increased use of carbon farming practices, the County could use Napa County RCD's Huichica Creek Sustainable Demonstration Vineyard Carbon Farm Plan and its implementation as a pilot project for potential replication. Additionally, the County could also work with Napa County RCD and farmers to identify regional, state, and federal incentive programs, along with other funding sources and financing.

Sustainable farming practices are also supported and encouraged under Multi-Sector Strategy measures outlined later in this chapter.

3.3.5 Off-Road Vehicles and Equipment

Emissions from the off-road sector accounted for nine percent of the County's total emissions in 2014, and off-road emissions are anticipated to increase by about 17 percent by 2030 and 38 percent to 2050 from 2014 levels, proportional to the forecasted growth in population and jobs.

Source: County of Napa

The CAP includes two primary measures that will reduce 2014 emissions from this sector by about 2 percent by 2030 and 17 percent by 2050. The proposed measures under this strategy are focused on improving equipment efficiency and the use of alternative fuels in marine vessels. Co-benefits include improved air quality and public health, reduced reliance on fossil fuels, and protection of natural ecosystems and habitats. These benefits are discussed in greater detail in Appendix B.

Off-road measures will reduce annual GHG emissions by:
- **2 percent by 2030, and**
- **17 percent by 2050.**

Table 3-7 summarizes the reductions from this strategy. Descriptions of the off-road primary measures follow Table 3-7.

Table 3-7 Summary of Off-Road Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Primary Measures				
OR-1	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	0	354	386
OR-2	Promote use of alternative fuels for recreational marine vessels~~Increase the use of alternative fuels for recreational watercraft~~	1,687	7,512	22,629
TOTAL		1,687	7,867	23,014

Notes: Columns may not add to totals due to rounding.
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Ascent Environmental 2018~~6~~

Primary Off-Road Measures

Measure OR-1 Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030

The County will revise current building ordinances to require the use of Tier 4 final equipment as a condition of approval for all construction projects occurring in the county by 2030. Equipment manufacturers claim that Tier 4 final equipment may increase fuel efficiency by up to 5 percent from Tier 4 interim equipment. Because higher Tier equipment have more stringent standards, efficiency gains compared to lower Tier equipment may be greater.

Co-Benefits (OR-1)
- **Improved Air Quality**
- **Protection of Natural Ecosystems and Habitats**
- **Improved Public Health**
- **Reduced Fossil Fuel Reliance**

Co-Benefits (OR-2)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Reduced Fossil Fuel Reliance

Measure OR-2 Promote use of alternative fuels for recreational marine vessels~~Increase the use of alternative fuels in recreational watercraft~~

The County will encourage both visitors and residents to use alternative fuels in recreational boats and other recreational watercraft. The County will work with watercraft rental companies, marinas, and parks districts that operate on waterways within the County to explore ways to offset diesel or gasoline with biodiesel, ethanol, or other alternative fuels. This could include increasing the availability of alternative fuels at marinas or other fueling locations, and working with incorporated cities in the county that have jurisdiction over similar entities within city limits, as recreational watercraft docking within city limits may operate on waterways in the county.

The biofuel performance targets for this measure (expressed as a percentage of total watercraft fuel consumption) are 5 percent by 2020, 20 percent by 2030, and 50 percent by 2050.

3.3.6 Water and Wastewater

Although water and wastewater-related GHG emissions only accounted for two percent of the County's emissions in 2014, water conservation is needed to address serious periodic drought issues affecting Napa County and the State, in general. As discussed further in Chapter 4, drought conditions could increase in frequency and severity because of climate change over the long term.

Water and wastewater-related GHG emissions will increase over time because projected population growth overshadows anticipated reductions in emissions from renewable energy production.

Water and wastewater-related measures included in this Plan will reduce both the strain on water supplies and GHG emissions from pumping and treatment activities. Although electricity emission factors will decrease over time due to current legislative actions, water and wastewater-related GHG emissions would still increase by 15 percent by 2030 and 27 percent by 2050 from 2014 levels. This is due primarily to the anticipated population growth in the county overshadowing the reductions due to greater renewable energy production. The State's water conservation plans, despite addressing the on-going drought, do not address reductions in non-urban water use by 2020 or future years.

All water and wastewater measures also serve as adaptation measures by preserving water quality and encouraging water conservation. For a complete list of adaptation measures related to water, see Chapter 4.

The supporting measures proposed under this strategy will reduce emissions primarily through water conservation in new and existing facilities. Most measures involve revising the County's current ordinances that relate to water conservation. Emissions reductions from these measures rely on successful coordination with and participation from Napa County residents and businesses. The major co-benefits of water and wastewater measures is improved water supply and quality. These benefits are discussed in greater detail in Appendix B.

This strategy includes four supporting measures, all of which are qualitatively addressed. These could not be quantified due to the uncertainty related to participation rates and the types of new facilities that will be constructed. Table 3-8 summarizes the supporting

measures included in this strategy. Each measure is described in further detail below.

Measure MS-2 under the Multi-Sector Strategy described later in this chapter also addresses reductions of wastewater emissions from wineries. Note that Measure MS-2, under the multi-sector strategy, includes and quantifies emissions reductions in wastewater treatment activity at wineries. ~~However~~However~~,~~, emissions reductions from that measure are not specifically attributed to the measures under the water and wastewater strategy. Nevertheless, emission reductions from MS-2 will reduce water and wastewater-related emissions by 36 percent in 2030 and 24 percent in 2050 from 2014 levels.

Table 3-8 Summary of Water and Wastewater Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Supporting Measures				
WA-1	Amend or revise water conservation regulations for landscape design ~~to include residential landscaping, and consider cash for grass rebates or other incentives to replace turf with drougt tolerant landscaping~~	NA	NA	NA
WA-2	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering	NA	NA	NA
WA-3	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities	NA	NA	NA
WA-4	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities	NA	NA	NA
TOTAL		NA	NA	NA

Notes: Columns may not add to totals due to rounding.
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
NA = Not Available
Source: Ascent Environmental 2018~~6~~

~~Note that Measure MS-2, under the multi-sector strategy, includes and quantifies emissions reductions in wastewater treatment activity at wineries. However, emissions reductions from that measure are not specifically attributed to the measures under the water and wastewater strategy. Nevertheless, emission reductions from MS-2 will reduce water and wastewater-related emissions by 36 percent in 2030 and 24 percent in 2050 from 2014 levels.~~

Supporting Water and Wastewater Measures

Measure WA-1 Amend or revise water conservation regulations for landscape design ~~to include residential landscaping, and consider cash-for-grass rebates or other incentives to replace turf with drought-tolerant landscaping~~

The County will consider expanding its existing water conservation ordinance (Chapter 18.118) to include homeowner-~~-~~provided landscaping projects. Section 18.118.020 exempts home-owner provided landscaping on a residential property. This measure will limit documentation requirements for homeowners. Other potential amendments can include minimum drought tolerant plant species and cash-for-grass turf rebates.

Co-Benefits (WA-1 and WA-2)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Reduced Fossil Fuel Reliance

Measure WA-2 Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering

The County will adopt a new water conservation ordinance for commercial and residential land uses that focuses on limiting on-site outdoor and indoor water use. Requirements include:

- limiting outdoor watering to 2 days per week and having written violations for the first offense and increasing fines for each offence thereafter, waiving a second offense fee after an offender attends a 2-hour water conservation seminar;
- staggering allowable watering days on an address-number basis (e.g., even address numbers can only water on Tuesday and Saturday);
- banning most lawn and landscape watering on consecutive days and irrigation within 48 hours of measurable rainfall, similar to the City of Napa's water conservation ordinance;
- banning outdoor car washing on certain days of the week; and
- providing educational material for residents and businesses on water conservation tips.

Co-Benefits (WA-3)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Reduced Fossil Fuel Reliance

Measure WA-3 Expedite and/or reduce permit fees associated with water conservation installations in existing facilities

The County will expedite, reduce, or exempt permits and permit fees associated with water conservation installations in existing facilities. These installations can include graywater plumbing and large rainwater catchment systems.

Co-Benefits (WA-4)

- Improved Water Supply and Quality

Measure WA-4 Require water audits for large new commercial or industrial projects and significant expansions of existing facilities

The County will require water audits for large new commercial or industrial projects and significant expansions of existing facilities to identify opportunities for water conservation. The County will establish a program to follow up with the water audits and explore water conservation that are appropriate to each facility.

3.3.7 Land Use Change

Changes in land use can result in the reduction or loss of stored carbon and carbon sequestration potential. This occurs when trees and other vegetation on natural undeveloped lands (e.g., riparian woodland, grassland, coniferous forest, oak woodland, shrubland) are converted to agriculture (e.g., vineyards) or urban development. The net losses in carbon storage and sequestration are considered GHG emissions in the CAP, and emissions from this sector accounted for two percent of the County's total emissions in 2014.

Source: County of Napa

The County anticipates that conversion of natural lands will increase in the future due to conversion of undeveloped lands to new or expanded vineyards or other crops, as well as increased residential and commercial development. The County's General Plan projected that over 8,000 acres of riparian woodland, oak woodland, coniferous forests, and other natural lands will be converted to vineyards between 2005 and 2030 (Hade, pers. comm., 2015). Due to these development forecasts, land use change-related emissions will increase by nearly 137 percent by 2030 and 1820 percent by 2050 compared to the baseline annual losses in 2014. These emissions are based on the annual carbon sequestration lost from the cumulative reduction in natural lands since 2014 and the annual losses in stored carbon from year-to-year reductions in natural lands. Apart from the County's land use forecasts under its general plan, no legislative actions are currently assumed to address future changes in land use or emissions related to land use change.

Land use change will result in net GHG emissions over time due to the loss of stored carbon and sequestration potential. However, land use measures will help to reduce this net increase in annual GHG emissions by:

- **25 percent in 2030, and**
- **88 percent in 2050.**

The measures included in this Plan under this strategy will reduce GHG emissions from the associated with land use change sector by promoting conservation of existing natural lands, tree replanting efforts, and preserving stored carbon through repurposing removed wood. These measures will not show substantial reductions in the near term due to the slow growth rates of trees over time and the larger effect in emissions from sudden loss of natural land cover. However, the CAP measures will reduce the increase in 2014 emissions from this sector from 137 to by a lesser amount (25 percent) in 2030 from 2014 levels and reduce 2014 emissions by 88 percent by 2050. Emissions reductions from these measures rely on successful administration of new programs, enforcement of County ordinances, and coordination with and participation from land use development in the County. Major co-benefits of land use change measures include improved air and water quality, and the protection of natural ecosystems and habitat. Furthermore, CalGreen Tier 1 Building standards include stipulations regarding low-VOC materials and building ventilation, leading to improved indoor air quality and health outcomes. These co-benefits are discussed in greater detail in Appendix B.

This strategy includes three primary measures, all of which are quantified. The first measure, LU-1, prioritizes preservation of existing

Measure LU-2 also serves as an adaptation measure by conserving natural habitats to prevent future flooding (see Chapter 4).

trees on lands that will be converted to urban development or agricultural use. In addition, the measure targets planting 2,500 trees per year. Such efforts will have a compounding effect on the amount of carbon dioxide (CO_2) removed from the atmosphere resulting in a reduction of over 15~~0~~,000 $MTCO_2e$ per year by 2050 from replanting alone.

Table 3-9 summarizes ~~the annual GHG emissions reductions anticipated from~~primary ~~-~~measures affecting the land use change sector. Each measure is described below Table 3-9.

Table 3-9 Summary of Land Use Change Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Primary Measures				
LU-1	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	7,077	4,544	15,360
LU-2	Refine protection guidelines for existing riparian lands	660	660	660
LU-3	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	10,839	3,453	4,731
TOTAL		18,576	8,657	20,751

Notes: Columns may not add to totals due to rounding.
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
Source: Ascent Environmental 2018~~6~~

Primary Land Use Measures

Measure LU-1 Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting

The County will establish a mitigation program that prioritizes preservation of existing on-site trees for land use development projects, including vineyard conversions. Trees that cannot be preserved will be required to be replaced at a 2:1 ratio, consistent with General Plan Policy CON-24. This program will primarily focus on, but will not be limited to, oak and coniferous trees. The program will target a minimum preservation rate of 30 percent of existing on-site trees. For any tree replacements, the County will encourage project applicants to prioritize replanting on the project site followed by offering off-site planting opportunities.

Co-Benefits (LU-1)

- **Improved Air Quality**
- **Improved Water Supply and Quality**
- **Protection of Natural Ecosystems and Habitats**
- **Improved Public Health**

Considering County resources, staffing, and physical space limitations on available lands, it is assumed that an average of 2,500 replacement trees will be planted per year beginning in 2017. This target could be achieved by a combination of existing or enhanced volunteer replanting efforts (e.g., 5,000 Oaks Initiative) and compliance with the County's 2:1 tree replacement policy.

The County will work with arborists and local conservation organizations (e.g., Napa Land Trust) to design and implement this mitigation program, along with other policies and programs that will protect or enhance the health of existing oak woodlands. Key coordination activities include determining ecologically-sound locations for tree plantings, or expanding the use of conservation easements or other efforts to protect existing oak woodlands.

Measure LU-2 Refine protection guidelines for existing riparian lands

The County will continue to enforce the County's Conservation Regulations (County Code, section 18.108.010 B.4) that protect riparian lands and prevents conversion of riparian lands to urban development, agricultural land use, or other land use types. If appropriate, the County will develop guidelines or refine existing regulations to ensure that no net losses of riparian lands will occur. The County will work with arborists and local organizations to implement policies or programs that enhance existing riparian lands, especially those deemed unhealthy or at risk.

Co-Benefits (LU-2)
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

Measure LU-3 Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests

The County will develop a program to require repurposing of usable ~~lumber~~ timber from trees removed due to land use conversion and burying or chipping of non-usable ~~lumber~~timber. Repurposed wood may be used in construction or sold to local woodworking businesses or collectives with proceeds funding the administration of this measure. A minimum of 80 percent of the total removed weight of trees shall be repurposed, buried, chipped, or otherwise prevented from burning. This measure excludes timber in commercial forests.

Co-Benefits (LU-3)
- Improved Air Quality
- Improved Public Health

Land use forecasts and associated GHG emissions forecasts from vegetation losses conservatively assume that all vegetation removed due to land conversions will be burned, releasing all stored carbon as CO_2 into the atmosphere. The goal of this program is to prevent burning of removed biomass, thus avoiding future CO_2 emissions.

3.3.8 High-GWP Gases

High-GWP gases accounted for 13,481 $MTCO_2e$, or approximately three percent of total emissions in 2014. High-~~-~~GWP gas emissions are generated as the result of the use or leakage of refrigerants, electrical insulators in transmission lines, fumigants, and other materials. Emissions in this sector includes various types of F-gas emissions such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur ~~hexafluroside~~hexafluoride (SF_6), which are also classified as SLCPs.

State and Federal regulations are reducing h~~H~~igh-GWP gases as the result of regulations. The County will ~~take action~~act to complement legislative actions already in place. This strategy includes two

supporting measures that aim to reduce the use of high-GWP refrigerant systems.

Table 3-10 summarizes supporting measures from this strategy, with descriptions following the table.

Table 3-10 Summary of High-GWP Gases Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Supporting Measures				
HG-1	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems	NA	NA	NA
HG-2	Incentivize the use of low-GWP refrigerants	NA	NA	NA
	TOTAL	NA	NA	NA

Notes:
CARB = California Air Resources Board
GWP = global warming potential
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
NA = Not Available
RMP = Refrigerant Management Program
Source: Ascent Environmental 2018d~~6~~

Supporting High GWP Gases Measures

Co-Benefits (HG-1)
- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

Measure HG-1 Encourage registration of facilities in CARB's Refrigerant Management Program and incentivize installation of low-GWP refrigerant systems

CARB's Refrigerant Management Program (RMP) requires facilities with refrigeration systems using over 50 pounds of high GWP refrigerant to register with the program. To reduce emissions of these refrigerants, facilities registered in the program are required to enact several BMPs including conducting periodic leak checks and detecting leaks in a timely manner. The County will encourage registration into the program and explore ways to financially incentivize the future installation of low-GWP refrigerant systems.

Co-Benefits (HG-2)
- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health

Measure HG-2 Incentivize the use of low-GWP refrigerants

The County will consider incentivizing the use of low-GWP refrigerants in refrigeration systems or heating, ventilation, and air conditioning (HVAC) systems by expediting the permitting process or reducing permitting for new or replacement projects. The County could also pair funds with other funding sources and financing mechanisms to increase installation rates.

Because of adoption and enforcement of CALGreen Tier 1 standards under Measures BE-1~~3~~ and BE-2~~4~~, eligible HVAC and refrigeration equipment would not be permitted to contain hydrochlorofluorocarbons (HCFCs). Installation of HVAC systems could comply with either of the

following: install HVAC and refrigeration that do not contain hydrofluorocarbons (HFCs) or do not contain HFCs with a GWP greater than 150; or install HVAC and refrigeration equipment that limit the use of HFC refrigerant through the use of a secondary heat transfer fluid with a GWP no greater than one.

~~3.3.8~~3.3.9 Multi-Sector Strategy

In addition to identifying reduction opportunities associated with individual measures in the affected sectors, a multi-sector GHG reduction strategy looks at implementing program and policies that will reduce GHG emissions across sectors. This strategy includes four measures, one of which ~~was quantified~~is primary and three of which are supporting. These measures address the overall function of activity in the County and establish a carbon offset program. ~~One of~~ The primary ~~the~~ measure~~s~~ targets Napa Green certification of 100 percent of eligible wineries, vineyards, and eligible businesses in the county by 2030. This measure will reduce approximately 5,743 $MTCO_2e$ per year by 2030 and 5,737 $MTCO_2e$ per year by 2050. In addition to the environmental co-benefits of the multi-sector measures, multi-sector measures could have economic benefits for the County and its businesses.

Source: County of Napa.

Table 3-11 summarizes the ~~annual reductions anticipated from~~ primary and supporting measures that affect ~~ing the~~ all sectors. Each measure is described below Table 3-11.

Table 3-11 Summary of Multi-Sector Measures

Measure Number	Measure Name	Annual GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Primary Measures				
~~MS-1~~	~~Work with other local jurisdictions within the County to develop a unified Climate Action Plan~~	~~NA~~	~~NA~~	~~NA~~
MS-1~~2~~	Support efforts to increase Napa Green Certified wineries and ~~vineyards~~ land in the County, with a goal of achieving a 100-percent ~~certified~~ certification rate for all eligible wineries and properties by 2030.	1,783	5,743	5,737
Supporting Measures				
MS-2	Work with other local jurisdictions within the County to develop a unified Climate Action Plan	NA	NA	NA
MS-3	Promote the sale of locally-grown foods and/or products	NA	NA	NA
MS-4	Establish a local carbon offset program in partnership with Sustainable Napa County	NA	NA	NA
TOTAL		1,783	5,743	5,737

Notes: Columns may not add to totals due to rounding.
GHG = greenhouse gas emissions
$MTCO_2e$ = metric tons of carbon dioxide equivalents
NA = Not Available
Source: Ascent Environmental 2016

Primary ~~Land Use~~Multi-Sector Measures

~~Measure MS-1 Work with other local jurisdictions within the County to develop a unified Climate Action Plan~~

~~Reducing GHG emissions in the entire County will require the efforts of all local jurisdictions in the County. The measures in the CAP are primarily focused on the unincorporated county. Under this measure, the County will coordinate with the incorporated cities in the County to pursue development of a unified, countywide climate action policy framework. This could result in a countywide CAP that applies to both the County and incorporated cities, or similar efforts to encourage incorporated communities to adopt their own CAPs consistent with the County's CAP.~~

~~A comprehensive, unified CAP will improve the effectiveness of intraregional GHG reduction efforts, such as providing affordable housing in city centers and offering regional transit or rideshare solutions to wineries, vineyards, and other employment centers throughout the county.~~

Measure MS-~~2~~ 1 Support efforts to increase Napa Green Certified wineries and ~~vineyards~~ land in the County, with a goal of achieving a 100- percent ~~certifie~~certification rate for all eligible wineries and properties~~d~~ by 2030

Napa Green offers two environmental certification programs, Napa Green Winery and Napa Green Land, for winery and land owners, respectively. Although Napa Green Land typically applies to vineyards, it also applies to land management of whole parcels, including any combination of farmland, natural land, and road and water ways. Green land management practices include using electrified or alternatively-fueled agricultural equipment, converting diesel-powered irrigation pumps to electric, night-shift harvesting, and using biochar as soil amendments. Together, the ~~The~~ Napa Green Winery and Land certification programs aim~~s~~ to reduce solid waste generation, water use, and wastewater generation, promoting sustainable agricultural practices.

~~. Green practices at vineyards include using electrified or alternatively-fueled agricultural equipment, converting diesel-powered irrigation pumps to electric, night-shift harvesting, and using biochar as soil amendments.~~

The County will support efforts to increase the number of Napa Green Certified wineries and ~~vineyards~~ properties in the County by including designated facilities as a favorable factor in its locational criteria when considering applications for new or expanded facilities. The County will also work with Napa Green to incentivize the replacement of CH_4-emitting open air wastewater treatment ponds in certified wineries and vineyards with low-emissions treatment systems. These actions depend on the ongoing support of the Napa Valley Vintners and increased staffing in the County to support the certification program.

Co-Benefits (MS-1 ~~and MS-2~~)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Reduced Fossil Fuel Reliance

The County will also consider highlighting Napa Green Certified wineries on appropriate websites (e.g., visitnapavalley.com). Currently, approximately 56 wineries in Napa are Napa Green Certified, representing approximately 40 percent of current annual wine production by volume in the County. Also, 40 percent of vineyard land in the County is currently Napa Green Land certified. This measure targets a participation rate of 60 percent by 2020 and 100 percent by 2030, as a function of eligible acreage or annual production by volume.

Supporting ~~Land Use~~Multi-Sector Measures

Measure MS-12 Work with other local jurisdictions within the County to develop a unified Climate Action Plan

Reducing GHG emissions in the entire County will require the efforts of all local jurisdictions in the County. The measures in the CAP are primarily focused on the unincorporated county. Under this measure, the County will coordinate with the incorporated cities in the County to pursue development of a unified, countywide climate action policy framework. This could result in a countywide CAP that applies to both the County and incorporated cities, or similar efforts to encourage incorporated communities to adopt their own CAPs consistent with the County's CAP.

A comprehensive, unified CAP will improve the effectiveness of intraregional GHG reduction efforts, such as providing affordable housing in city centers and offering regional transit or rideshare solutions to wineries, vineyards, and other employment centers throughout the county.

Co-Benefits (MS-~~1 and MS-~~2)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Reduced Fossil Fuel Reliance

Measure MS-3 Promote the sale and consumption of locally-grown foods and/or products

Developing and supporting a market for locally-grown foods or other consumer products helps to decrease transportation emissions from delivery, promotes local sustainable growing practices, and contributes to a stronger local economy. Under this measure, the County will promote the sale and use of locally grown food and/or products in the County. The County will work with local grocery stores, farmer's markets, and restaurants to identify opportunities to reduce the supply of imported foods and to encourage local farmers to grow foods that are typically imported. Imported crops are typically off-season crops or tropical fruits for which there is little or no domestic production. The County will encourage farmers to use greenhouses or other methods to supply off-season crops during the winter.

While primarily focused on food, this measure could also be expanded to other products. For example, locally-sourced wood products developed because of Measure LU-3 implementation will help to reduce demand for wood products from more distant locations.

Co-Benefits (MS-3)

- Improved Air Quality
- Improved Water Supply and Quality
- Improved Public Health

Co-Benefits (MS-4)

- Improved Air Quality
- Improved Water Supply and Quality
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Reduced Fossil Fuel Reliance

Measure MS-4 Establish a local carbon offset program in partnership with Sustainable Napa County

In coordination with Sustainable Napa County, the County will establish a local carbon offset program that allows events, persons, businesses, or institutions in Napa County to purchase credits to offset GHG emissions they generate. The funds from the sale of carbon offsets will be used to construct, develop, or operate projects that provide short or long term GHG reductions, depending on the emissions being offset. This program could be used to help implement other measures in this CAP, such as auditing and retrofitting existing buildings under applicable Building Energy sector measures ~~BE-1, BE-2, BE-3, or BE-8~~; or, converting agricultural equipment to alternative fuels under measures AG-2 or AG-3.

~~High-GWP Gases~~

~~High-GWP gases accounted for 13,481 $MTCO_2e$, or approximately three percent of total emissions in 2014. High-GWP gas emissions are generated as the result of the use or leakage of refrigerants, electrical insulators in transmission lines, fumigants, and other materials. Emissions in this sector includes various types of F-gas emissions such as hydrofluorocarbons (HFC), perfluorocarbons (PFCs) and sulfur hexafluroside (SF_6), which are also classified as SLCPs.~~

~~State and Federal regulations are reducing High-GWP gases as the result of regulations. The County will take action to complement legislative actions already in place. This strategy includes two measures that aim to reduce the use of high-GWP refrigerant systems.~~

~~Table 3-11 summarizes measures from this strategy, with descriptions following the table.~~

~~Table 3-11 Summary of High-GWP Gases Measure~~

~~Measure Number~~	~~Measure Name~~	~~Annual GHG Reductions ($MTCO_2e$/year)~~		
		~~2020~~	~~2030~~	~~2050~~
~~HG-1~~	~~Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems~~	~~NA~~	~~NA~~	~~NA~~
~~HG-2~~	~~Incentivize the use of low-GWP refrigerants~~	~~NA~~	~~NA~~	~~NA~~
	~~TOTAL~~	~~NA~~	~~NA~~	~~NA~~

~~Notes:~~
~~CARB = California Air Resources Board~~
~~GWP = global warming potential~~
~~GHG = greenhouse gas emissions~~
~~HVAC = heating, ventilation, and air conditioning~~
~~$MTCO_2e$ = metric tons of carbon dioxide equivalents~~
~~NA = Not Available~~
~~RMP = Refrigerant Management Program~~
~~Source: Ascent Environmental 2016~~

Napa County Climate Action Plan

A Tradition of Stewardship
A Commitment to Service

Chapter 4

Climate Change Vulnerability and Adaptation

https://upload.wikimedia.org/wikipedia/commons/8/89/Fall_in_Napa_Valley.jpg
By Brocken Inaglory (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0) or GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons

4.1 Introduction

Climate change is a global phenomenon that over the long term will have a wide variety of impacts on human health and safety, economic continuity, water supply, ecosystem function, and the provision of basic services (California Natural Resources Agency [CNRA] 2012a:3). Locally, climate change is already affecting and will continue to affect the physical environment throughout California, the Bay Area, and Napa County. For example, the 2017 California wildfire season, fueled by persistent drought in prior years , followed by heavy rains and vegetation growth, and record-setting high summer temperatures, resulted in one of the most destructive wildfire seasons on record (California Department of Forestry and Fire Protection [CAL FIRE] 2017, 2018a, b, c). Because impacts of climate change vary by location and other social and economic characteristics, it is important to identify the projected severity these impacts could have in Napa County.

The California Adaptation Planning Guide (APG) provides climate adaptation planning guidance to cities, counties, and local governments. The APG, developed by the California Office of Emergency Services and CNRA, introduces the basis for climate change adaptation planning, including a nine-step process that details ways communities can reduce climate-related risks and impacts and prepare for climate change.

The nine steps in the adaptation planning process are outlined below in Figure 4-1. The first five steps of the process represent the vulnerability assessment phase, which is a method for determining the potential impacts of climate change on community assets and populations. The severity of these impacts and the community's ability to respond determine how these impacts affect a community's health, economy, ecosystems, and socio-cultural stability. Section 4.2 of this chapter summarizes the results of the vulnerability assessment prepared for the County of Napa (County). The entire vulnerability assessment can be found in Appendix C.

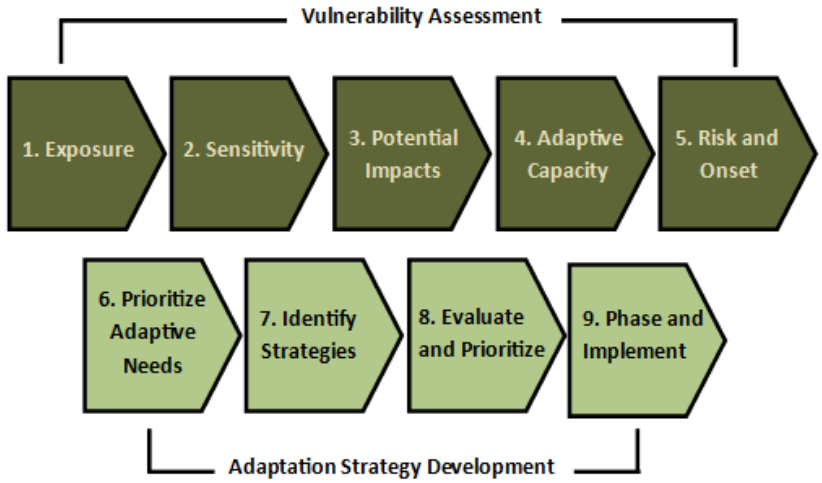


Figure 4-1: The Nine Steps in the Adaptation Planning Process

The second phase of the process is adaptation strategy development, in which effective climate adaptation strategies and measures are identified and prioritized that apply to County assets, systems or populations that may be vulnerable to climate change. These strategies and measures will help increase the County's ability to prepare for, respond to, and adapt to climate change. Climate adaptation strategies and measures for the County are included in Section 4.3 of this chapter.

4.2 Summary of Climate Change Effects and Vulnerability Assessment

This section summarizes the results of the vulnerability assessment prepared for the County, which includes identification of localized climate change exposure and related effects, an assessment of areas of vulnerability, a review of the County's current capacity to adapt to climate-related impacts, and consideration of how likely and how quickly impacts will occur. The completed vulnerability assessment, which follows the first five steps of APG's adaptation planning development, can be found in Appendix C.

4.2.1 Climate Change Effects

Where possible, climate change effects in the County are characterized for two periods of time: midcentury (around 2050) and the end of the century (around 2100). Historical data is used to identify the degree of change by these two future periods in time.

The first step in assessing vulnerability is to identify what climate change effects the County will experience in the future. To begin assessing climate change impacts over time, Cal-Adapt, a climate change scenario planning tool was used. Cal-Adapt downscales global climate simulation model data to local and regional resolution under both high and low global greenhouse gas (GHG) emissions scenarios. Results from both emissions scenarios are considered in this summary and distinguished where possible.

The direct, or primary, changes analyzed for the County include average temperature, annual precipitation, and sea-level rise. Secondary impacts, which can occur because of individual or a combination of these changes, are also assessed and include extreme heat and its frequency, wildfire risk, and changes in precipitation and hydrology (CNRA 2012a:16-17).

Increased Temperatures

Annual average temperatures are projected to increase between 3.3 ° F and 5.7 ° F by the end of the century.

Annual temperatures in the County are projected to climb steadily. The County's historical average temperature, based on data from 1960-1990, is 58.3 degrees Fahrenheit (˚F). Under the low-emissions scenario, annual average temperature is projected to increase to 61.6 ˚F by 2090, an increase of 3.3 ˚F. The annual average temperature under the high-emissions scenario is projected to increase 5.7 ˚F to 64.0 ˚F by the end of the century.

The County's average annual low temperature, based on historical data from 1960-1990, is 44.4 ˚F. Under the low-emissions scenario, annual low temperature is projected to increase to 48.6 ˚F by 2090, an increase of approximately 4.2 ˚F. The annual average low temperature under the high-emissions scenario is projected to increase to 50.7 ˚F in 2090 (i.e., an increase of approximately 6.3 ˚F). Historically, annual high temperatures average 70.5 ˚F. Annual average high temperatures are projected to increase under the low-emissions scenario by approximately 2.9 ˚F to 73.4 ˚F. Under the high-emissions scenario, annual average high temperature is projected to increase to 76.4 ˚F, an increase of approximately 5.9 ˚F.

Source: County of Napa

Increased Frequency of Extreme Heat Events and Heat Waves

In Napa County, an "extreme heat day" is defined as a day with a high temperature of at least 92 ˚F (~~Cal-Adapt~~California Energy Commission [CEC] 2016). Historically, the County has experienced an average of four extreme heat days a year. Because of climate change, the number of extreme heat days is projected to increase substantially by 2099. The projected annual average number of extreme heat days is expected to increase approximately 23-26 days per year in 2050, and 54-64 days per year towards the end of the 21st century.

Heat waves, which can be defined as five or more consecutive extreme heat days, have been historically infrequent in the County, with no more than two heat waves occurring in a year. However, with climate change, a significant rise in the frequency in heat waves is projected under both emissions scenarios. Under the low emissions scenario, projections show an increase of heat wave events with around three per year at the middle of the century and up to seven per year in 2090. The high emissions scenario also shows an increase in annual heat wave events, with up to five heat wave events occurring annual by midcentury and as high as 16 heat wave events occurring annually by the end of the century. Along with an increased frequency of heat events, heat waves are also projected to occur both earlier and later in the season, which historically started in late May/early June and ended in mid-September.

Heat waves have been historically infrequent in the County. However, with climate change, a significant rise in the frequency in heat waves is projected to occur.

Changes to Precipitation Patterns

While projections generally show little change in total annual precipitation in California and trends are not consistent, even modest changes could have a significant effect on California ecosystems that are conditioned to historical precipitation levels (~~Cal-Adapt~~CEC 2016).

Reduced precipitation could lead to higher risks of drought, while increased precipitation could cause flooding and soil erosion (CNRA 2014: 25).

While the County is not located in an area where snow typically accumulates, major water districts and utilities in the County receive a significant amount of water from the State Water Project, which depends on spring and early-summer snowmelt in the Sierra Nevada

for water supply. Additionally, agricultural water users in the unincorporated areas of the County are the primary user of groundwater (Napa County 2005:2). Increased average temperatures and changes in the timing and amounts of precipitation could affect local aquifer recharge for groundwater supplies, and thus the County could face increasing challenges of providing adequate water supplies because of increased uncertainty in the amount and timing of water availability to meet future demand. If demand exceeds supply, water users could face shortages in normal or dry years.

Increased Wildfire Risk

Recent mitigation efforts, including adoption of the 2010 Uniform Fire Code, the Firewise Program, and the Chipping Program, have helped reduce Napa County's wildfire risk, but it is still quite vulnerable and at high-risk for wildfires (Napa County 2013: 77).

According to Napa County's Operational Area Hazard Mitigation Plan, the County has a history of wildfires. Before the 2017 wildfires, ~~with~~ more than 200,000 acres of the County's 482,000 acres burned in the last thirty years, most of which ~~have~~ occurred in the unincorporated areas (Napa County 2013: 12). More recently, the 2017 California wildfire season was one of the most destructive seasons on record, occurring in a year of record-setting heat and persistent drought (CAL FIRE 2017, 2018a, b, c). In October 2017, a series of wildfires broke out across Napa, Lake, Sonoma, Mendocino, Butte, and Solano Counties, burning over 245,000 acres. According to CAL FIRE and various news outlets, the fires resulted in at least 44 casualties, the hospitalization of 185 people, and the destruction of an estimated 8,900 structures (CAL FIRE 2017). Napa County was greatly impacted by the fires, with over 70,000 acres burned, and 1,200 structures damaged or destroyed, including more than 700 residences (Napa County 2018). Currently, the major wildland fire hazard risks for residential development are in the County's hilly areas characterized by steep slopes, poor fire suppression delivery access, inadequate water supply and highly-flammable vegetation (Napa County 2013: 75).

Increased temperatures and changes in precipitation patterns associated with climate change are expected to increase the risk of wildfire in the County. The 2017 California wildfire season was exacerbated by periods of persistent drought, intense winter rains, and the hottest summer in more than 100 years of record keeping. Heavy winter rainfall resulted in an abundance of vegetation, which dried out in the summer, creating hazardous fuel conditions. Under the low-emissions scenario, wildfires ~~risk is~~ are 11 percent more likely to occur in 2020, compared with a baseline year of 2010, 15 percent more likely to occur in 2050, and 12 percent more likely to occur in 2085. Under the high-emissions scenario, wildfires ~~risk is~~are 14 percent more likely to occur in 2020, compared to the 2010 baseline year, 13 percent more likely in 2050, and 22 percent more likely to occur in 2085. Given that the County is currently at risk for wildfire, these increases of between 10 and 20 percent under both emissions scenarios is significant and could result in additional threats and increased vulnerability.

Increased Likelihood of Flooding

Climate change is likely to lead to changes in the frequency, intensity, and duration of extreme events, such as sustained periods of heavy precipitation and increased rainfall intensity during precipitation events. These projected changes could lead to increased flood magnitude and frequency (Intergovernmental Panel on Climate Change [IPCC] 2001:-14).

According to Napa County's Operational Area Hazard Mitigation Plan, the County is already considerably vulnerable to flooding. Flooding has caused the most disaster declarations and the most damage and loss of life historically in the County, with floods usually occurring during the season of highest precipitation or during heavy rainfall after prolonged dry periods (Napa County 2013:11). Almost all of the land adjacent to the Napa River is subject to flooding that has a one percent probability of occurring in any given year, or a 100-year flood event (Napa County 2013:58). While it is uncertain exactly how and to what extent climate change will affect flooding events in the County, it is reasonable to assume that any increase in flooding could have serious ramifications as the area is already considerably vulnerable. Additional information on increased risk of flooding, which could be exacerbated by sea-level rise in the southern portion of the County, is included below.

The County is dry during the late spring, summer, and early fall and receives most of its rain during the winter months (Napa County 2013:11).

Sea-Level Rise

Another outcome of global climate change is sea-level rise. The southwestern portion of the County includes the mouth of the Napa River, which forms a tidal estuary that drains into San Pablo Bay. Less than one percent of the County's population is considered at risk and vulnerable to sea-level rise (CEC 2012:14 and U.S. Census 2014). Some critical infrastructure (i.e., roads, hospitals, schools, emergency facilities, and properties) are at increased risk of coastal flooding in the County. For example, the American Canyon Power Plant and the Napa Sanitation District Water Treatment Plant could become vulnerable to a 100-year flood event with 1.4 meters (m) of sea-level rise (CEC 2012:23).

Currently 140,000 people, or 2 percent of the Bay Area's population, live in areas currently at risk of being inundated in a 100-year flood event. A 1.4 m rise in sea level will put an additional 130,000 people at risk, increasing the total number of people at risk to 270,000 (CEC 2012).

Because several physical structures (i.e., levees) are currently in place to protect against a 100-year flood event, approximately 36 acres in the County are currently at risk for flooding. Taking a 1.5 m rise in sea level into account, along with other storm factors, it is projected that an additional 13,000 acres could be inundated by a 100-year flood event. The majority of area that is at risk is currently undeveloped or used for agricultural purposes. Specific areas along the Napa River that could become vulnerable include Buchli, Cuttings Wharf, Thompson, and Imola, along with areas further north along the Napa River, including some industrial uses, wineries, and parts of Downtown Napa (i.e., up to 3rd Street and portions east of State-Route 29). The Milton Road/Edgerly Island area could be lost in its

entirety if the privately-owned levy system were to fail. Additional portions of Thompson, Middleton, and American Canyon also have some flood-prone low lying areas that would become more vulnerable to flooding because of sea-level rise. While the Napa County Airport itself is not at immediate risk for inundation from coastal flooding due to 1.5 m of sea-level rise, adjacent areas to the west are at increased risk of flooding due to sea-level rise.

4.2.2 Vulnerability

This section summarizes the main areas of vulnerability, in terms of structures, functions, and population to climate change exposures and impacts in the County. Vulnerability to climate change also considers the County's adaptive capacity, or the ability to currently address climate change exposures, along with how likely and how quickly impacts will occur. More detailed discussion of climate-related vulnerabilities, as they relate to the climate change exposures, can be found in Appendix C.

The County's wine industry accounts for $10.1 billion of $51.8 billion in economic impact from winemaking and related industries in California (Mayton 2015a).

Agriculture and Wine Industries

Climate change could significantly impact the agricultural and wine industries, which are large drivers of the County's economy. Specifically, the wine industry in Napa, which produces an average of 4 percent of California's wine grape harvest, currently has 475 wineries, producing more than 49.7 million cases of wines totaling over $4.5 billion dollars in sales (Napa Valley Vintners 2017 and Napa County 2013:-28).

Source: County of Napa

Increases in temperature and changes in precipitation and soil moisture could impact the growing of wine grapes by causing late or irregular blooming and affecting yields (Lee et al. 2013:1).

The increased likelihood of extreme floods could also lead to the destruction of crops, erosion of topsoil, and deposits of debris and sediment on crop lands. Conversely, as average temperatures increase with climate change, agricultural demand for water could intensify under extreme heat conditions, under which water evaporates faster and plants need more water to move through their circulatory systems to stay cool (CNRA 2014:21). More specifically, attempts to maintain wine grape productivity and quality in the face of warming may be associated with increased water use for irrigation, a change to different varietals of grapes, and to cool grapes through misting or sprinkling (Lee et al. 2013). As noted earlier, increased average temperatures and changes in timing and amounts of precipitation could affect local aquifer recharge for groundwater supplies in the future, which could in turn affect water supplies for agricultural uses.

The wine industry and thousands of acres of vines could also be affected by wildfire. ~~The majority of~~Most wineries in Napa County were left intact after the October 2017 fires. Roughly 3,500 acres of

vineyards were located within the fire areas; however, only 126 of those acres burned. No wineries were ~~completely destroyed~~destroyed (Napa County 2018). In addition to direct impacts such as loss of vineyards and property, several indirect impacts could occur. The October 2017 fires took place during the peak of the winemaking season, resulting in a temporary downturn in tourism. For vineyards that are near fire-prone areas, smoke from wildfire could potentially cause problems, particularly for red grapes, where the grape skin is still used in the winemaking process. Studies have shown that wildfire smoke can potentially infuse with the grape skin and create abnormal flavors (Mayton 2015a). Furthermore, wildfires could threaten vineyards, particularly at the start of harvest season. Oftentimes when wildfires occur, evacuation orders are established by ~~Cal~~ CAL ~~Fire~~FIRE, which could leave certain vineyards inaccessible for ~~a period of time~~a period. Without access, grapes could remain on the vine too long and over ripen, leaving them unsuitable for winemaking (Mayton 2015b).

Sensitive Populations

With approximately 17 percent of the County's population over the age of 65 and 33 percent of Hispanic or Latino origin, projected climate change exposures have the potential to leave sensitive populations in the County especially vulnerable to increased risk (Census 2014).

Higher frequency of extreme heat conditions can cause serious public health impacts, increasing the risk of conditions directly related to heat such as heat stroke and dehydration (CNRA 2012a: 3). Older adults, particularly seniors, are more likely to experience respiratory and/or cardiovascular health complications than younger individuals. Approximately 24,000 of the County's population are elderly, which are more likely to live alone with limited mobility, all of which can exacerbate health risks associated with extreme heat (Census 2014).

The County has a large Hispanic population, many of which are low-income agricultural workers that speak primarily Spanish. The majority of the County's large agricultural job base is of Hispanic origin. Heat stress can seriously affect those working outside, by reducing overall productivity and in extreme exposures could lead to illness, disability, or death (CNRA 2014:24). Wildfire could also negatively impact those who pick the grapes, because of the potential degradation of transportation infrastructure. Because a large number of agricultural workers cannot afford to live in the County (due to high housing costs and the lack of affordable housing), their access and mobility could be impaired.

