NAPA COUNTY
CLIMATE ACTION PLAN

REVISED OCTOBER 31, 2011

Prepared for:
Napa County

Prepared by:
ICF International

NAPA COUNTY
CLIMATE ACTION PLAN

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Acronyms and Abbreviations

AB	Assembly Bill
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BAU	business as usual
BDR	Napa County Baseline Data Report
C&D	construction and demolition
CAP	Napa County Climate Action Plan
CEQA	California Environmental Quality Act
DEIR	Draft Environmental Impact Report
District	Bay Area Air Quality Management District
DPW	Napa County Department of Public Works
ERP	Emissions Reduction Plan
FEIR	Final Environmental Impact Report
GHG	greenhouse gas
GWP	Global warming potentials
IPCC	Intergovernmental Panel on Climate Change
LGOP	Local Governments Operations Protocol
MTCO2e	metric tons of carbon dioxide equivalents
NCTPA	Napa County Transportation & Planning Agency
Plan, or CAP	Napa County Climate Action Plan

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Summary

This Revised Napa County Climate Action Plan (Plan or CAP) describes the current (2005) greenhouse gas (GHG) emissions and forecasted emissions for 2020, and identifies the feasible measures that Napa County (County) intends to implement to reduce emissions by 2020 to a level 15% below the 2005 levels. By seeking to reduce emissions to 15% below 2005 levels by 2020, the Plan addresses the commitment in the Napa County General Plan (General Plan) that is similar to the state goals in Assembly Bill (AB) 32.

This CAP has been revised in response to comments from environmental and agricultural stakeholders, the Bay Area Air Quality Management District (BAAQMD), and other members of the public on an earlier draft that was circulated for review from late January to mid-March, 2011 The County appreciates all of the input received, and recognizes that the revised CAP represents only a first step; achieving meaningful GHG emission reductions will require that this Plan be monitored, updated, and updated as the year 2020 draws near. The revised Plan provides an approach to reducing GHG emissions that can be used for tiering California Environmental Quality Act (CEQA) review process pursuant to state and BAAQMD CEQA guidelines.

Current and future GHG emissions, the County's GHG reduction target, and the estimated overall effectiveness of the Plan are shown in Table ES-1 and Figure ES-1. Identified reductions measures are listed in Table ES-2 and shown in Figure ES-2.

Plan Outline

The Plan that follows explains issues in more depth, and provides responses to the comments received on the earlier draft plan, as well as an explanation of Plan revisions. A summary of the plan is as follows:

- Chapter 1, *Reducing Greenhouse Gas Emissions: California and Napa County,* provides an overview of legal and regulatory activity motivating climate action planning in California and in Napa County.
- Chapter 2, *2005 GHG Emissions and 2020 GHG Emissions Projection for Napa County*, provides an inventory of greenhouse gas GHG emissions in the unincorporated portions of Napa County in 2005 and projection of GHG emissions to 2020.
- Chapter 3, *Emissions Reduction Measures*, described both state actions to reduce GHG emissions that will reduce emissions in Napa County and the list of actions that the County will take to reduce GHG emissions by 2020 to meet its reduction target.
- Chapter 4, *CEQA Considerations and Tiering*, describes the relationship of CEQA to the CAP and how project-level analysis of GHG emissions can utilize the CAP in their project-level CEQA analysis.
- Chapter 5, *Monitoring and Adaptive Management*, describes how the County will monitor CAP progress over time and how the County will approach climate action planning for the period after 2020.
- Chapter 6, *Conclusions*, presents the conclusions of the CAP analysis.
- Chapter 7, *References*, provides the references cited in the main section of the CAP.

- Appendix A, *Methodology*, describes the methods used for the GHG inventory and forecast and for quantifying the GHG reductions associated with state and local reduction measures.
- Appendix B, *Project Level Data Needs and Methodology*, presents drafts of the worksheets that the County intends to use for new projects in order to collect the data necessary to quantify project-level emissions and reductions and evaluate compliance with the CAP's project level performance standard.
- Appendix C, *Responses to Comments on the Draft CAP*, provides responses to the key issues raised by environmental and agricultural stakeholders, and other comments on the January 2011 Draft CAP.

Project Level Mitigation and Next Steps

The Revised CAP relies, in part, on GHG mitigation to be implemented at a project level for new development and new vineyard conversions. Napa County has created a project performance standard in which there is parity between the overall percentage of GHG reductions required for different economic sectors in which discretionary projects must reduce their "business as usual" emissions by 39 percent. For residential, commercial, and industrial development, applicants will get "credit" for certain emission reduction measures adopted by the State (like the CalGreen Building Code) as applicable to the new development project, and may achieve additional reductions by choosing from a variety of possible strategies (e.g. building to the Tier 2 or Tier 3 CalGreen standards, generating energy on site, adopting transportation demand management strategies, etc. For new vineyard development, applicants will be asked to achieve reductions through on-site and off-site measures, possibly including habitat restoration, avoided deforestation (permanent protection of otherwise viable and productive vineyard land), alternative energy projects, agricultural best management practices, and/or offset purchases. Following adoption of the CAP, the County plans to work with a non-profit partner to develop and implement a local offset program so that the co-benefits of GHG reductions will accrue locally (e.g. so that habitat restoration that's funded by new development or new vineyard conversion project in Napa County takes place in Napa County and not elsewhere to the extent feasible). This planning effort will commence following adoption of the CAP.