The Hispanic population has increased from 23.7 percent in 2000 to 33.7 percent in 2014 (Census 2014).

As sea levels rise, the area and the number of people at risk because of flooding will also rise. Factors that increase vulnerability to the adverse impacts of flood events associated with sea-level rise include access to preparedness information, transportation, healthcare, and

insurance. Key demographics associated with these vulnerabilities include income, race, linguistic isolation (i.e., non-English speaking), and residential tenure (CEC 2012:8). Language ability is an important factor in assessing vulnerability as emergency response crews may be unable to communicate with non-English speakers (CEC 2012: 9). The portion of the County's Hispanic population that is low-income and that speak primarily Spanish are especially vulnerable and would be impacted by a flood event associated with sea-level rise.

Renters are also more vulnerable, as they are less likely to reinforce buildings and buy insurance because the decision to make major home improvements typically lies with the property owner. Additionally, disaster recovery services have often targeted homeowners, to the disadvantage of renters (CEC 2012~~:~~9).

Source: County of Napa

Wildfire Threat is Likely to Increase

The County is already considered to be an area that is at high-risk for wildfires, which is only expected to increase by the end of the century (Napa County 2013:77). This increase could cause additional threats to the County and has the potential to affect emergency services, roads, water supplies to residents, housing access, and quality of life. For example, the County lost 6 percent of its housing stock in the October 2017 fires, in an already challenging housing market (Napa County 2018).

A changing climate is expected to subject forests to increased stress due to drought, disease, invasive species, and insect pests. These stressors are likely to make forests more vulnerable to catastrophic fire (Westerling 2007:231). While periodic fires are natural processes and carry out an important ecological function, catastrophic fire events that cannot be contained or managed can cause serious threats to homes and infrastructure, especially for properties located at the wildland-urban interface (i.e., where residential development mingles with wildland areas) (C~~alifornia Dept. of Forestry and Fire Protection~~AL FIRE 2009). Ecological functions are further impacted as the risk of fire increases. When it does rain in burned areas, more soil washes off the hills and into roads, ditches, and streams.

Source: County of Napa

Flooding and Sea-Level Rise Could Make New Areas in the County Vulnerable

The County ~~as a whole is~~is not extremely ~~very~~ vulnerable to sea-level rise, with less than one percent of the County's total population considered at risk (CEC 2012:14 and Census 2014). Considering a 100-year flood event, a 1.5 m rise in sea-level and other hydrodynamical factors, most of the land at increased risk for flooding is undeveloped. A small portion of critical infrastructure, such as roads, railways, hospitals, emergency facilities, and properties in the southwestern portion of the County and in areas along the Napa River, including parts of Downtown Napa, could become vulnerable.

American Canyon Power Plant and the Napa Sanitation District Water Treatment Plant could also become vulnerable (CEC 2012:23).

Current Actions and Adaptive Capacity

The County has already begun to address many of the challenges associated with climate change through existing local policies, plans, programs, resources, and institutions.

On a planning level, the County addresses current and future impacts related to existing natural hazards, as evidenced by the creation of the County's Operational Area Hazard Mitigation Plan in 2013, which identifies current hazard risks and mitigation strategies for flooding, earthquakes, and fires. Furthermore, the County's 2008 General Plan includes policies aimed at reducing local contributions to global climate change and encourages sustainable building practices, efficient use of resources (i.e., water, land, and energy), sustainable vineyard practices, and ecological stewardship. It also covers vulnerable populations, including policies aimed at achieving more equitable outcomes for the growing low-income populations in the County, as well as its aging population that require better access to public services and housing. In Fall 2018, the County will commence a 5-year update of the Operational Area Hazard Mitigation Plan. Concurrent with the plan update, the Safety Element of the County's general plan will be updated, including any necessary updates to climate adaptation and resilience policies.

The County is already addressing climate change through existing policies, plans, and programs. Based on current efforts, the CAP assesses the County's adaptive capacity, or its ability to adapt and respond to projected changes.

In addition to planning efforts, the County has embarked on a number of climate adaptation-related efforts, which are summarized below. The County's adaptive capacity, or the ability to adapt and reduce vulnerability to climate change, is also assessed. Adaptive capacity can be rated high, medium, or low. High adaptive capacity indicates that sufficient measures are already in place to address projected changes, while a low rating indicates a community is unprepared (CNRA 2012:26).

Efforts Related to Increased Temperature and Extreme Heat Frequency

The Napa County Health and Human Services Agency, Public Health Division, maintains an Excessive Heat Emergency Response Plan, which is designed to address current and projected changes in increased temperature, including extreme heat events and heat waves (Napa County 2009). The plan clearly outlines procedures and steps the County can take, including which other agencies to enlist for support, to effectively help the community in the event of excessive heat emergencies. While the plan can account for projected increases in temperature, it is reactive in nature and does not include potential solutions that could be put in place before extreme heat events occur. Therefore, the adaptive capacity ranking for increased temperature is considered medium.

Source: County of Napa

Efforts Related to Water Supply and Precipitation Patterns

The County has several water conservation programs, including rebates for appliances and free-water saving devices for residents, that are helping to combat drought and other water supply issues, but the County is still currently vulnerable to water supply issues because of drought and other factors. The County will face challenges in providing sufficient water supplies in the future due to climate change effects, coupled with an increasing population (i.e., mostly in the incorporated areas) and increasing water demand. While the County has already taken steps towards achieving long-term groundwater sustainability, there is still a possibility that water supply availability may change in the future and will need to be further addressed. Therefore, the adaptive capacity ranking for changes to precipitation patterns and water supply is medium.

The County has water conservation regulations for landscape design, with the intent to conserve water through promotion of the most efficient use of water in landscape design, while respecting the economic, environmental, aesthetic, and lifestyle choices of individuals and property owners (Napa County Municipal Code Title 18, Chapter 18.118).

Efforts Related to Flooding

While levees and structures have been built to protect the County from a 100-year flood event, and the Napa River Flood Control Project will provide a higher level of flood protection, the County is currently not prepared to address effects associated with future sea-level rise and other hydrodynamic factors that would increase the risk of flood0ing. Climate change is projected to expose 13,000 additional acres to 100-year flood risk. While ~~a majority of~~most of these areas are undeveloped, some developed areas are at risk and should be accounted for in future plans. Therefore, the adaptive capacity for risks associated with flooding is considered medium.

The Napa River Flood Control Project will restore more than 900 acres of high-value tidal wetlands of the San Francisco Bay Estuary while protecting 2,700 homes, 350 businesses, and over 50 public properties from 100-year flood levels, a savings of $26 million annually in flood damage costs (Napa County 2016a).

Efforts Related to Wildfire Prevention

The County is an area that is currently at high-risk for wildfires. Currently, the County has several programs to help prevent wildfires. The County participates in the National Fire Protection Association's (NFPA) Firewise Communities Program ~~and also~~and has several Fire Safe Councils that are active in minimizing the potential for wildfire damage. The County is also only one of four Counties to have road standards that meet the Board of Forestry's stringent requirements. While programs and policies in place show a current capacity to address risks, the County is still vulnerable, as evidenced by the October 2017 fires. Climate change is projected to increase this current risk by anywhere from 10 to 20 percent and the County will need to continue to adapt to this projected increase. Therefore, the adaptive capacity for risks associated with wildfire is considered medium.

The County has provisions to help prevent the accumulation of combustible vegetation or rubbish that can be found to create fire hazards and potentially impact health, safety, and general welfare of the public (Napa County Municipal Code Title 8, Chapter 8.36).

Other Climate-Adaptation Related Efforts

The County has practices and organizations in place that help address future issues of sustainability and climate adaptation. With organizations, such as Sustainable Napa County, that educate the public and foster collaboration for longer term environmental

The County enforces the Green Building Standards Code to establish and encourage sustainable building construction practices having a positive environmental impact (Napa County Municipal Code Title 15, Chapter 15.14).

sustainability, the County through partnerships is finding ways to change behaviors and practices now. The County also supports the Napa Green Certification program, which aims to reduce solid waste generation, water use, and wastewater generation, promoting sustainable agricultural practices. Furthermore, by adopting the Green Building Standards Code, the County is setting a precedent for reduced energy use, building with more sustainable materials, and employing better water conservation tactics. The County also recently joined Marin Clean Energy (MCE), which allows users to purchase more renewable energy options. These efforts, however, would need to be expanded and applied on a much larger scale throughout the County to address future changes attributed to climate change. Therefore, the adaptive capacity for other climate-adaptation related efforts is medium.

Risk and Onset

The County is committed to continuing efforts to address and reduce existing climate-related risks and future impacts on a program level. With several ordinances and programs that cover a range of climate exposures and related impacts, the County is well equipped to handle current issues of extreme heat events and water supply issues, but could still likely face increasing challenges as projected changes occur.

The timeframe in which the impact is most likely to occur are defined as follows:
- **Near-term: 2020-2040,**
- **Mid-term: 2040-2070, and**
- **Long-term: 2070-2100.**

In terms of how likely and quickly impacts will occur, temperature related impacts are the most likely near-term climate change exposure facing the County and should be addressed and prioritized in future adaptation planning efforts. While sea-level rise has a high certainty rating and is already occurring, its onset is not expected to occur until closer to the end of the century in terms of changes in areas already vulnerable to flooding or causing permanent inundation in tidally-influenced areas of the County. Addressing increases in flooding and wildfire risk have mid-term onsets and should be prioritized accordingly.

4.3 Adaptation Strategies and Measures

This section defines the strategies and measures that the County will pursue to further its climate adaptation efforts. These strategies build upon current efforts to be more sustainable, adaptive, and progressive. The County's 2008 General Plan contains several policies aimed at achieving sustainable development, reducing vehicle emissions, using resources more efficiently, and improving vineyard practices. The strategies and measures within this section define the specific steps necessary to prepare for the future effects of a changing climate. Other County plans, programs, efforts, and policies support this vision and contribute to addressing climate change issues.

See Section 4.2 Current Actions and Next Steps for more details regarding current County efforts to address climate change.

Strategies identify the primary ways to adapt to climate change impacts. Measures identify specific steps that the County will take to implement strategies.

Adaptation measures are grouped into five strategies. These strategies address the climate change impacts and vulnerabilities identified in the vulnerability assessment (i.e., temperature, wildfire, precipitation, flooding, and sea-level rise). Within each strategy are a series of measures that define the programs, policies and regulations the County will implement to remain responsive to the challenges created by climate change. Consideration for how likely and how soon impacts are expected to occur are included, with specific attention given to those exposures that pose the most serious and near-term threats to the County. This includes identifying responsible County departments and an implementation timeframe for each measure. More detailed discussion on implementation and monitoring of the CAP can be found in Chapter 5.

~~S~~Adaptation strategies also have the potential to provide other important benefits to the community, or co-benefits, such as improved air quality, water supplies, biological resources, public health outcomes, and beneficial outcomes for non-renewable energy resources. For example, several adaptation measures would help to curb the urban heat island effect while also strengthening education and awareness about extreme heat and health, thus reducing the incidence of heat-related illness. Flood protection measures would increase resilience to flood-events while also restoring and protecting riparian habitats, resulting in ecological co-benefits. Often, those who are most vulnerable to the impacts of climate change are the ones who have the fewest resources to deal with these issues. Adaptation strategies that focus on identifying and targeting vulnerable populations would also provide health equity co-benefits. ~~These~~ Co-benefits are identified within each strategy, where applicable. And finally, GHG reduction measures previously identified in Chapter 3 that also contribute to adaptation are discussed, where appropriate.

Below are the five strategies included in this section:

The five adaptation strategies address the climate change impacts and vulnerabilities identified in Section 4.2:
- **temperature,**
- **wildfire,**
- **precipitation,**
- **flooding, and**
- **sea-level rise.**

- Prepare for Increases in Average Temperatures and Extreme Heat Events,
- Prepare for Increased Risk of Wildfire,
- Prepare for Variable Water Supplies and Preserve Water Quality,
- Prepare for Increased Likelihood of Flooding, and
- Prepare for Sea-Level Rise.

4.3.1 Prepare for Increases in Average Temperatures and Extreme Heat Events

Source: County of Napa

Temperature-related impacts because of climate change are likely to affect the County in several ways. Increased average temperatures, along with more frequent extreme heat events, are likely to exacerbate already high temperatures, in what are known in developed areas as urban heat islands. Built-up areas, which tend to have a prominence of asphalt and less vegetation, create, intensify and retain heat. To help curb the effects of urban heat islands in developed areas, the County will incorporate "green" infrastructure into new development and developing areas. Examples of green infrastructure include planting trees, climate-appropriate landscaping, rain gardens, and rooftop gardens. The County will also incorporate cool pavement and rooftop technology in new and existing developments, while also including more shade trees in parking lots.

With increased average temperatures and more frequent extreme heat events, energy demand is likely to increase. A number of GHG-reduction measures (see Chapter 3) also serve as climate adaptation measures. For example, improving energy efficiency and reducing energy demand in buildings today will help to mitigate future increases in energy demand as average temperatures rise and more extreme heat events occur. GHG-reduction measures include working on increasing energy efficiency in new and existing buildings, by ~~incentivizing energy efficiency improvements (GHG Measures BE-1 and BE-7),~~ requiring compliance with CALGreen Tier 1 Standards (GHG Measures BE-~~3~~1 and BE-~~4~~2), ~~and~~ increasing participation in MCE's Deep Green option for renewable energy (GHG Measures BE-~~3~~5 and BE-~~9~~6), and incentivizing energy efficiency improvements (GHG Measures BE-5 and BE-8).

All GHG Building Energy measures serve as adaptation measures by reducing overall energy demand. For a complete list of measures related to building energy, see Chapter 3.

Understanding that health-related risks increase along with average temperatures, the County will continue to work with the Health and Human Services Agency, along with other departments to ensure that the proper outreach programs and plans are in place to deal with heat-related illnesses and that the agricultural sector is equipped to withstand a changing climate.

Measures related to temperature are described below and summarized in Table 4-1 below.

Measure Temp-1 Map Critical Infrastructure Locations Vulnerable to Extreme Heat Events

Map locations of communication, energy, service, and transportation infrastructure that are vulnerable to extreme heat events.

Co-Benefits:

- ~~Lowered~~ Reduced Energy Demand
- ~~Lowered~~ Reduced Energy Bills
- ~~Lowered~~ Reduced Building and Operating Costs
- Reduced Fossil Fuel Reliance
- Improved Air Quality
- Improved Public Health
- Improved Quality of Life
- Increased Public Awareness of Climate Change

Measure Temp-2 Develop Outreach Programs for Outdoor Workers

Work with labor organizations, the agriculture and wine community, and County and State health and safety agencies to publicize programs and standards for preventing heat-related illness in employees who work outdoors.

Measure Temp-3 Educate Residents on Heat-Related Illness Prevention

Develop education outreach materials to publicize methods for preventing heat-related illness during heat waves.

Measure Temp-4 Encourage the installation of Cool Roof Technologies and Rooftop Gardens

Encourage and explore ways to incentivize the installation of cool roof technologies and, where appropriate, rooftop gardens in residences and commercial buildings.

Measure Temp-5 Incorporat~~ion of~~ e Cool Pavement Technology

Explore options to incorporate cool pavement technology into both the regular maintenance of existing and construction of new roads, sidewalks, parking areas, and bike lanes.

Measure Temp-6 Improve Parking Lot Shading and Landscaping

Explore options to improve parking lot shading requirements in new construction and to promote planting of additional trees and landscaping in existing parking lots.

Measure Temp-7 Update the County's Excessive Heat Emergency Response Plan

Coordinate with the Napa County Health and Human Services Agency, Public Health Division, to maintain and update the County's Excessive Heat Emergency Response Plan to better prepare for increased extreme heat days and more frequent and intense heat waves.

Measure Temp-8 Support and Monitor Research on the Effects of a Warmer Climate on the Agriculture and Wine Industries

Support and monitor ongoing research on the potential effects of a warmer climate on the agriculture and wine industry by existing organizations and groups, including but not limited to, Napa Valley Vintners and the California Climate and Agriculture Network.

Measure Temp-9 Understand the Tolerance of Current Wine Grape Varieties to Withstand Increased Temperatures

Work with grape growers to understand the tolerance of current wine grape crop mixes to withstand increased temperatures, and explore options to shift the types of grape varietals to suit changing environments.

Measure Temp-10 Develop Outreach Programs for Winemakers

Develop outreach programs to inform and assist winemakers in changing practices to adapt to the effects of climate change (e.g., increasing

average temperatures, variation in water supplies, etc.). Techniques could include, but are not limited to, providing artificial shade and limiting light exposure on grapevines during extreme heat events.

Measure Temp-11 Develop and Implement Strategies to Increase Energy Resiliency

Work with MCE and PG&E to develop and implement strategies to increase energy resiliency in the face of extreme events (e.g., extreme heat events, damages due to wildfire, flooding, and sea-level rise). Strategies could include, but are not limited to, battery storage and back-up systems, creating grid flexibility through increased renewable energy development, and identifying design weaknesses in energy infrastructure.

Creating a more resilient energy system will increase reliability and help ensure uninterrupted access to critical resources like power and water. GHG Building Energy measures also help to increase energy resilience by reducing the County's overall energy demand and diversifying regional sources of renewable power generation.

Table 4-1 Summary of Temperature Related Measures

Measure	Title	Responsibility	Timeframe
Temp-1	Map Critical Infrastructure Locations Vulnerable to Extreme Heat Events	Planning and Public Works	Near-Term
Temp-2	Develop Outreach Programs for Outdoor Workers	Planning & Public Health Division	Near-Term
Temp-3	Educate Residents on Heat-Related Illness Prevention	Planning & Public Health Division	Near-Term
Temp-4	Encourage the installation of Cool Roof Technologies and Rooftop Gardens	Planning	Near-Term
Temp-5	Incorporate~~ion of~~ Cool Pavement Technology	Planning	Mid-Term
Temp-6	Improve Parking Lot Shading and Landscaping	Planning	Near-Term
Temp-7	Update the County's Excessive Heat Emergency Response Plan	Planning & Public Health Division	Mid-Term
Temp-8	Support Research on the Effects of a Warmer Climate on the Agriculture and Wine Industries	Planning & the Agriculture Commissioner's Office	Near-Term
Temp-9	Understand the Tolerance of Current Wine Grape Varieties to Withstand Increased Temperatures	Planning & the Agriculture Commissioner's Office	Mid-Term
Temp-10	Develop Outreach Programs for Winemakers	Planning & the Agriculture Commissioner's Office	Mid-Term
Temp-11	Develop and Implement Strategies to Increase Energy Resiliency	Planning and Public Works	Mid-Term

Note: Near-Term: 1-3 Years, Mid-Term: 4-8 Years, Long-Term: 8+ Years
Source: Ascent Environmental 2016

4.3.2 Prepare for Increased Risk of Wildfire

With the County already at high risk for wildfire, it is imperative that the County prepare for increased wildfire risk as a result of climate change. The Napa County Fire Department currently has mutual aid agreements with American Canyon, the City of Napa, St. Helena, and Calistoga, forming the Napa County Firefighters Association (Association). The County will continue to collaborate with the Association and other pertinent agencies to coordinate strategies to ensure a cohesive County-wide approach to wildfire risk management.

GHG Measure AG-5~~1~~ will help to reduce the risk of fire spreading (see Chapter 3).

Additionally, GHG Measure AG-~~1~~5, which supports BAAQMD efforts to reduce open burning of removed agricultural biomass and flood debris, will help to reduce the risk of fire to spread and become hazardous threats. Wildfire is also the largest source of black carbon in California, harmfully impacting both public health and the climate (CARB 2017). An added co-benefit of reducing fire hazard risks and building resiliency through wildfire-related adaptation measures, is that less black carbon will be emitted into the atmosphere.

All wildfire-related measures are described below. Summaries of the measures are included in Table 4-2 below.

Co-Benefits:

- Protection of Structures and Assets
- Improved Air Quality
- Reduction in Black Carbon Emissions
- Protection of Natural Ecosystems and Habitats
- Improved Public Health
- Improved Quality of Life
- Increased Public Awareness of Climate Change

Measure Fire-1 Map and Identify Locations That Are Newly at Risk, or at Higher Risk for Fire Hazards

Work with CAL FIRE and the Napa County Fire Department to map and identify locations in the County that are newly at risk, or at higher risk, for fire hazards because of climate change and its impacts.

Measure Fire-2 Map Critical Infrastructure Locations Vulnerable to Wildfires

Map locations of communication, energy, service, and transportation infrastructure that are vulnerable to wildfires.

Measure Fire-3 Collaborate ~~Dissemination of Information~~ with the Napa County Firefighters Association in the Dissemination of Information

Collaborate with the Napa County Firefighters Association to disseminate information regarding the nexus between climate change and increased wildfire risk to identify opportunities for County-wide coordination efforts.

The Napa County Firefighters Association is a joint agency comprised of fire departments in Napa County, American Canyon, City of Napa, St. Helena, and Calistoga (Napa County 2016b).

Measure Fire-4 Coordinate Emergency Preparedness Systems

Coordinate with the Napa County Firefighters Association and the Office of Emergency Services to identify strategies to ensure capacity and resilience of escape routes compromised by wildfire, including emergency evacuation and supply transportation routes.

Measure Fire-5 Collaborate on Programs to Reduce Fire Hazards

Collaborate with the Napa County Fire Department to continue to reduce fire hazards, including but not limited to, enforcing defensible space guidelines, restoring fire-resilient conditions by thinning, removing live or dead vegetation, and retaining healthy native trees.

Table 4-2	Summary of Wildfire Risk Measures		
Measure	Title	Responsibility	Timeframe
Fire-1	Map and Identify Locations That Are Newly at Risk, or at Higher Risk for Fire Hazards	Planning, Napa Couny Fire Department, & CAL FIRE	Near-Term
Fire-2	Map Critical Infrastructure Locations Vulnerable to Wildfires	Planning, Public Works, & Caltrans	Mid-Term
Fire-3	Collaborate ~~Dissemination of Information~~ with the Napa County Firefighters Association in the Dissemination of Information	Planning & Napa County Firefighters Association	Mid-Term
Fire-4	Coordinate Emergency Preparedness Systems	Planning, Napa County Firefighters Association, & Office of Emergency Services	Mid-Term
Fire-5	Collaborate on Programs to Reduce Fire Hazards	Planning & Napa County Fire Department	Near-Term

Note: Near-Term: 1-3 Years, Mid-Term: 4-8 Years, Long-Term: 8+ Years
Source: Ascent Environmental 2016

4.3.3 Prepare for Variable Water Supplies and Preserve Water Quality

Climate change effects will result in variable water supplies and an increased need to preserve water quality in Napa County. To prepare for these conditions, the County will continue to evaluate the vulnerabilities of its water supply systems and networks, while also identifying innovative options to meet future water demand.

Several GHG reductions measures also serve as adaptation strategies. GHG Measure LU-2, refines protection guidelines for existing riparian lands, further preserving areas and water quality. Additional water related GHG measures cover a range of water conservation tactics, including regulations for landscape design (GHG Measure WA-1), adopting ordinances that limit outdoor watering for commercial and residential land uses (GHG Measure WA-2), and requiring audits for new large-scaled projects and existing facilities (GHG Measure WA-4). GHG Measure WA-3, expedites and reduces permit fees associated with water conservation installations, including rainwater catchment systems, which are also encouraged in Adaptation Measure Water-3 below.

All GHG Water measures serve as adaptation measures by preserving water quality and encouraging water conservation. For a complete list of measures related to water, see Chapter 3.

Additionally, the County will pursue future grant opportunities to continue efforts related to provide enough water supplies in the future, and support local efforts from Napa Green Land to increase water efficiency in agricultural lands in the County.

All measures related to water supply and quality are described below and summarized in Table 4-3 below.

Co-Benefits:

- ~~Lowered~~ Reduced Water and Sewer Bills
- Improved Water Supply and Quality
- Increased Public Awareness of Climate Change

Measure Water-1 Evaluate Vulnerabilities of Water Supply Systems and Networks

Evaluate the vulnerability of the water supply systems and networks to climate change related impacts and develop strategies to increase the resilience of these systems.

Measure Water-2 Consider Innovative Options to Meet Future Demand

Consider innovative options to meet future water demand (e.g., on-site graywater systems; institute water conservation strategies; and use of recycled water).

Measure Water-3 Promote Use of Rainwater Catchment and Storage Systems

Promote the use of catchment systems, such as rain barrels, rain gardens, cisterns, and other mechanisms to capture and store rainwater.

Source: County of Napa

Measure Water-4 Support Napa Green Land Certification Efforts

Support efforts of the Napa Green Land ~~to increase~~ certification program for ~~of~~ agriculture and farm land to prevent soil erosion, reduce harmful inputs and runoff, restore wildlife habitats, and support healthy rivers, streams, and riparian vegetation to maintain water quality and conserve water resources. See also GHG reduction measure MS-1 in Chapter 3, which establishes a goal for 100 certification for all eligible properties in the Napa Green certification programs.

Measure Water-5 Collaborate with Agencies to Identify Future Water Supplies and Explore Alternative Supply Sources

Collaborate with the Napa County Flood Control and Water Conservation District and Public Works, to identify water supply options for the future. Explore opportunities to expand the use of on-site graywater systems, recycled water systems, or other alternative supply sources to meet non-potable water demands, and where possible, to offset groundwater and/or potable use.

Measure Water-6 Pursue Grant Funding Opportunities for Water Resource Planning Projects

Pursue grant funding opportunities related to on-site graywater reuse systems, water recycling projects, and/or other water resource planning projects.

Table 4-3	Summary of Water Supply and Quality Measures		
Measure	Title	Responsibility	Timeframe
Water-1	Evaluate Vulnerabilities of Water Supply Systems and Networks	Planning, Napa County Flood Control & Water Conservation District, & Public Works	Near-Term
Water-2	Consider Innovative Options to Meet Future Demand	Planning, Napa County Flood Control & Water Conservation District, & Public Works	Mid-Term
Water-3	Promote Use of Rainwater Catchment Systems	Planning & Public Works	Mid-Term
Water-4	Support Napa Green Land Certification Efforts	Planning	Near-Term
Water-5	Collaborate with Agencies to Identify Future Water Supplies and Explore Alternative Supply Sources	Planning, Napa County Flood Control & Water Conservation District, & Public Works	Mid-Term
Water-6	Pursue Grant Funding Opportunities for Water Resource Planning Projects	Planning & Public Works	Mid-Term

Note: Near-Term: 1-3 Years, Mid-Term: 4-8 Years, Long-Term: 8+ Years
Source: Ascent Environmental 2016

4.3.4 Prepare for Increased Likelihood of Flooding

Through a variety of measures, the County will prepare for the increased likelihood of flooding. The County will work with local agencies and organizations to reduce the effects of flooding by improving and mapping critical infrastructure. On a larger County-wide level, the County is committed to partner with incorporated cities to address flooding collectively, paying attention to areas at increased flooding risk along the Napa River.

The County will also use several measures to restore the natural environment to combat flooding. Identifying streamside areas that could be restored will not only buffer buildings, roads, and crops from floods, but will also improve natural landscapes and air quality.

Additionally, GHG reduction Measure LU-2 which refines protections guidelines for existing riparian lands, also serves as an adaptation strategy.

GHG Measure LU-2 will help conserve natural habitats to prevent future flooding (see Chapter 3).

Measures related to flooding are described below and summarized in Table 4-4 below.

Measure Flood-1 Update the County's Operational Area Hazard Mitigation Plan to Address Flooding and Climate Change

Ensure that future updates to the County's Operational Area Hazard Mitigation Plan incorporate strategies to address the increased likelihood of flooding because of climate change.

Co-Benefits:

- Protection of Structures and Assets
- Protection of Natural Ecosystems and Habitats
- Improved Air Quality
- Improved Public Health
- Improved Quality of Life

Measure Flood-2 Partner with Incorporated Towns and Cities and Local Organizations to Address Flooding

Partner with incorporated cities in the County and local organizations, such as the North Bay Climate Adaptation Initiative, to ensure coordinated efforts are taken to reduce threats to structures, populations, and functions because of flooding, particularly along the Napa River.

Measure Flood-3 Identify Potential Streamside Restoration Areas

Identify potential streamside areas in the County that could be restored by stabilizing stream banks and planting appropriate vegetation to buffer buildings, roads, and crops from floods.

Measure Flood-4 Encourage Replanting Bare or Disturbed Areas

Encourage the r~~R~~eplanting of bare or disturbed areas to reduce runoff, improve water uptake, and reduce erosion and sedimentation in streams.

Measure Flood-5 Coordinate Emergency Evacuation and Supply Transportation Routes

Coordinate emergency evacuation and supply transportation routes with the County's Office of Emergency Services to ensure capacity and resilience of escape routes compromised by flooding.

Measure Flood-6 Improve Sewage and Solid-Waste Management Infrastructure

Improve sewage and solid-waste management infrastructure, to the extent such infrastructure is within the jurisdiction of the County, to reduce vulnerabilities to climate change (i.e., storm surge, flooding, and inundation).

Measure Flood-7 Improve Capacity of Storm Water Infrastructure

Evaluate and improve capacity of storm water infrastructure for high intensity rainfall events.

Source: County of Napa

Measure Flood-8 Increase Use of Pervious Pavements and Landscaping in Developed Areas

Increase the use of pervious pavements and landscaped areas to allow for better infiltration and reduced stormwater overflow in developed areas.

Measure Flood-9 Map Critical Infrastructure Locations Vulnerable to Flooding

Map locations of communication, energy, service, and transportation infrastructure that are vulnerable to floods and storm surges.

Measure Flood-10 Understand the Tolerance of Current Wine Grape Varieties to Withstand Increased Flooding

Work with the agriculture sector to understand the tolerance of current wine grape varieties to withstand increased flooding, and explore

options to shift the types of grape varietals to suit changing conditions.

Measure Flood-11 Design Programs to Address Vector- and Waterborne Diseases

Design programs to monitor and prepare for the appearance of vector- and waterborne diseases following floods and storms.

Table 4-4 Summary of Flood Risk Measures

Measure	Title	Responsibility	Timeframe
Flood-1	Update the County's Operational Area Hazard Mitigation Plan to Address Flooding and Climate Change	Planning & Office of Emergency Services	Near-Term
Flood-2	Partner with Incorporated Towns and Cities and Local Organizations to Address Flooding	Planning & Incorporated Cities[1]	Mid-Term
Flood-3	Identify Potential Streamside Restoration Areas	Planning & Public Works	Near-Term
Flood-4	Encourage Replanting Bare or Disturbed Areas	Planning	Mid-Term
Flood-5	Coordinate Emergency Evacuation and Supply Transportation Routes	Planning & Office of Emergency Services	Mid-Term
Flood-6	Improve Sewage and Solid-Waste Management Infrastructure	Planning & Public Works	Mid-Term
Flood-7	Improve Capacity of Storm Water Infrastructure	Planning & Public Works	Mid-Term
Flood-8	Increase Use of Pervious Surfaces and Landscaping in Developed Areas	Planning	Mid-Term
Flood-9	Map Critical Infrastructure Locations Vulnerable to Flooding	Planning	Near-Term
Flood-10	Understand the Tolerance of Current Wine Grape Varieties to Withstand Increased Flooding	Planning & the Agriculture Commissioner's Office	Mid-Term
Flood-11	Design Programs to Address Vector- and Waterborne Diseases	Planning and Public Health Division	Mid-Term

Note: Near-Term: 1-3 Years, Mid-Term: 4-8 Years, Long-Term: 8+ Years
[1] Includes American Canyon, Calistoga, City of Napa, St. Helena and Yountville.
Source: Ascent Environmental 2016

4.3.5 Prepare for Sea-Level Rise

The County will coordinate with several agencies, including the Federal Emergency Management Agency (FEMA) Region IX, DWR, Napa County Public Works, and Napa County's Office of Emergency Services to prepare for the projected effects of sea-level rise. Measures include identifying specific areas in the County that will be affected by sea-level rise and establishing measures to protect functions, structures and populations. In addition to supporting ongoing research and analysis of sea-level rise and its effects on the County, the County will incorporate sea-level rise effects into its future planning efforts. The County will also through an outreach strategy,

Source: County of Napa

educate and inform residents of potentially affected areas of the need to plan for sea-level rise.

Measures related to sea-level rise are described below and summarized in Table 4-5 below.

Measure SLR-1 Identify Areas Affected by Sea-Level Rise

Conduct a detailed sea-level rise assessment to identify and inventory areas that will be affected by sea-level rise and establish measures to protect functions, structures, and populations.

Measure SLR-2 Update the County's Operational Area Hazard Mitigation Plan to Incorporate Sea-Level Rise

Ensure that future updates to the County's Operational Area Hazard Mitigation Plan incorporate sea-level rise assessment and risk management processes.

Measure SLR-3 Floodplain Mapping Coordination

Coordinate with FEMA and DWR to ensure that floodplain mapping for potentially affected areas are regularly updated to reflect changes in Base Flood Elevations that account for sea-level rise.

Co-Benefits:

- **Protection of Structures and Assets**
- **Improved Public Health**
- **Improved Quality of Life**
- **Increased Public Awareness of Climate Change**

Measure SLR-4 Support and Monitor Ongoing Analysis of Sea-Level Rise Data

Support and monitor ongoing collection and analysis of sea-level rise, storm surge, and tidal data by existing institutions, including, but not limited to FEMA, the Bay Conservation Development Commission, the Bay Area Regional Collaborative, and the National Oceanic and Atmospheric Administration.

Measure SLR-5 Create a Comprehensive Outreach Strategy

Create a comprehensive outreach strategy that informs residents in potentially affected areas of County efforts to protect and increase community resiliency to sea-level rise.

Measure SLR-6 Incorporate Sea-Level Rise Effects into Capital Improvement Plans

Update capital improvement plans for critical infrastructure to address the effects of future sea-level rise and associated hazards in potentially affected areas.

Measure SLR-7 Assess Sea-Level Rise Impacts on Agriculture

Conduct a more detailed assessment of the impacts sea-level rise, severe storms, and increased risk of coastal flooding on the County's agriculture sector.

Table 4-5 Summary of Sea-Level Rise Measures

Measure	Title	Responsibility	Timeframe
SLR-1	Identify Areas Affected by Sea-Level Rise	Planning	Mid-Term
SLR-2	Update Napa County's Operational Area Hazard Mitigation Plan to Incorporate Sea-Level Rise	Planning & Office of Emergency Services	Near-Term
SLR-3	Floodplain Mapping Coordination	Planning, FEMA & DWR	Near-Term
SLR-4	Support Ongoing Analysis of Sea-Level Rise Data	Planning	Near-Term
SLR-5	Create a Comprehensive Outreach Strategy	Planning	Mid-Term
SLR-6	Incorporate Sea-Level Rise Effects into Capital Improvement Plans	Planning & Public Works	Mid-Term
SLR-7	Assess Sea-Level Rise Impacts on Agriculture	Planning	Mid-Term

Note: Near-Term: 1-3 Years, Mid-Term: 4-8 Years, Long-Term: 8+ Years
Source: Ascent Environmental 2016

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Napa County Climate Action Plan

A Tradition of Stewardship
A Commitment to Service

Chapter 5

Implementation and Monitoring

Source: County of Napa

5.1 Introduction

This chapter outlines in detail how the County of Napa (County) will implement and monitor the Climate Action Plan (CAP) strategies and measures over time to reduce greenhouse gas (GHG) emissions and adapt to climate change. To achieve the GHG emissions reductions and adaptation strategies described in Chapters 3 and 4, measures must also be continuously assessed and monitored to ensure that: (1) the measures are effective; (2) the CAP is on track to achieve the GHG reduction targets; and (3) desired community outcomes are attained.

Source: County of Napa

5.2 Implementation Strategy

Achieving the 2020 and 2030 GHG reduction targets will require implementation of the strategies and measures identified in the CAP. Ensuring that the measures translate to on-the-ground results and reductions in GHG emissions is critical to success. It requires careful consideration of the operational and capital resources needed to implement the CAP, as well as the overall timing, phasing, and monitoring of implementation.

This chapter describes how County staff will implement the CAP, and how the CAP will be monitored and updated over time to ensure continued effectiveness and relevance of the document.

The monitoring strategy outlined below serves as initial guidance for County staff in monitoring progress towards established goals. Monitoring and assessment of the CAP implementation process will provide key insights into which strategies and measures have been most successful in terms of implementation and GHG reductions and will inform policy and strategy development for future CAP updates.

The County will implement strategies and measures of the CAP through several types of programs and activities that can be grouped into the following categories:

- **Code Updates.** Several of the measures in the CAP are implemented through new or amended regulations as part of County Code updates. The County, for example, will need to incorporate the California Green Building Standards Code (CALGreen) Tier 1 “reach code” into the County’s local building code, along with requiring that new or replacement residential water heating systems be electrically-powered and/or alternatively-fueled systems.
- **Financing and Incentives.** Identifying mechanisms for funding and allocating resources, such as expanding current green energy incentives, will help ensure that the CAP is successfully implemented.
- **Program Research and Development.** Several measures are programmatic in nature and will require additional research and development for proper implementation to occur (i.e., developing programs to address vector- and waterborne diseases). These programs may require future partnerships

Source: County of Napa

and financing mechanisms to be in place down the road, but most immediately, County staff will need to integrate program research and development into the context of existing workloads and programs whenever possible.

- **Partnerships.** Inter-agency coordination and partnerships with other organizations is critical to ensuring implementation of certain measures (i.e., developing a region-wide CAP, increasing Napa Green Certified wineries, or supporting efforts to allow commuter service to operate on the Napa Wine Train right-of-way).
- **Education and Outreach**. Education efforts about the objectives of the CAP will create support for the CAP and involve the community in its implementation.

Low cost measures are those that have low County administrative costs, can be subsidized, or compared to other measures have lower start-up costs. High cost measures are those that consume a substantial portion of local government budget or would require extensive infrastructure to implement.

Table 5-1 summarizes the implementation strategy for the CAP. More specifically, for each GHG reduction and adaptation measure, the table identifies the following information:

- **Responsibility**. Identifies County departments that will be responsible for implementing assigned actions upon adoption of the CAP. Because some measures will require interdepartmental or inter-agency cooperation, appropriate partnerships have been initially identified.
- **Timeframe**. The estimated timeframe for implementing each measure. Measures are categorized as Near-Term (will occur within 1-3 years), Mid-Term (will occur within 4-7 years), by 2030, or Ongoing (already occurring).
- **General County Implementation Costs**. Relative County costs required to implement each measure are represented by an order of magnitude category (i.e., Low, Medium, High) . These categories are based on the anticipated level of resources, staffing, and time required to implement each measure. The general cost category is not intended to represent the relative costs of compliance, but rather focused on the County's costs to facilitate program development and implementation. For a more specific discussion of the relative costs and benefits of compliance with individual measures, see Appendix B.
- **Estimated County Staff Time**. Staffing requirements for the County are presented in terms of the estimated number of full-time equivalent (FTE) employees needed to implement and coordinate CAP measures over one fiscal year. In some cases, the FTE estimates could be absorbed into existing work programs, while in other cases new work programs and associated staff positions could be required. More detailed estimates of staffing and program costs will be developed during implementation of specific measures.

Full-time equivalent (FTE) in this context represents the proportion of time that one employee working on a full-time basis (i.e., 40 hours a week) would devote to implementing the CAP over the course of one fiscal year.

- **Category**. Identifies the implementation category for each measure (i.e., Code Updates, Financing and Incentives, Program Research and Development, Partnerships, and Education and Outreach).

- **Applies to Projects Seeking CEQA GHG Streamlining**. Distinguishes which measures would be required for future development projects seeking to tier and streamline from the CAP during California Environmental Quality Act (CEQA) review. See Section 5.2.1 below and Appendix D for additional details.
- **Implementing Actions and Other Considerations**. Summarizes the key actions County staff will take, partnership or collaboration needs, generalized costs and benefits of compliance, and other considerations for measure implementation and monitoring.

The County will develop more detailed implementation schedules for each measure, based on staff requirements and funding opportunities available for implementing the measures outlined in the CAP. Implementation of the CAP will require inter-departmental collaboration and key staff in each department will facilitate and oversee action implementation. Priority will be given to programs based on cost effectiveness, GHG reduction potential, available funding, and the ease and length of time for implementation.

Proper implementation and tracking of the CAP allows County staff, the Board of Supervisors, and the public to monitor the effectiveness of each measure as well as the overall CAP.

The County will incur costs to implement some of the measures outlined in the CAP. These include initial start-up, ongoing administration, and enforcement costs. While some measures will only require funding from public entities, others will result in increased costs for businesses, new construction, and residents. However, most measures provide substantial cost-savings in the long term. The County will be diligent in seeking cost-effective implementation, strategic funding opportunities, and the use of partnerships to share costs.

5.2.1 Role of New Development

Implementation of the CAP will require that new development projects attain higher levels of energy efficiency and incorporate more sustainable design standards. However, new developments that are consistent with applicable GHG reduction measures in a CAP are eligible for CEQA streamlining, per the provisions of CEQA Guidelines Section 15183.5. Under these provisions, if a project can show consistency with applicable GHG reduction measures in a CAP, the level of analysis for the project required under CEQA with respect to GHG emissions can be reduced considerably (i.e., detailed analysis of project-level GHG emissions and potential climate change impacts is not needed). Furthermore, a project's incremental contribution to cumulative GHG emissions may be determined not to be cumulatively considerable. This CAP meets the criteria identified in Section 15183.5 and is therefore considered a "qualified" CAP.

The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

To help new development applicants plan and design projects consistent with the CAP, and to assist County staff in determining the consistency of proposed projects with the CAP during development

review, the County has prepared a CAP Consistency Checklist (See Appendix D). The Checklist incorporates the GHG reduction measures that could be feasibly applied to future projects subject to discretionary review and are noted in Table 5-1 below.

The Checklist may also be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or Federal law. By incorporating applicable GHG reduction measures in the Checklist into project designs or conditions of approval, the County will ensure that new development is consistent with applicable GHG reduction measures in the CAP and thus will contribute its “fair share” in achieving the identified GHG reduction targets.

Source: County of Napa

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
GHG Reduction Measures								
Agrciulture - Primary Measures								
AG-1	Support the conversion of stationary diesel or gas-powered irrigation pumps to electric pumps	Planning & BAAQMD	Near-Term	Low	Less than 0.01 FTE	Yes[2]	Financing & Incentives	Requires County staff time for development review, funding sources for new incentives, and collaboration with BAAQMD. New or replacement equipment costs and potential electrification costs for property owners, with potential for long-term cost savings.
AG-2	Support use of electric or alternatively-fueled agricultural equipment	Planning & BAAQMD	Near-Term	Low	Less than 0.01 FTE	Yes[2]	Partnerships	Requires County staff time for development review and collaboration with BAAQMD and agricultral sector. New or replacement equipment costs for property owners, with potential for long-term cost savings.
AG-3	Support the use of Tier 4 final diesel equipment for off-road agricultural equipment	Planning & Agricultural Community	Mid-Term	Low	Less than 0.01 FTE	Yes[2]	Partnerships	Requires County staff time for development review and collaboration with agriculture sector. New or replacement equipment costs for property owners, with potential for long-term cost savings.
AG-4	Support reduced application of inorganic nitrogen fertilizer	Planning & Agricultural Community	Near-Term	Low	0.02 FTE	No	Partnerships, Education & Outreach	Requires County staff collaboration with agriculture sector. Potential cost savings for farmers from reduced fertilizer use.
Agrciulture - Secondary Measures								
AG-5	Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris	Planning & BAAQMD	Near-Term	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time for collabration with BAAQMD.
AG-6	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	Planning, Napa County RCD, & Agricultural Community	Mid-Term	Low	Less than 0.01 FTE	Yes[2]	Partnerships, Program Research & Development, Education & Outreach	Requires County staff time for collaboration. New funding sources could be required to provide incentives or expand existing programs operated by RCD or other organizations.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Building Energy- Primary Measures								
BE-1	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings	Building & Public Works	Near-Term	Medium	0.08 FTE	Yes	Code Updates, Financing & Incentives	Requires County staff time to update and enforce new CALGreen Tier 1 building code requirements, and develop incentives to help offset permit and construction costs. Upgraded green building and sustainable site design measures could increase development costs, but also would reduce operating costs for future residents and businesses.
BE-2	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030	Building & Public Works	Near-Term	Medium	0.08 FTE	Yes	Code Updates, Financing & Incentives	Requires County staff time to update and enforce new CALGreen Tier 1 and ZNE code requirements and develop incentives to help offset permit and construction costs. Upgraded green building and sustainable site design measures could increase development costs, but also would reduce operating costs for future residents and businesses.
BE-3	Increase participation in MCE's Deep Green (100 percent renewable) option	Planning, Public Works, MCE, & Potential Funding Sources	Near-Term	Medium	Less than 0.01 FTE	No	Financing & Incentives	Requires County staff time to develop incentive program, along with a potential new funding source to provide subsidy to income-qualified residents to offset cost of MCE Deep Green premium.
BE-4	Require new or replacement residential and commercial water heating systems to be electrically powered and/or alternatively fueled (e.g., solar water heating) for all residential land uses	Building	Near-Term	Medium	0.08 FTE	Yes	Code Updates, Financing & Incentives	Requires County staff time to update and enforce new regulations in County building code, and develop incentives to help offset permit and construction costs. New or replacment could reduce operating costs for residents due to increased efficiency.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
BE-5	Expand current renewable energy and green energy incentives and update local ordinances	Planning, Google, and National Renewable Energy Laboratory	Mid-Term	Medium	0.08 FTE	No	Code Updates, Financing & Incentives, Partnerships	Requires County staff time to update local ordinances and expand incentive programs. Annual costs to County for permitting or other incentives. Potential costs savings to consumers would help to offest costs of installation along with County incentives.
BE-6	Select MCE's Deep Green option for all County facilities	Public Works	Near-Term	Low	0.000 FTE	No	Financing & Incentives	Annual County operating cost increases for MCE Deep Green premium.
BE-7	Support waste-to-energy programs at unincorporated landfills	Planning, Public Works, & Landfills	Mid-Term	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to collaborate with other agencies and organizations. New infrasuturctre costs, and operating costs and benefits, need to be determined based on specific programs or projects.
Building Energy- Secondary Measures								
BE-8	Work with PG&E, BayREN, MCE, and PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	Planning, Public Works, BayREN, MCE, & PG&E	Ongoing, Near-Term	Medium	0.02 FTE	No	Partnerships, Financing & Incentives	Requires County staff time to maintain and provide information to the public regarding existing incentive and financing programs, and collaborate with existing organizations and partnerships.
BE-9	Require energy audits for major additions to or alterations of existing buildings	Building	Near-Term	Medium	0.08 FTE	Yes	Code Updates	Requires County staff time to update and enforce new regulations in County building code. Upgraded homes or existing buildings would help to reduce operating costs for residents and businesses.
BE-10	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	Planning	Mid-Term	Medium	0.12 FTE	No	Program Research & Development	Requires County staff time to research, develop, and adopt a new GHG offset program.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
BE-11	Encourage solar panel installations on commercial ~~warehouse~~ roof spaces	Planning & MCE	Near-Term	Medium	Less than 0.01 FTE	No	Partnerships, Financing & Incentives	Requires County staff time to collaborate with MCE and develop incentive programs.
Land Use – Primary Measures								
LU-1	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	Planning, Project Applicants, & Volunteers	Near-Term	Medium	0.15 FTE	Yes	Code Updates, Partnerships, Financing & Incentives	Requires County staff time to update and enforce new code provisions, develop mitigation program, and collaborate with other agnecies or organizations to identify funding and appropriate replanting sites.
LU-2	Refine protection guidelines for existing riparian lands	Planning	Near-Term	Medium	0.15 FTE	Yes	Code Updates, Partnerships	Requires County staff time to update code & guidelines, and work with arborists and local organizations.
LU-3	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	Planning & Eligible Businesses/ Organizations	Near-Term	Medium	0.02 FTE	Yes	Program Research & Development, Partnerships	Requires County staff time to develop and implement a new program and establish partnerships with local businesses. Potential cost increases associated with harvesting of removed timber or woody biomass could be offset by the sale of wood products.
Multi-Sector – Primary Measures								
MS-1	Support efforts to increase Napa Green Certified wineries and ~~vineyards~~ land in the County, with a goal of achieving a 100~~-~~percent certification rate for all eligible wineries and properties~~ied either winery or land~~ by 2030	Planning, Public Works, Napa Green, & Businesses	Near-Term	Medium	0.12 FTE	No	Program Research & Development, Partnerships	Requires County staff time to work ~~colalboratively~~ collaboratively with the Napa Green program.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Multi-Sector – Secondary Measures								
MS-2	Work with other local jurisdictions within the County to develop a unified Climate Action Plan	Planning & Other Cities	Mid-Term	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to collaborate with local jursidictions
MS-3	Promote the sale and consumption of locally-grown foods and/or products	Planning & the Agriculture Commissioner's Office	Mid-Term	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to work collaboratively with local buisnesses and organizations.
MS-4	Establish a local carbon offset program in partnership with Sustainable Napa County	Planning & Sustainable Napa County	Mid-Term	High	0.23 FTE	No	Program Research & Development, Partnerships	Requires County staff time to work collaboratively with local organizations to develop and implement a new program.
Off-Road Vehicles and Equipment – Primary Measures								
OR-1	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	Planning & Project Applicants	Mid-Term	Medium	0.08 FTE	No	Code Updates	Requires staff time to develop, adopt and enforce County code amendments. Potential cost increases associated with new or modified equipment could potentially be offset by increased efficiency.
OR-2	Promote use of alternative fuels for recreational marine vessels	Planning, Dock Operators, Local Businesses, & Cities	Near-Term	Medium	0.02 FTE	No	Program Research & Development, Partnerships	Requires County staff time to develop program in collaboration with existing dock opeartors, local agencies, and the boating industry.
Solid Waste – Primary Measures								
SW-1	Encourage expansion of composting program for both residential and commercial land uses	Planning & Waste Management Companies	Near-Term	Medium	0.12 FTE	Yes	Program Research & Development, Partnerships	Requires County staff time to work collaboratively with waste haulers and waste management agencies on program expansion.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
SW-2	Meet an 80 percent Waste Diversion Goal by 2020 and a 90 percent Waste Diversion Goal by 2030	Planning & Waste Management Companies	Near-Term	Medium	0.12 FTE	No	Program Research & Development, Partnerships	Requires County staff time to work collaboratively with waste haulers and waste management agencies to adopt and implement new waste diversion goals.
On-Road Transportation – Primary Measures								
TR-1	Update Transportation System Management Ordinance (for employers)	Planning, BAAQMD, & MTC	Near-Term	Medium	0.23 FTE	Yes	Code Updates	Requires County staff time to develop, update, and enforce an existing ordinance, collaborate with regional and local agencies, and secure new funding.
TR-2	Adopt parking reduction ordinance revisions	Planning	Near-Term	Medium	0.23 FTE	Yes	Code Updates	Requires County staff time to research, develop and update parking standards in the County code.
TR-3	Increase affordable housing, especially workforce housing, in Napa County	Planning, Cities, Napa County Housing Authority & NVTA	Mid-Term	Medium	0.12 FTE	No	Program Research & Development, Partnerships	Requires County staff time to develop or implement affordable housing programs, and collaborate with regional partners on regional affordable housing efforts.
TR-4	Support efforts to allow commuter service to operate on railroad rights-of-way	Planning, NVTA, & Napa Wine Train	Mid-Term	High	Less than 0.01 FTE	No	Program Research & Development, Partnerships	Requires County staff time to research and develop potential new services, in collaboration with local and regional agencies such as NVTA. New funding sources could be required for capital and operations & maintenance.
TR-5	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to use compressed natural gas	Planning & Solid Waste Collection Services	By 2030	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to work collaboratively with waste haulers and waste management agencies on program expansion.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures								
Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
On-Road Transportation – Supporting Measures								
TR-6	Support efforts of transit agencies to increase availability and accessibility of transit information	Planning, NVTA, & Regional Transit Agencies	Near-Term	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to work collaboratively with NVTA and transit agencies
TR-7	Support alternatives to private vehicle travel for visitors	Planning, NVTA, & Visit Napa Valley	Mid-Term	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to work collaboratively with NVTA and Visit Napa Valley
TR-8	Support Napa County's incorporated cities in developing transit-oriented development unique to the needs of the Napa Region	Planning & Cities	Mid-Term	Medium	0.12 FTE	No	Program Research & Development	Requires County staff time to work collaboratively with local incorporated communities
TR-9	Support interregional transit solutions	Planning, Cities, NVTA, MTC, & Regional Transit Agencies	By 2030	Low	Less than 0.01 FTE	No	Partnerships	Requires County staff time to work collaboratively with local incorporated communities, NVTA, and regional transit agencies
TR-10	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers	Planning, Cities, & NVTA	By 2030	Medium	Less than 0.01 FTE	No	Partnerships	Requires County staff time to work collaboratively with local incorporated communities, NVTA
TR-11	Promote existing ride-matching services for people living and working in the unincorporated county	Planning, NVTA, Solano TransportationAuthority	By 2030	Low	0.02 FTE	No	Partnerships, Education & Outreach	Requires County staff time to work collaboratively with NVTA and Solano Transportation Authority

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures								
Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
TR-12	Increase the supply of electric vehicle charging stations	Planning, Public Works & Local Businesses	By 2030	Low	0.02 FTE	Yes	Financing & Incentives	Requires County staff time to promote programs, identify funding for capital costs and maintenance, and review development projects
TR-13	Promote telecommuting at office-based businesses	Planning	By 2030	Low	0.02 FTE	No	Partnerships, Education & Outreach	Requires County staff time to work collaboratively with local businesses and organizations
TR-14	Develop and implement active transportation projects	Planning, Public Health, Napa Valley Vine Trail Coalition, NVTA, & Caltrans	Mid-Term	Medium	Less than 0.01 FTE	No	Partnerships, Financing & Incentives	Requires County staff collaboration with NVTA and other organizations, and agencies to develop and implement projects. Existing statewide funding sources are available, however additional funding sources could also be needed.
TR-15	Require new development projects to evaluate and reduce VMT	Planning	Near-Term	Medium	~~XX~~ 0.12 FTE	Yes	Program Research & Development	Requires County staff time to further develop VMT analysis thresholds and guidance per the Circulation Element Update, and review development projects for consistency.
Water and Wastewater – Supporting Measures								
WA-1	Amend or revise water conservation regulations for landscape design	Planning	Near-Term	Low	0.08 FTE	Yes	Code Updates	Requires County staff time to review, update and enforce water conservation regualtions in the County Code.
WA-2	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering	Planning	Near-Term	Low	0.08 FTE	No	Code Updates	Requires County staff time to review, update and enforce water conservation regulations in the County Code.
WA-3	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities	Planning	Near-Term	Low	0.02 FTE	No	Financing & Incentives	Requires County staff time to develop and implement a permitting streamlining or incentive program

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
WA-4	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities	Planning	Mid-Term	Medium	0.02 FTE	Yes	Program Research & Development	Requires County staff time to review, update and enforce new water audit requirements in the County Code.
	High GWP Gases – Supporting Measures							
HG-1	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems	Planning & Building	Mid-Term	Medium	0.02 FTE	No	Partnerships, Education & Outreach, Program Research & Development	Requires County staff time to promote existing State programs and explore new incentive programs.
HG-2	Incentivize the use of low-GWP refrigerants	Planning & Building	Mid-Term	Medium	0.02 FTE	Yes	Partnerships, Education & Outreach, Research & Development	Requires County staff time to review development projects and explore new incentive programs.
Adaptation Measures								
Temperature								
Temp-1	Map Critical Infrastructure Locations Vulnerable to Extreme Heat Events	Planning & Public Works	Near-Term	Medium	0.06 FTE	N/A	Program Research & Development	Requires County staff time to develop a process for mapping infrastructure that is vulnerable and to work collaboratively across County departments. Potential funding may be needed to implement the work.
Temp-2	Develop Outreach Programs for Outdoor Workers	Planning & Public Health Division	Near-Term	Medium	0.02 FTE	N/A	Education & Outreach	Requires County staff time to research, develop, and create outreach programs, and to collaborate with labor organizations, the agriculture and wine community, and County and State health and safety agencies.
Temp-3	Educate Residents on Heat-Related Illness Prevention	Planning & Public Health Division	Near-Term	Low	0.02 FTE	N/A	Education & Outreach	Requires County staff time to develop and publicize methods for preventing heat-related illness during heatwaves.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Temp-4	Encourage the installation of Cool Roof Technologies and Rooftop Gardens	Planning	Near-Term	Medium	0.08 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to develop an incentive program for cool roof and rooftop gardens. Annual costs to County for permitting or other incentives, but potential cost savings to consumers.
Temp-5	Incorporate~~ion of~~ Cool Pavement Technology	Planning & Public Works	Mid-Term	Medium	0.08 FTE	N/A	Program Research & Development	Requires County staff time to research and develop methods for incorporating cool pavement technology into maintenance and construction of new roads, sidewalks, parking areas, and bike lanes, and to secure new sources of funding.
Temp-6	Improve Parking Lot Shading and Landscaping	Planning	Near-Term	Low	0.02 FTE	N/A	Program Research & Development, Code Updates, Education & Outreach	Requires County staff time to develop policies to improve parking lot shading requirements in new construction, and to develop outreach program for promoting planting of additional trees/landscaping in existing parking lots.
Temp-7	Update the County's Excessive Heat Emergency Response Plan	Planning & Public Health Division	Near-Term	Medium	0.12 FTE	N/A	Financing & Incentives	Requires County staff time to prepare an updated plan and to work collaboratively across County departments. Funding sources may be needed to support the update of this plan.
Temp-8	Support Research on the Effects of a Warmer Climate on the Agriculture and Wine Industries	Planning & the Agriculture Commissioner's Office	Near-Term	Low	Less than 0.01 FTE	N/A	Partnerships	Requires County staff time to collaborate with existing organizations and groups, including the Napa Valley Vintners and the California Climate and Agriculture Network.
Temp-9	Understand the Tolerance of Current Wine Grape Varieties to Withstand Increased Temperatures	Planning & the Agriculture Commissioner's Office	Mid-Term	Low	0.03 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to collaborate with grape growers and to research and explore options to shift the types of grape varietals to suit changing environment. Funding sources may be needed to begin research.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures								
Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Temp-10	Develop Outreach Programs for Winemakers	Planning & the Agriculture Commissioner's Office	Mid-Term	Low	0.03 FTE	N/A	Education & Outreach	Requires County staff time to develop and prepare outreach programs to inform and assist winemakers, and work collaboratively with the Agriculture Commissioner's Office.
Temp-11	Develop Strategies to Increase Energy Resiliency	Planning, Public Works, MCE, & PG&E	Mid-Term	Medium	Less than 0.01 FTE	N/A	Program Research & Development, Partnerships	Requires County staff time to develop and implement strategies, and work collaboratively with MCE and PG&E to increase energy resiliency in extreme events.
Wildfire Risk								
Fire-1	Map and Identify Locations That Are Newly at Risk, or at Higher Risk for Fire Hazards	Planning, Napa Couny Fire Department, & CAL FIRE	Near-Term	Medium	0.06 FTE	N/A	Program Research & Development, Partnerships	Requires County staff time to work collaboratively with CAL FIRE and the Napa County Fire Department to identify locations newly or at higher risk for fire hazards.
Fire-2	Map Critical Infrastructure Locations Vulnerable to Wildfires	Planning, Public Works, & Caltrans	Near-Term	Medium	0.06 FTE	N/A	Program Research & Development	Requires County staff time to develop a process for mapping infrastructure that is vulnerable and to work collaboratively across County departments. Potential funding may be needed to implement the work.
Fire-3	Collaborate ~~Dissemination of Information~~ with the Napa County Firefighters Association in the Dissemination of Information	Planning & Napa County Firefighters Association	Mid-Term	Low	Less than 0.01 FTE	N/A	Partnerships	Requires County staff time to work collaboratively with the Napa County Firefighters Association.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures								
Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Fire-4	Coordinate Emergency Preparedness Systems	Planning, Public Health, Napa County Firefighters Association, & Office of Emergency Services	Mid-Term	Low	0.01 FTE	N/A	Partnerships	Requires County staff time to work collaboratively with the Napa County Firefighters Association and the Office of Emergency Services.
Fire-5	Collaborate on Programs to Reduce Fire Hazards	Planning & Napa County Fire Department	Near-Term	Low	Less than 0.01 FTE	N/A	Partnerships	Requires County staff time to collaborate with the Napa County Fire Department to reduce fire hazards through continued programming.
Water Supply and Quality								
Water-1	Evaluate Vulnerabilities of Water Supply Systems and Networks	Planning, Napa County Flood Control & Water Conservation District, & Public Works	Near-Term	Medium	0.12 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to research and develop methodologies for evaluating the water supply system and network vulnerablilites. Potential funding may be needed to begin research.
Water-2	Consider Innovative Options to Meet Future Demand	Planning, Napa County Flood Control & Water Conservation District, & Public Works	Mid-Term	Medium	0.12 FTE	N/A	Program Research & Development	Requires County staff time to research, secure funding, and develop programs, and to work collaboratively with the Napa County Flood Control and Water Conservation District and across County departments.
Water-3	Promote Use of Rainwater Catchment Systems	Planning & Public Works	Mid-Term	Low	Less than 0.01 FTE	N/A	Partnerships, Outreach & Education	Requires County staff time to work collaboratively across County departments.
Water-4	Support Napa Green Land Efforts	Planning	Near-Term	Low	Less than 0.01 FTE	N/A	Partnerships	Requires County staff time to collaborate and support Napa Green Land.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Water-5	Collaborate with Agencies to Identify Future Water Supplies and Explore Alternative Supply Sources	Planning, Napa County Flood Control & Water Conservation District, & Public Works	Mid-Term	Medium	0.12 FTE	N/A	Partnerships, Program Research & Development	Requires County staff time to collaborate with Napa County Flood Control and Water Conservation District and Public Works, and time to develop and research opportunities to explore alternative water supply sources. Funding may be needed to begin research.
Water-6	Pursue Grant Funding Opportunities for Water Resource Planning Projects	Planning & Public Works	Mid-Term	Low	0.12 FTE	N/A	Financing & Incentives	Requires County staff time to identify and pursue grant funding opportunities for water resource planning projects.
Flood Risk (Adaptation)								
Flood-1	Update the County's Operational Area Hazard Mitigation Plan to Address Flooding and Climate Change	Planning, Public Health, & Office of Emergency Services	Near-Term	Medium	0.15 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to prepare an updated plan and to work collaboratively across County departments. Funding sources may be needed to support the update of this plan.
Flood-2	Partner with Incorporated Towns and Cities and Local Organizations to Address Flooding	Planning, Napa County Flood Control and Water Conservation District, & Incorporated Cities[1]	Mid-Term	Medium	Less than 0.01 FTE	N/A	Partnerships	Requires County staff time to coordinate efforts and work collaboratively with incorporated cities in the County and local organizations to address flooding.
Flood-3	Identify Potential Streamside Restoration Areas	Planning & Public Works	Near-Term	Low	0.02 FTE	N/A	Program Research & Development	Requires County staff time to research and identify streamside area locations that could be restored.
Flood-4	Encourage the Replanting of Bare or Disturbed Areas	Planning & Public Works	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development	Requires County staff time to develop, secure funding, and implement a program to replant bare or distrubed areas.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Flood-5	Coordinate Emergency Evacuation and Supply Transportation Routes	Planning & Office of Emergency Services	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development, Partnerships	Requires County staff time to coordinate with the Office of Emergency Services on emergency evacuation and supply transportation routes to ensure capacity and resilience.
Flood-6	Improve Sewage and Solid-Waste Management Infrastructure	Planning & Public Works	Mid-Term	High	0.04 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to research, develop, and implement programs to improve sewage and solid-waste management infrastructure, and to work collaboratively across County departments. Funding sources may be needed to support implementation.
Flood-7	Improve Capacity of Storm Water Infrastructure	Planning & Public Works	Mid-Term	High	0.04 FTE	N/A	Program Research & Development	Requires County staff time to research, evaluate, and implement programs to improve the capcity of storm water infrastructure for high intensity rainfall events. Funding sources may be needed to support implementation.
Flood-8	Increase Use of Pervious Surfaces and Landscaping in Developed Areas	Planning & Public Works	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development, Education & Outreach	Requires County staff time to develop, secure funding, implement, and promote programs to increase the use of pervious surfaces and landscaping.
Flood-9	Map Critical Infrastructure Locations Vulnerable to Flooding	Planning, Napa County Flood Control and Water Conservation District, & NVTA	Near-Term	Medium	0.06 FTE	N/A	Program Research & Development	Requires County staff time to develop a process for mapping infrastructure that is vulnerable and to work collaboratively across County departments, Napa County Flood Control and Water Conservation District, and NVTA. Potential funding may be needed to implement the work.
Flood-10	Understand the Tolerance of Current Wine Grape Varieties to Withstand Increased Flooding	Planning & the Agriculture Commissioner's Office	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to collaborate with the agriculture sector and to research and explore options to shift the types of grape varietals to suit changing environment. Funding sources may be needed to begin research.
Flood-11	Design Programs to Address Vector- and Waterborne Diseases	Planning and Public Health Division	Near-Term	Low	0.04 FTE	N/A	Program Research & Development	Requires County staff time to research, develop, coordinate, and implement programs to monitor and prepare for the appearance of vector- and waterborne diseases following floods and storms.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
Sea-Level Rise								
SLR-1	Identify Areas Affected by Sea-Level Rise	Planning	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development	Requires County staff to research, identify, and assess areas that will be affected by sea-level rise, and to establish policies and programs to protect functions, structures, and populations.
SLR-2	Update Napa County's Operational Area Hazard Mitigation Plan to Incorporate Sea-Level Rise	Planning & Office of Emergency Services	Near-Term	Medium	0.15 FTE	N/A	Program Research & Development, Financing & Incentives	Requires County staff time to prepare an updated plan and to work collaboratively across County departments. Funding sources may be needed to support the update of this plan.
SLR-3	Floodplain Mapping Coordination	Planning, Napa County Flood Control and Water Conservation District, FEMA, DWR, & NVTA	Near-Term	Medium	Less than 0.01 FTE	N/A	Program Research & Development	Requires County staff time to coordinate and collaborate with FEMA, DWR, and Napa County Flood Control and Water Conservation on updating floodplain mapping regularly.
SLR-4	Support Ongoing Analysis of Sea-Level Rise Data	Planning	Near-Term	Low	Less than 0.01 FTE	N/A	Partnerships	Requires County staff time to support FEMA, the Bay Conservation Development Commission, the Bay Area Regional Collaborative, and National Oceanic and Atmospheric Administration in ongoing collection and analysis of sea-level rise data.
SLR-5	Create a Comprehensive Outreach Strategy	Planning	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development, Education & Outreach	Requires County staff time to research, design, implement, educated, and promote a comprehensive outreach strategy to protect and increase community resiliency to sea-level rise.
SLR-6	Incorporate Sea-Level Rise Effects into Capital Improvement Plans	Planning & Public Works	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development	Requires County staff time to prepare and incorporate sea-level rise into Capitol Improvement Plans and to work collaboratively across County departments.

Table 5-1 Napa County CAP Implementation Assumptions for GHG Reduction and Adaptation Measures

Measure #	Title	Responsibility	Timeframe[1]	General County Implementation Costs	Estimated County Staff Time	Applies to Projects Seeking CEQA GHG Streamlining	Category	Impementing Actions and Other Considerations
SLR-7	Assess Sea-Level Rise Impacts on Agriculture	Planning	Mid-Term	Medium	0.04 FTE	N/A	Program Research & Development	Requires County staff time to research, identify, and assess the impacts of sea-level rise on the County's agriculture sector. Funding sources may be needed to support research.

Notes:

[1] Near-Term = 1-3 Years, Mid-Term = 4-7 Years

[2] These measures only apply to new vineyards on more than 5% slope. See Appendix D for the Checklist and additional details.

BAAQMD = Bay Area Air Quality Management District, BAU = Business-As-Usual, CAL FIRE = California Department of Forestry and Fire Protection, CALGreen = California Green Building Standards Code, CAP = Climate Action Plan, CARB = California Air Resources Board, CEQA = California Environmental Quality Act, DWR = Department of Water Resources, FEMA = Federal Emergency Management Agency, FTE = full-time equivalent, GHG = greenhouse gas emissions, MCE = Marin Clean Energy, MTC = Metropolitan Transportation Commission, $MTCO_2e$ = metric tons of carbon dioxide equivalent, N/A = Not Applicable, NVTA = Napa Valley Transportation Authority, PACE = property assessed clean energy, PG&E = Pacific Gas and Electric, RCD = Resource Conservation District, RMP = Refrigerant Management Program, VMT = vehicle miles traveled, ZNE = zero net energy

Source: Ascent Environmental 2018

5.3 Monitoring and Updates

The CAP lays out a broad-based strategy to ~~substantially reduce~~substantially reduce GHG emissions and improve the sustainability and resilience of the community. However, the CAP will need to be updated and maintained if it is to remain relevant and effective. Thus, County staff will need to evaluate and monitor plan performance over time and make recommendations to alter or amend the plan if it is not achieving the proposed reduction targets. This will include conducting periodic GHG emissions inventory updates and analyzing measure performance for primary and supporting GHG reduction measures and climate adaptation measures.

Upon adoption in 2019, the specific measures and actions identified as near-term priorities will begin to be implemented by the County. To track progress, County staff will coordinate updates to the inventory every five years beginning with the year 2020. This will help ensure progress is being made towards achieving emission reduction targets.

Beginning with the year 2020, the County will:

- **evaluate measure performance every two years,**
- **coordinate inventory updates every five years, and**
- **evaluate and summarize measures in a detailed report to the Board of Supervisors every five years.**

In addition to updating the County's emissions inventory, County staff will also evaluate the GHG emission reduction measures' capacity, cost, effectiveness, and benefits of each individual measure. Evaluating CAP measure performance requires monitoring the level of community participation, costs, barriers to implementation, and actual reductions in fuel consumption, vehicle miles traveled, energy usage, water usage, landfilled waste, or other activities that result in GHG emissions reductions. By evaluating whether the implementation of a measure is on track to achieve its reduction potential, the County can identify successful measures and reevaluate or replace under-performing ones.

Beginning in 2020, County staff will evaluate measures every two years and will summarize progress toward meeting the GHG reduction target at that time in a report to the Board of Supervisors. Additionally, beginning in 2022 and every five years after, County staff will prepare a more detailed report on the CAP to the Board that describes:

CEQA Guidelines Section 15183.5(b)(1)(E) requires that the County amend the CAP if it finds that the plan is not achieving the adopted GHG reduction targets.

- results of the latest five-year update to the inventory;
- estimated annual GHG reductions associated with measure implementation or legislative reductions;
- participation rates (where applicable);
- implementation costs and funding needs;
- community benefits realized;
- remaining barriers to implementation; and
- recommendations for changes to the CAP.

Additionally, the County will prepare a Target Year Report in 2027 for the Board of Supervisors. This report will present the most current inventory, status of measures, and will summarize achievements to

date and demonstrate progress towards achieving the 2030 and 2050 targets. The report will also provide recommendations for any changes needed to the CAP to ensure that targets are met in 2030. Figure 5-1 below outlines the CAP monitoring schedule.

CAP Monitoring Schedule

2019	**CAP Adopted** Board of Supervisors adopts plan and staff begins to implement CAP measures.
2020	**Measure Status Review** County staff reviews measure performance and implementation status, and prepares report for presentation to the Board.
2022	**Inventory Update / Measure Status Review / CAP Report** County staff report to the Board of Supervisors on the 2020 inventory update results, measure performance and implementation status, key achievements to date (i.e., status of meeting 2020 targets), and recommended changes to the CAP if measures prove infeasible. The report also will identify ways to adapt the plan to maintain the desired reduction path.
2024,2026	**Measure Status Reviews** County staff reviews measure performance and implementation status, and prepares report for presentation to the Board.
2027	**Inventory Update / Target Year Report** County staff reports on results of the 2025 inventory update and develops Target Year Report for presentation to Board that summarizes achievements to date and provides recommended changes to the CAP to stay on track in meeting 2030 targets.
2030+	Repeat above process and develop appropriate actions to meet 2050 GHG reduction goals.

Figure 5-1. CAP Monitoring Schedule

5.4 Ongoing Community Engagement and Participation

Source: County of Napa

As the County continues to implement and monitor progress on the CAP, continued engagement with and participation by the community is critical. This includes individual residents and businesses, community organizations (e.g., Napa Valley Vintners, Napa Valley Grapegrowers, Sustainable Napa County), local and regional government agencies, and others. It is important to engage disadvantaged communities, who are the most vulnerable to and least able to adapt to the impacts of climate change. While this CAP focuses on measures in which the County has a role, many of the measures require partnership and collaboration.

The County is also committed to public education about the important role individuals play in combating climate change. Effective and long term climate action and resiliency in the County can only be achieved through efforts that continue to change the way individuals interact with the environment. Many of the measures in Chapters 3 and 4 are focused on increasing community awareness and participation in existing programs, or connecting the community with new information, tools, funding or resources to take action. Thus, this CAP serves as a resource that supports community-based action.

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Napa County Climate Action Plan

A Tradition of Stewardship
A Commitment to Service

Chapter 6

References

Source: County of Napa

Executive Summary

None present.

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Chapter 5, Implementation and Monitoring

None present.

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Memo

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Date: ~~April 5~~July ~~XX~~128~~XX25~~, 2018

To: David Morrison, Jason Hade (County of Napa)

From: Honey Walters, Erik de Kok, Brenda Hom

Subject: Napa County Climate Action Plan – Revised Technical Memorandum #2~~: #2:~~ Greenhouse Gas Emissions Reduction Targets, Measures, and Gap Analysis

INTRODUCTION

This ~~revised~~ technical memorandum summarizes the results of the ~~revised draft~~ quantitative GHG reduction measures "gap analysis" process for the Napa County Climate Action Plan (CAP). This version of the memo includes revisions to GHG reduction measures ~~the gap analysis~~ since the initial gap analysis results were reported in December 2016 and published in the Draft ~~and Final~~ CAP document ~~s that were~~ circulated for public review in 2017~~, . TThe revisions in this current iteration of the memo reflects potential~~ the revisions to greenhouse gas (GHG) reduction measures that ~~will arebe~~ were incorporated into the Final ~~Revised Draft~~ CAP based on comments from the public and County staff, and additional revisions to GHG reduction measures proposed by staff in 2018.

The purpose of the gap analysis is two-fold: 1.) to ensure that all GHG-reducing actions to be incorporated in the CAP will set the community on course to meet the County's proposed GHG reduction targets; and 2.) to ensure that specific actions and associated GHG emissions reduction calculations are defensible and appropriate for the purposes of California Environmental Quality Act (CEQA) streamlining benefits for proposed projects in the future.

The gap analysis process accounts for several steps in the climate action planning process, which are listed below and addressed in subsequent sections.

1. Summary of 2014 community-wide GHG emissions inventory;
2. Summary of the GHG emissions projections for 2020, 2030 and 2050;
3. Identification and evaluation of recommended GHG emissions reduction targets for 2020 and 2030, as well as a long-term goal for 2050; and,
4. Quantification of GHG emissions reductions and evaluation of the calculated gap between the estimated GHG reductions and the recommended targets.

In addition to the quantitative GHG analysis, we qualitatively addressed the ~~final~~ proposed GHG measures in terms of potential environmental co-benefits, cost/benefit and economic impacts, and administrative feasibility.

GREENHOUSE GAS EMISSIONS INVENTORY

The baseline GHG emissions inventory for the year 2014 includes emissions from community-wide sources in the unincorporated County. The purpose of the baseline inventory is to gain an understanding of the sources and levels of GHG emissions within a jurisdiction, as well as to establish a level of GHG emissions against which future GHG emissions can be compared. The 2014 GHG emissions inventory is summarized below in Table 1. Total emissions from all sectors in the 2014 ~~Inventory~~ inventory were 484,602 metric tons of carbon dioxide equivalent ($MTCO_2e$) emissions. The 2014 inventory updates a previous baseline inventory for the year 2005 and includes new emissions sources and accounts for new data sources, calculation methodologies, and an updated set of global warming potential (GWP) factors.

Further details with respect to the 2014 inventory are discussed in the Revised Final Technical Memorandum #1 to the County, dated August 25, 2016, found in Appendix A of the ~~Final~~ CAP. ~~Note that a revision was made to adjust emissions estimates from the Land Use Change sector.~~

Table 1 2014 Unincorporated Napa County Greenhouse Gas Emissions Inventory

Sectors	2014[1] ($MTCO_2e$/yr)
Building Energy Use	148,338
On-Road Vehicles	125,711
Solid Waste	83,086
Agriculture	52,198
Off-Road Vehicles	42,508
High GWP Gases	13,481
Wastewater	11,189
Land Use Change	7,684
Imported Water Conveyance	88
Total	**484,283**

Notes: Columns may not add to totals due to rounding.

MTCO2e = metric tons of carbon dioxide equivalent; GWP = Global Warming Potential; IPCC = Intergovernmental Panel on Climate Change

1. Uses GWP factors from IPCC's Fourth Assessment Report.

Source: Data compiled by Ascent Environmental in 2016. See Revised Final Tech. Memo #1, August 25, 2016.

Greenhouse Gas Emissions Projections

GHG emissions projections for a community are used to estimate future levels in the absence of climate action measures. Emissions projections were prepared for both "business-as-usual" (BAU) and legislative-adjusted BAU scenarios for 2020, 2030, and 2050. BAU projections were based on population, housing, and employment growth anticipated in the unincorporated County as forecasted by the Metropolitan Transportation Commission (MTC), assuming no actions would be taken to reduce emissions by Federal, State or local agencies pursuant to Assembly Bill (AB) 32 or other legislation. The BAU projections represent theoretical "worst-case" future conditions, while the legislative-adjusted forecast accounts for future emissions reductions pursuant to AB 32 and other legislation in California from a variety of regulations and programs, including the Renewable Portfolio Standard (RPS), improving vehicle fuel economy standards due to Advanced Clean Cars, and other State and Federal policies.

The legislative-adjusted BAU forecast for community-wide GHG emissions are summarized below in Table 2. Under the legislative-adjusted BAU scenario, community-wide GHG emissions are projected to decrease by approximately 4 percent by 2020, 28 percent by 2030, and 24 percent by 2050 for the unincorporated Napa County compared to 2014 emissions.

Further details with respect to the GHG emissions projections are discussed in the Revised Final Technical Memorandum #1, dated August 25, 2016, found in Appendix A of the ~~Final~~ CAP.~~.~~

Table 2 Unincorporated Napa County Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/yr)

Sector and Subsector	2014	2020	2030	2050
Energy	148,338	131,643	59,150	66,184
Transportation	125,711	112,854	84,845	85,735
Waste	83,086	62,345	56,711	48,854
Agriculture	52,198	52,521	53,589	57,446
Off-Road Vehicles and Equipment	42,508	45,164	49,592	58,474
High-GWP Gases	13,481	11,828	13,169	15,867
Water and Wastewater	11,277	11,858	12,959	14,335
Land Use Change	7,684	35,608[1]	18,239	21,669
Total	**484,283**	**463,821**	**348,253**	**369,563**
Percent change from 2014 (%)	**NA**	**-4**	**-28**	**-24**

Notes: Columns may not add to totals due to rounding.

BAU = Business as usual; NA = Not Applicable; GWP = Global Warming Potential; MTCO2e = metric tons of carbon dioxide equivalent

1. The large increase in land use change "emissions" is due to sequestration and carbon storage losses associated with land use forecasts from the County that show a high rate of land use change between 2015 and 2020 compared to other years.

Source: Ascent Environmental, 2016

GREENHOUSE GAS EMISSIONS REDUCTION TARGETS

As directed in AB 32, SB 32, Executive Order (EO) B-30-15, and EO S-3-05, the State aims to reduce annual GHG emissions to:

- 1990 levels by 2020;
- 40 percent below 1990 levels by 2030; and
- 80 percent below 1990 levels by 2050.

To determine an equivalent reduction target at the local level, California's 2017 Climate Change Scoping Plan released by the California Air Resources Board (CARB) recommends community-wide GHG reduction goals for local climate action plans that would help the State achieve its 2030 and 2050 goals (CARB 2017). These goals consist of reducing emissions to 6 $MTCO_2e$ per capita and 2 $MTCO_2e$ per capita by 2030 and 2050, respectively. Considering the overall statewide emissions in 1990 and 2014 and the forecasted statewide population in 2030 and 2050, these per-capita goals would be equivalent to reducing 2014 emissions by 40 percent by 2030 and 77 percent by 2050 (CARB 2016b, DOF 2014). Although CARB did not recommend a similar community-level target for 2020, an equivalent target can be calculated by comparing the State's GHG inventories for 1990 and 2014. According to CARB's estimate of California's GHG inventory, the State emitted approximately 431 million $MTCO_2e$ ($MMTCO_2e$) in 1990 and 442 $MMTCO_2e$

in 2014, a 2 percent increase. Thus, the following 2020 and 2030 targets and long-term goal for 2050 would reduce annual community-wide GHG emissions in unincorporated Napa County consistent with CARB's recommended goals:

- 2 percent below 2014 levels by 2020;
- 40 percent below 2014 levels by 2030; and
- 77 percent below 2014 levels by 2050.

Specific assumptions and calculations for these adjusted targets are available in Attachment 1.

Based on the County's 2014 inventory shown in Table 1, the targets and long-term goal above aim to reduce annual County emissions to 474,598, 290,570, and 111,385 $MTCO_2e$ by 2020, 2030, and 2050, respectively. As shown in Figure 1, the County is already meeting the 2020 target due to existing legislative actions but would require significant additional GHG reductions to meet the 2030 and 2050 targets. The County would need to reduce annual legislative-adjusted BAU 2030 emissions by 57,683 $MTCO_2e$ (17 percent). However, meeting the long-term 2050 goal would require annual emissions reduction of 258,178 $MTCO_2e$, or 70 percent, beyond the effect of current legislative reductions.

The recommended targets, along with estimated reductions required to achieve the targets, are summarized below in Table 3.

Table 3 Recommended Greenhouse Gas Emissions Reduction Targets: 2020, 2030, and 2050

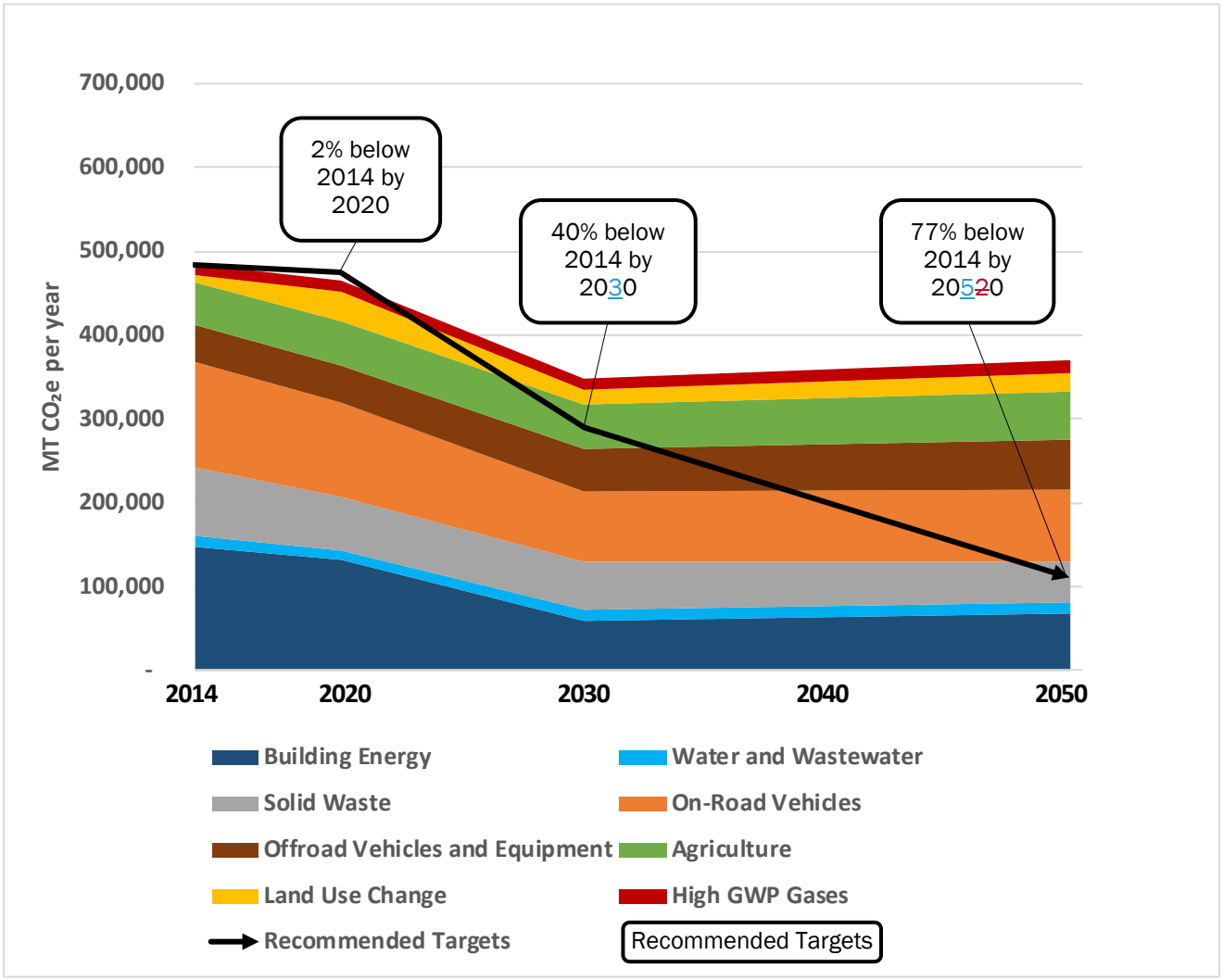
Scenario or Target	2014	2020	2030	2050
Baseline and Projections				
2014 Baseline GHG Inventory ($MTCO_2e$)	484,283	NA	NA	NA
Legislative-Adjusted BAU Forecast ($MTCO_2e$)	NA	463,821	348,253	369,563
Legislative-Adjusted BAU Forecast: Percent below Baseline (%)	NA	4	28	24
Targets				
Target Percent Reduction below Baseline (%)	NA	2	40	77
Target Annual Emissions ($MTCO_2e$)	NA	474,598	290,570	111,385
Gap Analysis				
Reduction from Baseline needed to meet Target ($MTCO_2e$)	NA	9,686	193,713	372,898
Reduction from Legislative-Adjusted BAU needed to meet Target ($MTCO_2e$)	NA	0	57,683	258,178
Additional Percent Reduction below Legislative-Adjusted BAU needed to meet Target (%)[1]	NA	0	17	70

Notes: BAU = Business as usual, $MTCO_2e$ = metric tons of carbon dioxide equivalent, GHG = greenhouse gas, NA = Not Applicable

Source: Ascent Environmental, 2016

Figure 1, below, depicts the baseline and legislative-adjusted BAU GHG emissions forecasts by sector, as distinguished by colored wedges. The sum of the wedges represents annual anticipated GHG emissions in each year. Each wedge shows how an emissions sector is expected to contribute to the County's annual inventory over time. For example, the reduction in BAU building energy emissions (dark blue wedge) between 2020 and 2030 illustrates the effect of SB 350 energy efficiency and renewable energy policies on this sector. The black line indicates the recommended GHG emissions reduction targets for 2020, 2030, and 2050. The additional reductions needed to meet the 2020 and 2030 targets to close the expected "gap"

between the expected legislative-adjusted BAU emissions levels and the recommended targets are also apparent in Figure 1. With respect to emissions beyond 2030, current legislation, such as SB 350 and the Federal Corporate Average Fuel Economy (CAFE) standards, have specific targets and policies that only address activities up to the year 2030. Though advances in new technologies and policy strategies may allow for additional significant reductions in the future, legislative reductions that may occur past 2030 are currently unknown.