Table ES-1: Summary of Napa County Emissions and Reductions*

		2005	2020
	DEVELOPMENT ASSUMPTIONS		
1	Population	28,600	33,290
2	Housing Units	11,492	13,393
3	Employment (Jobs)	23,050	26,765
4	Approved New Vineyard (Acres)	229*	301*
5	Other Approved Development (Acres)	285*	285*
	COMMUNITY GHG EMISSIONS	**(MT CO2e)**	**(MT CO2e)**
6	Residential Buildings	48,220	55,940
7	Commercial/Industrial Buildings	95,320	111,060
8	Waste	9,240	10,630
9	On-Road Vehicles	191,270	230,100
10	Off-Road Vehicles/Equipment (non-agricultural)	16,620	19,700
11	Wastewater and Septic	9,900*	11,210*
12	Agriculture (other than land use change)	46,800*	49,400*
13	Land Use Change	26,300*	28,630*
14	TOTAL EMISSIONS	443,670*	516,670*
15	**GHG REDUCTION TARGET**		
16	AB 32 Community Target (15% below 2005 levels)		377,120*
17	GHG Reductions Needed to Reach Target		139,550*
18	**IDENTIFIED GHG REDUCTIONS IN CAP**		
19	State Level Actions (See Table ES-2)		96,480*
20	County Level Actions (See Table ES-2)		23,720*
21	Project Level Actions (See Table ES-2)		19,350*
22	TOTAL GHG REDUCTIONS		139,550*
23	***GHG EMISSIONS IN 2020 WITH IMPLEMENTATION OF CAP***		***377,120****

***Revised based on comments received regarding the January 2011 Draft CAP. See Chapter 2 and Appendix A for an explanation of the data and assumptions inherent in this summary table.**

Table ES-2: Summary of GHG Reduction Measures in the Napa County CAP*

		(MT CO2e)
	State Level Actions	96,480*
1	*AB 1493 Pavley I and II*	
2	*Low Carbon Fuel Standard*	
3	*Other Vehicle Efficiency Measures*	
4	*Renewable Portfolio Standard*	
5	*Landfill Methane Regulation*	
	County Level Actions	23,720*
6	*Green Building Ordinance*	
7	*Energy Efficiency and Renewable Energy Financing District*	
8	*Weatherization of Low Income Homes*	
9	*Plant Trees for Shading for Discretionary Projects*	
10	*Passive Design for Discretionary Projects*	
11	*Green business Program- Certified Wineries*	
12	*Comprehensive Water Efficiency Ordinance*	
13	*Landscape Ordinance*	
14	*Recycled Water*	
15	*Agricultural Water Conservation Programs*	
16	*Expand/start kitchen compost programs*	
17	*Expand/start C&D waste programs*	
18	*Waste minimization public outreach*	
19	*Biofuels and renewable energy at Clover Flat*	
20	*Remove barriers to renewable energy*	
21	*Promote dense, mixed-use development*	
22	*Integrate below market rate housing*	
23	*Requirements for use permit applications*	
24	*Traffic calming improvements*	
25	*Bicycle network and bicycle parking*	
26	*Improve transit network*	
27	*Station bike parking*	
28	*Park & ride lots*	
29	*Required contribution for transit access improvements*	
30	*Employer based commute trip reduction program*	
31	*Employer sponsored van pool/shuttle*	
32	*Reduce parking requirements and establish parking maximums*	
33	*Preferential parking*	
34	*Improve traffic flow*	
	Project Level Actions	19,350*
35	*Project Level Mitigation Program*	

*Revised based on comments received regarding the January 2011 CAP. See Chapter 2 and Appendix A for an explanation of the data and assumptions inherent in this summary table.