Notes: BAU = Business as Usual; GHG = Greenhouse Gas Emissions; MT CO_2e = metric tons of carbon dioxide equivalent
Source: Ascent Environmental, 2018

Figure 1 Legislative-Adjusted Business-as-Usual Forecast Emissions by Sector and Recommended Emissions Reduction Targets: 2020 through 2050

Greenhouse Gas Emissions Reductions and Estimated Gap

As discussed above, additional GHG reductions are needed to achieve the recommended GHG reduction targets for 2020 and 2030 and long-term 2050 goal. As a local government, the County can act to adopt or update land use plans, enforce or update County ordinances, adjust municipal operations, encourage or influence County residents and business by partnering with local organizations, and work with local and regional transportation planning or other agencies that provide services or maintain infrastructure that is not directly in the County's control. The County can effectively reduce emissions in some sectors where the

County has jurisdictional control (e.g., municipal operations, land use change), but in some cases the County has limited ability to influence reductions because the County has limited jurisdictional control (e.g., on-road transportation).

Since the original Draft and Final CAP documents were circulated for public review in 2017, Ascent worked with the County to develop a final revised draft list of recommended GHG reduction measures based on the County's jurisdictional influence, public input, and other measures based on best practices. These GHG reduction measures will have beenbe reorganized into "primary" and "supporting" measure categories in the Revised Draft Final Revised Draft CAP.

Primary measures include those for which GHG reductions have been quantified and are the primary measures that the County would rely upon to meet the GHG reduction targets identified. Many of the primary measures include specific and enforceable components that could apply be applied to future projects seeking to tier and streamline from the CAP in the future; however, not all primary measures are regulatory in nature. Some of the primary GHG reduction measures identified that will result in quantifiable GHG reductions do not rely on County regulation. The All primary GHG reduction measures were quantified wherever substantial evidence and reasonable assumptions were available to support calculations.

GHG reductions associated with the primary measures were calculated in a step-wise manner for the future years of 2020, 2030, and 2050. In other words, GHG reductions (in $MTCO_2e$/year) wereare assessed during a snapshot in time in 2020, 2030, and 2050. This is a simplified method of characterizing GHG reductions, which would more realistically occur on a continuous basis. However, a step-wise method is appropriate for a planning-level document because the County's GHG reduction targets and monitoring of CAP implementation progress would be tied to these future years.

Supporting measures are qualitative and are not identified as part of the primary set of quantifiable GHG reduction measures to meet the targets. Supporting measures are still important to include because they contribute to achieving GHG reductions and may also result in other important co-benefits. However, supporting measure are not quantifiable due to lack of available data or quantification methods, or were not quantified to avoid double-counting of GHG reductions achieved by other similar measures under the same strategy. The supporting measures could be tracked for potential quantification in the future if data and/or quantification methods become available in the future.

~~GHG reductions associated with the primary measures were calculated in a step-wise manner for the future years of 2020, 2030, and 2050. In other words, GHG reductions (in $MTCO_2e$/year) are assessed during a snapshot in time in 2020, 2030, and 2050. This is a simplified method of characterizing GHG reductions, which would more realistically occur on a continuous basis. However, a step-wise method is appropriate for a planning-level document because the County's GHG reduction targets and monitoring of CAP implementation progress would be tied to these future years.~~

Although supporting measures were not quantified, implementation of supporting measures would further reduce GHG emissions depending on a variety of factors. These factors include the level of participation from the public and other partners, potential of technological improvements to reduce emissions, and changes to the regulatory environment outside of the County.

Summary of Results

Estimates of GHG emissions reductions, along with an estimated emissions reduction "gap," are summarized below in Table 4 and illustrated in Figure 2. Detailed measure descriptions, calculations, and assumptions supporting the GHG reduction estimates are provided in Attachment 1.

Table 4 Summary of Greenhouse Gas Emissions Reduction Measures Performance

Measure Number	Measure Name	GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Agriculture				
Primary Measures				
AG-1	Support the cConversion of t all stationary diesel or gas-powered irrigation pumps to electric pumps	1,696	1,792	2,009
AG-2	Support the use of electric or alternatively-fueled agricultural equipment	1,617	8,540	19,149
AG-3	Support the use of Tier 4 final Diesel Equipment for Off-Road Agricultural Equipment	0	64	48
AG-4	Support reduced application of inorganic nitrogen fertilizer	199	420	1,130
Supporting Measures				
AG-5	Support BAAQMD in efforts to reduce in ending open burning of removed agricultural biomass and flood debris	-		
AG-6	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	-		
	Agriculture Subtotal	3,512	10,816	22,336
Building Energy				
Primary Measures				
BE-1	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildingsRequire compliance with CalGreen Tier 1 Green Building standards (incl. Tier 1 building energy efficiency standards in Title 24, Part 6) for eligible alterations or additions to existing buildings	28	23	24
BE-2	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030Require compliance with CalGreen Tier 1 standards (incl. Tier 1 building energy efficiency standards in Title 24, Part 6 for all new construction), and phase in ZNE requirements for new construction, beginning with residential in 2020 and non-residential by 2030.	1,361	2,037	4,587
BE-3	Increase participation in MCE's Deep Green option (100 percent% Renewable Energy)	4,005	1,384	1,338
BE-4	Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.	6,096	11,575	12,550
BE-5	Expand current renewable energy and green energy incentives and update local ordinances	1,479	1,806	1,703
BE-6	Select MCE's Deep Green Option for all County Facilities	382	170	205
BE-7	Support waste-to-energy programs at unincorporated landfills	10	5	5
Supporting Measures				
BE-8	Work with PG&E, BayREN, MCE, and PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	-		
BE-9	Require energy audits for major additions to or alterations of existing buildings	-		
BE-10	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	-		
BE-11	Encourage solar panel installations on commercial roof spaces	-		
	Building Energy Subtotal	13,361	16,999	20,412

Table 4 Summary of Greenhouse Gas Emissions Reduction Measures Performance

Measure Number	Measure Name	GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
Land Use Change				
Primary Measures				
LU-1	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	7,077	4,544	15,360
LU-2	Refine protection guidelines for existing riparian lands	660	660	660
LU-3	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	10,839	3,453	4,731
	Land Use Subtotal	18,576	8,657	20,751
Off-Road Transportation				
Primary Measures				
OR-1	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	-	354	386
OR-2	Promote use of alternative fuels for recreational marine vessels	1,687	7,512	22,629
	Off-Road Transportation Subtotal	1,687	7,867	23,014
On-Road Transportation				
Primary Measures				
TR-1	Update Transportation System Management Ordinance (for Employers)	4,818	3,582	3,547
TR-2	Adopt ~~P~~parking reduction ordinance revisions	78	58	57
TR-3	Increase affordable housing, especially workforce housing, in Napa County	31	23	23
TR-4	Support efforts to allow commuter service to operate on railroad rights-of-ways~~ the Napa Wine Train right- of way~~	542	605	948
TR-5	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to CNG~~.~~	284	247	169
Supporting Measures				
TR-6	Support efforts of transit agencies to increase availability and accessibility of transit information	-		
TR-7	Support alternatives to private vehicle travel for visitors	-		
TR-8	Support Napa County's incorporated cities in developing transit-oriented development unique to the needs of the Napa Region~~Support NCTPA and Cities in developing transit oriented development unique to the needs of the Napa Region~~	-		
TR-9	Support interregional transit solutions	-		
TR-10	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers~~Support implementation of harvest season ride matching or ridesharing service pilot~~	-		
TR-11	Promote existing ride-matching services for people living and working in the unincorporated county~~Work with Cities and neighboring regions to increase presence of park and ride facilities near residential centers~~	-		
TR-12	Increase the supply of electric vehicle charging stations	-		
TR-13	Promote telecommuting at office-based businesses	-		

Table 4 Summary of Greenhouse Gas Emissions Reduction Measures Performance

Measure Number	Measure Name	GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050
TR-14	Develop and implement active transportation projects		-	
TR-1~~5~~4	Require new development projects to evaluate and reduce vehicle miles traveled (VMT)		-	
	On-Road Transportation Subtotal	5,753	4,514	4,745
Solid Waste				
Primary Measures				
SW-1	Encourage expansion of composting programs for both residential and commercial land uses	629	1,106	1,270
SW-2	Meet an 80~~%~~ Percent Waste Diversion Goal by 2020 and a 90 Percent~~%~~ Goal by 2030	1,179	2,625	3,163
	Solid Waste Subtotal	1,807	3,731	4,433
Water and Wastewater				
Supporting Measures				
WA-1	Amend or revise water conservation regulations for landscape design		-	
WA-2	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering		-	
WA-3	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities		-	
WA-4	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities		-	
High GWP Gases				
Supporting Measures				
HG-1	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems		-	
HG-2	Incentivize the use of low-GWP refrigerants		-	
Multi-Sector Measures~~ple Sectors~~				
Primary Measures				
MS-1	Support efforts to increase Napa Green Certified wineries and land in the County, with a goal of achieving a 100-percent certification rate for all eligible wineries and properties by 2030~~Support efforts to increase Napa Green Certified wineries and vineyards in the unincorporated County, with a goal of 100% certified by 2030~~	1,783	5,743	5,737
Supporting Measures				
MS-2	Work with other local jurisdictions within the County to develop a unified Climate Action Plan		-	
MS-3	Promote the sale of locally-grown foods and/or products		-	
MS-4	Establish a local carbon offset program in partnership with Sustainable Napa County		-	
Total GHG Emissions Reductions		46,479	58,327	101,427
Recommended GHG Emissions Reduction Target		0	57,683	258,178
Remaining GHG Emissions Reduction Gap (Surplus)		(57,255~~57,153~~)[1]	(644~~530~~)	156,751

Notes: "-" = Not enough data to quantify or relies on participation from external or private entities over which the County has no control, BAAQMD = Bay Area Air Quality Management District, BayREN = Bay Area Regional Energy Network, CARB = California Air Resources Board, CNG = compressed natural gas, CO_2e = carbon dioxide equivalents, GHG = greenhouse gas, GWP = global warming potential, NA = Not Applicable, NVTA~~CTPA~~ = Napa Valley Transportation~~County~~ Authority~~Transportation and~~

Table 4 Summary of Greenhouse Gas Emissions Reduction Measures Performance

Measure Number	Measure Name	GHG Reductions ($MTCO_2e$/year)		
		2020	2030	2050

~~Planning Agency~~, MCE = Marin Clean Energy, MT = metric tons, MTC = Metropolitan Transportation Commission, PACE = property assessed clean energy, PG&E = Pacific Gas and Electric, RMP = Refrigerant Management Program, ZNE = zero net energy.

1. 46,479 $MTCO_2e$ of the surplus comes from the reduction measures. 10,777 $MTCO_2e$ comes from legislative reductions at the S~~s~~tate and federal level.

Source: Data provided by Ascent Environmental 2018.

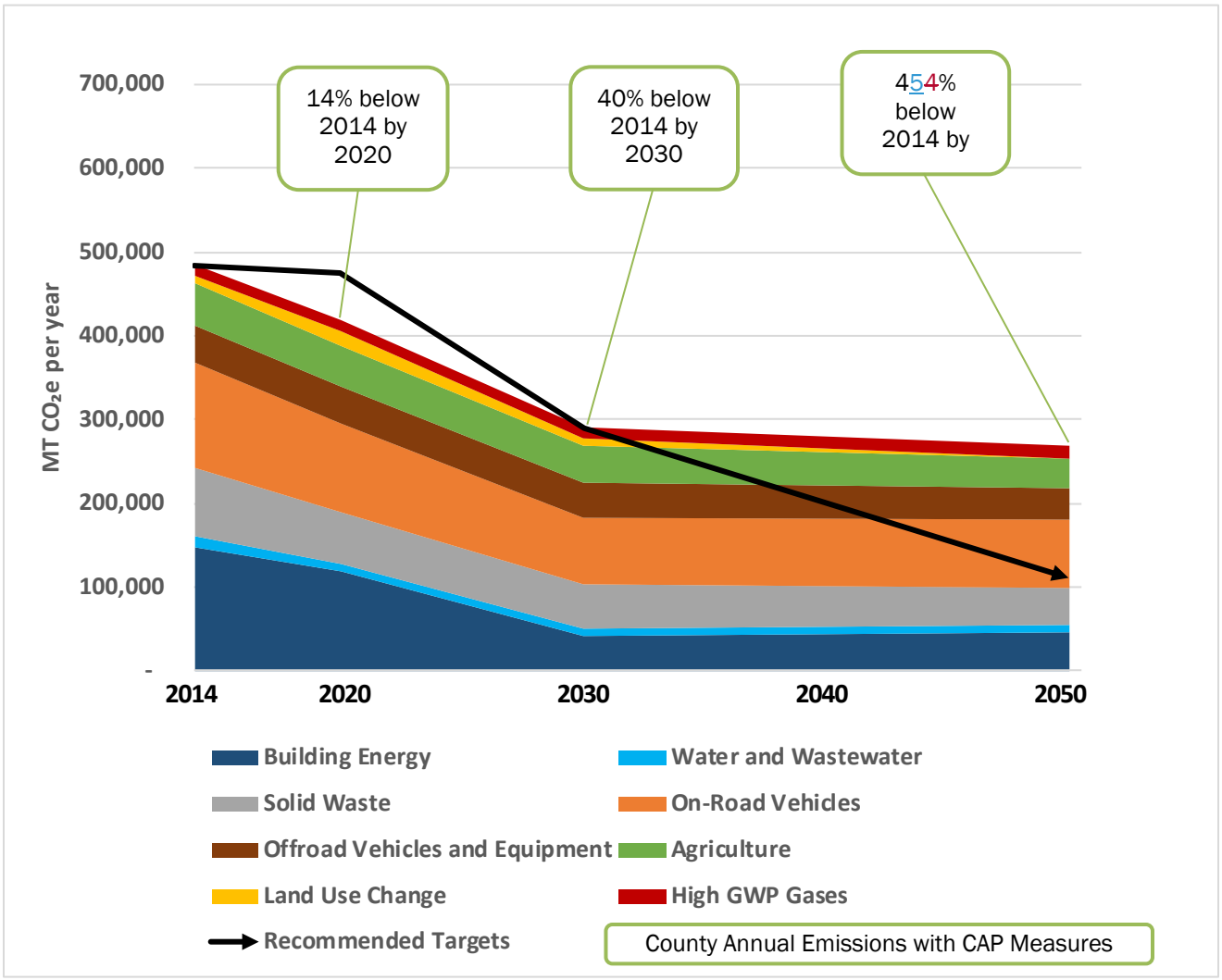


Figure 2 Projections of Greenhouse Gases by Sector with Implementation of CAP Measures and Recommended Targets: 2020 through 2050

The total estimated GHG emissions reductions from all measures quantified is approximately 46,479 $MTCO_2e$ in 2020, 58,327 $MTCO_2e$ in 2030, and 101,427 $MTCO_2e$ in 2050. The total estimated reductions in 2020 would be more than sufficient to meet the recommended 2020 target, with a 46,479 $MTCO_2e$ annual surplus of GHG reductions beyond legislative-adjusted forecasts. Legislative-adjusted forecasts ~~-~~show that the C~~c~~ounty's emissions would ~~already~~ be 10,777 $MTCO_2e$ lower than the 2020 target. Implementation of the revised draft GHG reduction measures identified in Table 4 would also meet the recommended 2030

target, with a slight surplus of 644 $MTCO_2e$ in reductions. However, the projected GHG reductions from all measures in 2050 would fall considerably short of the long-term goal for 2050, requiring an additional 156,751 $MTCO_2e$ to be reduced per year by 2050.

Certainly, the scale of reductions required to achieve the much more aggressive longer-term 2050 goal outlined earlier will require significant improvements in the availability and/or cost of near-zero and zero-emissions technology, as well as potential increased reductions from ongoing State and Federal legislative actions that are currently unknown. The ~~Draft~~ Revised Draft CAP proposes that the County update the CAP every five years, so that new legislation and new technological solutions can be incorporated into the recommended measures and future forecasts adjusted accordingly.

Ascent recommends that the County's CAP be updated at least every 5 years after adoption to periodically assess the County's progress toward meeting the GHG reduction targets, ~~and~~ identify potential new or revised GHG measures that may be implemented as new technology and policy strategies become available, and adjust ~~-~~future forecasts accordingly

Additional Considerations and Co-Benefits

In addition to the GHG emissions gap analysis process identified above, we also qualitatively considered ~~environmental co-benefits,~~ potential implementation costs and regional economic impacts, ~~and~~ administrative feasibility of the proposed GHG reduction measures, and environmental co-benefits. Detailed results are shown in Attachment 1, with general discussion below.

The feasibility of the final GHG reduction measures described above may depend on program participation rates, cooperation from partnering agencies, available County resources, and various economic factors. For example, measure AG-5 in Table 4 requires participation and enforcement by the Bay Area Air Quality Management District (BAAQMD); implementation of BE-1 and BE-2 would depend on the size and number of alterations and new construction that would occur in the future, which are closely linked to the health of the economy; and the various transportation measures would require participation from NVTA, residents, and businesses. Many of the measures, such as ordinance revisions, may be implemented by the County, but the effectiveness of those measures would still depend on ~~available County resources and~~ general compliance to proposed ordinances and the effectiveness of compliance efforts.~~.~~

The GHG reduction measures would result in considerable environmental co-benefits, including improvements to air quality, water quality and supply reliability, biological resources, ~~and~~ public health outcomes, and other resources.~~ Reducing natural gas use, fossil fuel use in on-road vehicles, and open-burning would also reduce criteria air pollutant emissions and improve air quality.~~

- Air Quality: GHG reduction measures that reduce fossil fuel combustion will also help to reduce criteria air pollutants such as ozone or particulate matter, as well as toxic air contaminants, which would help to improve air quality and health risk. Several measures would reduce natural gas combustion in stationary sources or building space heating and water heating, while transportation sector measures would reduce on ~~road~~ and off-road mobile source emissions. Improvements in air quality helps to benefit public health, as well as improves visibility.

- Water Quality and Supply Reliability: GHG reduction measures that reduce the strain on local and S~~s~~tate water supply or improve water quality would provide water system benefits. For example, several GHG reduction measures would improve landscape water conservation and efficiency in existing developed areas, and ~~by~~ require~~ing~~ new construction to comply with CALGreen Tier 1 building standards that increase indoor and outdoor water efficiency and conservation.

- Biological Resources: GHG reduction measures that improve or preserve natural ecosystems and habitats would provide co-benefits for biological resources. For example, preserving oak woodlands, forests, and other carbon-sequestering land uses would also conserve habitats for native plant and animal species, maintain water quality, prevent soil erosion, and provide other benefits to that would help to balance the local ecosystem.

- Public Health: Many of the GHG reduction measures would help to reduce criteria pollutants, toxic air contaminants pollutants and other hazards, and alsoand increase physical activity;, thus benefitting public health. For example, transportation measures that promote alternative modes of transportation such as walking and ,biking, which increase. Talso physical activity and can also help to reduce obesity , which in turn and may decrease deaths caused by due to cardiovascular disease, stroke, and cancer which are (among the top 10 causes of death in the Napa County). Measures that improve air quality also have significant public health benefits and could lead to a decrease in respiratory diseases such as asthma.

- Non-Renewable Energy Resources: several GHG reduction measures would help to reduce reliance on finite fossil fuel resources by increasing the use of alternative and renewable energy sources (e.g., , such as solar and geothermal resources or renewable biofuels).

In addition to these environmental co-benefits, GHG reduction measures would also provide economic benefits through long-term operational cost savings and quality of life improvements. ,For example, reduced electricity and natural gas use through energy efficiency and conservation efforts allows utilities, residents, and businesses to require less alternative and conventional energy resources and would help residents people save money. Transit-oriented development and siting of affordable housing in the County would allow for residents to live closer to jobs, schools, and services;, thus, reducing the amount of time and money spent on commuting and transportation.Preserving oak woodlands, forests, and other carbon-sequestering land uses would also conserve habitats for native plant and animal species, maintain protect water quality, prevent soil erosion, and provide other benefits that would help to balance maintain the local ecosystem. Switching to alternative and renewable energy sources, such as solar and geothermal resources, would reduce the burden on finite fossil fuel resources. Also, reduced electricity and natural gas use through energy efficiency and conservation efforts allows utilities, residents, and businesses to require less alternative and conventional energy resources and would help people save money.

Revisions from the December 2016 Version of this Memorandum

In response to public comments received in 2017 on the Draft and Final Napa Climate Action Plan, staff direction, and recent policy updates, Ascent has revised the GHG reduction targets and revised, removed, and added new GHG reduction measures to the initial list of measures included in the December 2016 version of this technical memorandum. Also, per public and staff comments, revisions were made to the inventory and forecast document in Technical Memorandum #1 which slightly affected the level of emissions reductions of each measure. The reasons behind each measure removal, revision, and addition are described below.

Revised Measure Numbering

Measures were renumbered to reflect the regrouping and categorization of measures as either "primary" or "supporting" measures, as described above. Table 5 compares the measure numbering between this and the December 2016 version of this technical memorandum.

Appendix B

Technical Memo #2 - Greenhouse Gas Emissions Reduction Targets and Gap Analysis

Table 4 Comparison of Measure Numbering between Revised Technical Memorandum #2 and Revised Technical Memorandum #3

Measure Number in the Revised Technical Memorandum #2 December 2016	New Measure Number in the Revised Technical Memorandum #3 March 2018
AG-2	AG-1
AG-3	AG-2
AG-4	AG-3
AG-5	AG-4
AG-1	AG-5
AG-6	AG-6
BE-3	BE-1
BE-4	BE-2
BE-5	BE-3
BE-6	BE-4
BE-7	BE-5
BE-9	BE-6
BE-10	BE-7
BE-1	BE-8
BE-2	BE-9
BE-8	BE-10
LU-1	LU-1
LU-2	LU-2
LU-3	LU-3
OR-1	OR-1
OR-2	OR-2
TR-1	TR-1
TR-2	TR-2
TR-3	TR-3
TR-4	TR-4
TR-13	TR-5
TR-5	TR-6
TR-6	TR-7
TR-7	TR-8
TR-8	TR-9
TR10	TR10
TR-10	TR-11
TR-11	TR-12
TR-12	TR-13
SW-1	SW-1
SW-2	SW-2
WA-1	WA-1
WA-2	WA-2

Table 4 Comparison of Measure Numbering between Revised Technical Memorandum #2 and Revised Technical Memorandum #3

Measure Number in the Revised Technical Memorandum #2 December 2016	New Measure Number in the Revised Technical Memorandum #3 March 2018
WA-3	WA-3
WA-4	WA-4
HG-1	HG-1
HG-2	HG-2
MS-2	MS-1
MS-1	MS-2
MS-3	MS-3
MS-4	MS-4

sSource: Ascent Environmental 2018

Revised Measures

AG-5 The title of AG-5 was amended in the Final Draft CAP released in June 2017 as follows: "Support BAAQMD in ending in efforts to reduce open burning of removed agricultural biomass and flood debris." This results in AG-5 becoming a qualitative measure in the CAP with no quantified GHG emissions reductions.

TR-4 The quantification behind TR-4 was updated to reflect new information about Napa Valley Wine Train's proposed pilot to include dedicated commuter passenger train cars on the company's normal route. According to discussions with Napa Valley Wine Train, the company has four passenger cars that could be converted for commuting purposes by 2020, carry 80 passengers each, and be operated 5 days per week, 52 weeks per year (Goldie, pers. comm., 2018). It is assumed that the route would cover a 40-mile round trip. According to a study on passenger diesel locomotives used for Caltrain, passenger diesel locomotives use 80 percent less emissions per passenger mile than gasoline-powered light duty vehicles (Tang et. al. 2015). Adjusting for the difference in rail car capacity between Caltrain (135 per rail car) and the proposed Napa Valley Wine Train commuter rail cars (80 per rail car), the passenger vehicle emissions that would be offset by this service would result in over twice as much emissions reductions, in 2030, thaen the previous approach. Previously, it was assumed that this commuter service would reduce commute VMT by 0.5 percent according to measure LUT-5 in the California Air Pollution Control Officer Association's (CAPCOA) GHG mitigation guidance (CAPCOA 2010).

Added Measures

AG-4 "Support reduced application of inorganic nitrogen fertilizer"

This new primary measure focuses on reducing GHG emissions resulting from the application of inorganic nitrogen based fertilizer, which results in nitrous oxide (N2O) emissions when applied to crops via microbial activity in the soil. The title and description of the new measure (AG-4) is as follows:

Measure AG-4: Support reduced application of inorganic nitrogen fertilizer

The County will work with farmers to either reduce or replace the use of inorganic nitrogen based fertilizers. Reductions can be achieved through better fertilizer management and expanding use of replacements such as compost produced from local waste management activities or manure from local ranches and dairies.

This measure targets reductions in the rate of fertilizer application of 5 percent by 2020, 10 percent by 2030, and 30 percent by 2050 compared to 2014 levels of inorganic nitrogen applied in the County. To track the progress of this measure, the County will work with the farming cooperatives, such as Napa Vineyards, to determine the amount of inorganic and organic nitrogen fertilizers applied per year.

Caveats

The 2014 estimates for emissions from fertilizer application in the County's baseline inventory was based on fertilizer application rates and crop acreages by crop type. The fertilizer application rates were obtained from available UC Davis cost studies by crop. No data was available on specific amounts of fertilizer used in the County in 2014. Similarly, information on the application of or the ratio between inorganic and organic fertilizer used specifically in Napa County was not available. As a conservative approach, this CAP assumes that all nitrogen based fertilizers applied in the County in 2014 were synthetic.

TR-14 "Require new development projects to evaluate and reduce VMT"

This new supporting measure reflects the proposed VMT reduction policy in the Draft Circulation Element of the County's General Plan. Implementation of the proposed policy will be consistent with options presented in the Governor's Office of Planning and Research's Technical Advisory on Evaluation Transportation Impacts in CEQA, per Senate Bill (SB) 743 (OPR 2017). SB 743 requires that VMT, not vehicle travel delay, be used as the most appropriate metric to analyzing a project's transportation impacts. Because the County has not yet defined specific VMT thresholds or metrics that would be used to implement the policy, no specific This new supporting measure reflects the proposed VMT reduction policy and associated action item in the pending update to the County's Circulation Element of the General Plan that will implement SB 743 requirements. SB 743 requires that VMT, not vehicle travel delay, be used as the most appropriate metric to analyze a project's transportation impacts under CEQA. Proposed Policy CIR-39 would require new development projects to reduce unmitigated project VMT by 15 percent, and under proposed Action Item CIR-39.1, the County would develop specific project screening criteria to determine whether specific projects would have a significant VMT impact.

the VMT data used for the GHG analysis in the CAP MTC's Travel One Model (as described in Technical Memo #1)We believe that the proposed VMT policy, as written in the Draft Circulation Element Update, would still result in VMT reductions and associated GHG reductions because of CEQA mitigation requirements once implemented project by project; however, estimating countywide VMT reductions or associated GHG reductions associated with the proposed policy cannot be quantified accurately for the CAP at this time because of the aforementioned differences in VMT quantification methods. In addition, any estimates generated now would also be inaccurate because the screening criteria have not yet been developed by staff and thus the capture rate of the proposed policy cannot be determined. Finally, even if quantification of the policy were possible, there would still be considerable likelihood of double-counting VMT reductions with those achieved by other primary GHG reduction measures already included in the CAP for the transportation sector.

Therefore, we recommend that this measure remain qualitative and supportive of the primary transportation sectors measures already included in the CAP..

The title and description of the new measure (TR-14) to be included in the Revised Draft CAP is as follows:

Measure TR-14: Require new development projects to evaluate and reduce VMT

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ATTACHMENT 1

GHG Measure Reduction Summary				
GHG Emission Reductions by Sector				
		Annual GHG Reduction ($MTCO_2e$)		
Sector	Notes	2020	2030	2050
Agriculture		3,512	10,816	22,336
Building Energy	Includes MU-1	13,361	16,999	20,412
Land Use Change		18,576	8,657	20,751
Wastewater	Includes GHG-2	1,783	5,743	5,737
On-Road Transportation		5,753	4,514	4,745
Off-Road Transportation		1,687	7,867	23,014
Solid Waste		1,807	3,731	4,433
TOTAL Reductions from Proposed Measures		**46,479**	**58,327**	**101,427**
Needed reductions to meet CAP Targets from 2014 levels (MTCO2e)		0	57,683	258,178
Forecasts with Legislative Reductions	Annual GHG Emissions ($MTCO_2e$)			
	2014	**2020**	**2030**	**2050**
Building Energy	148,338	131,643	59,150	67,184
Water and Wastewater	11,277	11,858	12,959	14,335
Solid Waste	83,086	62,345	56,711	48,854
On-Road Vehicles	125,711	112,854	84,845	85,735
Offroad Vehicles and Equipment	42,508	45,164	49,592	58,474
Agriculture	52,198	52,521	53,589	57,446
Land Use Change	7,684	35,608	18,239	21,669
High GWP Gases	13,481	11,828	13,169	15,867
TOTAL	**484,283**	**463,821**	**348,253**	**369,563**
Forecasted Percent Reduction from 2014		-4%	-28%	-24%
CAP Targets (adjusted for percent reduction from 2014)		-2%	-40%	-77%
CAP Targets (MTCO2e)		474,598	290,570	111,385
Needed reductions to meet CAP Targets from 2014 levels (MTCO2e)		9,686	193,713	372,898
Needed reductions to meet CAP Targets from forecasts (MTCO2e)		-10,777	57,683	258,178

Forecasts with Legislative Reductions and County CAP Measures	Annual GHG Emissions ($MTCO_2e$)			
	2014	**2020**	**2030**	**2050**
Building Energy	148,338	118,282	42,151	46,772
Water and Wastewater	11,277	10,075	7,216	8,598
Solid Waste	83,086	60,538	52,980	44,420
On-Road Vehicles	125,711	107,101	80,331	80,990
Offroad Vehicles and Equipment	42,508	43,477	41,725	35,460
Agriculture	52,198	49,009	42,772	35,110
Land Use Change	7,684	17,032	9,582	918
High GWP Gases	13,481	11,828	13,169	15,867
TOTAL	**484,283**	**417,342**	**289,926**	**268,136**
Percent below 2014		-14%	-40%	-45%
Additional Reductions Needed to meet CAP Targets (negative indicates surplus) (MTCO2e)		-57,255	-644	156,751

GHG Measure Reduction Summary (continued)			
Percent below 2014 by Sector. Legislative reductions only			
Sector	**2020**	**2030**	**2050**
Building Energy	-11%	-60%	-55%
Water and Wastewater	5%	15%	27%
Solid Waste	-25%	-32%	-41%
On-Road Vehicles	-10%	-33%	-32%
Offroad Vehicles and Equipment	6%	17%	38%
Agriculture	1%	3%	10%
Land Use Change	363%	137%	182%
High GWP Gases	-12%	-2%	18%
Percent below 2014 by Sector. Combined effect of legislative reductions and proposed actions			
Sector	**2020**	**2030**	**2050**
Building Energy	-20%	-72%	-68%
Water and Wastewater	-11%	-36%	-24%
Solid Waste	-27%	-36%	-47%
On-Road Vehicles	-15%	-36%	-36%
Offroad Vehicles and Equipment	2%	-2%	-17%
Agriculture	-6%	-18%	-33%
Land Use Change	122%	25%	-88%
High GWP Gases	-12%	-2%	18%
Percent below BAU by Sector. Effect of proposed actions			
Sector	**2020**	**2030**	**2050**
Building Energy	-10%	-29%	-30%
Water and Wastewater	-15%	-44%	-40%
Solid Waste	-3%	-7%	-9%
On-Road Vehicles	-5%	-5%	-6%
Offroad Vehicles and Equipment	-4%	-16%	-39%
Agriculture	-7%	-20%	-39%
Land Use Change	-52%	-47%	-96%
High GWP Gases	0%	0%	0%

Measure Details							
#	Lead Agency	Sector	Community or Municipal	Measure Name	Annual GHG Reduction (MT CO_2e)		
					2020	2030	2050
AG-1	Napa County	Agriculture	Community	Support the conversion of stationary diesel or gas-powered irrigation pumps to electric pumps	1,696	1,792	2,009
AG-2	Napa County	Agriculture	Community	Support the use of electric or alternatively-fueled agricultural equipment	1,617	8,540	19,149
AG-3	Napa County	Agriculture	Community	Support the use of Tier 4 final Diesel Equipment for Off-Road Agricultural Equipment	0	64	48
AG-4	Napa County	Agriculture	Community	Support reduced application of inorganic nitrogen fertilizer	199	420	1,130
AG-5	Napa County	Agriculture	Community	Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris	NA	NA	NA
AG-6	Napa County	Agriculture	Community	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	NA	NA	NA
BE-1	Napa County	Building Energy	Community	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings	28	23	24
BE-2	Napa County	Building Energy	Community	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030	1,361	2,037	4,587
BE-3	Napa County	Building Energy	Community	Increase participation in MCE's Deep Green option (100% Renewable Energy)	4,005	1,384	1,338
BE-4	Napa County	Building Energy	Community	Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.	6,096	11,575	12,550
BE-5	Napa County	Building Energy	Community	Expand current renewable energy and green energy incentives and update local ordinances	1,479	1,806	1,703
BE-6	Napa County	Building Energy	Municipal	Select MCE's Deep Green Option for all County Facilities	382	170	205
BE-7	Napa County	Building Energy	Municipal	Support waste-to-energy programs at unincorporated landfills	10	5	5
BE-8	Napa County	Building Energy	Community	Work with PG&E, BayREN, MCE, and PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	NA	NA	NA
BE-9	Napa County	Building Energy	Community	Require energy audits for major additions to or alterations of existing buildings	NA	NA	NA
BE-10	Napa County	Building Energy	Community	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	NA	NA	NA
BE-11	Napa County	Building Energy	Community	Encourage solar panel installations on commercial roof spaces	NA	NA	NA
HG-1	Napa County	High GWP	Community	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems	NA	NA	NA
HG-2	Napa County	High GWP	Community	Incentivize the use of low-GWP refrigerants	NA	NA	NA
LU-1	Napa County	Land Use Change	Community	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	7,077	4,544	15,360
LU-2	Napa County	Land Use Change	Community	Refine protection guidelines for existing riparian lands	660	660	660
LU-3	Napa County	Land Use Change	Community	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	10,839	3,453	4,731
MS-1	Napa County	Wastewater	Community	Support efforts to increase Napa Green Certified wineries and land in the County, with a goal of achieving a 100-percent certification rate for all eligible wineries and properties by 2030	1,783	5,743	5,737
MS-2	Napa County and Cities in Napa County	Multiple	Community	Work with other local jurisdictions within the County to develop a unified Climate Action Plan	NA	NA	NA
MS-3	Napa County	Multiple	Community	Promote the sale of locally-grown foods and/or products	NA	NA	NA
MS-4	Napa County	Multiple	Community	Establish a local carbon offset program in partnership with Sustainable Napa County	NA	NA	NA
OR-1	Napa County	Off-Road Transportation	Community	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	-	354	386
OR-2	Napa County	Off-Road Transportation	Community	Promote use of alternative fuels for recreational marine vessels	1,687	7,512	22,629

Measure Details							
#	Lead Agency	Sector	Community or Municipal	Measure Name	Annual GHG Reduction (MT CO_2e)		
					2020	2030	2050
SW-1	Napa County/ Landfill Owners Operators	Solid Waste	Municipal	Encourage expansion of composting program for both residential and commercial land uses	629	1,106	1,270
SW-2	Napa County/ Waste Management Companies	Solid Waste	Community	Meet an 80 Percent Waste Diversion Goal by 2020 and a 90 Percent Goal by 2030	1,179	2,625	3,163
TR-1	NVTA/Napa County	On-Road Transportation	Community	Update Transportation System Management Ordinance (for Employers)	4,818	3,582	3,547
TR-2	Napa County	On-Road Transportation	Community	Adopt parking reduction ordinance revisions	78	58	57
TR-3	NVTA/Napa County	On-Road Transportation	Community	Increase affordable housing, especially workforce housing, in Napa County	31	23	23
TR-4	NVTA/Napa County	On-Road Transportation	Community	Support efforts to allow commuter service to operate on railroad rights-of-ways	542	605	948
TR-5	Napa County	On-Road Transportation	Municipal	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to CNG	284	247	169
TR-6	NVTA/Napa County	On-Road Transportation	Community	Support efforts of transit agencies to increase availability and accessibility of transit information	NA	NA	NA
TR-7	Napa County	On-Road Transportation	Community	Support alternatives to private vehicle travel for visitors	NA	NA	NA
TR-8	NCTPA/Napa County	On-Road Transportation	Community	Support Napa County's incorporated cities in developing transit-oriented development unique to the needs of the Napa Region	NA	NA	NA
TR-9	NVTA/Napa County	On-Road Transportation	Community	Support interregional transit solutions	NA	NA	NA
TR-10	NCTPA/Napa County	On-Road Transportation	Community	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers	NA	NA	NA
TR-11	NCTPA/Napa County	On-Road Transportation	Community	Promote existing ride-matching services for people living and working in the unincorporated county	NA	NA	NA
TR-12	NVTA/Napa County	On-Road Transportation	Community	Increase the supply of electric vehicle charging stations	NA	NA	NA
TR-13	NCTPA/Napa County	On-Road Transportation	Community	Promote telecommuting at office-based businesses	NA	NA	NA
TR-14	NCTPA/Napa County	On-Road Transportation	Community	Develop and implement active transportation projects	NA	NA	NA
TR-15	Napa County	On-Road Transportation	Community	Require new development projects to evaluate and reduce VMT	NA	NA	NA
WA-1	Napa County	Water	Community	Amend or revise water conservation regulations for landscape design	NA	NA	NA
WA-2	Napa County	Water	Community	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering	NA	NA	NA
WA-3	Napa County	Water	Community	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities	NA	NA	NA
WA-4	Napa County	Water	Community	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities	NA	NA	NA

Environmental Co-Benefit Potential						
#	Measure Name	Air Quality *Reduces criteria air pollutants directly or indirectly*	Water *Reduces strain on local and state water supply or improves water quality*	Biological Resources *Improves or preserves natural ecosystems and habitats*	Health *Improves public health through reduced pollutants and hazards, and increasing physical activity*	Non-Renewable Energy Resources *Reduces reliance on finite fossil fuel resources*
AG-1	Support the conversion of stationary diesel or gas-powered irrigation pumps to electric pumps	Yes	No	Yes	Yes	Yes
AG-2	Support the use of electric or alternatively-fueled agricultural equipment	Yes	No	Yes	Yes	Yes
AG-3	Support the use of Tier 4 final Diesel Equipment for Off-Road Agricultural Equipment	Yes	No	Yes	Yes	Yes
AG-4	Support reduced application of inorganic nitrogen fertilizer	Yes	Yes	Yes	Yes	No
AG-5	Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris	Yes	No	Yes	Yes	No
AG-6	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	Yes	Yes	Yes	Yes	Yes
BE-1	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings	Yes	Yes	Yes	Yes	Yes
BE-2	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030	Yes	Yes	Yes	Yes	Yes
BE-3	Increase participation in MCE's Deep Green option (100% Renewable Energy)	Yes	No	No	No	Yes
BE-4	Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.	Yes	No	No	No	Yes
BE-5	Expand current renewable energy and green energy incentives and update local ordinances	Yes	No	No	No	Yes
BE-6	Select MCE's Deep Green Option for all County Facilities	Yes	No	No	No	Yes
BE-7	Support waste-to-energy programs at unincorporated landfills	Yes	Yes	No	Yes	Yes
BE-8	Work with PG&E, BayREN, MCE, and PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	Yes	No	No	No	Yes
BE-9	Require energy audits for major additions to or alterations of existing buildings	Yes	No	No	No	Yes
BE-10	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	Yes	Yes	No	Yes	Yes

Environmental Co-Benefit Potential						
#	Measure Name	Air Quality *Reduces criteria air pollutants directly or indirectly*	Water *Reduces strain on local and state water supply or improves water quality*	Biological Resources *Improves or preserves natural ecosystems and habitats*	Health *Improves public health through reduced pollutants and hazards, and increasing physical activity*	Non-Renewable Energy Resources *Reduces reliance on finite fossil fuel resources*
BE-11	Encourage solar panel installations on commercial roof spaces	Yes	No	No	Yes	Yes
HG-1	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems	Yes	No	No	No	No
HG-2	Incentivize the use of low-GWP refrigerants	Yes	No	No	No	No
LU-1	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	Yes	Yes	Yes	Yes	No
LU-2	Refine protection guidelines for existing riparian lands	No	Yes	Yes	Yes	No
LU-3	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	Yes	No	No	Yes	No
MS-1	Support efforts to increase Napa Green Certified wineries and land in the County, with a goal of achieving a 100-percent certification rate for all eligible wineries and properties by 2030	Yes	Yes	Yes	Yes	Yes
MS-2	Work with other local jurisdictions within the County to develop a unified Climate Action Plan	Yes	Yes	Yes	Yes	Yes
MS-3	Promote the sale of locally-grown foods and/or products	Yes	Yes	No	Yes	No
MS-4	Establish a local carbon offset program in partnership with Sustainable Napa County	Yes	Yes	Yes	Yes	Yes
OR-1	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	Yes	No	Yes	Yes	Yes
OR-2	Promote use of alternative fuels for recreational marine vessels	Yes	Yes	Yes	Yes	Yes
SW-1	Encourage expansion of composting program for both residential and commercial land uses	Yes	Yes	Yes	No	No
SW-2	Meet an 80 Percent Waste Diversion Goal by 2020 and a 90 Percent Goal by 2030	No	Yes	Yes	Yes	No
TR-1	Update Transportation System Management Ordinance (for Employers)	Yes	No	No	Yes	Yes
TR-2	Adopt parking reduction ordinance revisions	Yes	No	No	Yes	Yes
TR-3	Increase affordable housing, especially workforce housing, in Napa County	Yes	No	No	Yes	Yes
TR-4	Support efforts to allow commuter service to operate on railroad rights-of-ways	Yes	No	No	Yes	Yes
TR-5	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to CNG	Yes	No	No	No	No

Environmental Co-Benefit Potential						
#	Measure Name	Air Quality *Reduces criteria air pollutants directly or indirectly*	Water *Reduces strain on local and state water supply or improves water quality*	Biological Resources *Improves or preserves natural ecosystems and habitats*	Health *Improves public health through reduced pollutants and hazards, and increasing physical activity*	Non-Renewable Energy Resources *Reduces reliance on finite fossil fuel resources*
TR-6	Support efforts of transit agencies to increase availability and accessibility of transit information	Yes	No	No	Yes	Yes
TR-7	Support alternatives to private vehicle travel for visitors	Yes	No	No	Yes	Yes
TR-8	Support Napa County's incorporated cities in developing transit-oriented development unique to the needs of the Napa Region	Yes	No	No	Yes	Yes
TR-9	Support interregional transit solutions	Yes	No	No	Yes	Yes
TR-10	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers	Yes	No	No	Yes	Yes
TR-11	Promote existing ride-matching services for people living and working in the unincorporated county	Yes	No	No	Yes	Yes
TR-12	Increase the supply of electric vehicle charging stations	Yes	No	No	Yes	Yes
TR-13	Promote telecommuting at office-based businesses	Yes	No	No	Yes	Yes
TR-14	Develop and implement active transportation projects	Yes	No	No	Yes	Yes
TR-15	Require new development projects to evaluate and reduce VMT	Yes	No	No	Yes	Yes
WA-1	Amend or revise water conservation regulations for landscape design	Yes	Yes	Yes	No	Yes
WA-2	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering	Yes	Yes	Yes	No	Yes
WA-3	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities	Yes	Yes	Yes	No	Yes
WA-4	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities	No	Yes	No	No	No

Measure Cost and Administrative Feasibility					
#	Measure Name	Estimated Cost/Benefit and Regional Economic Impact Considerations		Administrative Feasibility	
		High-Level Cost Assessment	Detail	Coordination Level	Detail
AG-1	Support the conversion of stationary diesel or gas-powered irrigation pumps to electric pumps	Medium	May involve costs with respect to rebates or other incentives provided to operators who choose to convert the pumps.	County and BAAQMD	County may work with BAAQMD to acquire funds and possibly administration to support this measure.
AG-2	Support the use of electric or alternatively-fueled agricultural equipment	Low	Some costs to the County associated with program-level management	County and BAAQMD	County may work with BAAQMD to acquire funds and possibly administration to support this measure.
AG-3	Support the use of Tier 4 final Diesel Equipment for Off-Road Agricultural Equipment	Medium	Some costs to the County associated with program-level management. May involve increased costs to equipment operators.	County and Agricultural Community	County would need to establish code or program to enforce requirement. Requires collaboration with agricultural equipment operators.
AG-4	Support reduced application of inorganic nitrogen fertilizer	Medium	Some costs to the County associated with program-level management	County and Agricultural Community	Requires County to establish a new program. County would need to work with agricultural community to establish program goals.
AG-5	Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris	Medium	Some costs to the County associated with program-level management	County and BAAQMD	Requires collaboration with BAAQMD. County does not have direct jurisdiction over open burning activities related to agriculture, but may have some jurisdiction over burning of flood control and forest debris.
AG-6	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	Medium	Some costs to the County associated with program-level management	County and Agricultural Community	Requires County to establish a new program. County would need to work with agricultural community to establish program goals.
BE-1	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings	Low	Potential increased costs to building applicants associated with green building and efficiency requirements. Low additional cost to the county due to current code enforcement.	County only	Requires updating current building code ordinances. County already does building code enforcements.
BE-2	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030	Low	Potential increased costs to building applicants associated with green building and efficiency requirements. Low additional cost to the county due to current code enforcement.	County only	Requires updating current building code ordinances. County already does building code enforcements.