Figure ES-1: Path to Meeting County Reduction Target in 2020

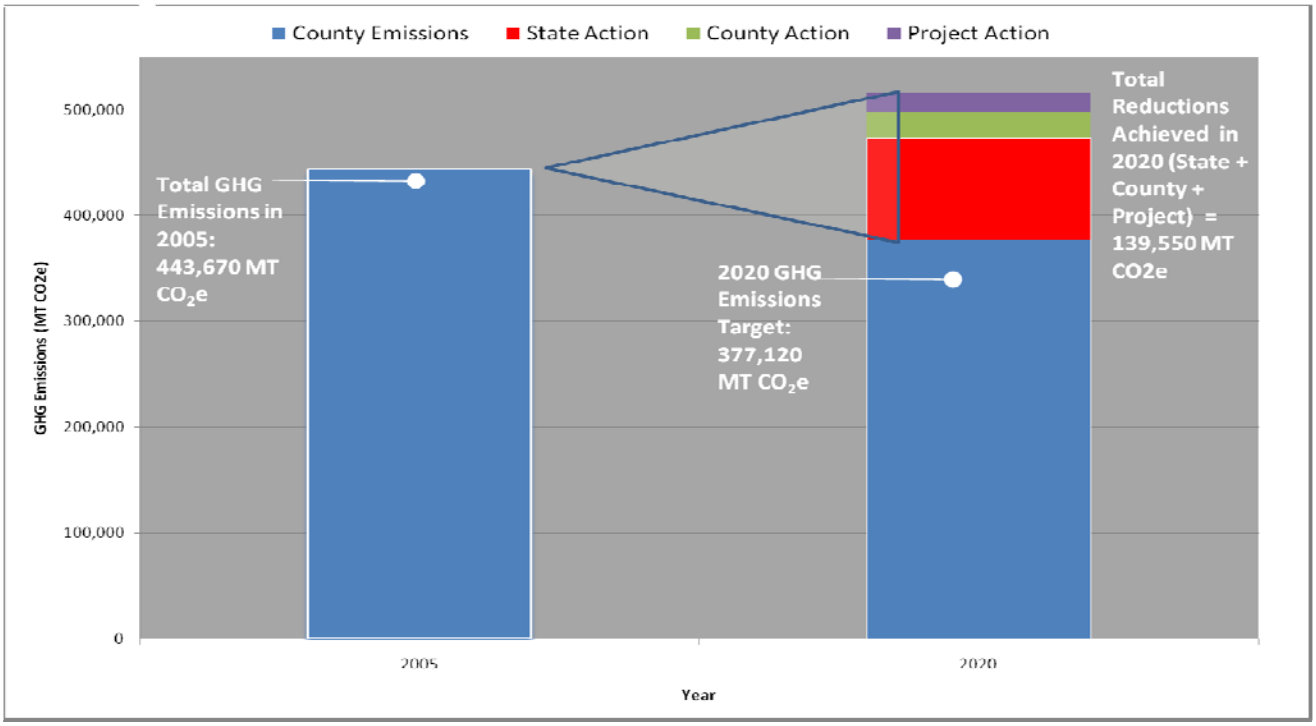
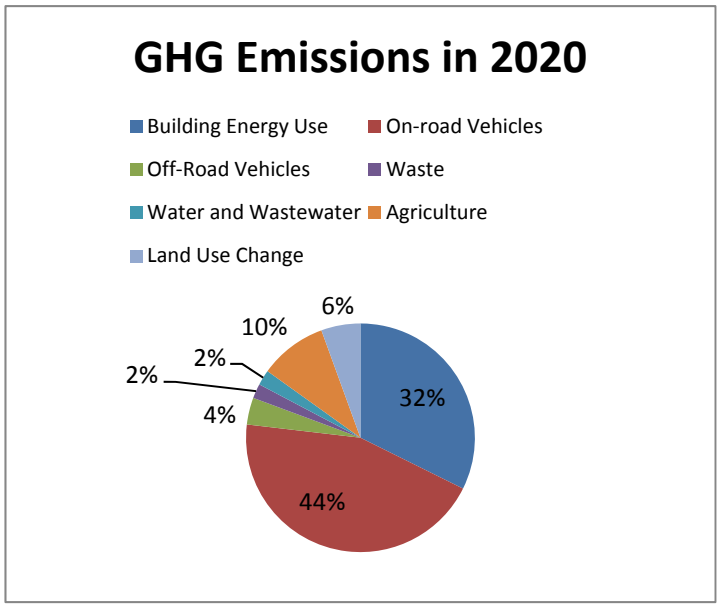
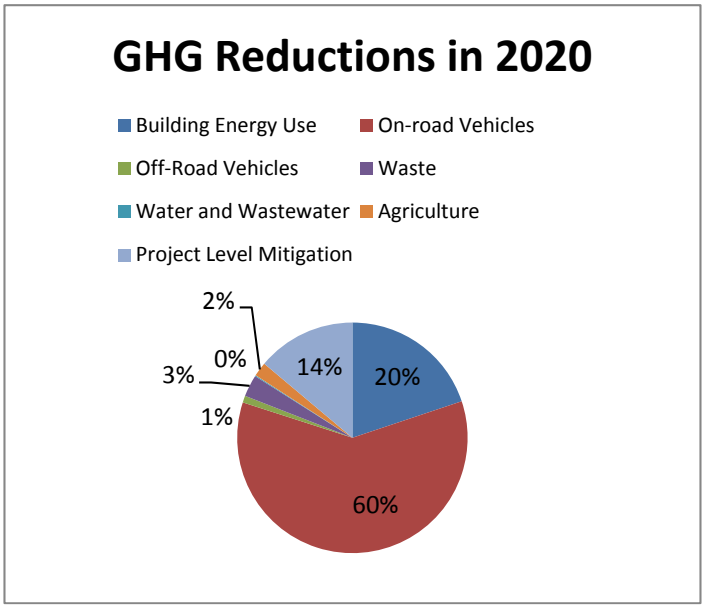


Figure ES-2: Greenhouse Gas Emissions and Reductions in 2020





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Chapter 1
Introduction

This document describes the Climate Action Plan (Plan, or CAP) for unincorporated Napa County. This Plan was developed by ICF in collaboration with staff from the County's Department of Conservation, Development and Planning and the Department of Environmental Management. The planning effort benefited from the earlier County-wide planning effort described below, as well as numerous meetings with the County Planning Commission and interested members of the public. The Plan also addresses specific written comments received in response to a draft plan circulated in early 2011. More explanation of the planning process and the plan's context and purpose is contained below.

The revised Plan contains:

- a description of legal and regulatory activity motivating climate action planning in California
- an inventory of greenhouse gas GHG emissions in the unincorporated portions of Napa County in 2005
- an inventory of projected GHG emissions in 2020
- a list of actions that the County will take to reduce GHG emissions by 2020
- a discussion of the relationship of CEQA to a CAP
- Appendices detailing the assumptions, methodologies, and calculations that support the CAP:
    - Appendix A -Methodology
    - Appendix B - Project Level Data Needs and Methodology
    - Appendix C - Responses to Comments on the Draft CAP.

1.1 California's Goals to Reduce Greenhouse Gas Emissions (AB 32)

In 2006, the California legislature passed AB 32, the Global Warming Solutions Act of 2006. The law establishes a state-wide GHG emissions reductions goal for the year 2020. Executive Order (EO) S-03-05 establishes California's 2050 GHG reductions goal. The state's GHG emissions reductions goals are:

- Return to 1990 levels of GHG emissions by 2020 (AB 32)
- Reduce GHG emissions to 80% below 1990 levels by 2050 (EO S-03-05)
- Support achievement of the above goals by: increasing transit oriented development, reducing VMT, and promoting the development of sustainable communities (Senate Bill [SB] 375)

The California Air Resources Board (ARB) has estimated that statewide GHG emissions for the year 1990 and for the period 2002–2004 were 427 million metric tons of carbon dioxide equivalents

($MTCO_2e$[1]) and 469 million $MTCO_2e$, respectively. ARB also determined that in the absence of action to reduce or mitigate GHG emissions, in 2020 the state would emit 596 million $MTCO_2e$. ARB's 2020 projection is known as a *business as usual* (BAU) projection.[2] To achieve the 2020 GHG emission reduction goals set out by ARB, the state of California would have to reduce 2020 BAU emissions by approximately 30%, which is equivalent to reducing current [3]emissions by approximately 15%.

1.2 Local Governments and Assembly Bill 32

AB 32 directed ARB to develop a roadmap for achieving California's 2020 GHG reduction goal. The roadmap, known as the *AB 32 Scoping Pla*n, lists and describes actions and programs that the state will undertake to reduce its GHG emissions (California Air Resources Board 2008) including the Pavley standards (AB 1493), the low carbon fuel standard (EO S-01-07), the renewable portfolio standards (AB 1078 and AB 107), and the landfill methane capture rules. The Scoping Plan also identifies a unique role for local governments stating that local governments have broad influence and sometimes exclusive authority over activities resulting in GHG emissions in California.

The Scoping Plan recommends, but does not require, that municipalities reduce existing emissions by 15% (compared to current levels) to be consistent with AB 32 objectives. Many local governments have completed or are in the process of completing a GHG inventory and GHG reduction plan (also known as a Climate Action Plan or CAP) consistent with the recommendations of the AB 32 Scoping Plan.

Napa County adopted a comprehensive General Plan Update in June 2008 and in doing so committed to develop a plan to reduce GHG emissions to 1990 levels by 2020, consistent with the goals of AB 32.

1.3 Napa County Activities

Napa County is a rural county with a total population of around 136,000 county-wide and 26,000 in the unincorporated area (2010 Census). An estimated 90% of the unincorporated county is undeveloped open space, incorporating agricultural uses and dispersed home sites, along with native habitats of all sorts (coniferous forest, woodlands, shrubs, grasslands, wetlands, etc.). In all, the vegetated areas in the unincorporated County are estimated to sequester carbon at the rate of around 400,000 MT per year (2005 estimate).

GHG emissions in the unincorporated county derive from the sources described in Section 2.2.1 [title], and since 2005, the County has taken the following actions to reduce GHG emissions in Napa County:

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[1] Carbon dioxide equivalent refers to the combined level of GHG emissions due to different GHGs, including carbon dioxide, methane, nitrous oxide, and other gases. These gases have different global warming potentials (GWP). Thus, in order to combine the totals of all GHGs, each gas is adjusted by a GWP factor to account for the difference in their effect on the atmosphere. The level for carbon dioxide is set at 1. As an example, the GWP for methane is 21, which means that pound for pound, methane is has a global warming potential 21 times greater than carbon dioxide.

[2] *Business as usual* refers to future emissions including future growth, but not taking into account the effect any actions taken by the state or the County to reduce emissions. This scenario provides a basis by which to evaluate the reductions possible from different reduction strategies.

[3] According to the state of California, as regards local GHG inventories *current conditions* means 2008 or earlier. For the purposes of this inventory *current conditions* refers to the baseline GHG inventory year, 2005, consistent with baseline conditions used in the General Plan EIR (Napa County 2007) and the baseline year for the Napa County Baseline Data Report (BDR) (Watershed Information Center & Conservancy of Napa County 2005).

- **GHG Inventory and Forecast for all Napa Jurisdictions** - In 2005, the incorporated cities and the unincorporated portions of Napa County contracted an outside consultant, MIG Consulting Engineers and the Climate Protection Campaign, to perform a GHG inventory for community-wide emissions[4] in all jurisdictions (Unincorporated Napa County, City of Napa, City of Calistoga, City of St. Helena, City of American Canyon and City of Yountville).
- **GHG Reduction Plan for County Municipal Operations** - In 2007, the Napa County Department of Public Works (DPW), together with Kenwood Energy, performed a separate inventory of and reduction plan for the GHG emissions associated only with the County's municipal operations[5]. DPW and Kenwood Energy identified a suite of actions (the Emissions Reduction Plan or ERP) (Napa County Department of Public Works and Kenwood Energy 2007) that would result in the County reducing municipal emissions by 15%.
- **GHG Inventory and Reduction Plan for the Unincorporated County** - In 2010, Napa County contracted ICF International to assist in developing a community GHG reduction plan for the unincorporated County. This effort builds and improves upon the two earlier efforts with special focus on the following: the GHG emissions of only the unincorporated County only; a detailed traffic analysis allowing better segregation of jurisdictions' trips; the GHG emissions due to agriculture; an assessment of the GHG emissions due to land use change (i.e. loss of carbon stock and sequestration when natural land is converted to another use).