Measure Cost and Administrative Feasibility					
#	Measure Name	Estimated Cost/Benefit and Regional Economic Impact Considerations		Administrative Feasibility	
		High-Level Cost Assessment	Detail	Coordination Level	Detail
BE-3	Increase participation in MCE's Deep Green option (100% Renewable Energy)	Medium	This measure would cost the County between approximately $282,000 and $343,000 per year. See quantification in separate spreadsheet. Some funding could be available through BAAQMD, who currently funds a similar program in the City of Fairfax through a grant.	County, MCE, and potential funding sources	Requires starting and maintaining an annual subsidy program. May require proposal development to request grant funding.
BE-4	Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.	Low	Potential increased costs to building applicants associated with efficiency requirements. Low additional cost to the county due to current code enforcement.	County only	Requires updating current building code ordinances. County already does building code enforcements.
BE-5	Expand current renewable energy and green energy incentives and update local ordinances	Varies	Potential increased costs associated with monetary incentives. Cost would depend on any changes in level of incentives.	County only	Requires maintaining current program and monitoring total kW of approved solar permits
BE-6	Select MCE's Deep Green Option for all County Facilities	Low	Assuming an additional cost of $0.01 per kWh, this would cost the County approximately $30,000 per year. See quantification in separate spreadsheet.	County and MCE	Requires a one-time selection of Deep Green for all facilities located in the unincorporated County.
BE-7	Support waste-to-energy programs at unincorporated landfills	High	Costs would be associated with construction and operation of the new facility	Landfills and County	Requires coordination with landfill operators located in the unincorporated County.
BE-8	Work with PG&E, BayREN, MCE, and PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	Medium	Some costs to the County associated with program-level management	County, PG&E, BayREN, and MCE	Requires collaboration with PG&E, BayREN, MCE, California Energy Commission to determine applicable energy efficiency incentives.
BE-9	Require energy audits for major additions to or alterations of existing buildings	Medium	Some costs to the County associated with program-level management.	County only	May require County to establish a new energy audit program.
BE-10	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	Medium	Some costs to the County associated with program-level management	County Only	Requires County to establish a new program.
BE-11	Encourage solar panel installations on commercial roof spaces	Medium	Some costs to the County associated with program-level management	County Only	Requires County to establish a new program.

Measure Cost and Administrative Feasibility					
#	Measure Name	Estimated Cost/Benefit and Regional Economic Impact Considerations		Administrative Feasibility	
		High-Level Cost Assessment	Detail	Coordination Level	Detail
HG-1	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems	Medium	Some costs to the County associated with program-level management and potential incentives.	County, CARB, and eligible businesses/ organizations	Requires County to establish a new incentive program and coordinate with CARB's RMP representatives.
HG-2	Incentivize the use of low-GWP refrigerants	Medium	Some costs to the County associated with program-level management and potential incentives.	County and eligible businesses/ organizations	Requires County to establish a new incentive program.
LU-1	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	Low	Costs associated with code enforcement, project design to prioritize preservation, and replanting efforts	County, Project Applicants, and Volunteers	Requires updating code and enforcement of code and coordination with volunteer replanting efforts.
LU-2	Refine protection guidelines for existing riparian lands	Low	Costs associated with code enforcement	County Only	Requires updating code and enforcement of code.
LU-3	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	Low	Costs associated with developing, maintaining, and operating a new program and research. Some costs also associated with contracts with eligible businesses and services.	County and eligible businesses/ organizations	May require dedicated staff time to research feasible repurposing pathways and contracts with eligible businesses or services.
MS-1	Support efforts to increase Napa Green Certified wineries and land in the County, with a goal of achieving a 100-percent certification rate for all eligible wineries and properties by 2030	Medium	Potential costs to winery and land owners to pay certification costs. Costs to County associated with target monitoring. Potential County costs associated with monetary or other incentives (e.g. increased presence on Napa Visitors website).	County, Napa Green, and Businesses	Requires coordination with Napa Green and Napa wineries and land owners and operators. May require discussion with Napa Green on feasibility of 2030 target.
MS-2	Work with other local jurisdictions within the County to develop a unified Climate Action Plan	High	Costs associated with coordination and CAP development. May take over a year to complete and require dedicated staff resources to manage technical studies and public participation.	County and Cities	Requires working with local jurisdictions.
MS-3	Promote the sale of locally-grown foods and/or products	Low	Costs associated with promotion of locally grown foods/products	County Only	May require establishment and promotion program and dedicated staff time to achieve measure goals.
MS-4	Establish a local carbon offset program in partnership with Sustainable Napa County	High	Costs associated with developing, maintaining, and operating a new program	County and Sustainable Napa County	May require establishment and promotion program and dedicated staff time to manage carbon offsets.

Measure Cost and Administrative Feasibility					
#	Measure Name	Estimated Cost/Benefit and Regional Economic Impact Considerations		Administrative Feasibility	
		High-Level Cost Assessment	Detail	Coordination Level	Detail
OR-1	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	Medium	Some costs to the County associated with program-level management. May involve increased costs to project applicants.	County and Project Applicants	County would need to establish code or program to enforce requirement. Requires participation from and collaboration with developers or project applicants.
OR-2	Promote use of alternative fuels for recreational marine vessels	Medium	Some costs to the County associated with promotion and coordination efforts, as well as program management.	County, Dock operators, Local Businesses, and Cities	County would need to coordinate with operators at County and City waterways to encourage use of alternative fuels, especially biodiesel. County would need to do some research related to best implementation methods.
SW-1	Encourage expansion of composting program for both residential and commercial land uses	Medium	Some increased costs associated with promotion of composting.	County and Waste Management Companies	Requires increased County efforts to promote composting of food and yard waste generated in the County.
SW-2	Meet an 80 Percent Waste Diversion Goal by 2020 and a 90 Percent Goal by 2030	Medium	Some increased costs associated with promotion of waste reduction options (e.g. recycling, composting, reuse).	County and Waste Management Companies	Requires increased County efforts to promote recycling, composting, and reuse of waste materials generated in the County.
TR-1	Update Transportation System Management Ordinance (for Employers)	Medium	Increased costs associated with enforcement and monitoring of ordinance.	County and MTC	Requires ordinance update and a new program to be established to monitor progress of and enforce the new ordinance. Some coordination may be needed with MTC to synergize with Bay Area's Commuter Benefits Program.
TR-2	Adopt parking reduction ordinance revisions	Medium	Increased costs associated with enforcement and monitoring of ordinance.	County Only	Requires ordinance update and regular enforcement of ordinance.
TR-3	Increase affordable housing, especially workforce housing, in Napa County	Medium	Costs to be shared throughout the region, depending on location of affordable housing.	County, Cities, and NVTA	The County has land use authority and can influence design and approval of projects for affordable workforce housing.
TR-4	Support efforts to allow commuter service to operate on railroad rights-of-ways	Medium	High initial capital costs associated with new commuter train cars and annual costs from regular service operation. Train would not be operated by the County. Operation costs would need to be negotiated between agencies (e.g. cities, NVTA, Napa Wine Train).	County, NVTA, and Private Railroad Entities	The County has seats on the NVTA Board and can influence transportation planning decisions.

Measure Cost and Administrative Feasibility					
#	Measure Name	Estimated Cost/Benefit and Regional Economic Impact Considerations		Administrative Feasibility	
		High-Level Cost Assessment	Detail	Coordination Level	Detail
TR-5	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to CNG	High	High capital cost of performing the vehicle conversions to CNG. May rely on grant funding.	Solid Waste Collection Services and County	Requires coordination with solid waste collection services located in the unincorporated County.
TR-6	Support efforts of transit agencies to increase availability and accessibility of transit information	Low	Low initial costs associated with linking current transit data with transit information providers, such as Google.	County, NVTA, and Regional Transit Agencies	The County has seats on the NVTA Board and can influence transportation planning decisions. Would require some coordination with Google and other transit information providers.
TR-7	Support alternatives to private vehicle travel for visitors	Low	Low costs associated with updating and maintaining visitor bureau website to include focus on private vehicle alternatives.	County and Visit Napa Valley	County funds the VisitNapaValley.com website through Napa County Special Projects Funding. County has some influence over the contents of the website. Requires coordination with Visit Napa Valley.
TR-8	Support Napa County's incorporated cities in developing transit-oriented development unique to the needs of the Napa Region	Varies	Costs associated with land use planning and development. Funding sources would depend on the location of proposed developments.	County, Cities, and NVTA	The County has seats on the NVTA Board and can influence transportation planning decisions related to transit oriented development.
TR-9	Support interregional transit solutions	Varies	Costs may vary depending on the solutions needed. Higher costs would be associated with developments of new transit infrastructure, stations, or fleet. Lower costs would be associated with coordination of schedules, routes, and information between transit agencies.	County, Cities, NVTA, and Regional Transit Agencies	The County has seats on the NVTA Board and can influence transportation planning decisions related to transit solutions. A more aggressive approach requires coordination with local and regional transit agencies to promote synergy across transit service areas.
TR-10	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers	Medium	Costs associated with coordination and development of a pilot project. Project moves foreword, may require regular monitoring of program progress.	County and NVTA	The County has seats on the NVTA Board and can influence transportation planning decisions related to transit solutions. A more aggressive approach requires coordination with vineyards and Vine or private ridesharing companies, such as Enterprise, to explore the ridership potential of and best schedule for harvest season ride services.

Measure Cost and Administrative Feasibility					
#	Measure Name	Estimated Cost/Benefit and Regional Economic Impact Considerations		Administrative Feasibility	
		High-Level Cost Assessment	Detail	Coordination Level	Detail
TR-11	Promote existing ride-matching services for people living and working in the unincorporated county	Varies	Some costs associated with coordination. Cost of park and ride facilities will depend on whether the facilities are located in the unincorporated area or not.	County, Cities, and NVTA	The County has seats on the NVTA Board and can influence transportation planning decisions related to park and ride facilities. Most facilities would likely be located in Cities where the greatest concentration of residential units are. Park and ride facilities could be located in the unincorporated County if located close to nearby residential concentrations.
TR-12	Increase the supply of electric vehicle charging stations	High	High capital costs associated with construction of EV charging stations, signage, and related infrastructure throughout County. Some costs associated with maintenance.	County and County businesses	Requires coordination with businesses and multi-family complexes to install EV chargers. May require routine maintenance that can be contracted out.
TR-13	Promote telecommuting at office-based businesses	Low	Costs associated with identifying eligible businesses and promotion of telecommuting.	County only	Requires some staff time dedicated to achieving measure goals.
TR-14	Develop and implement active transportation projects	Medium	Costs associated with project research, program funding, and project funding.	County and NVTA	The County would work with NVTA to develop and fund projects, as part of countywide efforts to implement bicycle and pedestrian master plans that exist.
TR-15	Require new development projects to evaluate and reduce VMT	High	Costs associated with project review, program funding, and project funding.	County and NVTA	Requires staff time dedicated to reviewing project applications and determining whether projects meets VMT reduction goals.
WA-1	Amend or revise water conservation regulations for landscape design	Low	Low additional cost to the county due to current code enforcement.	County only	Requires updating current water conservation ordinance. County already does code enforcements.
WA-2	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering	Low	Low additional cost to the county due to current code enforcement.	County only	Requires updating current water conservation ordinance. County already does code enforcements.
WA-3	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities	Low	Low additional cost for expedited permits. Slightly reduced revenue from lowered permit fees.	County only	Requires updating County permit fee list.
WA-4	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities	Medium	Some costs associated with developing water audit methods, performing audits themselves, providing feedback to businesses, and recommending solutions.	County only	Requires some staff time dedicated to achieving measure goals. May require establishing a water audit program.

Quantification Assumptions		
#	Measure Name	Calculation Assumptions
AG-1	Support the conversion of stationary diesel or gas-powered irrigation pumps to electric pumps	Assumes all pumps are diesel-powered and all are converted to electric, and any future pumps associated with growth in ag sector would be electric
AG-2	Support the use of electric or alternatively-fueled agricultural equipment	Assumes 5% of emissions from agricultural equipment would be reduced.
AG-3	Support the use of Tier 4 final Diesel Equipment for Off-Road Agricultural Equipment	See separate calculation spreadsheet
AG-4	Support reduced application of inorganic nitrogen fertilizer	See separate calculation spreadsheet
AG-5	Support BAAQMD in efforts to reduce open burning of removed agricultural biomass and flood debris	Not quantified
AG-6	Encourage and support the use of carbon farming and other sustainable agricultural practices in the County	Not quantified
BE-1	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings	See separate calculation spreadsheet
BE-2	Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030	See separate calculation spreadsheet
BE-3	Increase participation in MCE's Deep Green option (100% Renewable Energy)	See separate calculation spreadsheet
BE-4	Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.	See separate calculation spreadsheet
BE-5	Expand current renewable energy and green energy incentives and update local ordinances	Not quantified
BE-6	Select MCE's Deep Green Option for all County Facilities	See separate calculation spreadsheet
BE-7	Support waste-to-energy programs at unincorporated landfills	See separate calculation spreadsheet
BE-8	Work with PG&E, BayREN, MCE, and PACE financing programs, and other regional partners to incentivize energy efficiency improvements in existing buildings	Not quantified
BE-9	Require energy audits for major additions to or alterations of existing buildings	Not quantified
BE-10	Develop a program to allow new development to offset project GHG emissions by retrofitting existing income-qualified homes and buildings	Not quantified
BE-11	Encourage solar panel installations on commercial roof spaces	Not quantified
HG-1	Encourage registration of facilities in CARB's RMP and incentivize installation of low-GWP refrigerant systems	Not quantified
HG-2	Incentivize the use of low-GWP refrigerants	Not quantified
LU-1	Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	Assumes 30% of trees forecasted to be lost would be conserved and up to 2,500 oak and coniferous trees would be planted per year to replace lost trees. Replanting efforts assume a 20% mortality rate. Original forecasts assume a certain reduction in oak woodland based on land use forecasts. See separate calculation spreadsheet.
LU-2	Refine protection guidelines for existing riparian lands	Assumes all riparian land in 2014 would remain in future years. Original forecasts assume a certain reduction in these land uses based on land use forecasts. Reductions associated with this measure assume that any forecasted removal of riparian lands would not occur. See separate calculation spreadsheet.
LU-3	Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	Assumes 80% of the lumber from removed oak and coniferous trees would be repurposed, buried, or otherwise unburned and prevented from releasing stored CO2 back into the atmosphere.

#	Measure Name	Calculation Assumptions
MS-1	Support efforts to increase Napa Green Certified wineries and land in the County, with a goal of achieving a 100-percent certification rate for all eligible wineries and properties by 2030	Currently, 56% of wineries and 40% of vineyard land are Napa Green Certified. Although this measure would theoretically reduce emissions across all sectors, there is not enough information available to determine the average savings associated with being Napa Green Certified. Only reductions in wastewater emissions from wineries were accounted for in this measure because the inventory assumed that all Napa Green Wineries treat their wastewater aerobically. Calculations assumes a 60% certification rate by 2020 and an 100% certification rate for wineries by 2030 by production volume. See separate calculation spreadsheet. For all certified businesses, it is assumed that 75% of businesses already undergoing energy retrofits pursuant to SB350 programs would seek to be or are already Napa Green Certified.
MS-2	Work with other local jurisdictions within the County to develop a unified Climate Action Plan	Not quantified
MS-3	Promote the sale of locally-grown foods and/or products	Not quantified
MS-4	Establish a local carbon offset program in partnership with Sustainable Napa County	Not quantified
OR-1	Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030	This measure assumes that emissions and fuel efficiency are directly proportional. Assume a 5% efficiency improvement because efficiency gains are likely higher when compared to older models.
OR-2	Promote use of alternative fuels for recreational marine vessels	Assumes a plan would successfully reduce emissions from pleasure craft by 5% by 2020, 20% by 2030, and 50% by 2050 due to shifts to alternative fuels, including biodiesel.
SW-1	Encourage expansion of composting program for both residential and commercial land uses	See separate calculation spreadsheet.
SW-2	Meet an 80 Percent Waste Diversion Goal by 2020 and a 90 Percent Goal by 2030	See separate calculation spreadsheet.
TR-1	Update Transportation System Management Ordinance (for Employers)	Applies CAPCOA measures TRT-1/TRT-3/TRT-11 (Commute Trip Reduction measures) and TRT-2 (Commute Trip Reduction Monitoring Program), which have a minimum VMT reduction of 1-2% and 4.2%, respectively. Calculations assume a rural context and applicability to large employers in the unincorporated area. Measure applies only to commute VMT, available from MTC. See separate calculation spreadsheet.
TR-2	Adopt parking reduction ordinance revisions	Applies CAPCOA TRT-14 and TRT-15 measures which assume a 0.1-19.7% reduction in VMT. This measures assumes a low rate of VMT reduction due to rural nature of Napa County. See separate calculation spreadsheet.
TR-3	Increase affordable housing, especially workforce housing, in Napa County	Applies CAPCOA LUT-6 measure which assumes a 0.4 - 1.2% reduction in VMT. This measure assumes a low rate of VMT reduction due to distance from cities in Napa County to destinations in the unincorporated area. Commute from cities is closer than commuting from neighboring counties, depending on work locations. See separate calculation spreadsheet.
TR-4	Support efforts to allow commuter service to operate on railroad rights-of-ways	Pilot program information from Napa Valley Wine Train. See separate calculation spreadsheet.
TR-5	Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to CNG	See separate calculation spreadsheet.
TR-6	Support efforts of transit agencies to increase availability and accessibility of transit information	Not quantified
TR-7	Support alternatives to private vehicle travel for visitors	Not quantified
TR-8	Support Napa County's incorporated cities in developing transit-oriented development unique to the needs of the Napa Region	Not quantified
TR-9	Support interregional transit solutions	Not quantified
TR-10	Work with Napa County's incorporated cities, NVTA, and neighboring regions to increase presence of park and ride facilities near residential centers	Not quantified
TR-11	Promote existing ride-matching services for people living and working in the unincorporated county	Not quantified
TR-12	Increase the supply of electric vehicle charging stations	Not quantified
TR-13	Promote telecommuting at office-based businesses	Not quantified

#	Measure Name	Calculation Assumptions
TR-14	Develop and implement active transportation projects	Not quantified
TR-15	Require new development projects to evaluate and reduce VMT	Not quantified
WA-1	Amend or revise water conservation regulations for landscape design	Not quantified
WA-2	Adopt a new water conservation ordinance for commercial and residential land uses limiting outdoor watering	Not quantified
WA-3	Expedite and/or reduce permit fees associated with water conservation installations in existing facilities	Not quantified
WA-4	Require water audits for large new commercial or industrial projects and significant expansions of existing facilities	Not quantified

Reduction Measure Quantification

Building Energy Assumptions				
		2020	2030	2050
Napa County Average Electricity Emissions Factor (MTCO2e/MWh)		1.29E-01	5.91E-02	5.58E-02
Natural Gas Emissions Factor (MTCO2e/therm)			0.00685	
Source: Final Technical Memorandum #1: 2014 Greenhouse Gas Emissions Inventory and Forecasts				

AG-1				
Support the conversion of stationary diesel or gas-powered irrigation pumps to electric pumps	2014	2020	2030	2050
Number of Diesel Pumps in Napa County	25.9	26.5	28.0	31.4
Emissions from Diesel Pumps (MTCO2)	1,657	1,697	1,792	2,009
Assume all diesel pumps are converted to electric				
Diesel Emission Factor (kg CO2/gal) 10.21				
Calculated fuel use (gal)	162,302	166,231	175,614	196,880
Energy content of diesel (kBTU/gal) - lower heating value	128	128	128	128
Efficiency of diesel pump (%)	35%	35%	35%	35%
Energy required by pumps (kBTU)	7,299	7,476	7,898	8,854
Efficiency of electric pump (%)	75%	75%	75%	75%
Calculated electricity use in electric pumps (kBTU)	9,732	9,967	10,530	11,805
Calculated electricity use in electric pumps (kWh)	2,852	2,921	3,086	3,460
Emissions from electricity use (MTCO2e)		0.38	0.18	0.19
Net GHG Reduction from AG-1 (MTCO2e)		1,696	1,792	2,009

AG-2				
Support the use of electric or alternatively-fueled agricultural equipment	2014	2020	2030	2050
Emissions from Agricultural Equipment Except for Irrigation Pumps. Scaled by change in cropland. (MTCO2e)	31,571	32,336	34,161	38,297
Percent of Equipment Converted to Electric or Alternative Fuel		5%	25%	50%
Net GHG Reduction from AG-2 (MTCO2e)		1,617	8,540	19,149

AG-3				
Support the use of Tier 4 final Diesel Equipment for Off-Road Agricultural Equipment	2014	2020	2030	2050
Emissions from Agricultural Equipment **Except** for Irrigation Pumps (MTCO2e)	31,571	32,336	34,161	38,297
Emissions Reduced from AG-3		1,617	8,540	19,149
Remaining emissions from diesel agricultural equipment		30,719	25,621	19,149
Participation rate of equipment that are Tier 4 Final		-	5%	5%
Average percent improvement in fuel efficiency with Tier 4 Final equipment		5.00%	5.00%	5.00%
Net GHG Reduction from AG-3 (MTCO2e)		-	64	48

Reduction Measure Quantification (continued)

AG-4

Support reduced application of inorganic nitrogen fertilizer	2014	2020	2030	2050
Existing N2O Emissions from Nitrogen Fertilizer Use (MTCO2e)	2,683			
Cropland inventory and forecast (acres)	70,005	71,699	73,956	78,482
Forecasted N2O Emissions from Nitrogen Fertilizer Use (MTCO2e)		2,748	2,835	3,008
Percent reduced or displaced by organic fertilizers from 2014 levels		5%	10%	30%
Forecasted N2O Emissions from Nitrogen Fertilizer Use after reduction (MTCO2e)		2,549	2,415	1,878
Net GHG Reduction from AG-4 (MTCO2e)		199	420	1,130

BE-1

Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for eligible alterations or additions to existing buildings		2020	2030	2050
From Inventory Demographics Assumptions (Unincorporated County)	***2014***	***2020***	***2030***	***2050***
Households (HH)	12,356	12,931	13,890	15,844
Population	26,665	28,612	31,857	38,384
Jobs	11,400	11,732	12,284	13,372
Source: Fehr and Peers 2015 (Technical Memorandum to Ascent dated November 5, 2015)				
Residential				
Average number of eligible residential permits per year scaled by population growth	50	52	56	64
Average electricity use per HH (from County HH data and PGE estimates for 2013) (kWh)	9,406	9,406	9,406	9,406
Average natural gas use per HH (from County HH data and PGE estimates for 2013) (therms)	308	308	308	308
Percent of HH applicable to energy audit (conservative assumption)	50%			
CalGreen Tier 1 Percent Reduction from 2008 standards (conservative assumption)	15%			
Electricity Savings per year (kWh)	35,273	36,915	39,653	45,230
Natural Gas Savings per year (therms)	1,155	1,209	1,298	1,481
Emissions savings per year (MTCO2e)		**13.05**	**11.24**	**12.67**
Commercial				
Average number of eligible non-residential permits per year	50	51	54	59
Sqft of new or improved space per permit	1,000	1,001	1,002	1,003
Total SQFT of new or improved existing building space	50,000	51,506	53,986	58,823
Percent of Commercial area applicable to energy audit	50%			
CalGreen Tier 1 Percent Reduction from 2008 standards (conservative assumption)	15%			
Average kwh per commercial sqft (kwh/sqft)	14			
Average therm per commercial sqft (therms/sqft)	0.30			
Electricity Savings per year (kWh)		54,307	56,922	62,022
Natural Gas Savings per year (therms)		1,177	1,233	1,344
Emissions savings per year (MTCO2e)		**15.07**	**11.27**	**11.09**
Net GHG Reduction from BE-1 (MTCO2e)		28	23	24

Reduction Measure Quantification (continued)

BE-2					
Require compliance with CALGreen Tier 1 Green Building standards and Tier 1 Building Energy Efficiency Standards for all new construction, and phase in ZNE standards for new construction, beginning with residential in 2020 and non-residential by 2030		2014	2020	2030	2050
Residential					
Forecast energy usage (w/o SB350)					
	Electricity (kWh)	116,340,405	121,689,479	130,714,390	149,098,861
	Natural Gas (therms)	3,809,649	3,984,808	4,280,335	4,882,347
New Energy Use Only (w/o SB350)					
	Electricity (kWh)		5,349,074	14,373,986	32,758,457
	Natural Gas (therms)		175,159	470,686	1,072,699
New Energy Use Only (w/ SB350)					
	Electricity (kWh)		3,851,334	7,186,993	16,379,228
	Natural Gas (therms)		126,115	235,343	536,349
Percent Reduction from CalGreen Tier 1 or ZNE from prior set of standards			100%	100%	100%
Calgreen Tier 1 or ZNE			ZNE	ZNE	ZNE
New Energy Use Only (w/ SB350 + CalGreen Tier 1 or ZNE)					
	Electricity (kWh)		-	-	-
	Natural Gas (therms)		-	-	-
Energy Reductions					
	Electricity (kWh)		3,851,334	7,186,993	16,379,228
	Natural Gas (therms)		126,115	235,343	536,349
Emissions Reductions (MTCO2e)					
	Electricity		**497**	**425**	**913**
	Natural Gas		**864**	**1,612**	**3,674**
Commercial					
Forecast energy usage (w/o SB350)					
	Electricity (kWh)	214,162,060	220,391,174	230,773,030	251,200,573
	Natural Gas (therms)	8,626,723	8,877,640	9,295,835	10,118,682
New Energy Use Only (w/o SB350)					
	Electricity (kWh)		6,229,114	16,610,971	37,038,513
	Natural Gas (therms)		250,917	669,111	1,491,959
New Energy Use Only (w/ SB350)					
	Electricity (kWh)		4,484,962	8,305,485	18,519,256
	Natural Gas (therms)		180,660	334,556	745,979
Percent Reduction from CalGreen Tier 1 or ZNE from prior set of standards			15%	100%	100%
Calgreen Tier 1 or ZNE			ZNE	ZNE	ZNE
New Energy Use Only (w/ SB350 + CalGreen Tier 1 or ZNE)					
	Electricity (kWh)		3,812,218	-	-
	Natural Gas (therms)		153,561	-	-

Reduction Measure Quantification (continued)

		2020	2030	2050
Energy Reductions				
Electricity (kWh)		672,744	8,305,485	18,519,256
Natural Gas (therms)		27,099	334,556	745,979
Emissions Reductions (MTCO2e)				
Electricity		**87**	**491**	**1,033**
Natural Gas		**186**	**2,292**	**5,110**
Commercial and Residential				
Emissions Reductions (MTCO2e)				
Electricity		**584**	**916**	**1,946**
Natural Gas		**1,050**	**3,904**	**8,784**
Net GHG Reduction from BE-2 (MTCO2e)		1,361	2,037	4,587
w/o ZNE		*479*	*725*	*1,613*
Difference		*882*	*1,312*	*2,974*
BE-3				
Increase participation in MCE's Deep Green option (100% Renewable Energy)		2020	2030	2050
City of Fairfax's current participation rate with similar subsidy program for Deep Green which is limited to 100 households	6%			
Target Participation Rate under BE-5		10%	15%	15%
County electricity use prior to measures (with Legislative Reductions) (kWh)		344,385,969	190,832,440	219,495,859
Reductions from other measures (kWh)				
BE-3		54,307	54,307	54,307
BE-4		4,524,078	15,492,478	34,898,485
BE-6		(3,630)	(2,386)	(2,411)
BE-10		75,353	78,914	85,904
Adjusted County Electricity Use (kWh)		339,735,862	175,209,127	184,459,575
Emissions from Electricity use under MCE/PGE (MTCO2e)		43,868	10,361	10,286
Emissions removed under Deep Green (MTCO2e)		4,387	1,554	1,543
Reductions from MU-1 (assumes that County's participation is accounted for in County's total participation rate)		382	170	205
Net GHG Reduction from BE-3 (MTCO2e)		4,005	1,384	1,338

Reduction Measure Quantification (continued)

BE-4

Require new or replacement water heating systems to be electrically powered or alternatively fueled (e.g., solar water heating) for all residential land uses.

		2020	2030	2050
Percent of natural gas use in homes by end use in California	***2009***			
Space Heating	25%			
Water Heating	34%			
Cooking	25%			
Other	16%			
Water heating usage by fuel type	***2009***			
Natural Gas	85%			
Electric	11%			
Propane	4%			
Source: EIA 2009. http://www.eia.gov/consumption/residential/data/2009/				
Average age of natural gas water heater at replacement (years)	13			
		Percent of existing water heaters replaced by this year		
Percent of current main water heaters by age	***2009***	***2020***	***2030***	***2050***
Less Than 2 Years	16%	0	100%	100%
2 to 4 Years	16%	0	100%	100%
5 to 9 Years	30%	50%	100%	100%
10 to 14 Years	18%	100%	100%	100%
15 to 19 Years	7%	100%	100%	100%
20 Years or More	14%	100%	100%	100%

	2014	***2020***	***2030***	***2050***
Annual Residential Natural Gas Use in Napa with Legislative Reductions (therms)	3,809,649	3,937,389	2,245,464	2,679,159
Savings from BE-3 (therms)		1,177	1,233	1,344
Adjusted Residential Natural Gas Use (therms)		3,936,212	2,244,231	2,677,815

		2020	2030	2050
Natural Gas Savings from replacement of Existing Water Heaters				
Natural gas usage in existing water heaters with replacement (therms)	1,282,332.72	593,867	-	-
Natural Gas Savings from replacement of Existing Water Heaters (therms)		688,466	1,282,333	1,282,333
Natural Gas Savings from elimination of new Natural Gas water heaters				
Water heater usage in all residences (therms)		1,325,330	755,826	901,808
Eliminated new water heater usage (therms)		731,463	755,826	901,808
Total reduction in Natural Gas Use due to Measure (therms)		1,419,928	2,038,159	2,184,141
GHG Reductions from Natural Gas Savings (MTCO2e)		9,727	13,961	14,961
Assuming all natural gas replaced by electric water heaters (conservative)				
Therms needed to heat 45 gallons of hot water (61% efficiency)	0.333333			
kWh needed to heat 45 gallons of hot water (99% efficiency)	6.6			
kwh per therm conversion for water heating	19.8000198			
Total electricity use needed to offset natural gas water heating (kWh)		28,114,612	40,355,588	43,246,038
Additional GHG emissions from Electricity Use (discounted from reductions) (MTCO2e)		3,630	2,386	2,411
Net GHG Reduction from BE-4 (MTCO2e)		6,096	11,575	12,550

Reduction Measure Quantification (continued)

BE-5				
Expand current renewable energy and green energy incentives and update local ordinances	2014	2020	2030	2050
The quantification of this measure only accounts for the GHG reductions associated with solar installations. Measure assumes that homes/businesses that choose to install solar would not opt into MCE's Deep Green Option.				
Target size of all solar permits approved starting from 2014 (kW)		7,500	20,000	20,000
Annual electricity generated for a 10 kW rooftop system *(based on National Renewable Energy Laboratory's PV Watts Calculator for a rooftop system in Napa)*		15,271	15,271	15,271
Annual Electricity Generated by new Solar PVs from new permits (kWh)		11,453,250	30,542,000	30,542,000
Annual Electricity Generated by new Solar PVs from new permits (MWh)		11,453	30,542	30,542
Additional GHG emissions from Electricity Use (discounted from reductions) (MTCO2e)		1,479	1,806	1,703
Feasibility Check				
Annual Electricity Demand in the County after BE-1, BE-2, BE-4, and BE-7 (MWh)		339,736	175,209	184,460
Percent of County Electricity offset by additional solar under BE-5		3%	17%	17%
Percent of County Electricity generated by MCE's Deep Green option under BE-6		10%	15%	15%
Net GHG Reduction from BE-5 (MTCO2e)		1,479	1,806	1,703

BE-6				
Select MCE's Deep Green Option for all County Facilities		2020	2030	2050
	2015			
County unincorporated population	26,899	28,612	31,857	38,384
County's Facility Electricity Usage (kWh)	7,425,183	7,898,067	8,793,861	10,595,445
County's Facility Electricity Usage in the Unincorporated Area Only (kWh)	2,789,619	2,967,280	3,303,827	3,980,677
MCE Light Green Emission Factors (MTCO2e/MWh)		1.29E-01	5.15E-02	5.15E-02
MCE Deep Green Emission Factors (MTCO2e/MWh)		0	0	0
BAU Emissions Associated with Electricity Consumption at County Facilities (MTCO2e)		382.08	170.17	205.03
Reduced Emissions Associated with Electricity Consumption at County Facilities (MTCO2e)		-	-	-
Net GHG Reduction from BE-6 (MTCO2e)		382	170	205
Additional GHG Reduction if County uses Deep Green at County facilities located within cities.		638	350	386

Reduction Measure Quantification (continued)

BE-7				
Support waste-to-energy programs at unincorporated landfills	2014	2020	2030	2050
This measure quantifies the potential of having a waste-to-energy program at Clover Flat Landfill				
BAU Electricity Demand at CFL (scaled by incorporated population because CFL served incorporated area) (kWh)	73,216	75,353	78,914	85,904
Electricity Demand from Grid with Waste-to-Energy (assumes no sell back to grid. See note.)		0	0	0
Source: *Egdar & Associates 2016 ("Climate Action Management Plan to 2020 for Clover Flat Landfill and Upper Valley Recycling"*				
Note: This does not count reductions from electricity sold back to the grid because those reductions are already accounted for in the RPS targets. Also, the waste-to-energy facility began operations in 2014, which means the project is already accounted for in the inventory. The facility is anticipated to ramp up production in the future.)				
Incorporated Population based on MTC forecasts	112,409	115,690	121,157	131,889
Electricity Reduction (kWh)		75,353	78,914	85,904
Net GHG Reduction from BE-7 (MTCO2e)		10	5	5

MS-1				
Support efforts to increase Napa Green Certified wineries and land in the County, with a goal of achieving a 100-percent certification rate for all eligible wineries and properties by 2030	2014	2020	2030	2050
Wastewater Emissions Reductions				
Winery wastewater emissions (Napa Green Certified Wineries are assumed to have no wastewater emissions)	5,087	5,348	5,743	5,737
Percent of Napa Green Certified Wineries under current projections	40%	40%	40%	40%
Percent of Napa Green Certified Wineries under MS-2		60%	100%	100%
Emissions reductions from winery wastewater		***1,783***	***5,743***	***5,737***
Net GHG Reduction from MS-1 (MTCO2e)		1,783	5,743	5,737

LU-1				
Establish targets and enhanced programs for oak woodland and coniferous forest preservation and mandatory replanting	2014	2020	2030	2050
Target minimum percent of trees preserved under project-level avoidance (%)		30%	30%	30%
Oak and Coniferous Tree Conservation				
Forecasted number of trees removed per year		21,039	6,701	9,181
Forecasted Annual Emissions from lost Oak and Coniferous Trees (MT CO2e)		22,757	8,475	14,032
Emissions saved from conserved trees (MT CO2e)		***6,827***	***2,543***	***4,210***
Replacement of Lost Trees				
Post-conservation number of trees lost per year		14,727	4,691	6,427
Maximum number of trees to be planted per year		2,500	2,500	2,500
Mortality Rate (%)	20%			
Number of surviving trees planted per year		2,000	2,000	2,000
Emissions sequestered from planted trees (MT CO2e)		***249***	***2,002***	***11,150***
Net GHG Reduction from LU-1 (MTCO2e)		7,077	4,544	15,360

Reduction Measure Quantification (continued)

LU-2				
Refine protection guidelines for existing riparian lands	2014	2020	2030	2050
Assumes that future losses in riparian lands would not occur. Thus, reductions are equivalent to forecasted losses in annual carbon sequestration from riparian woodlands.				
Net GHG Reduction from LU-2 (MTCO2e)		660	660	660

LU-3				
Repurpose or otherwise prevent burning of removed trees and other woody material from land use conversions of oak woodlands and coniferous forests	2014	2020	2030	2050
This measure would require repurposing of usable timber from trees removed due to land use conversion and burying or chipping of non-usable timber. Repurposed wood may be either be used in construction or sold to local woodworking businesses or collectives with proceeds funding the administration of this measure. A minimum of 80% of total removed weight of trees shall be repurposed, buried, chipped, or otherwise prevented from burning. This measure only quantifies trees removed due to land use conversion of oak woodlands and coniferous forests. This measure prioritizes wood repurposing. If any portion of removed tree material cannot be repurposed due to disease or structural limitations, dispose of material either through burial, chipping, or other non-burning measures.				
Preservation of Removed Tree Carbon				
Post-conservation number of trees lost per year (LU-1)		14,727	4,691	6,427
Weighted average carbon storage rate per oak/coniferous tree removed (MTCO2/tree)		0.92	0.92	0.92
Emissions from lost trees, if burned (MTCO2)		13,549	4,316	5,914
Percent of tree mass prevented from burning		80%	80%	80%
Net GHG Reduction from LU-3 (MTCO2e)		10,839	3,453	4,731

OR-1				
Require Tier 4 equipment for all construction activity and mining operations as a condition for approval by 2030		2020	2030	2050
Offroad Construction and Mining Emissions (MTCO2e)		6,766	7,085	7,712
Percent of equipment that are Tier 4 Final	No Change		100%	100%
Average percent improvement in fuel efficiency with Tier 4 equipment		5%	5%	5%
Net GHG Reduction from OR-1 (MTCO2e)	-		354	386

OR-2			
Promote use of alternative fuels for recreational marine vessels	2020	2030	2050
Pleasure Craft Emissions from OFFROAD 2007 model, assuming all occur within the Unincorporated County	33,736	37,562	45,258
Percent reduction in emissions based on biofuel targets (%)	5%	20%	50%
Net GHG Reduction from OR-2 (MTCO2e)	1,687	7,512	22,629

Reduction Measure Quantification (continued)

SW-1

Encourage expansion of composting program for both residential and commercial land uses	2014	2020	2030	2050
Generation of Organic Waste In Unincorporated Napa County (Ascent Adjusted)				
Disposal	20,156	14,099	15,698	18,914
Commercial				
*Percentage of Disposal that is Commercial**	71.4%	71.4%	71.4%	71.4%
Commercial Disposal	14,396	10,070	11,212	13,509
*Percentage of Commercial Disposal that is Organic** †	32.8%	32.8%	32.8%	32.8%
Commercial Organic Disposal	4,716	3,299	3,673	4,425
Residential				
*Percentage of Disposal that is Residential**	28.6%	28.6%	28.6%	28.6%
Residential Disposal	5,760	4,029	4,486	5,405
*Percentage of Residential Disposal that is Organic** †	39.8%	39.8%	39.8%	39.8%
Residential Organic Disposal	2,291	1,603	1,784	2,150

*Based on 1999 Waste Characterization Study for the Unincorporated Napa County. Same source used for the inventory. Newer sources unavailable. Split between commercial and residential is unlikely to change much over time due to the focus of Napa County on the wine industry.

† This is a conservative assumption because the success of the 75% diversion target would most likely reduce the number of landfilled recyclables and increase the percentage of overall organics per ton of disposal. However, the BAU forecast is also conservative because it assumes the percent organics does not change.