The resulting plan, described herein, is the compilation of these efforts, and charts a clear path to reducing community GHG emissions in the unincorporated portions of the County for the near term (to the year 2020). The Plan addresses written comments received on an earlier draft, and makes clear how the Plan must be monitored, updated, and ultimately replaced. By addressing the goal of AB 32, the County is not eliminating all emissions or mitigating all possible impacts of projected development. Instead, the Plan is understood as a modest step in a positive direction, and would reverse the trend ("business as usual") of ever-increasing GHG emissions, ushering in a new planning process related to establishment of a local off-set program (as discussed below_.

1.4 What is this Plan?

This is a living document, the intent of which is three-fold.

First, the AB 32 Scoping Plan directs local governments to reduce their GHG emissions from both municipal operations and the community at large by 15% relative to current levels (i.e. the period 2004-2008). The Napa County CAP demonstrates that the County has completed analysis sufficient to determine what GHG levels were during the period 2004-2008 (in Napa's case, 2005 was selected as the baseline year). The CAP further demonstrates with quantitative analyses that through a combination of state, County and project level actions, it is feasible for the County to reduce its GHG emissions to a level that is 15% below current levels by 2020.

[4] Community-wide emissions refer to those emissions that result from all activities within the jurisdictional boundary, including activities of residents, businesses, visitors as well as activities associated with municipal operations. Municipal operations emissions refer to those emissions that result only from the County government's operations and provision of services and include but are not limited to operation of County buildings, fleet, landfills and wastewater treatment facilities. The municipal inventory overlaps in part with the community inventory where County operations occur within unincorporated areas. Where municipal operations occur within incorporated City areas, they are outside the community inventory. Napa County is taking action to reduce both community emissions (through this Plan) and County municipal emissions (through the ERP).

[5] See above

Second, the Napa County CAP satisfies mitigation measure M-4.8.7a in the Napa County General Plan EIR and the resulting Action Item in the General Plan. The Conservation Element of the General Plan includes policies and action items ensuring that the County will:

- Prepare a detailed inventory of current GHG emissions for the County in a manner consistent with Assembly Bill 32.
- Prepare a greenhouse gas reduction plan (GGRP) after completion of the GHG emission inventory to reduce GHG emissions to 1990 levels by 2020. (For purposes of this CAP, 1990 levels are assumed to be equivalent to 15% below 2005 levels.)

Third, this document is the foundation upon which all subsequent GHG planning and management in the County will be built. It is anticipated that GHG emission management and mitigation will become an integral part of all County planning activities moving forward and that the framework described in this CAP will be improved and expanded upon in the future. Specifically, the County is interested in development of a local off-set program to assist project applicants in meeting emission reduction requirements contained in the plan, and is committing to further planning for GHG reductions as the year 2020 approaches. While this CAP is the County's first step towards a continued commitment to minimizing their carbon footprint, it is also not the only plan or project that will address this issue. Other ongoing endeavors, such as implementation of the County's Voluntary Oak Woodlands Management Plan, completion of restoration projects along the Napa River and requirements that proposed projects mitigate for the loss of habitat, will also reduce carbon emissions over time.

Chapter 2

2005 GHG Emissions and 2020 Forecast

2.1 Methods and Data Sources

GHG emissions were estimated for the unincorporated portions of Napa County for the baseline year 2005 and projected for the BAU year 2020 using standard protocols and methodologies. These include:

- Local Governments Operations Protocol (LGOP) for the quantification and reporting of greenhouse gas emissions inventories (California Air Resources Board 2010)
- 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change 2006)
- Protocols contained in ICLEI Clean Air Climate Protection Software (ICLEI 2010a, b)
- Guidance for apportioning vehicle miles travelled between trip origins and destination from the SB 375 Regional Targets Advisory Committee (Regional Targets Advisory Committee 2009)
- Protocols used for the California Air Resources Board California Greenhouse Gas Emission Inventory and 2020 Limit[6] (CARB, 2010)
- Protocols used for the U.S. Environmental Protection Agency's (EPA) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009 (U.S. EPA, 2010)

These protocols were used in conjunction with Napa County specific data as provided by the County and from the following publications:

- Napa County General Plan (June 2008)
- Napa County General Plan Draft Environmental Impact Report (DEIR) and Final Environmental Impact Report (FEIR);
- Napa County Baseline Data Report
- 2050 Napa Valley Water Resources Study
- Napa/Solano Travel Demand Model
- Bay Area Regional Transportation Plan
- Napa County Conservation, Development and Planning Department (personal communications)

A complete description of the methods used to develop the GHG inventory and BAU forecast can be found in Appendix A.

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

2.2 GHG Emissions Inventory and Forecast

2.2.1 Napa County GHG Emissions in 2005

Total GHG emissions in 2005 for Napa County were 443,670 metric tons of carbon dioxide equivalents (MT CO2e).[7] GHG emissions in 2005 are listed by sector in Table 1 and shown by sector in Figure 1 below. These emissions are the result of activity associated with Napa County residents, businesses, farms and include the following sectors:

- residential building energy use
- commercial building energy use
- residential wastewater
- commercial wastewater
- waste generation
- on-road vehicles
- off-road vehicles
- agriculture
- land use change

The principal GHG gases that are emitted as a result of human activities are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and fluorinated gases (HFCs, PFCs and SF6). The data presented in table 1 and figure 1 account for emissions of CO2, CH4 and N2O, but do not include emissions of fluorinated compounds. Accurate data for usage and storage of these compounds is difficult to obtain8 and the associated emissions likely represent less than 5% of total County emissions. Efforts will be made to capture emissions of fluorinated compounds in regular updates to the County's GHG inventory.