COMMERCIAL COMPOSTING

Tons to Be Landfilled, Which Will Be Composted Instead			
AB 1826's Commercial Organic Waste Disposal Limit	2,358	2,358	2,358
Tons Composted Instead of Landfilled	941	1,315	2,067

Organic Breakdown		
	Residential	Commercial
Food	45%	50%
Green	39%	19%
Lumber	4%	17%
Paper	12%	13%
Manure	0%	1%

Composition of Composted Commercial Tons per AB1826 (no less than 50% of 2014 organics) (For reference only)			
Food	466	651	1,023
Green	181	253	398
Lumber	160	223	351
Paper	126	176	277
Manure	8	11	18

Percent of organics composted under SW-1			
Food	50%	85%	80%
Green	80%	100%	100%
Composted Commercial Tons			
Food	816	1,545	1,752
Green	508	707	852

Reduction Measure Quantification (continued)

RESIDENTIAL COMPOSTING	2020	2030	2050
Percent of organics composted under SW-1			
Food	50%	85%	80%
Green	80%	100%	100%
Composted Residential Tons			
Food	361	683	774
Green	499	695	837
TOTAL ORGANICS COMPOSTED INSTEAD OF LANDFILLED under SW-1			
Food	1,177	2,228	2,527
Green	1,007	1,402	1,689
Total	2,184	3,630	4,216
EMISSIONS CALCULATIONS			
Emissions reductions per ton of food waste composted instead of landfilled (MTCH4/ton)	1.566E-02	1.566E-02	1.566E-02
Emissions reductions per ton of green waste composted instead of landfilled (MTCH4/ton)	6.659E-03	6.659E-03	6.659E-03
Emissions reductions from food waste composted instead of landfilled (MTCH4)	18.433	34.891	39.566
Emissions reductions from green waste composted instead of landfilled (MTCH4)	6.707	9.335	11.247
Emissions reductions from food waste composted instead of landfilled (MTCO2e)	461	872	989
Emissions reductions from green waste composted instead of landfilled (MTCO2e)	168	233	281
Total Emissions Reduction (MTCO2e)	629	**1,106**	**1,270**
Net GHG Reduction from SW-1 (MTCO2e)	629	1,106	1,270

SW-2				
Meet an 80 Percent Waste Diversion Goal by 2020 and a 90 Percent Goal by 2030	2014	2020	2030	2050
Current Diversion Rate	70%			
Target Diversion Rate		80%	90%	90%
Legislative-Adjusted Forecasted Emissions from Solid Waste Generation	19,961	3,537	3,938	4,744
Reduced Solid Waste Emissions with New Diversion Rate		2,358	1,313	1,581
Net GHG Reduction from Net GHG Reduction from SW-1 (MTCO2e) (MTCO2e)		1,179	2,625	3,163

Reduction Measure Quantification (continued)

TR-1				
Update Transportation System Management Ordinance (for Employers)		2020	2030	2050
Work-related, or Commute, VMT (from MTC)		547,462	567,609	570,091
Total Daily Passenger VMT (MTC only provided forecasts through 2040. This assumes 2040 VMT sufficiently represents 2050 VMT.)		747,377	782,909	800,945
Percent Commute		73%	72%	71%
Total Legislative Adjust BAU On-Road Transportation Emissions (MTCO2e)		112,854	84,846	85,735
Percent Passenger		94%	94%	94%
Total Legislative Adjust BAU On-Road Transportation Emissions (MTCO2e) (Commute Passenger Only)		77,703	57,768	57,213
CAPCOA TRT-1/TRT-2/TRT-3 Minimum percent reduction in VMT from Commute Trip Reduction Measures	2%			
CAPCOA TRT-1/TRT-2/TRT-3 Minimum percent reduction in VMT from Commute Trip Reduction Monitoring	4.20%			
Net GHG Reduction from TR-1 (MTCO2e)		4,818	3,582	3,547

TR-2				
Adopt parking reduction ordinance revisions		2020	2030	2050
Total Legislative Adjust BAU On-Road Transportation Emissions (MTCO2e) (Commute Passenger Only)		77,703	57,768	57,213
CAPCOA TRT-14 and TRT-15 Minimum percent reduction in VMT from Pricing Workplace Parking and Implementing Employee Parking Cash-Out	0.10%			
Net GHG Reduction from TR-2 (MTCO2e)		78	58	57

TR-3				
Increase the supply of electric vehicle charging stations		2020	2030	2050
Total Legislative Adjust BAU On-Road Transportation Emissions (MTCO2e) (Commute Passenger Only)		77,703	57,768	57,213
CAPCOA LUT-6 Minimum percent reduction in VMT from Integrating Affordable and Below Market Rate Housing	0.04%			
Net GHG Reduction from Increase the supply of electric vehicle charging stations (MTCO2e)		31.08	23.11	22.89

Reduction Measure Quantification (continued)

TR-4

Support efforts to allow commuter service to operate on railroad rights-of-ways		2020	2030	2050
Number of rail cars in use for commuters		4	6	8
Number of passengers per rail car	80			
Round trip miles per day per passenger	40			
Commuting days per year	260			
Total Passenger Miles Travelled per year		3,328,000	4,992,000	6,656,000
Assumed occupancy rate of offset vehicles trips (persons per vehicle)	1			
Average light duty gasoline vehicle emissions per mile (g CO2e/mi) (EMFAC 2014)		246	183	215
Ratio of Caltrain locomotive to light duty gasoline vehicle emissions	0.20			
Caltrain passengers per train car (based on 677 passengers per locomotive and 5 rail cars per locomotive)	135.40			
Source: Tang et. al. 2015 (https://www.sciencedirect.com/science/article/pii/S1352231015300741?via%3Dihub) Caltrain.com (http://www.caltrain.com/about/statsandreports/commutefleets.html)				
Adjusted Ratio of Napa Valley Wine Train locomotive to light duty gasoline vehicle emissions based on difference in passengers per rail car	0.34			
Emissions from locomotives per passenger mi (g CO2e/mi)		83.38	61.98	72.89
Emissions reduced per year (MTCO2e/year)		542.26	604.68	948.03
Net GHG Reduction from TR-4 (MTCO2e)		542.26	604.68	948.03

Reduction Measure Quantification (continued)

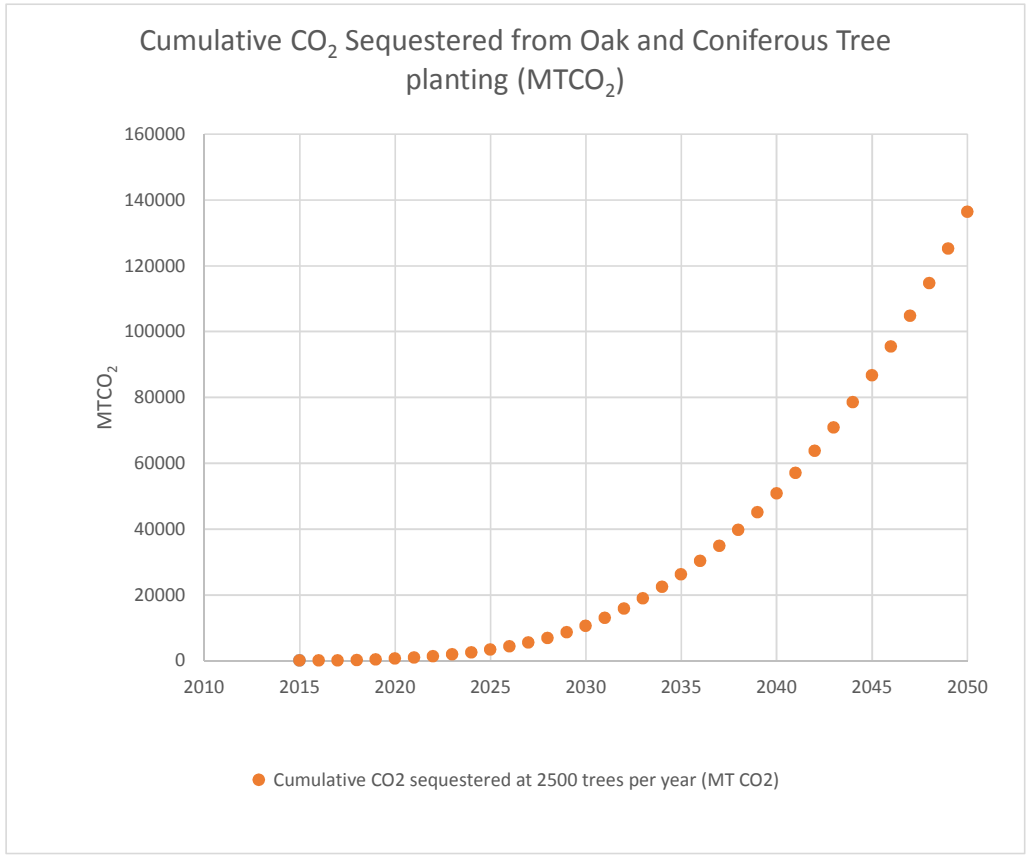
TR-5				
Support efforts of solid waste collection services to convert diesel solid waste collection vehicles to CNG		2020	2030	2050
Quantification of this measure is based on fuel use Clover Flat Landfill and UVDS in 2014			Scaled by incorporated population	
BAU Diesel Use (Gallons)		203,700	213,327	232,224
Equivalent CNG (MMBTU)		28,858	30,221	32,898
Equivalent CNG (scf)		28,098,892	31,285,854	37,695,336
Incorporated Population based on MTC forecasts		115,690	121,157	131,889
Diesel Emission Factor (kg CO2/gal)	10.21			
Diesel Emission Factor (kg CH4/gal)	5.04E-04			
Diesel Emission Factor (kg N2O/gal)	3.60E-04			
CNG Emission Factor (kg CO2/scf)	0.05			
CNG Emission Factor (kg CH4/scf)	2.67E-06			
CNG Emission Factor (kg N2O/scf)	1.91E-06			
Factor sources: The Climate Registry 2015 and SEMS (as sourced by Edgar & Associates 2016)				
BAU Diesel Emissions (MTCO2e)		2,104	2,203	2,398
Project CNG Emissions (MTCO2e)		1,535	1,709	2,059
Emissions Difference from BAU		568	494	339
50% Apportionment to account for customers in the incorporated areas, consistent with the RTAC method used in the Transportation Sector.		284.16	246.81	169.29
Net GHG Reduction from TR-5 (MTCO2e)		284.16	246.81	169.29

LU-1: Carbon Storage Loss and Potential Associated with Loss and Replanting of Oak and Coniferous Trees

Calculation of Equivalent New Tree Planting to Offset Lost Carbon Storage/Sequestration		
preserved under project-level avoidance (%)	30%	
Forecasted Annual Emissions from Lost Oak and Coniferous Trees (MT CO2e)		
2020	22,757	
2030	8,475	
2050	14,032	
Emissions saved from conserved trees (MT CO2e)		
2020	6,827	
2030	2,543	
2050	4,210	
Replaced Trees		
Maximum number of trees replanted **per year** (trees)	2,500	Assumes constant rate of tree removal
Mortality Rate (%)	20%	
Annual Emissions Sequestered from Planted Trees (MT CO2e)		Accounts for growth rates over time
2020	249	
2030	2,002	
2050	11,150	
Total Emissions Reductions from LU-1 (MT CO2e)		
2020	7,077	
2030	4,544	
2050	15,360	

Cumulative Carbon Storage

Year	Annual Oak Trees Lost (Forecasted)	Annual Coniferous Trees Lost (Forecasted)	Annual Oak and Coniferous Trees Replanted	Cumulative CO2 sequestered at 2500 trees per year (MT CO2)	Annual Sequestration from Replanted Trees (MTCO2/year)
2015	5203	529		-	
2016	6808	1986		-	-
2017	8412	3443	2500	4	4
2018	10016	4901	2500	150	146
2019	11620	6358	2500	342	191
2020	13224	7815	2500	591	249
2021	12568	7038	2500	911	320
2022	11911	6261	2500	1,315	404
2023	11255	5483	2500	1,832	518
2024	10598	4706	2500	2,483	651
2025	9942	3929	2500	3,288	805
2026	9285	3151	2500	4,270	982
2027	8629	2374	2500	5,456	1,186
2028	7972	1597	2500	6,876	1,420
2029	7316	819	2500	8,565	1,689
2030	6659	42	2500	10,567	2,002
2031	6696	130	2500	12,939	2,372
2032	6732	217	2500	15,764	2,825
2033	6769	305	2500	18,892	3,129
2034	6805	392	2500	22,342	3,450
2035	6842	479	2500	26,131	3,789
2036	6878	567	2500	30,276	4,145
2037	6915	654	2500	34,795	4,520
2038	6951	742	2500	39,707	4,912
2039	6988	829	2500	45,031	5,324
2040	7025	917	2500	50,785	5,754
2041	7061	1004	2500	56,989	6,204
2042	7098	1092	2500	63,661	6,672
2043	7134	1179	2500	70,822	7,161
2044	7171	1267	2500	78,492	7,669
2045	7207	1354	2500	86,690	8,198
2046	7244	1442	2500	95,437	8,747
2047	7280	1529	2500	104,753	9,316
2048	7317	1617	2500	114,660	9,907
2049	7353	1704	2500	125,178	10,518
2050	7390	1791	2500	136,328	11,150


Cumulative CO_2 Sequestered from Oak and Coniferous Tree planting ($MTCO_2$)
160000
140000
120000
100000
80000
60000
40000
20000
0
$MTCO_2$
2010
2015
2020
2025
2030
2035
2040
2045
2050
Cumulative CO2 sequestered at 2500 trees per year (MT CO2)

GHG Reduction Target Calculations		
Year	**State Emissions (million metric tons of CO_2 equivalent based upon IPCC Fourth Assessment Report's Global Warming Potentials - all sectors) (1)**	**State Population (2)**
1990	431	
2013	459	38,030,609
2014 (Emissions scaled by population from 2013)	463	38,357,121
State Targets		**Applicable Rule**
Percent below 1990 emissions by 2020	0%	AB 32
Percent below 1990 emissions by 2030	40%	EO B-30-15
Percent below 1990 emissions by 2050	80%	EO B-30-15
Equivalent State Targets for Reduction below 2014		**Applicable Rule**
Percent below 2014 emissions by 2020	7%	AB 32
Percent below 2014 emissions by 2030	44%	EO B-30-15
Percent below 2014 emissions by 2050	81%	EO B-30-15
Source: (1) ARB 2015 applies to 1990 and 2013 inventories only (http://www.arb.ca.gov/cc/inventory/data/data.htm), (2) DOF 2015 (http://www.dof.ca.gov/research/demographic/reports/estimates/e-7/view.php)		

Legislative Reductions and Existing Programs					
Lead Agency	**Sector**	**Measure Name**	**Measure Description**	**Current or Recommended**	**Included in Inventory Forecasts?**
State	Building Energy	Renewable Portfolio Standard	The State has a goal of achieving a 33% renewable portfolio standard (RPS) for electricity generated and sold to retail customers in the State by 2020.	Current	Yes
State	Building Energy	Senate Bill (SB) 350	Signed into law in October 2015, Senate Bill (SB) 350 extends the State's Renewable Portfolio Standard (RPS) target from 33% by 2020 to 50% renewables by 2030. In addition, SB 350 calls for a doubling of building energy efficiency by 2030.	Current	Yes
State	Building Energy	Title 24 Building Energy Efficiency Standards	The 2016 Title 24 building energy efficiency standards were adopted in December 2015 and will go into effect January 2017. The California Energy Commission (CEC) estimates that new residential buildings built to these standards would be 28 percent more efficient than buildings built to the current 2013 Title 24 standard. Relative savings for non-residential buildings was not readily available from the CEC; thus, it was assumed that non-residential buildings built to 2016 standards would have similar improvements as the residential standards.	Current	Yes
PG&E	Building Energy	Napa County Energy Watch Program	Free evaluation of energy usage from residences and businesses. Connects utility customers with available financing and low cost options for energy upgrades.	Current	No
Napa County / MCE	Building Energy	Participation in Marin Clean Energy (MCE)	In February 2015, Marin Clean Energy (MCE), a local Community Choice Aggregator, began serving the unincorporated portions of Napa County. MCE automatically provides customers within its service area with 50 percent renewable electricity, although customers are allowed to opt out of MCE's service or pay into MCE's "Dark Green" program that would allow for a higher percentage renewable mix. Those that opt out would remain under PG&E's electricity service, which is currently 27% renewable. MCE currently has an average participation rate of 89%. According to MCE's Integrated Resource Plan, MCE plans to increase the minimum renewable energy supply of the program from 50 to 80% by 2025.	Current	Yes
State	High GWP Gases	Refrigerant Management Program (RMP)	The RMP requires facilities with refrigeration systems with more than 50 pounds of high-global warming potential (GWP) refrigerant to conduct and report periodic leak inspections; promptly repair leaks; and keep service records on site. Small facilities are to begin reporting in March 2016. Applicable facilities are required to pay fees to ARB with the fee amount determined by the facility's size category (small, medium, or large) and amount of high-GWP refrigerant used.	Current	Yes
Federal	High GWP Gases	Federal Ban on Certain Hydrofluorocarbons (HFCs)	On August 19, 2015, the EPA enacted a national ban on a variety of HFC emissions with very high-GWP values (many over 2,500) under 40 CFR Part 82. ARB estimates that this ban would reduce California's HFC emissions by ten percent annually below current emission rates by 2025.	Current	Yes

Lead Agency	Sector	Measure Name	Measure Description	Current or Recommended	Included in Inventory Forecasts?
BAAQMD/Napa County	On-Road Transportation	Commuter Benefits Program	Under the purview of MTC, Bay Area employers with 50 or more employees are now required to register and offer commuter benefits to their employees in order to comply with the Bay Area Commuter Benefits Program. Through this program, employers must offer their employees one of four Commuter Benefit options in order to comply with BAAQMD Regulation 14, Rule 1. Commuter benefits encourage employees to take transit, vanpool, carpool, bicycle and walk rather than drive alone to work. Certain federal tax benefits apply. Napa County offers additional incentives for vanpool drivers, bike commuters, and emergency ride home programs.	Current	No
Napa County	On-Road Transportation	County Employee Local Housing Fund	The County's existing program encourages County employees to buy homes locally to reduce commute travel distances and VMT. The program offers down payment financial assistance up to 10% of the home's purchase price at below market interest rates as long as the home is located within Napa County.	Current	No
NCTPA	On-Road Transportation	Expand and improve bicycle and pedestrian network	The Napa County Transportation and Planning Agency (NCTPA) has adopted a long-range strategic goal of having 10% of all trips made by bicycle in Napa County by 2035. Some efforts are already being made under the NCTPA Countywide Bicycle Plan.	Current	No
State/Federal	On-Road Transportation	Advancements in Fuel Efficiency and Clean Fuels	The State and Federal governments have several policies in place that address fuel efficiency and alternative fuels. These include the Advanced Clean Car rule, CAFÉ standards, Federal Pavley regulations, and Tractor-Trail Greenhouse Gas regulations.	Current	Yes
BAAQMD	Solid Waste	Reduce methane emissions from Municipal Solid Waste Landfills	In August 2011, BAAQMD entered into a memorandum of understanding with ARB to implement and enforce this regulation, including engineering review of LFG collection system design plans. Each of the 14 active landfills in the Bay Area applied for permits for alterations for their gas collection systems. These permits include conditions to test for methane from flares and energy recovery devices per the ARB landfill regulation.	Current	Yes
State	Solid Waste	Landfill Methane Control Measure	ARB approved a new regulation that reduces emissions of methane, a greenhouse gas, from municipal solid waste (MSW) landfills. The regulation, which became effective June 17, 2010, is a discrete early action greenhouse gas emission reduction measure, as described in the California Global Warming Solutions Act ("AB 32"). The regulation primarily requires owners and operators of certain uncontrolled MSW landfills to install gas collection and control systems, and requires existing and newly installed gas and control systems to operate in an optimal manner. The regulation allows local air districts to voluntarily enter into a memorandum of understanding (MOU) with ARB to implement and enforce the regulation and to assess fees to cover costs.	Current	Yes
State	Solid Waste	Statewide 75% Waste Diversion Goal	The California Department of Resources Recycling and Recovery (CalRecycle) established a target pursuant to AB 341 (Chapter 476, Statutes of 2011) to achieve a statewide waste diversion rate of 75 percent by 2020, or 2.7 pounds of waste per resident per day (lb/resident/day).	Current	Yes

Lead Agency	Sector	Measure Name	Measure Description	Current or Recommended	Included in Inventory Forecasts?
DWR	Water	Water Conservation Rebates	The California Department of Water Resources has a rebate program that provides rebates for removing turf and replacing toilets at California single-family residences to support the State's drought response. This program is financed by the Proposition 1 water bond approved by voters in 2014.	Current	No
Napa County	Water	Washer rebate	Residents in unincorporated Napa County are eligible for clothes washer rebates for up to $150 from PG&E and the County.	Current	No

Appendix C

Climate Change Vulnerability Assessment for Napa County

1 Introduction

The purpose of this vulnerability assessment is to identify the primary climate change threats facing Napa County (County) and its vulnerability to these threats.

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to provide the world with a scientific view on climate change and its potential effects. Global climate change has the potential to result in many adverse effects on natural resources and the human population. These include:

- rising sea levels around the world due to melting of polar ice caps and sea ice, which can inundate low-lying areas and increase the severity of flooding risk;
- changes in the timing or amounts of rainfall and snowfall, leading to changes in water supply;
- increased stress to vegetation and habitat, leading to adverse effects on biological resources and sensitive species;
- changes in the frequency and duration of heat waves and droughts, which can affect human populations and infrastructure on which they depend; and
- increases in wildfire hazards and related effects on forest health.

These changes over the long term have the potential for a wide variety of secondary impacts including detrimental impact on human health and safety, economic continuity, water supply, ecosystem function, and provision of basic services (CNRA 2012a:3). On a more local level, climate change is already affecting and will continue to affect the physical environment throughout California, the Bay Area, and the County. However, specific effects and impacts of climate change on the County vary because of physical, social, and economic characteristics. For this reason, it is important to identify the projected severity these impacts could have on the County and ways the County ~~of Napa (County)~~ can reduce vulnerability to projected climate changes. Communities that begin to plan now will have the best options for adapting to climate change and increasing resilience (CNRA 2012a:4).

2 Climate Change Adaptation Planning Process

The California Adaptation Planning Guide (APG) provides climate adaptation planning guidance to cities, counties, and local governments. The APG, developed by the California Emergency Management Agency (CalEMA) and California Natural Resources Agency (CNRA), introduces the basis for climate change adaptation planning and details a step-by-step process for local and regional climate vulnerability assessment and adaptation strategy development (CNRA 2012a:i). As shown below in Figure 1, the planning process follows a sequence of steps:

Figure 1: The Nine Steps in Adaptation Planning Development

1. Exposure: assessing exposure to climate change impacts
2. Sensitivity: assessing community sensitivity to the exposure
3. Potential Impacts: assessing potential impacts

4. Adaptive Capacity: evaluating existing community capacity to adapt to anticipated impacts
5. Risk and Onset: evaluating risk and onset, meaning the certainty of the projections and speed at which they may occur
6. Prioritize Adaptive Needs: setting priorities for adaptation needs
7. Identify Strategies: identifying strategies to address adaptation needs
8. Evaluate and Prioritize: evaluating and setting priorities for strategies
9. Phase and Implementation: establishing a phasing and implementation plan

The first five steps of the process represent the vulnerability assessment phase, which is a method for determining the potential impacts of climate change on community assets and populations. The severity of these impacts and the community's ability to respond will determine how these impacts affect a community's health, economy, ecosystems, and socio-cultural stability. The second phase of the process is adaptation strategy development. The vulnerability assessment phase helps communities understand climate change impacts so that they can prepare effective climate adaptation strategies to increase resilience to climate change. Development of climate adaptation strategies will be included in the main body of the County's Climate Action Plan (CAP).

3 Vulnerability Assessment

A vulnerability assessment involves the first five steps in climate change adaptation planning development, and is intended to answer the following questions:

1. Exposure: What climate change effects will a community experience?
2. Sensitivity: What aspects of a community (i.e., functions, structures, and populations) will be affected?
3. Potential Impacts: How will climate change affect the points of sensitivity?
4. Adaptive Capacity: What is currently being done to address the impacts?
5. Risk and Onset: How likely are the impacts and how quickly will they occur?

Based on the work of IPCC and research conducted by the State and partner agencies and organizations, climate change is already affecting the County and will continue to further in the future. These effects are analyzed further below.

3.1 Step 1: Exposure

The first step in the vulnerability assessment is to identify what climate change effects the County will experience in the future. For purposes of this assessment, where possible, climate change effects in the County are characterized for two periods of time: midcentury (around 2050) and the end of the century (around 2100). Historical data are used to identify the degree of change by these two future periods in time.

The direct, or primary, changes analyzed for the County include average temperature, annual precipitation, and sea-level rise. Secondary impacts, which can occur because of individual or a combination of these changes, are also assessed and include extreme heat and its frequency, wildfire risk, and ~~snowpack~~ flooding (CNRA 2012a:16-17).

To begin identifying these impacts, the APG encourages communities to use Cal-Adapt as a means of assessing potential climate change impacts over time. Cal-Adapt is a climate change scenario planning tool developed by the California Energy Commission (CEC) and the University of California Berkeley Geospatial Innovation Facility. Cal-Adapt currently downscales global climate simulation model data to local and regional resolution under two emissions scenarios: the A-2 scenario represents a higher business-as-usual future global greenhouse has (GHG) emissions scenario, while the B-1 scenario represents a lower future GHG emissions scenario. Results from both emissions scenarios are considered in this vulnerability assessment and distinguished where possible.

While Cal-Adapt provides information on a local level, ~~County-wide~~county-wide data are~~is~~ not readily available for all climate change effects. Most of the data presented in Cal-Adapt has been "downscaled" to grid cells that are 12 kilometer (km) by 12 km (approximately 60 square miles) in size and cannot be easily aggregated. Within the County, over a dozen grid cells are located entirely or partially within boundaries. For purposes of this vulnerability assessment, where County-wide data were~~as~~ not available, the same grid cell in the County was used for consistency.

Cal-Adapt data for each impact for the County are summarized in the sections below.

3.1.1 Increased Temperatures

According to IPCC, global average temperature is expected to increase relative to the 1986-2005 period by 0.3–4.8 degrees Celsius (° C) (0.5-8.6 degrees Fahrenheit [° F]) by the end of the 21st century (2081-2100), depending on future GHG emission scenarios (IPCC 2014: SPM-8). According to the California Natural Resources Agency (CNRA), downscaling of global climate simulation model data suggest~~s~~ that average temperatures in California are projected to increase 2.7 ° F above 2000 averages by 2050 and, depending on emission levels, 4.1–8.6 ° F by 2100 (CNRA 2012b:2).

Figures 1 and 2 below show the projected change in annual average temperatures across the County under the low-emissions scenario (i.e., Figure 1) and high-emissions scenario (i.e., Figure 2).

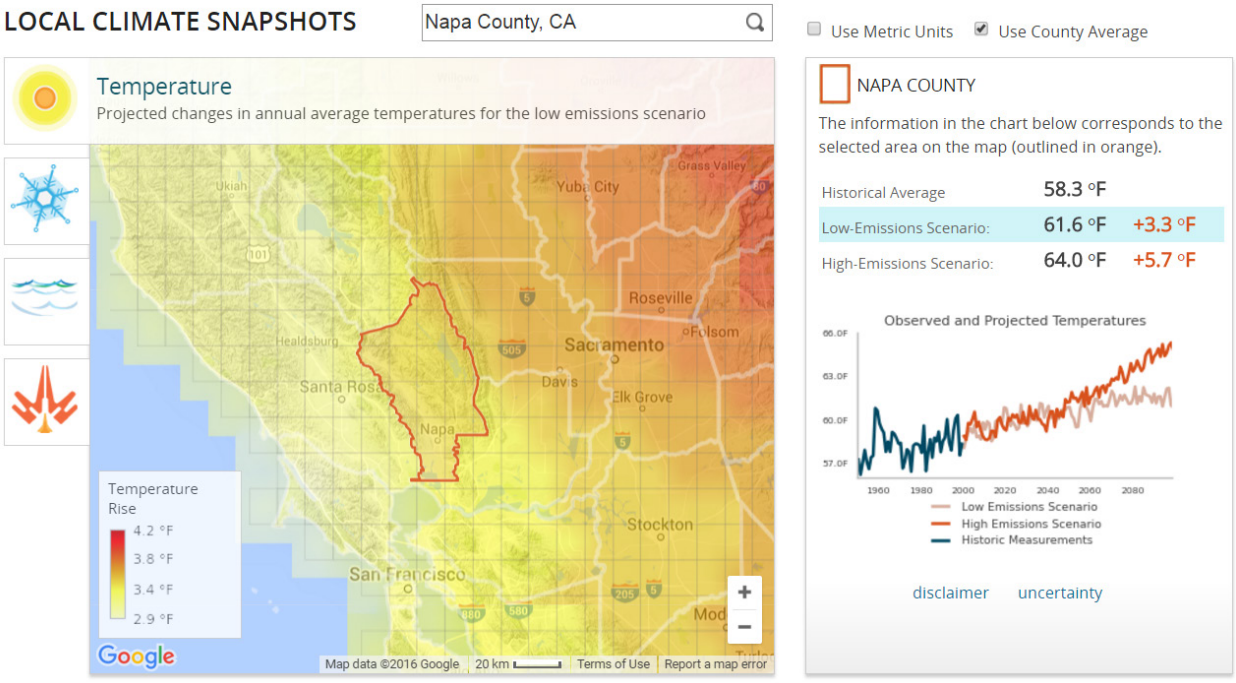


Figure 2: Projected Changes in Annual Average Temperatures for the Low-Emissions Scenario (1960-2090) (Source: CEC 2016)

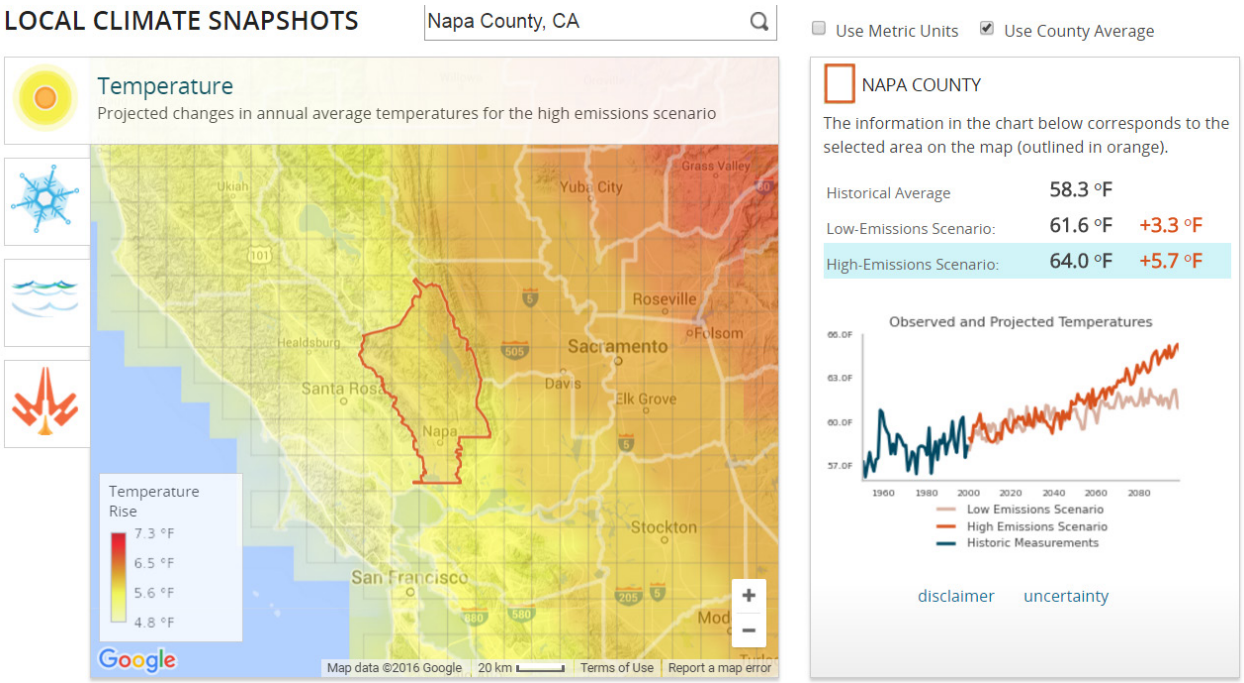


Figure 3: Projected Changes in Annual Average Temperatures for the High-Emissions Scenario (1960-2090) (Source: CEC 2016)

Figures 2 and 3 show that annual average temperatures in the County are projected to climb steadily. The County's historical average temperature, based on data from 1960-1990, is 58.3 ° F. Under the low-emissions scenario in Figure 2, annual average temperature is projected to increase to 61.6 ° F by 2090, an increase of 3.3 ° F. The annual average temperature under the high-emissions scenario in Figure 3 is projected to increase 5.7 ° F to 64.0 ° F by the end of the century.

The County's average annual low temperature, based on historical data from 1960-1990, is 44.4 ° F. Under the low-emissions scenario, annual low temperature is projected to increase to 48.56 ° F by 2090, an increase of 4.12 ° F. The annual average low temperature under the high-emissions scenario is projected to increase to 50.66 ° F in 2090 (i.e., an increase of 6.22 ° F). Historically, annual high temperatures average 70.47 ° F. Annual average high temperature is projected to increase under the low-emissions scenario by 2.94 ° F to 73.41 ° F. Under the high-emissions scenario, annual average high temperature is projected to increase to 76.32 ° F, an increase of 5.85 ° F.

3.1.2 Increased Frequency of Extreme Heat Events and Heat Waves

Changes in precipitation patterns and increased temperatures associated with climate change will alter the distribution and character of natural vegetation and associated moisture content of plants and soils (CNRA 2012b:11). Increased temperature is also expected to lead to secondary climate change impacts including increases in the frequency, intensity, and duration of extreme events and heat waves in California. Using Cal-Adapt's Extreme Heat tool, historical data from the County was used to project the change in frequency of extreme heat days, warm nights, and heat waves (including their occurrence during the year) for the low- and high-emissions scenarios in 2050 and at the end of the century (2099).

Extreme Heat Events

Cal-Adapt defines the extreme heat day threshold for the County as 92 ° F or higher. An extreme heat day is defined as a day between April through October where the maximum temperature exceeds the historical

maximum temperatures from 1961-1990. The County has a historical average of four extreme heat days a year. Figures 4 and 5 below show the number of days the County is projected to exceed the area's extreme heat day threshold for each year from 1950-2099 under both emissions scenarios.

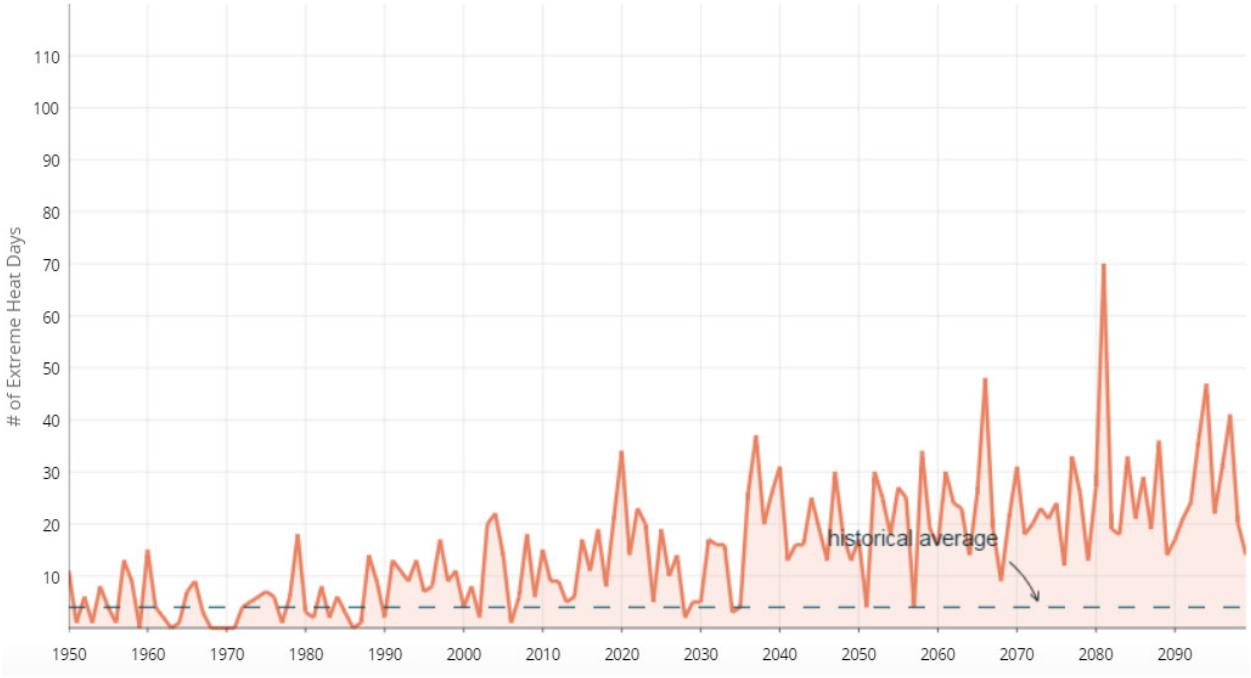


Figure 4: Number of Extreme Heat Days in Napa County Under the Low-Emissions Scenario (1950-2099) (Source: CEC 2016)

Cal-Adapt data shows a range of projected increases in the number of extreme heat days by 2099, all of which are at least double the historical average in both emissions scenarios. The projected annual average number of extreme heat days is between roughly 23-26 days per year in 2050 to 54-64 days per year towards the end of the century.

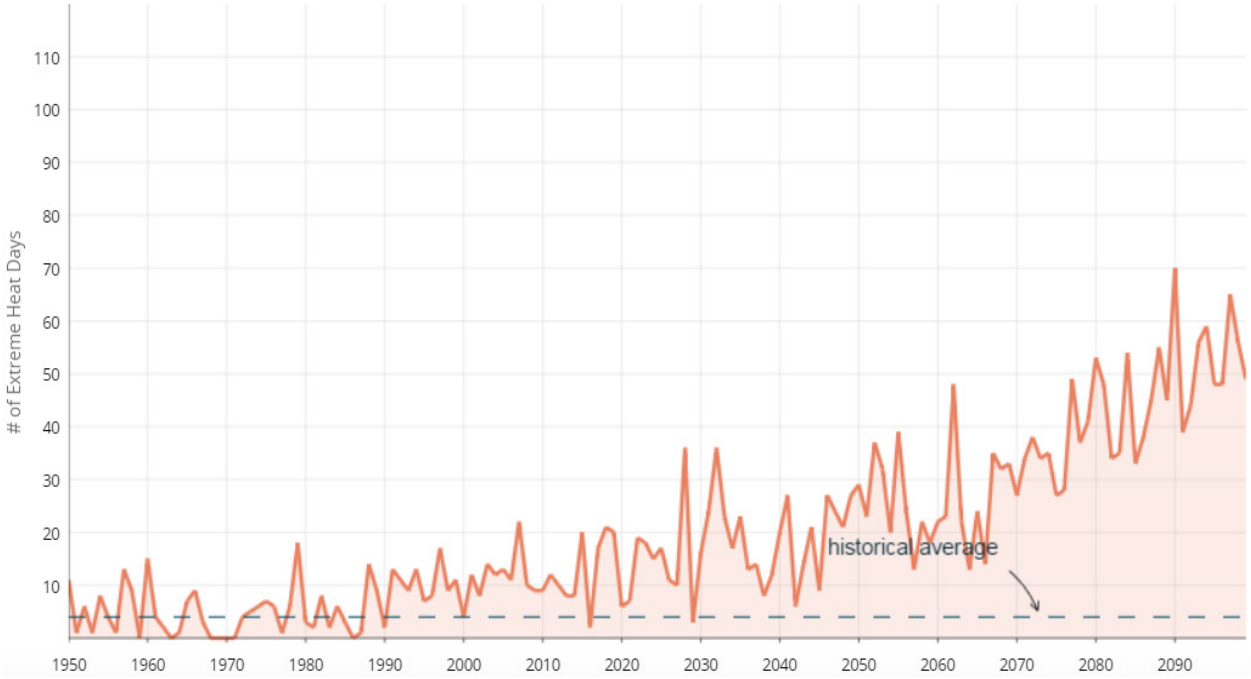


Figure 5: Number of Extreme Heat Days in Napa County Under the High-Emissions Scenario (1950-2099) (Source: CEC 2016)

In combination with extreme daytime heat, extremely warm nights are also an important factor to consider. A warm night is defined as a day between April through October where the minimum temperature exceeds the historical minimum temperatures between 1960-1990. Historically, the County has an average of four warm nights a year, with a threshold of 56 º F. Under both the high- and low-emissions scenarios, the number of warm nights is expected to significantly increase, with an average of 17-41 warm nights in 2050 to 30-100 warm nights in 2099.

Frequency and Timing of Heat Waves

Along with individual days and nights exhibiting extreme temperature, events in which these extreme temperatures are experienced over a period of several days are known as heat waves. Cal-Adapt identifies a heat wave as an event in which the extreme heat threshold (i.e., 92 º F in the County) is exceeded for a period of five days. Figures 6 and 7 below show the count of heat wave events in the County for each year between 1950-2099 under the low- and high-emissions scenarios. Each five-day period exceeding the extreme heat threshold is counted, so a 20-day heat wave would appear on the figures as four counted periods.

As shown in Figures 6 and 7 above, heat waves in the County are infrequent, with no more than two heat waves occurring in one year between 1950 and 2016. However, the model projects a significant rise in the frequency of heat waves under both emissions scenarios. Under the low emissions scenario, projections show an increase of heat wave events with around three at the middle of the century and up to seven in 2090. The high emissions scenario also shows an increase in heat wave events, with up to five heat wave events occurring midcentury and as high as 16 heat events at the end of the century.

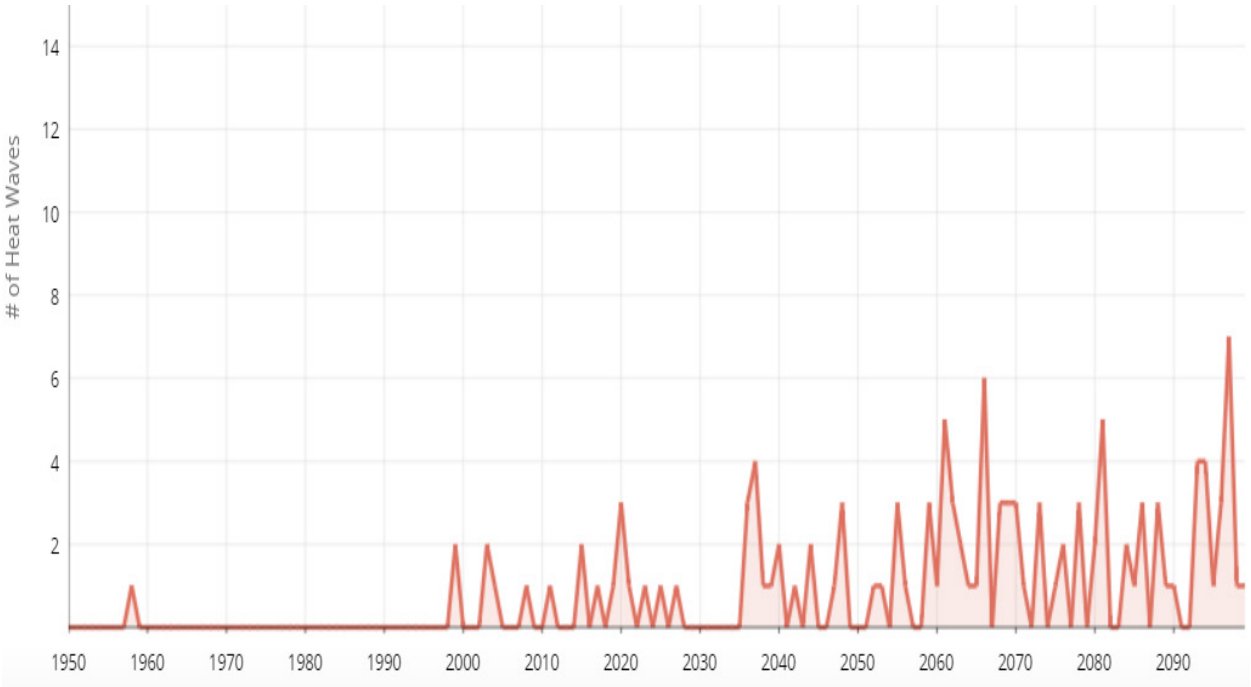


Figure 6: Number of Heat Waves in Napa County Under the Low-Emissions Scenario (1950-2099) (Source: CEC 2016)

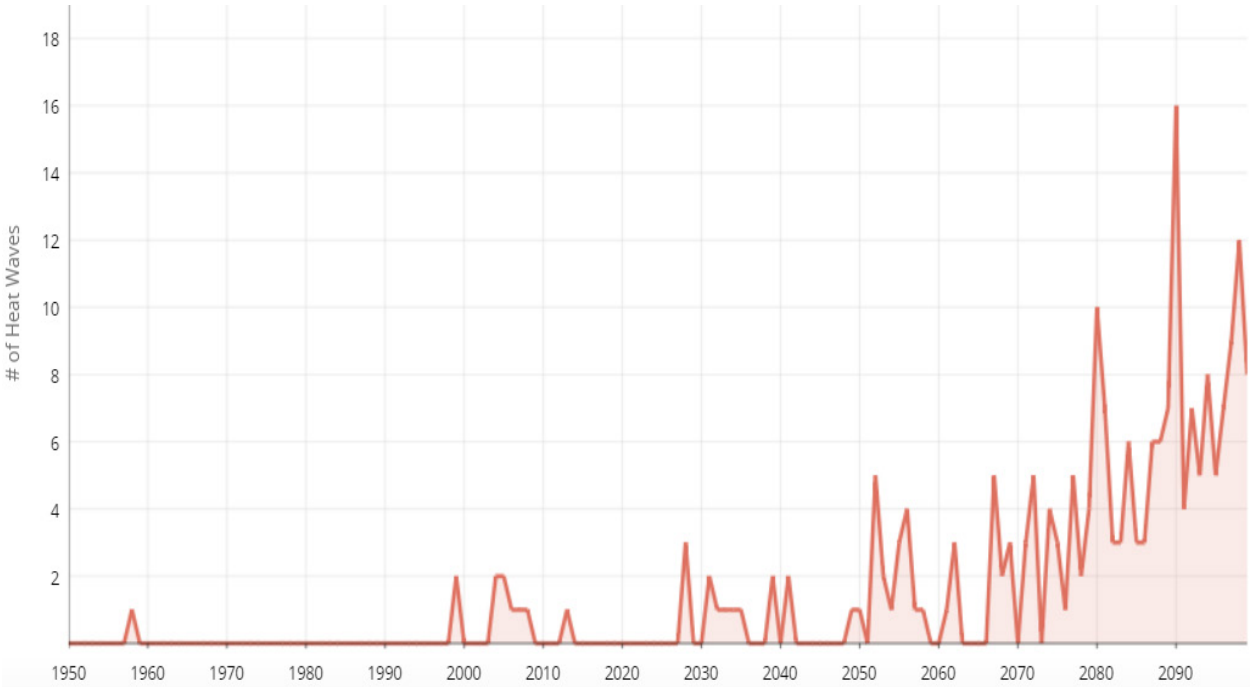


Figure 7: Number of Heat Waves in Napa County Under the High-Emissions Scenario (1950-2099) (Source: CEC 2016)

Another consideration with respect to the number of extreme heat events is the time of year when they may occur. Figures 8 and 9 below show the time of year that extreme heat conditions are projected to occur under both emissions scenarios between 1950-2099. A point on each of the figures represents each day that exceeds the extreme heat threshold for the County and what time of year, between April through October, that it occurs.

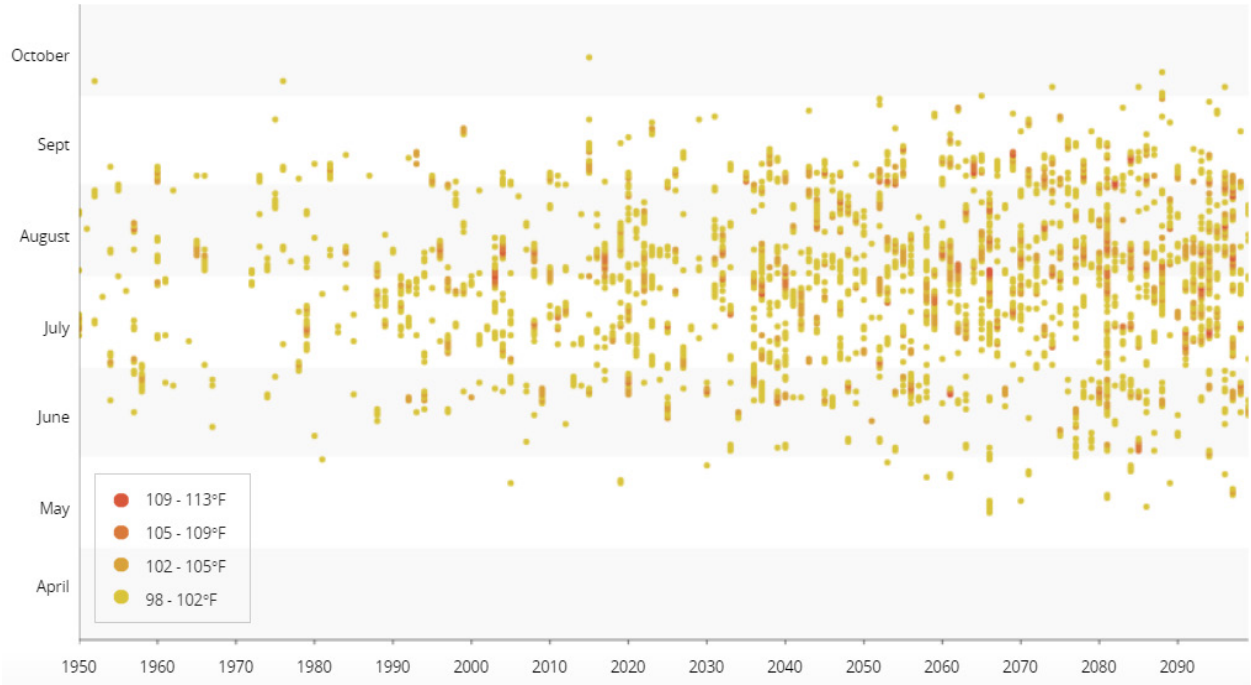


Figure 8: Timing of Extreme Heat Days by Year in Napa County Under the Low-Emissions Scenario (1950-2099) (Source: CEC 2016)

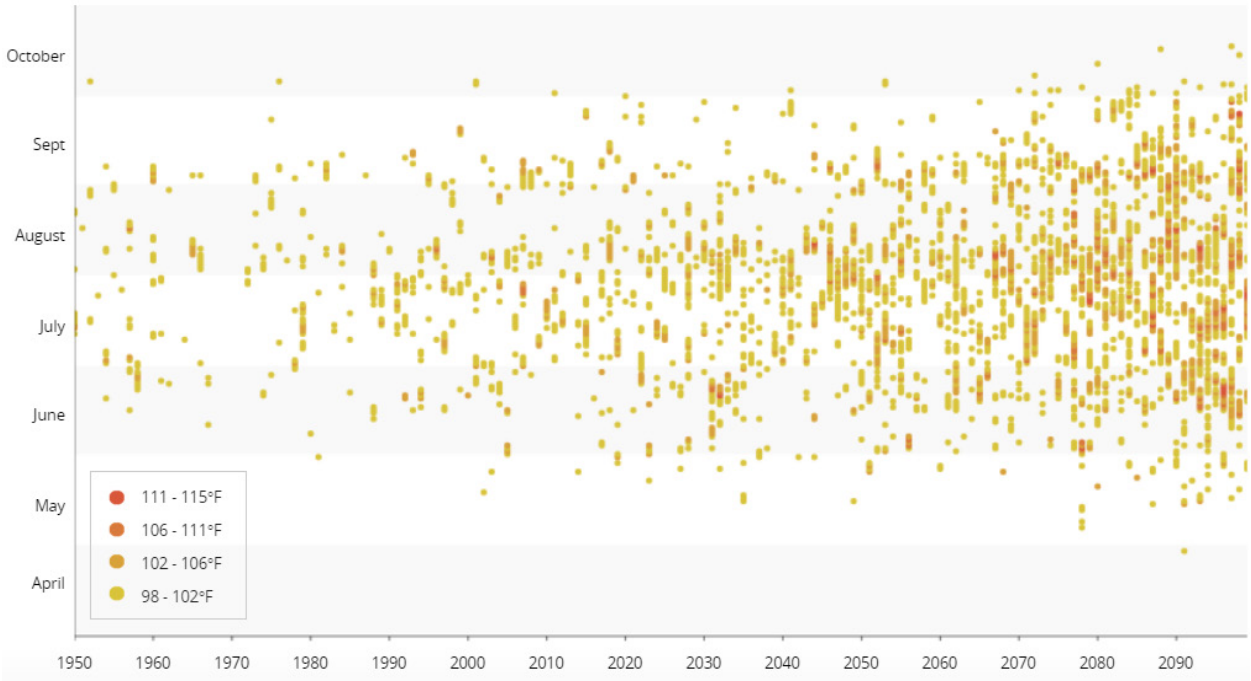


Figure 9: Timing of Extreme Heat Days by Year in Napa County Under the High-Emissions Scenario (1950-2099) (Source: CEC 2016)

As shown in Figures 8 and 9 above, the County has a history of exceeding the extreme heat threshold starting in late May/early June and ending in mid-September. As shown under both emissions scenarios, the model projects not only an increase in the frequency of exceeding the extreme heat threshold, but also their occurrence both earlier and later in the season. In Figure 9 under the high emissions scenario, longer sustained periods of exceeding the extreme heat threshold will also result in more frequent and sustained heat wave events earlier and later in the season towards the end of the century.

Changes to Precipitation Patterns

Global climate change will affect physical conditions beyond average temperatures, including changes to precipitation patterns. While projections generally show little change in total annual precipitation in California and trends are not consistent, even modest changes could have a significant effect on California ecosystems that are conditioned to historical precipitation levels (CEC 2016). Reduced precipitation could lead to higher risks of drought, while increased precipitation could cause flooding and soil erosion (CNRA 2014: 25). Changes in weather patterns resulting from increases in global average temperature could also result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Based upon historical data and modeling, the California Department of Water Resources (DWR) projects that the Sierra snowpack will decrease by 25 to 40 percent from its historic average by 2050 (DWR 2008:4).

While the County is not located in an area where snow typically accumulates, major water districts and utilities in the County receive a significant amount of water from the State Water Project, which depends on spring and early-summer snowmelt in the Sierra Nevada for water supply. Additionally, agricultural water users in the unincorporated areas of the County are the primary user of groundwater (Napa County 2005:2). Increased average temperatures and changes in the timing and amounts of precipitation could affect local aquifer recharge for groundwater supplies, and thus the County could face increasing challenges of providing adequate water supplies because of increased uncertainty in the amount and timing of water availability to meet future demand. If demand continues to increase, water users could face shortages in normal or dry years.

Increased Wildfire Risk

Changes in precipitation patterns and increased temperatures associated with climate change will alter the distribution and character of natural vegetation and associated moisture content of plants and soils. (CNRA 2012b:11). Increased temperature and frequency of extreme heat events, along with changes in precipitation patterns, can lead to a secondary impact of climate change: an increase in the frequency and intensity of wildfires (CNRA 2012a:17).

According to Napa County's Operational Area Hazard Mitigation Plan, the County has a history of wildfires. ~~,~~ Before the 2017 wildfires, ~~with~~ more than 200,000 acres of the County's 482,000 acres burned in the last thirty years, most of which ~~have~~ occurred in the unincorporated areas (Napa County 2013:12). ~~Recent m~~Mitigation efforts, including adoption of the 2010 Uniform Fire Code, the Firewise Program, and the Chipping Program, have helped reduce the County's wildfire risk, but it is still vulnerable and at high-risk for wildfires, as evidenced by the 2017 wildfires (Napa County 2013: 77). The 2017 California wildfire season was one of the most destructive seasons on record, occurring in a year of record-setting heat and persistent drought (CALFIRE 2017, 2018a, b, c). In October 2017, a series of wildfires broke out across Napa, Lake, Sonoma, Mendocino, Butte, and Solano Counties, burning over 245,000 acres. According to CALFIRE and various news outlets, the fires resulted in at least 44 casualties, the hospitalization of 185 people, and the destruction of an estimated 8,900 structures (CALFIRE 2017). Napa County was greatly impacted by the fires, with over 70,000 acres burned, and 1,200 structures damaged or destroyed, including more than 700 residences (Napa County 2018). Currently, the major wildland fire hazards risks for residential development are in the County's hilly areas characterized by steep slopes, poor fire suppression delivery access, inadequate water supply and highly flammable vegetation (Napa County 2013:75).

Figure 10 below depicts that fire risk relative to 2010 levels under the low-emissions scenario is 11 percent more likely to occur in 2020 than it would have in 2010, 15 percent more likely to occur in 2050, and 12 percent more likely to occur in 2085. Under the high-emissions scenario, as depicted in Figure 11 below, fire risk is 14 percent more likely to occur in 2020 than it would have in 2010, 13 percent more likely in 2050, and 22 percent more likely to occur in 2085. Given that the County is currently at risk for wildfire, these increases

of between 10 and 20 percent under both emissions scenarios is significant and can cause additional threats and vulnerability.

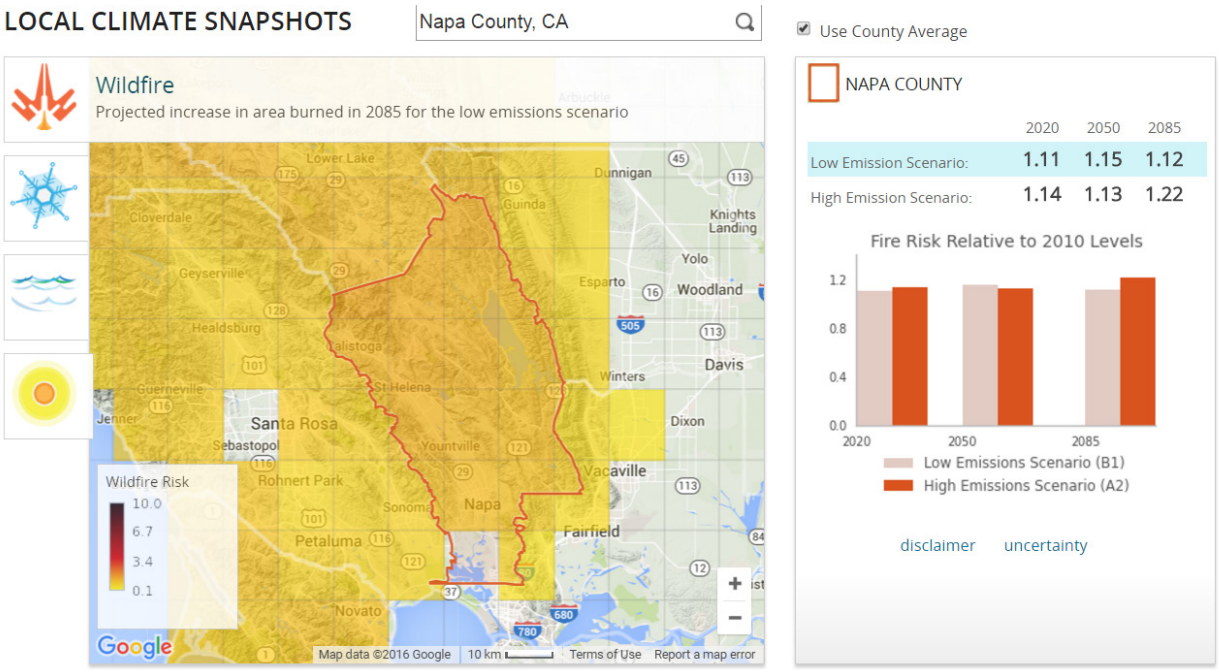


Figure 10: Projected Increase in Fire Risk Relative to 2010 Levels in Napa County for 2020, 2050, and 2085 (Source: CEC 2016)

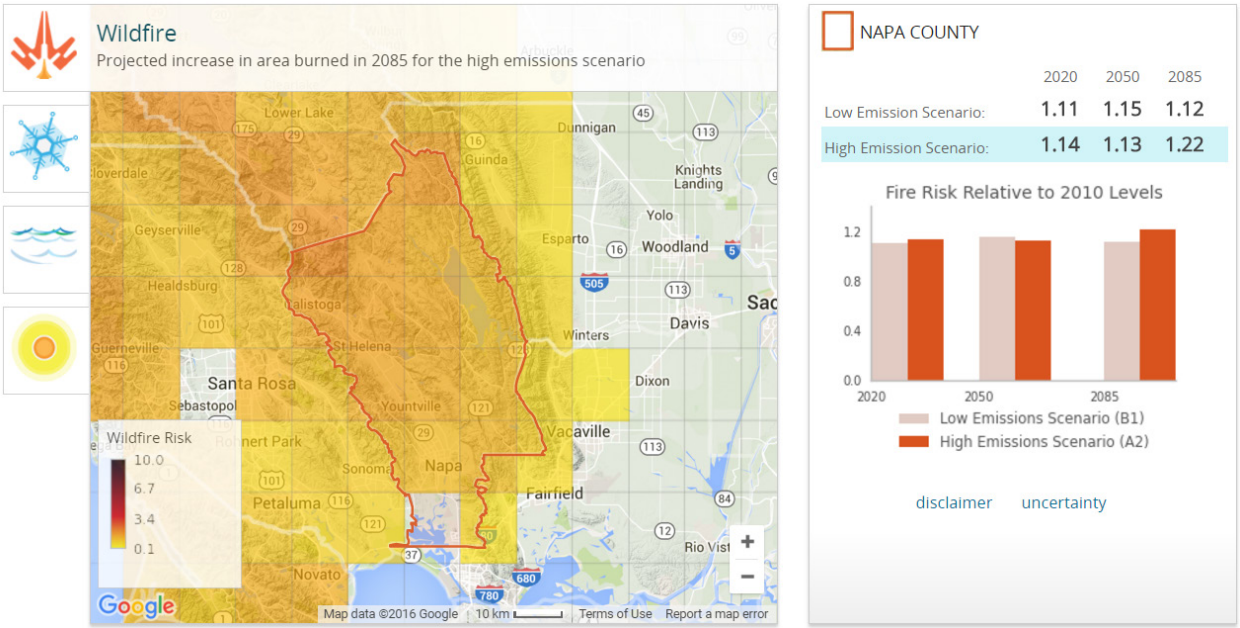


Figure 11: Projected Increase in Fire Risk Relative to 2010 Levels in Napa County for 2020, 2050, and 2085 (Source: CEC 2016)

Increased Likelihood of Flooding

Climate change is likely to lead to changes in frequency, intensity, and duration of extreme events, such as heavy precipitation and rainfall intensity. These projected changes could lead to increased flood magnitude and frequency and could place more pressure on the County, destroying land, buildings, roads, and crops (IPCC 2001:14).

According to Napa County's Operational Area Hazard Mitigation Plan, the County is considerably vulnerable to flooding. Flooding has caused the most disaster declarations and the most damage and loss of life historically in the County, with floods usually occurring during the season of highest precipitation or during heavy rainfalls after prolonged dry periods (Napa County 2013:11). The County is dry during the late spring, summer, and early fall and receives most of its rain during the winter months. A majority of the land adjacent to the Napa River is subject to flooding that has a one percent probability of occurring in any given year, or a 100-year flood event (Napa County 2013:58). While it is uncertain exactly how and to what extent climate change will affect flooding events in the County, it is reasonable to assume that any increase in flooding could have serious ramifications as the area is already considerably vulnerable. Additional information on increased risk of flooding, which could be exacerbated by sea-level rise in the southern portion of the County, is included below.

Sea-Level Rise

Another outcome of global climate change is sea-level rise. The average global sea level rose approximately seven inches during the last century. ~~Assuming that~~If sea-level changes along the California coast continue to reflect global trends, sea level along the State's coastline in 2050 could be 10-18 inches (0.25-0.45 meters [m]) higher than in 2000, and 31-55 inches higher (0.78-1.4 m) than 2000 levels by the end of this century (CNRA 2012b:9).

According to the CEC's 2012 report, *The Impacts of Sea-Level Rise on the San Francisco Bay*, currently 140,000 people, or 2 percent of the region's population, live in areas currently at risk of being inundated in a 100-year flood event. A 1.0 m rise in sea level will put an additional 80,000 people at risk, increasing the total number of people at risk to 220,000. With a 1.4 m rise in sea- levels, the number of people at risk of a 100-year flood event would increase to 270,000, an additional 130,000 people.

The southwestern portion of the County includes the mouth of the Napa River, which forms a tidal estuary that drains into San Pablo Bay. Less than one percent of the County's population is considered at risk and vulnerable to sea-level rise (CEC 2012:14 and Census 2014). Some critical infrastructure (i.e., roads, hospitals, schools, emergency facilities, and properties) are at risk in the County, including American Canyon Power Plant and the Napa Sanitation District Water Treatment Plant are vulnerable to a 100-year flood event with a 1.4 m sea-level rise (CEC 2012:23).

Using data developed for the Our Coast, Our Future effort, led by the United States Geological Survey (USGS), the Cal-Adapt tool depicts sea-level rise projections and existing storm-related flooding events using the Coastal Storm Modeling System (CoSMoS). CoSMos depicts coastal flooding projections for the San Francisco Bay Area due to the combination of sea-level rise and storm events, while also accounting for physical protective structures (e.g. levees), waves, tides, surge, steric effects, and fluvial discharge erosion, and other hydrodynamical factors.

Figure 12 shows land in the County that is both currently and projected to be vulnerable to flooding because of a 100-year flood event, a 1.5 m in sea-level rise, and other hydrodynamical factors. Because the CoSMos model accounts for physical structures, such as levees that protect against a 100-year flood event, only approximately 36 acres in the County are currently at risk for flooding. Taking a 1.5 m rise in sea level into account, along with other storm factors, the tool projects an additional 13,000 acres would be inundated by a

100-year flood event. Most of the area that is at risk is currently undeveloped or used for agricultural purposes. Specific areas along the Napa River include Buchli, Cuttings Wharf, Thompson, and Imola, along with areas further north along the Napa River, including some industrial uses, wineries, and parts of Downtown Napa (i.e., up to 3rd Street and portions east of State-Route 29). Additional portions of Thompson, Middleton, and American Canyon also have some flood-prone ~~low lying~~low-lying areas that would become more vulnerable to flooding because of sea-level rise. While the Napa County Airport itself is not at immediate risk for inundation, adjacent areas to the west are at increased risk of flooding due to sea-level rise.

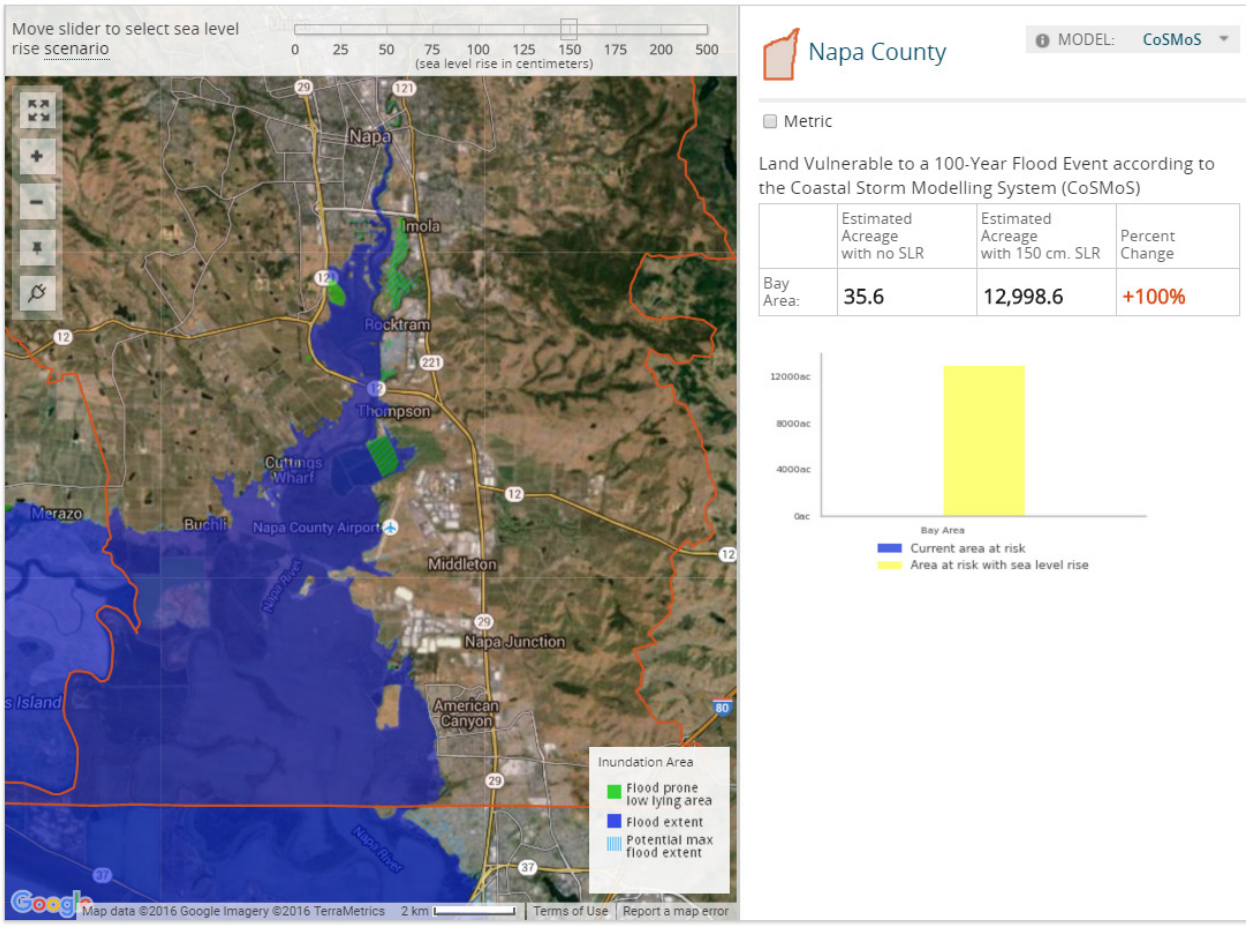


Figure 12: Sea-Level Rise, Current and Projected Areas Threatened (Source: CEC 2016)

The Adapting to Rising Tides (ART) subregional project, developed and sponsored by the San Francisco Bay Conservation and Development Commission (BCDC), studied five potential climate impact scenarios associated with sea-level rise and storm event scenarios in Alameda County (BCDC 2016a). While the subregional project looked at Alameda County specifically, potential consequences of sea-level rise and storm events identified in the project could also apply to other Bay Area counties like the County. Potential climate impacts identified include:

- more frequent flooding events due to rising Bay water levels;
- more extensive and longer duration flooding;
- permanent inundation in areas due to higher Bay water levels and shifts in the tidal range;
- increased shoreline erosion and increased potential for levy over-topping; and
- elevated groundwater and salinity intrusion (BCDC 2016b).

3.2 Steps 2 and 3: Sensitivity and Potential Impacts

The next two steps in the vulnerability assessment are closely related and are thus discussed together. The second step in the vulnerability assessment involves using a systematic evaluation to identify structures, functions, and populations that may be affected in the County by projected exposures to climate change impacts. Using the APG's recommended sensitivity checklist, this assessment focuses specifically on resources in the County potentially affected by climate change that were identified in the Exposure section of this Chapter.

The sensitivity checklist is organized into three main categories; Functions, Structures, and Populations. The categories are described in more detail below:

- **Functions**: Includes facilities that are essential to the health and welfare of the whole population and are especially important following climate-influenced hazard events. These facilities include hospitals, medical facilities, police and fire stations, emergency operations centers, evacuation shelters, and schools. Transportation systems, such as airways (e.g., airports and highways), bridges, tunnels, railways (e.g., tracks, tunnels, bridges, and rail yards), and waterways (e.g., canals, seaports, harbors, and piers) are also important to consider. Finally, lifeline utility systems such as potable water, wastewater, fuel, natural gas, electric power, and communications must also be identified.

- **Structures**: Includes the structures of essential facilities noted above. It also includes high potential loss facilities, where damage would have large environmental, economic, or public safety consequences (e.g., nuclear power plants, dams, and military installations). This category also includes hazardous material facilities that house industrial/hazardous materials.

- **Populations**: Includes a community's vulnerable populations, such as non-English-speaking people or elderly people who may require special response assistance or special medical care after a climate-influenced disaster.

Sensitivity checklists for each of the identified climate change exposures in the County are provided below, in conjunction with Step 3 of the vulnerability assessment. The third step in the assessment includes evaluating how these impacts will occur and how severe they may be. Given that climate change exposures at the local scale are inherently uncertain, the APG recommends that communities conduct a qualitative assessment that describes the potential impacts based on the exposure (CNRA 2012a:23). This assessment is not meant to be exhaustive and prescriptive, but is rather intended to provide a high-level view of potential impacts that could occur because of identified climate change exposures. Further evaluation and research would be needed to more clearly identify points of sensitivity and potential impacts, including specific facilities, structures, and areas of concern.

3.2.1 Increased Temperature and Frequency of Extreme Heat Events and Heat Waves

Based on the low- and high-emissions scenarios, annual average temperatures in the County are projected to rise three to six degrees Fahrenheit by 2090. Increased temperature can lead to secondary climate change impacts including increases in the frequency, intensity, and duration of extreme events and heat waves in the County. Points of sensitivity are identified below in Figure 13.

Higher frequency of these extreme heat conditions can cause serious public health impacts, increasing the risk of conditions directly related to heat such as heat stroke and dehydration (CNRA 2012a:3). Furthermore, public and private resources could be severely strained as the number of extreme heat occurrences

increase. Older adults, particularly seniors, are more likely to experience respiratory and/or cardiovascular health complications than younger individuals. Approximately 17 percent of the County's population are elderly, which are more likely to live alone with limited mobility, all of which can exacerbate the risk of extreme heat (Census 2014).

Increases in temperature, along with the frequency of extreme heat events and heat waves, can also affect the agriculture industry, which is a large driver of the County's economy. The significant, overall outcome of warming is the likely reduction in yield of some of California's most valuable specialty crops (CNRA 2014: 21). More specifically, climate change could have serious effects to the wine industry in Napa County, which produces an average of 90 percent of American wine (Mayton 2015). The County currently has 400 wineries, producing more than 9.2 million cases of wines totaling over $1 billion dollars in sales. The wine industry in Napa accounts for $10.1 billion of $51.8 billion economic impact from winemaking and related industries in California (Napa County 2013:28). Increases in temperature and moisture could impact the growing of wine grapes, by causing late or irregular blooming and affecting yields (Lee et al. 2013:1). Limited livestock operations could also be subject to heat stress, which can result in reduced livestock pregnancy rates, longer time needed to meet market weight, and reduced milk production (CNRA: 2014:24). The County's large Hispanic agricultural worker base could also be affected by heat stress, which could reduce productivity, and may lead to illness, disability, or death in extreme exposures (CNRA 2014:24).

Higher temperatures could also threaten the County's energy system, by increasing consumer energy demand and affecting the facilities themselves. Energy usage tends to spike during extreme events and heat waves, which can create stress on the energy grid. Increased consumer demand can force utilities to ramp up the supply of energy, which can sometimes require the use of older and dirtier fossil fuel. Higher temperatures can also physically alter the thermal performance of power plants (e.g., American Canyon Power Plant), substations, and transmissions lines. (CEC 2012:14).

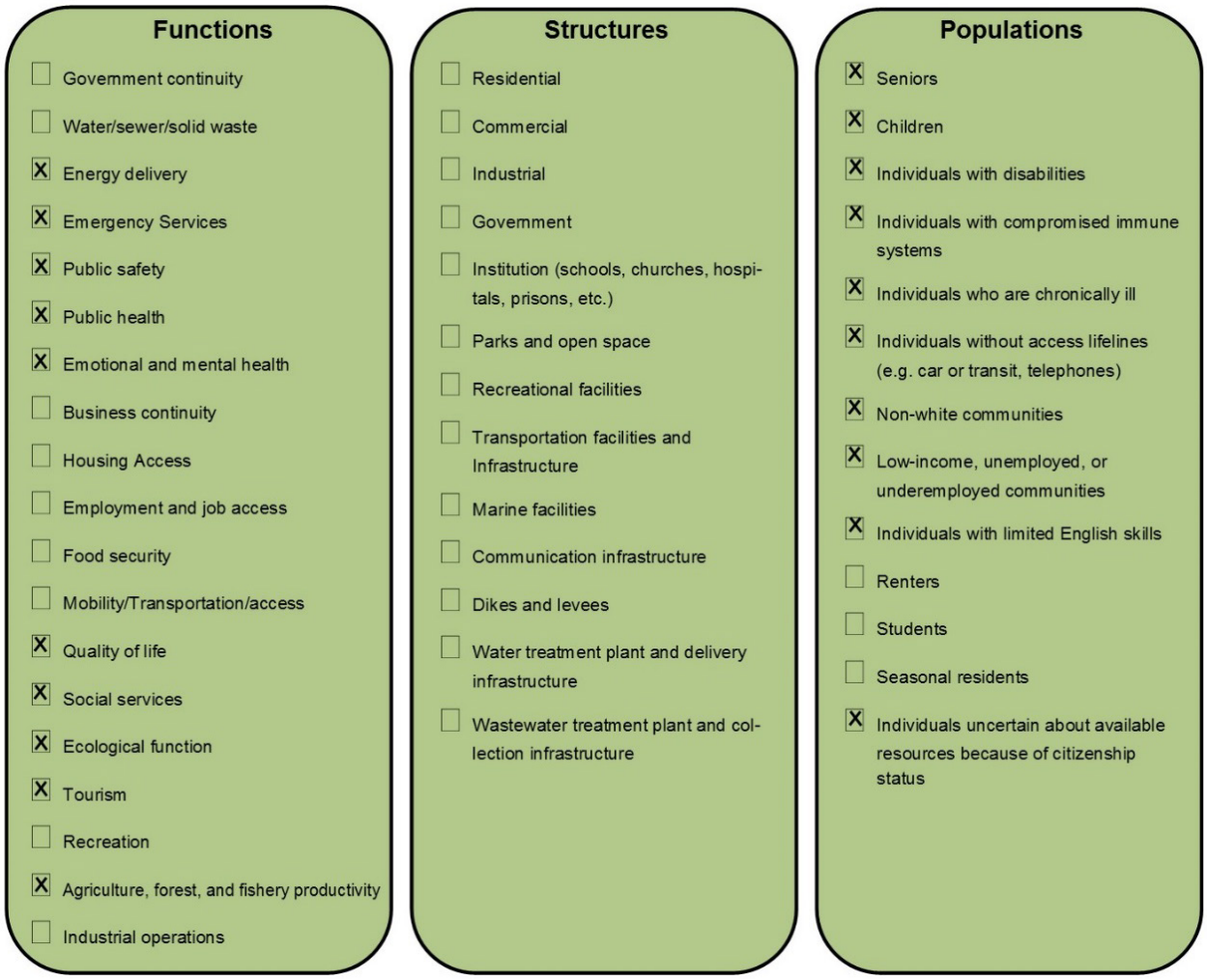


Figure 13: Napa County's Sensitivity to Increased Temperatures and Extreme Heat

3.2.2 Changes to Precipitation Patterns

Increased average temperatures and a hastening of snowmelt in distant watersheds, along with local and regional changes in precipitation and timing of runoff in local watersheds, could affect both surface and groundwater supplies in the County. As a result, the County could struggle in the future in providing adequate water supplies to its residents. Water users could face shortages in normal or dry years, if demand continues to increase. The points of sensitivity identified because of changes in precipitation patterns are shown below in Figure 14.

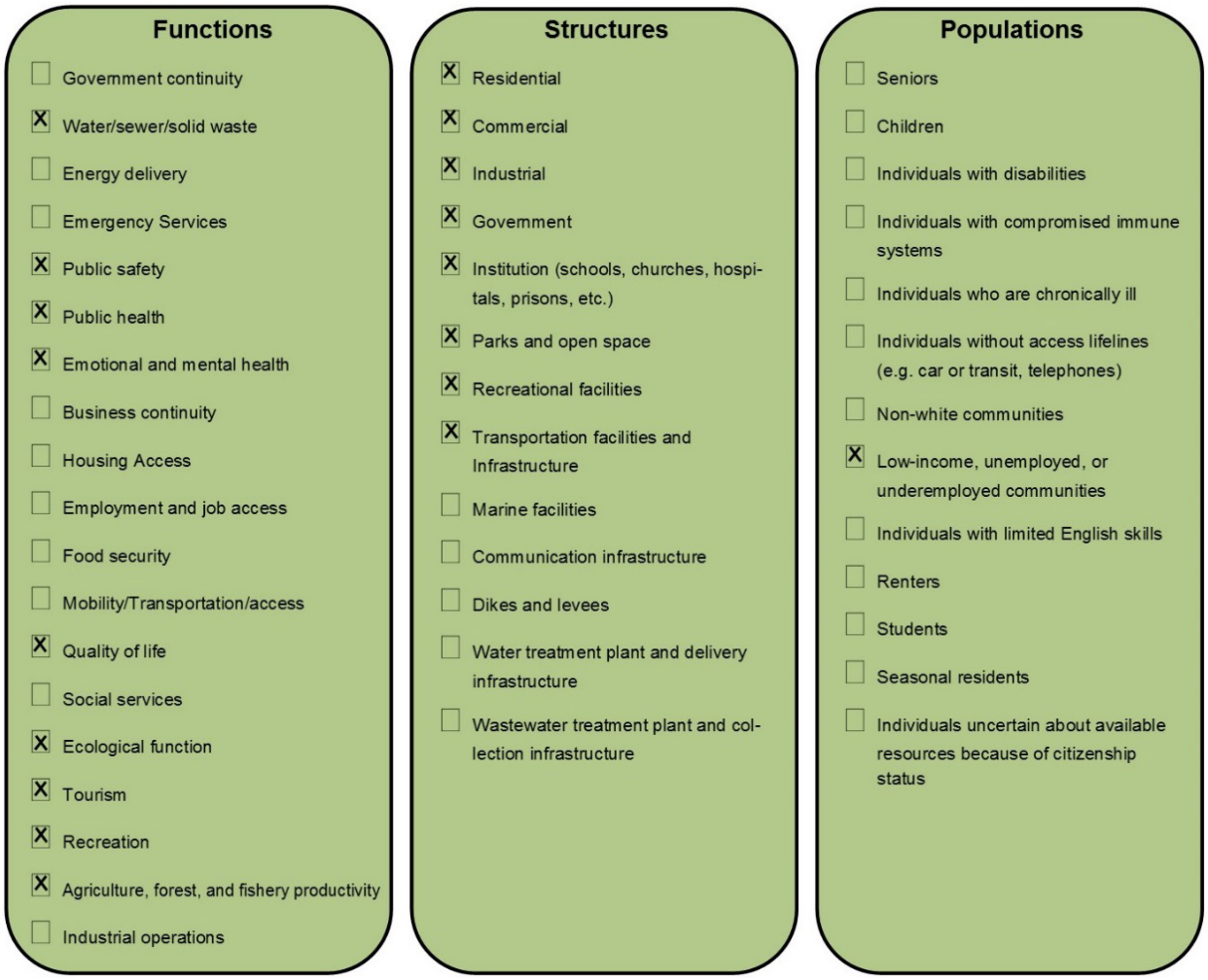


Figure 14: Napa County's Sensitivity to Changes in Precipitation

With intensified use of groundwater, many of California's groundwater basins are already in overdraft, with groundwater being used faster than it is being replenished and groundwater levels declining. Overdraft can also lead to land subsidence, which is the gradual settling or sudden sinking of the earth's surface. The effects of subsidence could impact houses and other structures such as transportation infrastructure, water well casing failures, and changes to the elevation and gradient of stream channels, drains, and other water transport structures (CNRA 2014:235).

In terms of agriculture, changes in timing and amounts of precipitation could affect local aquifer recharge for groundwater supplies in the future, which could in turn affect water supplies for agricultural uses. Conversely, as the weather gets warmer with climate change, agricultural demand for water could intensify because in extreme heat conditions water evaporates faster and plants need more water to move through their circulatory systems to stay cool (CNRA 2014:21). More specifically, attempts to maintain wine grape productivity and quality in the face of warming may be associated with increased water use for irrigation and to cool grapes through misting or sprinkling (Lee et al. 2013).

3.2.3 Increased Wildfire Risk

The County is already considered to be an area that is at high-risk for wildfires (Napa County 2013:77). Increased temperatures and changes in precipitation patterns associated with climate change are expected to increase the risk of wildfire in the County by approximately 10 to 20 percent by the end of the century. This increase could cause additional threats to the County and has the potential to affect emergency services,

roads, water supplies to residents, housing access, and quality of life. The points of sensitivity identified for this exposure to increased wildfire risk is shown below in Figure 15.

Figure 15: Napa County's Sensitivity to Wildfire Exposure

A changing climate is expected to subject forests to increased stress because of drought, disease, invasive species, and insect pests. These stressors are likely to make forests more vulnerable to catastrophic fire (Westerling 2008:231). While periodic fires are natural processes and an important ecological function, catastrophic fire events that cannot be contained or managed, can cause serious threats to homes and infrastructure, especially for properties located at the wildland-urban interface (i.e., where residential development mingles with wildland areas) (California Dept. of Forestry and Fire Protection 2009). Ecological functions are further impacted as the risk of fire increases. When it does rain in burned areas, more soil washes off the hills and into roads, ditches, and streams.

Wildfire also threatens energy generation and transmission infrastructure, resulting in damages to facilities (e.g., hydroelectric generation facilities in remote locations), increased maintenance costs, and reduced transmission line efficiency (CEC 2012:15).

The wine industry and the thousands of acres of vines could also be affected by wildfire. For vineyards that are near fires, the smoke could potentially cause problems, particularly for red grapes, where the skin is still used to in the winemaking process. That smoke could potentially infuse with the skin and create abnormal flavors (Mayton 2015). Wildfire could also negatively impact those who pick the grapes, because of the

potential degradation of transportation infrastructure. Because many agricultural workers cannot afford to live in the County (due to high housing costs and the lack of affordable housing), their access and mobility could be impaired.

3.2.4 Increased Likelihood of Flooding

The County is considerably vulnerable to flooding, which has caused the most disaster declarations and the most damage and loss of life historically in the County (Napa County 2013:11). While it is uncertain exactly how climate change will affect flooding events in the County and to what extent, it is reasonable to assume that any increase in flooding could have serious ramifications as the area is already considerably vulnerable. Points of sensitivity are identified below in Figure 16.