[7] The January 2011 Draft CAP estimated total 2005 emissions at 398,112. The new estimate is 11% greater because of additional data and refinements, as explained in Section 2.5 Revisions to the Draft CAP.

[8] MIG. 2009. Internal Draft Napa County DRAFT Climate Action Plan. Provided by Napa County Conservation, Planning and Development Department.

Table 1: GHG Emissions in 2005 and Projected Emissions by 2020

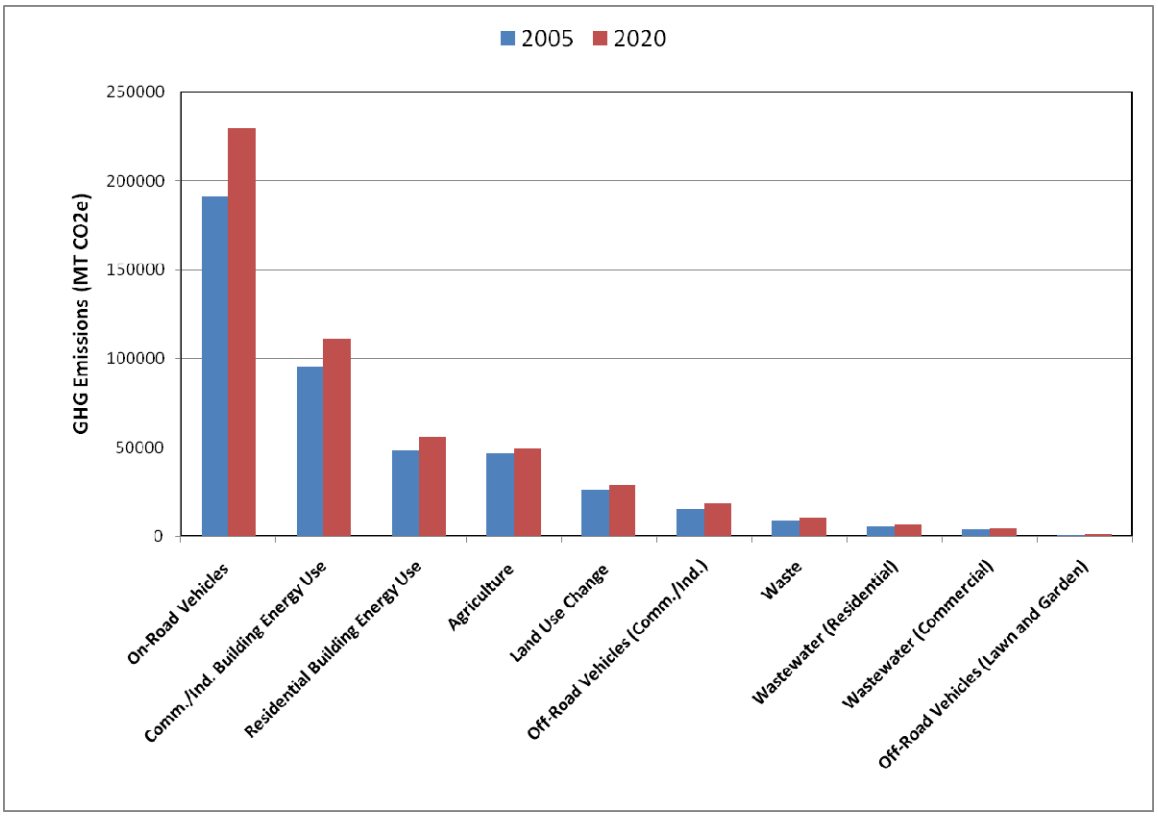
Sector	2005 (MT CO2e)	2005 (%)	2020 (MT CO2e)	2020 (%)
Building Energy Use (Residential)[1]	48,220	10.9	55,940	10.8
Building Energy Use (Commercial/Industrial)	95,320	21.5	111,060	21.5
Waste	9,240	2.1	10,630	2.1
Wastewater (Residential)	5,630	1.3	6,480	1.3
Wastewater (Commercial/Industrial)	4,270	1.0	4,730	0.9
On-Road Vehicles	191,270	43.1	230,100	44.5
Off-Road Vehicles (Lawn and Garden)	750	0.2	870	0.2
Off-Road Vehicles (Construction/Industrial)	15,870	3.6	18,830	3.6
Agriculture				
Vehicles/Equipment	*34,460*		*41,580*	
Enteric Fermentation	*8,130*		*4,410*	
Manure Management	*2,310*		*1,250*	
Fertilizer Use	*1,550*		*1,720*	
Lime Use	*350*		*440*	
Agriculture Total	46,800	10.5	49,400	9.6
Land Use Change				
Loss in carbon stock (RCI + Vineyard development)	*27,130*		*29,790*	
Gain in carbon stock (Vineyard development)	*(1,020)*		*(1,340)*	
Loss in annual sequestration capacity (RCI and Vineyard development)	*190*		*180*	
Land Use Change Total	26,300	5.9	28,630	5.5
TOTAL EMISSIONS[3]	443,670	100.0	516,670	100.0
Municipal Operations[2]	7,940		9,130	

[1] Includes energy used by wastewater treatment and water pumping facilities. Napa County does not require water imports from outside the County.