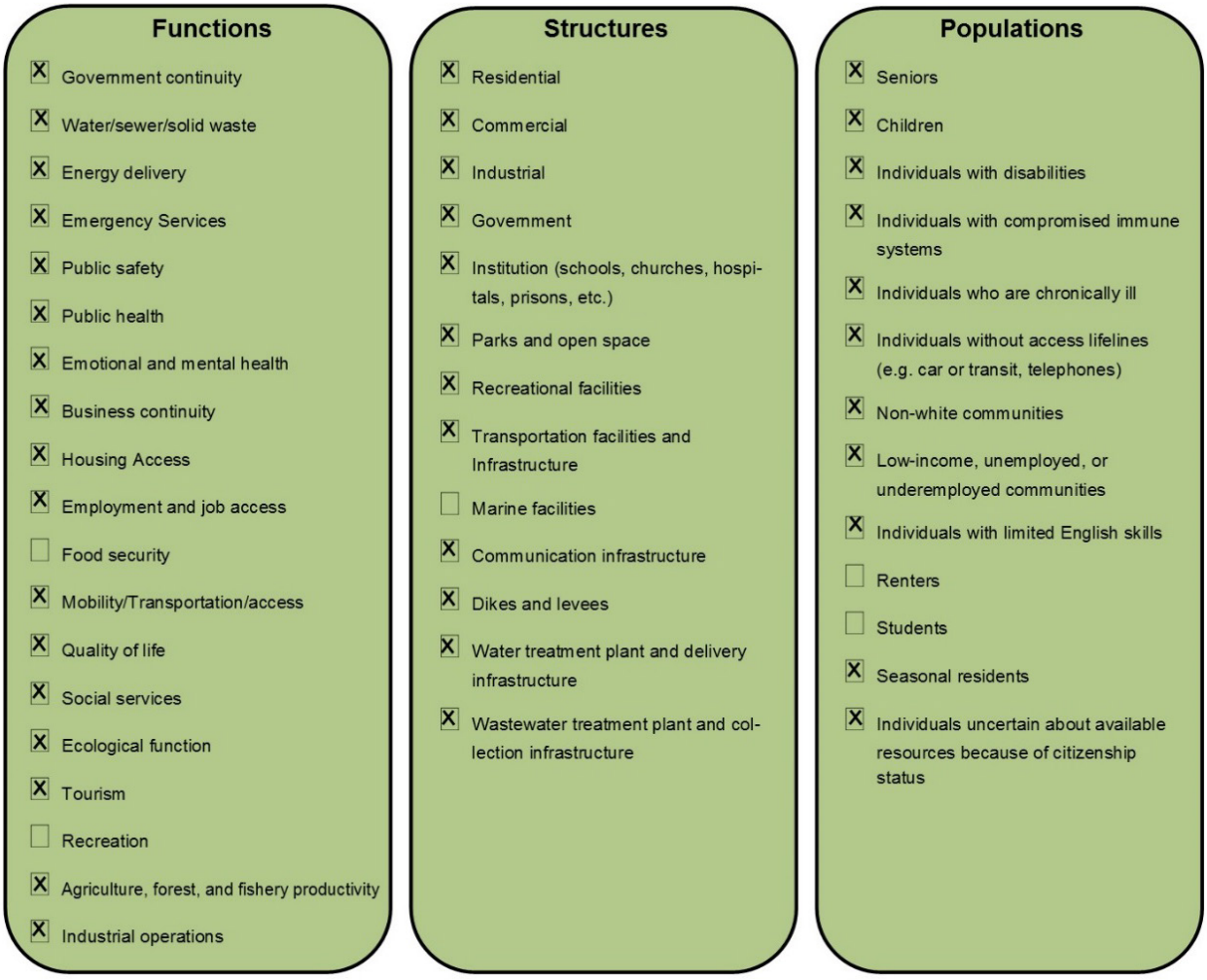


Figure 16: Napa County's Sensitivity to an Increased Likelihood of Flooding

One of the projected impacts of climate change is the increased likelihood of extreme floods capable of destroying streamside land, buildings, roads, and crops. Climate change will not only stress human communities and infrastructure, but will also threaten the biodiversity that occurs along the streams and creeks in the County. Flooding could also lead to the destruction of agriculture, erosion of topsoil, and deposits of debris and sediment on crop lands. It could also release sewage and hazardous or toxic materials as wastewater treatment plans are inundated, storage tanks are damaged, and pipelines severed. Floods also cause economic losses through closure of businesses and government facilities; disrupt communications; disrupt the provision of utilities such as water and sewer; result in excessive expenditures for emergency response; and generally, disrupt the normal function of a community. (Napa County 2013:58)

3.2.5 Sea-Level Rise

The County is not very vulnerable to sea-level rise, with less than one percent of the County's total population considered at risk (CEC 2012:14 and Census 2014). Considering a 100-year flood event, a 1.5 m rise in sea-level and other hydrodynamical factors, most of the land at increased risk for flooding is undeveloped. A small portion of critical infrastructure, such as roads, railways, hospitals, emergency facilities, and properties in the southwestern portion of the County and in areas along the Napa River, including parts of Downtown Napa, could become vulnerable. American Canyon Power Plant and the Napa Sanitation District Water Treatment Plant could also become vulnerable (CEC 2012:23). The points of sensitivity identified for this exposure risk is shown below in Figure 17.

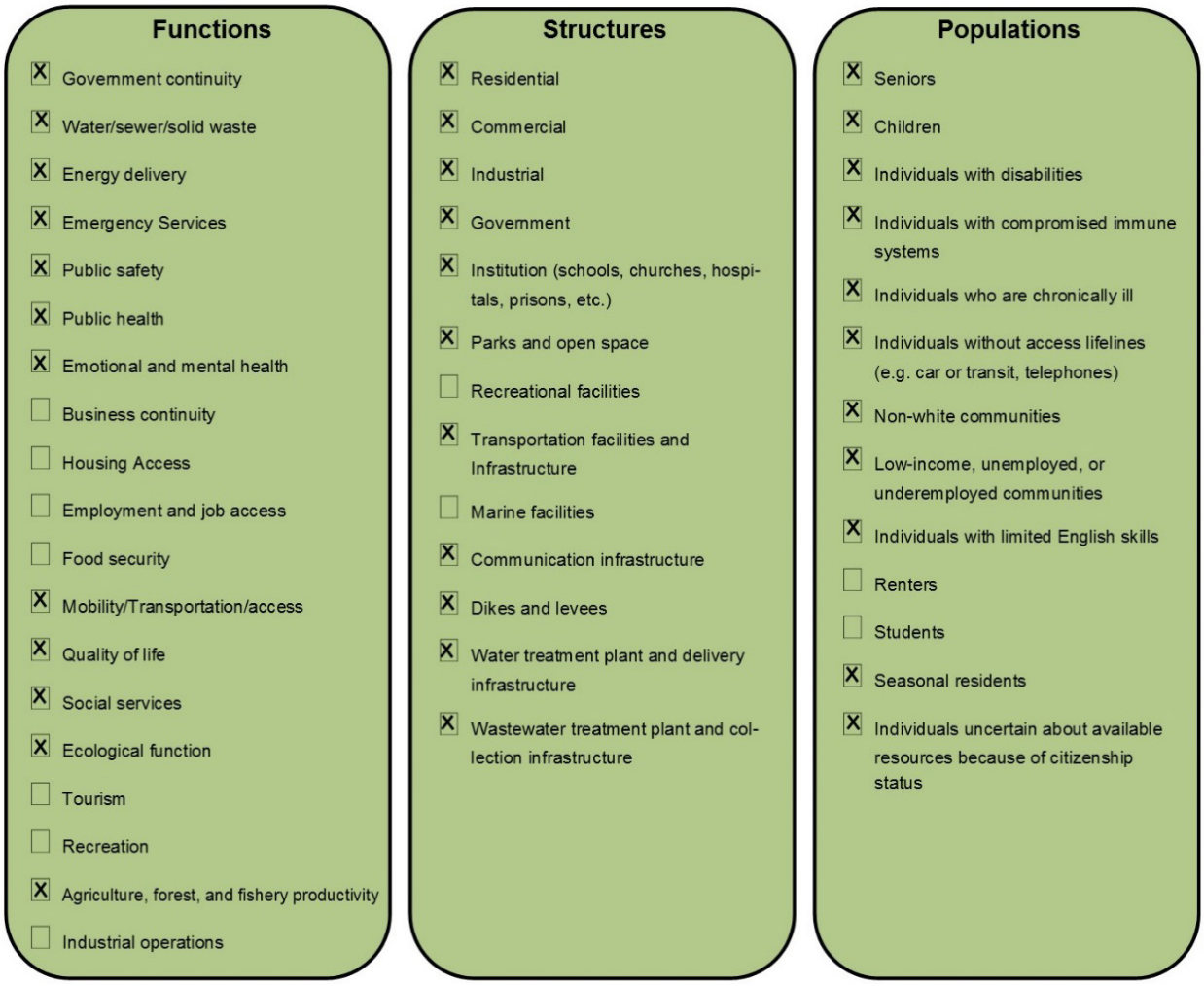


Figure 17: Napa County's Sensitivity to Sea-Level Rise Exposure

As sea-levels rise, the area and the number of people at risk due to flooding will also rise. Rising sea levels can overwhelm existing protection structures, putting those County residents living in vulnerable areas at increased risk (CEC 2012:6). Factors that increase vulnerability to the adverse impacts of flood events associated with sea-level rise include access to preparedness information, transportation, healthcare, and insurance. Key demographics associated with these vulnerabilities include income, race, linguistic isolation (i.e., non-English speaking), and residential tenure (CEC 2012:8). Language ability is an important factor in assessing vulnerability as emergency response crews may be unable to communicate with non-English speakers (CEC 2012:9). The County has a large Hispanic population, many of which are low-income agricultural workers that speak primarily Spanish. The Hispanic population has increased from 23.7 percent

in 2000 to 33.7 percent in 2014 (Census 2014). This population is especially vulnerable and would be impacted by a flood event associated with sea-level rise.

Renters are also more vulnerable, as they are less likely to reinforce buildings and buy insurance because the decision to make major home improvements typically lies with the property owner. Additionally, disaster recovery services have often targeted homeowners, to the disadvantage of renters (CEC 2012:9).

3.3 Step 4: Adaptive Capacity

Once identifying the points of sensitivity and the potential impacts of exposures, the next step is to look at the County's current adaptive capacity to address climate change. Step 4 involves determining what is or can be currently done in the County to address these challenges. Review of the County's existing local policies, plans, programs, resources, or institutions provides a good snapshot of the County's ability to adapt to climate change and reduce vulnerability. Based on this information, adaptive capacity for a County can be rated high, medium, or low. High adaptive capacity indicates that sufficient measures are already in place to address projected changes, while a low rating indicates a community is unprepared (CNRA 2012a:26).

The adaptive capacity of the County to respond to projected climate change impacts is analyzed below, based on identified exposures where possible. It is important to note that this review of local climate adaptation-related work offers a high-level perspective on the issue and is not meant to be all-inclusive. As more specific facilities, structures, and areas are identified in the future, additional review of adaptive capacity may likely be needed.

On a planning level, the County addresses current and future impacts related to existing natural hazards, as evidenced by the creation of the County's Operational Area Hazard Mitigation Plan in 2013, which identifies current hazard risks and mitigation strategies for flooding, earthquakes, and fires. Furthermore, the County's 2008 General Plan includes policies aimed at reducing local contributions to global climate change and encourages sustainable building practices, efficient use of resources (i.e., water, land, and energy), sustainable vineyard practices, and ecological stewardship. It also covers vulnerable populations, including policies aimed at achieving more equitable outcomes for the growing low-income populations in the County, as well as its aging population that require better access to public services and housing.

In addition to planning efforts, climate adaptation-related work occurring in the County includes, but is not limited, to the following:

Efforts Related to Increased Temperature and Frequency of Extreme Heat Events and Heat Waves

- The Napa County Health and Human Services Agency, Public Health Division maintains an Excessive Heat Emergency Response Plan. This plan provides information and structure to the County in heat related emergencies. A part of the plan includes identifying and allocating locations of cooling centers in the event of a heat emergency. Cooling centers can include senior centers, community centers, shopping malls, churches, possible ice skating rinks, and other places that fit the appropriate criteria (Napa County 2009).

Adaptive Capacity Ranking: Medium

Napa County's Excessive Heat Emergency Response Plan is designed to address current and projected changes in increased temperature, including extreme heat events and heat waves. The plan clearly outlines procedures and steps the County can take, including which other agencies to enlist for support, to effectively help the community in the event of excessive heat emergencies. While the plan can account for projected increases in temperature, it is reactive in nature and does not include potential solutions that could be put in place before extreme heat events occur. Therefore, the adaptive capacity ranking for increased temperature is medium.

Efforts Related to Changes to Precipitation Patterns and Water Supply

- The County participates in the Home Energy Opportunity (HERO) Program, which is part of the Property Assessed Clean Energy (PACE) Program. HERO helps homeowners reduce energy bills and decrease water consumption through special financing options, while also creating jobs for registered contractors in the County (Yune 2014).

- The County has water conservation regulations for landscape design, with the intent to conserve water through promotion of the most efficient use of water in landscape design, while respecting the economic, environmental, aesthetic, and lifestyle choices of individuals and property owners (Napa County Municipal Code Title 18, Chapter 18.118)

- The County has several water conservation programs to help combat drought and other water supply issues. These include promotion of rebate programs from DWR for single-family residences to remove turf and replace toilets, as well as clothes washer rebates for residents from PG&E and the County (Napa County 2016).

- The Napa County Flood Control and Water Conservation District Office also provides free water-saving devices to those living in the County. These include faucet aerators, showerheads, and hose times (Napa County 2016).

- The County recently adopted a Sustainable Groundwater Management Plan, which continues policies that have arrested further subsidence from the Milliken, Sarco, and Tulocay (MST) basin. This has resulted in a stable aquifer for the past ten years (Napa County 2017).

Adaptive Capacity Ranking: Medium

The County has several water conservation programs, including rebates for appliances and free-water saving devices for residents, that are helping to combat drought and other water supply issues; however, the County is still currently vulnerable to water supply issues because of drought and other factors. The County will face challenges in providing sufficient water supplies in the future because of climate change effects, coupled with an increasing population (i.e., mostly in the incorporated areas) and increasing water demand. While the County has already taken steps towards achieving long-term groundwater sustainability, there is still a possibility that water supply availability may change in the future and will need to be further addressed. Therefore, the adaptive capacity ranking for changes to precipitation patterns and water supply is medium

Efforts Related to the Increased Likelihood of Flooding

- Structures to control flooding have been built throughout the populated west side of the County and are operated and maintained by several agencies. A number of levees have been built along the Napa River to protect agricultural lands and populated parts of the County and to withstand a 100-year flood event. The Napa River Flood Control Project, a major flood control project on the Napa River and its tributaries, will provide a much higher level of flood protection. (Napa County 2013:59).

Adaptive Capacity Ranking: Medium

While levees and structures have been built to protect the County from a 100-year flood event, and the Napa River Flood Control Project will provide a higher level of flood protection, the County is currently not prepared to address effects associated with future sea-level rise and other hydrodynamic factors. Climate change is projected to expose 13,000 additional acres to 100-year flood risk. While a majority of these areas are undeveloped, some developed areas are at risk and should be accounted for in future plans. Therefore, the adaptive capacity for risks associated with flooding is medium.

Efforts Related to the Increased Risk of Wildfire

- The County has adopted the 2010 Uniform Fire Code to help reduce the County's risk of wildfire (Napa County 2013:77).

- The County has provisions to help prevent the accumulation of combustible vegetation or rubbish that can be found to create fire hazards and potentially impact health, safety, and general welfare of the public. Provisions include ensuring that defensible spaces, which are adjacent to each side of a building or structure, are cleared of all brush, flammable vegetation, or combustible growth (Napa County Municipal Code Title 8, Chapter 8.36).

- The County participates in the National Fire Protection Association's (NFPA) Firewise Communities Program, which is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters. The program encourages local solutions for safety by teaching people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent losses (NFPA 2016).

- The Napa Communities Firewise Foundation, in cooperation with the Napa County Fire Department, provides a free chipping service to County residents who are working to maintain the State mandated 100-feet of defensible space around their homes and complying with the County Hazard Abatement Ordinance (Napa County 2016).

- The County has several Fire Safe Councils that are active in minimizing the potential for wildfire damage. Fire Safe Councils receive Federal grants from agencies like the U.S. Forest Service, Bureau of Land Management, and National Park Service. These funds provide Fire Safe Councils with grant money to pursue projects to reduce hazardous fuels, provide wildfire prevention education, and create risk assessments and Community Wildfire Protections Plans (California Fire Safe Council 2017).

- The County is also only one of four Counties to have road standards that meet the Board of Forestry's stringent requirements.

Adaptive Capacity Ranking: Medium

The County is an area that is currently at high-risk for wildfires. While programs and policies in place show a current capacity to address risks, the County is still vulnerable. Climate change is projected to increase this current risk by anywhere from 10 to 20 percent. The County will need to continue to adapt to this projected increase. Therefore, the adaptive capacity for risks associated with wildfire is medium.

Other Climate-Adaptation Related Efforts

- Sustainable Napa County is a nonprofit organization that brings together County business, agriculture, nonprofit, and government entities as part of a comprehensive, collaborative campaign for long term environmental, economic, and social sustainability. With support from PG&E, their mission is to help residents get informed about sustainability and to offer resources and education on a variety of issues including green business, green building, energy, water, recycle and waste, agriculture, air, and transportation (Sustainable Napa County 2016).

- The County enforces the Green Building Standards Code to establish and encourage sustainable building construction practices having a positive environmental impact (Napa County Municipal Code Title 15, Chapter 15.14).

- The County supports the Napa Green Certification program, which is a comprehensive environmental certification program for vineyards and wineries in the Napa Valley. The program aims to reduce solid waste generation, water use, and wastewater generation, promoting sustainable agricultural practices. There is currently a 40 percent participation rate amongst wineries in Napa (Napa Green 2017).

- The County recently joined Marin Clean Energy (MCE), a Community Choice Aggregation (CCA) program. A CCA allows city and county governments to aggregate or pool electricity customers to purchase and develop power, while also allowing them to administer energy programs on behalf of their residents and businesses. A CCA works in partnership with a region's existing utility, which continues to deliver power, maintain the grid, and provide consolidated billing and other customer services. MCE offers its customers three different product offerings: Light Green, Deep Green, and Local Sol. Customers in the MCE service territory are automatically enrolled in Light Green, which provides customers with 50 percent renewable energy from sources such as solar, wind, bioenergy, geothermal, and small hydroelectric power facilities (MCE 2017).

Adaptive Capacity Ranking: Medium

The County has practices and organizations in place that help address future issues of sustainability and climate adaptation. With organizations that educate the public and foster collaboration for longer term environmental sustainability, the County is finding ways to change behaviors and practices now. Furthermore, by adopting the Green Building Standards Code, the County is setting a precedent for reduced energy use, building with more sustainable materials, and employing better water conservation tactics. These efforts, however, would need to be expanded and applied on a much larger scale throughout the County ~~in order to~~to address future changes attributed to climate change. Therefore, the adaptive capacity for other climate-adaptation related efforts is medium.

In conclusion, the County is committed to continuing efforts to reduce and address existing risks and future climate change impacts ~~as a result of climate change~~ on a program level. With a number of ordinances and programs that cover a range of exposures, the County is well equipped to handle current issues of extreme heat events and water supply ~~issues, but~~issues but could still likely face increasing challenges as projected changes occur. Programs and adoption of the 2010 Uniform Fire Code has helped to mitigate the high risk for wildfires, but the County is still vulnerable to current and future fires. Other efforts, aimed at increasing energy efficiency, are commendable but cover only a small range of climate-related impacts. The County will also need to continue to adapt to better address impacts to sea-level rise and associated flooding. However, the long-term vision identified in the County's planning documents demonstrate that the County is forward-thinking in their policy and mitigation development towards all exposures and are positioned to maintain services in the face of climate change.

3.4 Step 5: Risk and Onset

The final step in the vulnerability assessment is to rank impacts based on the level of risk and the projected timeframe. Risk is the likelihood or probability that a certain impact will occur, which is an assessment that combines the estimated certainty of the science projecting the climate change impact and the certainty of the sector sensitivity. Certainty ratings are based on percent probability of global models created by IPCC (CNRA 2012a:29). The timeframe in which the impact is most likely to occur (based on risk) can be categorized as:

- Current: Impacts currently occurring
- Near-term: 2020-2040
- Mid-term: 2040-2070
- Long-term: 2070-2100

Risk certainty has been provided based on the certainty of exposures estimated in Step 1 in Table 1 below. Onset designations have also been assigned.

The table shows that all temperature-related impacts are the most likely near-term climate change exposure facing the County and should be addressed and prioritized in future adaptation planning efforts. While sea-

level rise has a high certainty rating and is already occurring, its onset is not expected to occur until closer to the end of the century in terms of changes in areas already vulnerable to flooding or causing permanent inundation in tidally-influenced areas of the County. Addressing increases in flooding and wildfire risk have mid-term onsets and should be prioritized accordingly.

Table 1 Risk and Onset for Napa County Climate Change Impacts

Impact	Certainty Rating	Timeframe
Increased Temperature	High	Near-term
Increased Frequency in Extreme Heat Events	High	Near-term
Increased Frequency in Heat Waves	High	Near-term
Sea-Level Rise	High	Long-term
Changes to Precipitation Patterns	Medium	Near-term
Increased Wildfire Risk	Medium	Mid-term
Increased Flooding	Medium	Mid-term

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Appendix D

Climate Action Plan Consistency Checklist

FILE#_____

NAPA COUNTY
PLANNING, BUILDING, AND ENVIRONMENTAL SERVICES
1195 Third Street, Suite 210, Napa, California, 94559
(707) 253-4417

A Tradition of Stewardship
A Commitment to Service

Climate Action Plan Consistency Checklist

Introduction

The Napa County Climate Action Plan (CAP), adopted by the County Board of Supervisors on XXXXXXX, ~~2017~~2018, outlines actions that the County will undertake to achieve its proportional share of State greenhouse gas (GHG) emissions reductions. Implementation of the CAP will require that new development projects attain higher levels of energy efficiency and incorporate more sustainable design standards. To help new development applicants plan and design projects consistent with the CAP, and to assist County staff in determining the consistency of proposed projects with the CAP during development review, the County has prepared a CAP Consistency Checklist (Checklist). This Checklist, in conjunction with the CAP, provides a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The Napa County CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to cumulative GHG emissions effect may be determined to not cumulatively be significant if it complies with the requirements of a plan for the reduction of GHG emissions. The Napa County CAP meets the criteria identified in Section 15183.5; therefore, the CAP is considered a "qualified" plan for the reduction of GHG emissions. New development projects that can demonstrate consistency with applicable GHG reduction measures in a qualified plan for the reduction of GHG emissions are eligible for CEQA streamlining, per the provisions of CEQA Guidelines Section 15183.5. Under these provisions, if a project can show consistency with applicable GHG reduction measures, the level of analysis for the project required under CEQA with respect to GHG emissions can be reduced considerably (i.e., a detailed analysis of project-level GHG emissions and potential climate change impacts is not needed).

This Checklist contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions regarding the implementation of relevant CAP strategies toward achieving the identified GHG reduction targets. Furthermore, a project's incremental contribution to cumulative GHG emissions may be determined to not be cumulatively considerable. Projects that are consistent with the CAP, as determined using this Checklist, may rely on the CAP for the cumulative impacts analysis of GHG emissions under CEQA. Projects requiring discretionary review that cannot demonstrate consistency with the CAP using this Checklist would be required to prepare a separate, more detailed project-level GHG analysis as part of the CEQA document prepared for the project.

Checklist Applicability

This Checklist only applies to certain development projects that require discretionary review and must undergo environmental review (i.e., not exempt) pursuant to CEQA. Projects that only require ministerial review (e.g., only building permits) would not be subject to the Checklist. The CAP contains other measures that, when implemented, would apply ~~to~~ broadly to all ministerial and discretionary projects. Some of those measures (e.g., CALGreen Tier 1 standards) are included for discretionary projects in this Checklist~~,~~ but could also apply to all ministerial projects broadly once the County takes action to codify specific requirements or standards.

Discretionary actions that are not subject to this Checklist would include: 1) discretionary actions that are otherwise exempt from CEQA because they do not result in any physical changes to the environment; 2) permits allowing wireless communication facilities; and 3.) certain infrastructure projects such as roads, pipelines, or other public works projects that are not directly tied to specific development proposals. These classes of discretionary actions would not result in changes in land use, the intensification of existing land uses, new building construction, or substantial renovations or expansions of buildings, and thus completion of this Checklist would not be applicable. However, staff may still require certain discretionary projects to complete separate, project-specific GHG analyses and incorporate such analyses and any project-level mitigation required into CEQA documents. This could include, for example, roads, pipelines, or other public works, where construction activities or physical changes in the environment could result in increases in GHG emissions. The final determination of whether the CAP Checklist may be used, or whether a project-specific analysis is required, will be made by staff.

Checklist Procedures

General procedures for Checklist compliance and review are described below. Specific guidance is also provided under each of the questions under Steps 1 and 2 of the Checklist in subsequent pages.

- The County's Planning Division reviews development applications and will make determinations regarding environmental review requirements under CEQA. Procedures for CEQA can be found on the County's Planning Policy Documents Homepage. County staff will make the final determination as to whether environmental review is required, and if so, whether completion of the CAP Checklist is required for a proposed project or whether a separate project-level GHG analysis is required.

- The specific requirements outlined in the Checklist, along with any items the applicant agrees to in consideration of this process, shall be required as a condition of approval.

- The applicant must provide a written explanation that demonstrates how the proposed project will implement each Checklist requirement described herein to the satisfaction of the Planning Division.

- If a question in the Checklist is deemed not applicable (N/A) to a project, an explanation must be provided to the satisfaction of the Planning Division.

- Applicants may provide alternate GHG reduction measures to those included in this checklist, so long as the alternate measures are demonstrated to be equivalent or more effective than those being replaced. Applicants requesting use of alternate GHG reduction measures must submit supporting documentation along with the completed CAP Checklist, including detailed GHG reduction calculations and a written narrative, substantiating how the alternate measures would achieve equivalent or more GHG reductions.

- Development projects requiring discretionary review that cannot demonstrate consistency with the CAP using this Checklist would be required to prepare a separate, more detailed project-level GHG analysis as part of the CEQA document prepared for the project.

- The Checklist is an administrative document that may be updated periodically by County staff to incorporate new GHG reduction measures or to comply with later amendments to the CAP or local, State, or federal law. Any updates to the Checklist will be administered by the Planning Division at the staff level.

Application Information

Contact Information

Project No./Name: _____

Property Address/APN: _____

Applicant Name/Co.: _____

Contact Phone: _____ Contact Email: _____

Was a consultant retained to complete this checklist? ☐ Yes ☐ No
If Yes, complete the following:

Consultant Name: _____ Contact Phone: _____

Company Name: _____ Contact Email: _____

Project Information

1. What is the size of the project (acres)? _____

2. Identify all applicable proposed land uses (indicate square footage):

- ☐ Residential (indicate # of one- and two-family units): _____
- ☐ Residential (indicate # of multi-family units): _____
- ☐ Commercial (indicate total square footage): _____
- ☐ Industrial (indicate total square footage): _____
- ☐ Winery (indicate total square footage): _____
- ☐ Agricultural (indicate total acreage): _____
- ☐ Other (describe): _____

4. Provide a brief description of the project proposed: _____

CAP Consistency Checklist Questions

Step 1: Land Use Consistency

For projects that are subject to the CAP consistency evaluation, the first step in determining consistency is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the County to determine a project's consistency with the land use assumptions used in the CAP.

Step 1: Land Use Consistency		
Checklist Item (Check the appropriate box and provide explanation and supporting documentation for your answer)	Yes	No
1. Is the proposed project consistent with the existing General Plan land use and zoning designations?	☐	☐

Applicant Detail:
Please substantiate how the project satisfies question 1.

_____
_____
_____
_____
_____
_____
_____

If **"Yes,"** proceed to Step 2 (CAP Measures Consistency) of the Checklist.

If **"No,"** proceed to the question 2 below.

2. Does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?	☐	☐

Applicant Detail:
Please substantiate how the project satisfies question 2 and provide estimated project emissions under both existing and proposed designations(s) for comparison.

_____
_____
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_____

If "No," the project's GHG impact is potentially significant and must be analyzed in accordance with CEQA. The applicant must prepare a separate, more detailed project-level GHG analysis to demonstrate how it would offset the increase in emissions over the existing designations. The project must incorporate each of the measures identified in Step 2 to mitigate cumulative GHG emissions impacts unless the decision maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. Proceed and complete a separate project-specific GHG analysis and Step 2 of the Checklist.

Step 2: CAP Measures Consistency

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable measures of the CAP. Each checklist item is associated with a specific GHG reduction measure(s) in the Napa County CAP.

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
New Vineyards on More than 5% Slopes				
1a. Electric Irrigation Pumps If installing new irrigation pumps, would the project install only electric irrigation pumps using either on-site solar photovoltaic (PV) or small wind energy generation systems and battery storage, or via connection to overhead power lines?; OR If the site contains existing diesel-powered or gasoline-powered irrigation pumps, would the project convert them to electric pumps using on-site solar PV or small wind energy generation systems with battery storage, or via connection to overhead power lines? Check "N/A" only if the project does not contain any agricultural operations.	AG-12	☐	☐	☐
1b. Applicant Detail: Please substantiate how the project satisfies questions 1a. _____ _____ _____				
2a. Agricultural Equipment Would the project, following project completion, use electric or alternatively-fueled agricultural equipment (i.e., renewable diesel, natural gas, or other low-carbon fuels) in its operations?; OR If the project cannot commit to using electric or alternatively-fueled agricultural equipment during operations, would the project use Tier 4 diesel equipment for off-road agricultural equipment? Check "N/A" only if the project does not contain any agricultural operations.	AG-23 & AG-34	☐	☐	☐
2b. Applicant Detail: Please substantiate how the project satisfies questions 2a. _____ _____ _____				
3a. Sustainable Agricultural Practices Which of the following sustainable agricultural best management practices (BMPs) will the project, following project completion, include in its operations? Check all that apply: ☐ Low carbon farming ☐ Low impact farming (e.g., minimizing tractor passes) ☐ Low- or no-till farming ☐ Cover cropping strategies ☐ Low nitrogen fertilizer usage ☐ Low water usage ☐ Composting	AG-6	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
☐ Use of fuel efficient equipment ☐ Napa Green Land certification ☐ Other Check "N/A" only if the project does not contain any agricultural operations.				
3b. Applicant Detail: Please substantiate how the project satisfies questions 3a, providing details for each checked BMP. _____ _____ _____ _____ _____				
Building Energy Efficiency and Green Building				
4a. Energy Audits Existing Buildings: For projects that require substantial additions to or alterations to existing buildings, and the scope of work would affect greater than or equal to 50 percent of the lot's total building square footage, the project must complete an energy audit. Will the energy audit be performed prior to issuance of a building permit? And, will the project applicant agree, as a condition of approval, to incorporate all cost-effective energy improvements into the project design, per the recommendations of the energy audit? Check "N/A" only if the project is not an existing project addition or alteration.	BE-92	☐	☐	☐
4b. Applicant Detail: Please substantiate how the project satisfies questions 4a. _____ _____ _____ _____ _____				
5a. CALGreen Tier I Standards for Existing Nonresidential and Residential Construction: For projects that require substantial alterations or additions to existing buildings over 1,000 square feet, will the project agree, as a condition of approval, to comply with current CALGreen Tier 1 Green Building standards, as outlined in the California Green Building Standards Code; and, current Tier 1 energy efficiency standards in Title 24, Part 6 of the California Code of Regulations?	BE-13	☐	☐	☐
5b. CALGreen Tier I Standards for New Nonresidential and Residential, and ZNE Requirements: For projects that include new nonresidential or residential construction, will the project agree, as a condition of approval, to comply with current CALGreen Tier 1 Green Building standards, as outlined in the California Green Building Standards Code; and, current Tier 1 energy efficiency standards in Title 24, Part 6 of the California Code of Regulations? For projects that include new residential construction for which building permits would be issued after January 1, 2020, will the project agree, as a condition of approval, to achieve zero-net energy (ZNE) performance, in accordance with standards, specifications or guidance issued by the California Energy Commission under Title 24 of the California Code of Regulations?	BE-24	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
5c. Applicant Detail: Please substantiate how the project satisfies questions 5a and 5b. _____ _____ _____ _____ _____ _____ _____ _____				
Oak Woodland and Forest Preservation and Tree Mitigation				
6a. Oak Woodland and Coniferous Forest – Preservation and Mitigation Would the project preserve a minimum of 30 percent of existing trees on-site?; AND For any existing trees that cannot be preserved on-site, would they be replanted at a minimum ratio of 2:1 on-site or elsewhere?	LU-1	☐	☐	☐
6b. Applicant Detail: Please substantiate how the project satisfies questions 6a. _____ _____ _____ _____ _____				
Riparian Woodland Preservation				
7a. Riparian Woodlands Would the project avoid removal of riparian woodland habitat and result in no net losses? Check "N/A" only if the project does not contain any riparian woodland habitat.	LU-2	☐	☐	☐
7b. Applicant Detail: Please substantiate how the project satisfies questions 7a. _____ _____ _____ _____ _____				
Tree and Woody Biomass Waste Diversion				
8a. Tree and Woody Biomass Waste Diversion If the project requires existing trees and/or woody biomass to be removed, will the project applicant demonstrate in the Construction & Demolition (C&D) Waste Management Plan that ~~at least~~at least 80 percent of the total removed weight of trees or woody biomass will be diverted for other uses or prevented from burning by implementing any of the following? ☐ Reuse of harvested wood from removed trees as lumber or furniture in on-site construction ☐ Sale of harvested wood from removed trees to local businesses ☐ Chipping non-usable wood or woody biomass for use as mulch on-site ☐ Burying non-usable woody biomass ☐ Other sustainable reuse or disposal methods	LU-3	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
Check "N/A" only if the project does not remove existing trees or woody biomass on-site.				

8b. Applicant Detail:
Please substantiate how the project satisfies questions 8a, providing details for each checked item.

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_____
_____

Water Heating Systems				
9a. ~~Electric or~~Electric or Alternatively-Fueled Water Heating Systems: Residential~~ and Non-Residential~~: For residential~~ and non-residential projects~~, will the project agree, as a condition of approval, to install the following types of electric or alternatively-fueled water heating systems? Please check which types of systems will be installed: ☐ Electric water heater ☐ Ground source heat pump ☐ Solar thermal water heater ☐ Heat pump water heater ☐ Other Natural gas water heating systems will only be permitted if natural gas water heaters proposed to be used are rated to achieve a minimum thermal efficiency of 95 percent. In this case, applicants must submit documentation verifying that the thermal efficiency ratings of the proposed water heaters are at least 95 percent. Check "N/A" if the project does not contain any residential ~~or non-residential~~ buildings.	BE-4~~6~~	☐	☐	☐

9b. Applicant Detail:
Please substantiate how the project satisfies questions 9a.

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_____

Transportation System Management				
10a. Transportation System Management (TSM) Non-residential: For non-residential projects in which more than 20 employees will be employed on-site, will the project agree, as a condition of approval, to comply with the County's TSM ordinance? And, will the project work with County staff to implement the proper combination of the following BMPs? At least one of the following components: ☐ Parking cash out program ☐ Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools ☐ Unbundled parking whereby parking spaces would be leased or sold separately from the rental or purchase fees for the development for the life of the development At least three of the following components:	TR-1	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
☐ Convenient access to transit ☐ On-site car-sharing vehicle(s) or bike-sharing ☐ Secure bike parking ☐ Preferential parking for carpools and vanpools ☐ Pedestrian access to public sidewalks ☐ Flexible or alternative work hours ☐ Parking management plan ☐ Telework program ☐ Transit, carpool, and vanpool subsidies ☐ Pre-tax deduction for transit or vanpool fares and bicycle commute costs ☐ Access to services that reduce the need to drive, such as cafes, commercial stores, banks, post offices, restaurants, gyms, or childcare, either onsite or within ¼ mile of the structure/use? Check "N/A" if the project is a residential project or if the project would not accommodate more than 20 employees.				
10b. Applicant Detail: Please substantiate how the project satisfies questions 10a, providing details for each checked item. _____ _____ _____ _____ _____				
Vehicle Miles Traveled				
11a. Vehicle Miles Traveled (VMT) Per the~~r~~ requirements of Circulation Element Policy CIR-39, w~~W~~ill the project ~~agree, as a condition of approval, to evaluate and~~ reduce ~~any~~ unmitigated VMT ~~associated with its project~~ by at least 15 percent?	TR-15	☐	☐	☐
11b. Applicant Detail: Please substantiate how the project satisfies questions 11a. _____ _____ _____ _____ _____				
Parking				
~~11a~~12a. Clean-Air Designated Parking Spaces Non-residential projects: For new nonresidential projects, will the project agree, as a condition of approval, to comply with clean-air designated parking spaces as stated in non-residential voluntary measure A5.106.5.11 of the California Green Building Standards Code and to provide designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles as outlined in the table below?	BE-1~~3~~, BE-2~~4~~ and TR-2	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
<table><tr><th>Number of Required Parking Spaces</th><th>Number of Designated Parking Spaces</th></tr><tr><td>0-9</td><td>0</td></tr><tr><td>10-25</td><td>2</td></tr><tr><td>25-60</td><td>4</td></tr><tr><td>51-75</td><td>6</td></tr><tr><td>76-100</td><td>9</td></tr><tr><td>101-150</td><td>11</td></tr><tr><td>151-200</td><td>18</td></tr><tr><td>201 and over</td><td>At least 10% of total</td></tr></table> This question does not cover electric vehicles (EVs). See Question 14 for EV parking requirements. Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces. The required designated parking spaces are to be provided within the overall minimum parking requirement, not in addition to it. Check "N/A" only if the project is a residential project.				
12~~1~~b. Applicant Detail: Please substantiate how the project satisfies questions 12~~1~~a. _____ _____ _____ _____ _____				
13~~2~~a. Reduced Parking Capacity Non-residential: For new nonresidential projects, will the project agree, as a condition of approval, to comply with provisions stated in non-residential voluntary measure A5.106.6.1of the California Green Building Standards Code to reduce parking capacity by employing at least one of the following strategies? 1. Use of on street parking or compact spaces, illustrated on the site plan; or, 2. Implementation and documentation of programs that encourage occupants to carpool, ride share or use alternate forms of transportation. Check "N/A" only if the project is a residential project.	BE-13~~,~~, BE-24 and TR-2	☐	☐	☐
13~~2~~b. Applicant Detail: Please substantiate how the project satisfies questions 12a _____ _____ _____ _____ _____				
Electric Vehicle Infrastructure				
14~~3~~a. EV Charging For the following types of projects, will the project agree, as a condition of approval, to comply with applicable EV charging measures, as outlined in the California Green Building Standards Code?	BE-13~~,~~, BE-24 and TR-12~~4~~	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
• One- and two-family dwellings and townhouses with attached private garages: To comply with Tier 1 residential voluntary measure A4.106.8.1 of the California Green Building Standards Code, would the required parking serving each new dwelling be "EV Ready"[1] to allow for the future installation of electric vehicle supply equipment to provide an electric vehicle charging station for use by the resident? • Multi-Family Projects of 17 or more dwelling units: To comply with Tier 1 residential voluntary measure A4.106.8.2 of the California Green Building Standards Code, would 5% of the total parking spaces required, or a minimum of one space, whichever is greater, be "EV Capable"[2] to allow for the future installation of electric vehicle supply equipment to provide electric vehicle charging stations at such time as it is needed for use by residents? • Non-residential: To comply with Tier 1 nonresidential voluntary measure A5.106.5.3 .1 of the California Green Building Standards Code, would the project provide "EV Capable" spaces, as outlined in the table below, to allow for future installation of electric vehicle supply equipment to provide stations at such time as it is needed for use by future occupants?				

Number of Required Parking Spaces	Number of Designated Parking Spaces
0-9	0
10-25	2
25-60	3
51-75	5
76-100	7
101-150	10
151-200	14
201 and over	At least 8% of total

143b. Applicant Detail:
Please substantiate how the project satisfies questions 13a.

_____
_____
_____
_____
_____
_____

Recycling and Composting				
154a. Recycling and Composting Multi-Family Projects of 5 or more dwelling units: Would the project provide a readily accessible area(s) that serve all buildings on the site and is identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals?	SW-1	☐	☐	☐

[1] "EV Ready" means a parking space that is pre-wired with a dedicated 208/240 branch circuit installed in conduit that originates at the electrical service panel or sub-panel and 40 ampere minimum overcurrent protection device, and terminates into a cabinet, box or enclosure, in a manner approved by the building official.
[2] "EV Capable" means a parking space that has a cabinet, box or enclosure connected to a conduit linking the parking space to the electrical service panel in a manner approved by the building official. The electrical service panel shall provide sufficient capacity to simultaneously charge all electric vehicles with or without a load management system.

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
Commercial and Wineries: Would the project facilitate or participate in food or winery waste composting for small and large businesses, in coordination with applicable food waste and winery waste composting programs offered by various recycling and waste disposal services within the County? Check "N/A" if the project is single-family residential, multi-family less than five units, and industrial.				
154b. Applicant Detail: Please substantiate how the project satisfies questions 154a. _____ _____ _____ _____ _____				
Water Efficiency and Conservation				
165a. For residential and non-residential projects, would the project comply with all applicable indoor and outdoor water efficiency and conservation measures required under CALGreen Tier 1, as outlined in the California Green Building Standards Code?	BE-13, BE-24 and WA-1	☐	☐	☐
165b. Applicant Detail: Please substantiate how the project satisfies questions 165a. _____ _____ _____ _____ _____				
176a. Water Audits Existing Commercial and Industrial: For commercial and industrial projects that require substantial addition, alteration, and expansion to existing facilities, the project must comply with a water audit. Will the water audit be performed prior to issuance of a building permit? And, will the project agree, as a condition of approval, to incorporate all cost-effective water efficiency improvements into the project design, per recommendations in the water audit?	WA-4	☐	☐	☐
176b. Applicant Detail: Please substantiate how the project satisfies questions 17a. _____ _____ _____ _____ _____				
Low-Global Warming Potential Refrigerants				
187a. Low-Global Warming Potential (GWP) Refrigerant Use Non-residential: For new nonresidential projects, will the project agree, as a condition of approval, to comply with CALGreen Tier 1 non-residential voluntary measure A5.508 as stated in the California Green Building Standards Code, which would require the installation of HVAC equipment that complies with either of the following: 1. Install HVAC, refrigeration and fire suppression equipment that do not contain HFCs or that do not contain HFCs with a global warming potential greater than 150.	BE-13, BE-24 and HG-2	☐	☐	☐

Step 2: CAP Measures Consistency				
Checklist Item (Check the appropriate box and provide explanation for your answer)	CAP Measure	Yes	No	N/A
2. Install HVAC and refrigeration equipment that limit the use of HFC refrigerant through the use of a secondary heat transfer fluid with a global warming potential no greater than 1. Check "N/A" if the project is residential.				

18~~7~~b. Applicant Detail:
Please substantiate how the project satisfies questions 18~~7~~a.

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