[2] Municipal operations are a subset of the community's emissions and are captured in each sector total. They are shown as a separate line item for informational purposes only and are not included in the total.

[3] All values rounded to the nearest 10 – consistent with the level of uncertainty of the overall inventory

Figure 1: GHG Emissions in 2005 and Projected Emissions by 2020



The largest source of GHG emissions in Napa County in 2005 was on-road transportation (43%), followed by commercial building energy (21%), residential building energy (11%) and agriculture (11%). Emissions due to waste generation, wastewater generation, off-road vehicles and land use change combined represent approximately 14% of total GHG emissions in 2005. Per capita emissions for Napa County in 2005 were 15.5 MT CO2e per person. Average per capita emissions for the state of California in 2005 were approximately 13 MT CO2e per person. Emissions by sector are described in section 2.3.

2.2.2 Napa County GHG Emissions Projected in 2020

Total GHG emissions in Napa County are projected to be 516,670 MT CO2e in 2020.[9] This represents an increase of approximately 16% over 2005 levels. GHG emissions in 2020 are listed by sector in Table 1 and shown by sector in Figure 1 above. The pattern of emissions in 2020 is similar to that in 2005. The largest source of emissions is projected to be on-road transportation (44%) followed by commercial building energy use (21%), residential energy use (11%) and agriculture (10%). Waste generation, wastewater generation, off-road vehicles and land use change combined account for approximately 14% of total emissions in 2020.

What is business as usual (BAU)?

The projected emissions in 2020 represent a "business as usual" (BAU) scenario which has specific meaning within the context of GHG reduction planning in California. BAU refers to the hypothetical

[9] The January 2011 Draft CAP estimated total 2020 emissions at 499,832. The new estimate is 3% greater because of additional data and refinements, as explained in Section 2.5 Revisions to the Draft CAP

condition where no actions are taken by either the state or the local government to curb emissions. BAU does not account for the actions that the County already considers fairly certain, such as improved future building standards and improvements in equipment efficiency. For the purposes of GHG emissions forecasting, BAU assumes that the per capita GHG emissions in 2005 will remain essentially unchanged going forward.

State regulations such as the Assembly Bill 1493 (Pavley) Vehicle Efficiency requirements and the Renewable Portfolio Standard and improvements in technology, will lead to reduced GHG emissions statewide; however, the BAU forecast does not account for these actions. Consequently, the BAU forecast is an overestimate of the City's future GHG emissions. It is the standard practice, however, for local government GHG assessments and is used as a reference point for all actions (known and unknown at this time) taken to reduce GHG emissions in a jurisdiction.

How are GHG emissions projected for a future year?

GHG emissions are the result of activity that occurs within the boundaries of the City including, but not limited to: the use of electricity in homes and businesses, driving cars, use of water, and the generation of wastewater and waste. As population and the economy grow, the activities that produce GHGs also increase. These activities generally increase at the same rate as population and job growth. Therefore, population and economic growth can be used to estimate the rate at which GHG emissions from each sector will increase in the future, assuming that the emissions per person are the same as they are now (i.e., the BAU scenario).

Table 2 shows the estimated growth in population, housing and jobs during the period 2005 to 2030, as reported in the Napa County General Plan Housing Element (Table 9). This data was used to estimate GHG emissions in Napa County in 2020.

Table 2: Projected growth in Napa County, 2005-2030

Sector	2005	2015	2020	2030
Population	28,600	31,397	33,290	36,114
Housing	11,492	12,687	13,393	14,718
Jobs	23,050	25,524	26,765	29,234

2.3 Sector Descriptions

Residential and Commercial Building Energy Use

The use of electricity by residential and commercial buildings results in the release of GHGs when fossil fuel (either coal or natural gas) is combusted at a power plant servicing Napa County residents and businesses. Although the combustion of fuel occurs outside of Napa County, the activities requiring electricity occur within the county's jurisdiction and are thus attributed to the County. Natural gas is used in buildings for on-site heating and cooking. In 2005, Napa County residents consumed approximately 329,620 MWh of electricity (38% residential, 62% commercial/industrial) resulting in emission 143,540 MT CO2e. To accommodate a growing economy and population, new homes and commercial/industrial spaces will be constructed during the period 2005-2020. Consumption of electricity and natural gas by Napa county buildings in 2020 is estimated to result in the release of 167,000 MT CO2e, an increase of 16% over 2005 conditions.

On-Road Vehicles

The combustion of gasoline or diesel fuel by on-road vehicles results in the release of GHG emissions. On-road vehicles include passenger vehicles, buses, and medium and heavy duty trucks traveling on Napa roadways. A detailed origin-destination analysis was performed using the Napa-Solano Travel demand model in order to allocate vehicle miles traveled (VMT) to the unincorporated portion of Napa County. A complete description of this analysis is provided in Appendix B.

In 2005, on-road vehicle transportation required the combustion of approximately 25 million gallons of gasoline and diesel fuel, resulting in the release of 191,270 MT CO2e, or 43% of total GHG emissions. In 2020, on-road transportation is projected to result in the release of 230,100 MT CO2e, or 45% of total County GHG emissions in 2020. This estimate accounts for typical increases in fuel economy, although does not account for more stringent efforts to increase fuel economy or decrease fuel carbon content such as the Pavley Standards or the Low Carbon Fuel Standard. On-road vehicles are the largest, single source of GHG emissions in Napa County both now and in the future.

Off-Road Vehicles and Equipment (non agriculture uses)

Off-road vehicles include lawn and garden equipment, recreational vehicles and construction and mobile industrial equipment. Combustion of gasoline or diesel fuel by this class of vehicles resulted in the release of 16,620 MT CO2e in 2005, or 3.7% of total County GHG emissions. In 2020, emissions from this source are estimated to be 19,700 MT CO2e, an increase of approximately 18%. These estimates do not account for agricultural vehicles which are discussed together with other agriculture related emissions below.

Waste Generation

In 2005, Napa County residents, businesses and farms sent approximately 31,500 tons of waste to regional landfills. 10 The unincorporated County had a diversion rate of approximately 75% in 2005, considerably higher than the state average of 52%, reflecting the presence of numerous recycling and composting programs. When waste decomposes in a landfill under anaerobic conditions, methane is reduced. Methane, (CH4), is a potent GHG, with a warming potential 21 times that of carbon dioxide. Land-filled waste generated in Napa County in 2005 will result in the release of 9,240 MT CO2e over the decomposition lifetime of the waste. These emissions are "credited" to the County in the year the waste was generated. If the County takes no action to expand diversion programs, waste generated by County residents, businesses and farms in 2020 will result in 10,630 MT of GHG emissions. GHG emissions due to waste generation are approximately 2% of total County emissions in both the baseline (2005) and future (2020) year.

The County does not own or operate landfills and is therefore not responsible for the GHG emissions associated with historical waste deposits (landfill as a stationary source).

Wastewater

GHG emissions are the result of two activities in the processing of wastewater: 1) energy use by treatment buildings/facilities and 2) fugitive emissions associated with the biological and chemical treatment of the waste. Energy used by wastewater treatment buildings/facilities was included in electricity and natural gas data provided by PG&E. The associated GHG emissions are therefore captured in the residential and commercial building energy sector.

[10] Steve Kokotas, MIG, 2011. Personal communication.

Fugitive release of CH4 and N2O during the treatment of residential wastewater in 2005 was on the order of 5,630 MT CO2e. This includes wastewater treated in a centralized wastewater treatment plant or an on-site septic system. In 2020, GHG emissions from the processing of residential wastewater are estimated to be 6,480 MT CO2e. Commercial wastewater, largely associated with winery operations, resulted in the release of approximately 4,270 MTCO2e.[11] In 2020, this source is estimated to yield 4,730 MT CO2e. The wastewater sector (residential and commercial) is responsible for 2.3% of total County GHG emissions in both the baseline (2005) and future (2020) year.

Water Consumption

Energy is required to pump, treat and distribute potable water within a jurisdiction. For many California communities, energy is also required to transport water to the jurisdiction from another location in California or the Colorado River basin (i.e. the state water project). Napa County does not currently require water imports to meet its residential, commercial and agricultural water needs. Therefore all energy required to pump, treat and distribute water is consumed locally and was included in electricity data provided by PG&E. Stand alone, diesel power pumps are included in the ARB's OFFROAD model which was used to estimate GHG emissions in the off-road sector above. Emissions associated with energy used to pump, treat and distribute water in Napa County are captured in the building energy sector. A small percentage of emissions are captured in the off-road vehicle/equipment sector.

Agriculture (other than land use change)

GHG emissions due to agriculture in Napa County are the result of the following activities: 1) consumption of fuel by agricultural vehicles and equipment 2) enteric fermentation by ruminant livestock 3) management of manure 4) application of fertilizer and lime. Emissions associated with fermentation of grapes are not included because release of carbon dioxide during fermentation does not result in a net increase of atmospheric carbon dioxide because grapes release carbon dioxide during fermentation that was originally taken in during growth. Landfill methane emissions due to disposal of harvest vegetative matter (grapes, leaves, etc.) in landfills were included, but disposal of vegetative matter by other means was not estimated due to a lack of readily available data on other disposal methods and quantities.

The burning of diesel and gasoline by agricultural vehicles and equipment in 2005 resulted in the release of 34,460 MT CO2e. 74% of all agricultural emissions and 8% of total County GHG emissions in 2005 were due to agricultural vehicles and equipment. . In 2020, agricultural vehicles are projected to produce 41,850 MTCO2e in emissions.

Napa County livestock were responsible for the release of 10,440 MT CO2e in 2005. Livestock populations in the County have been declining for several decades. This trend is expected to continue through 2020, resulting in a decline in associated emissions (5,660 MT CO2e in 2020). Fertilizer application for grapes is small relative to other types of crops. GHG emissions due to fertilizer and lime application were 1,900 MT CO2 in 2005 and projected to be 2,160 MT CO2e in 2020.

[11] GHGs generated during the on-site treatment of winery wastewater vary significantly based on the treatment practices used. Practices used for on-site treatment of winery wastewater vary substantially from site to site. Data at the individual winery level was not collected as part of this effort. A minimal level of pre-treatment was assumed for all wastewater generated by Napa wineries. Therefore the commercial wastewater GHG emissions listed in table1 and figure 1 are likely an over-estimate, as they do not account for best practices that may have been in place at numerous wineries in 2005.

Land Use Change

In 2005, Napa County contained more than 375,000 acres of vegetated land cover such as grasslands, shrub lands, coniferous forests, riparian forests, oak woodlands and wetlands.[12] Additionally, in 2005, approximately 64,000 acres were devoted to agriculture in Napa County, 40,000 acres to vines. Vegetation removes carbon from the atmosphere and stores the carbon for the life of the plant in the plant structure (roots, trunks, leaves, branches, and soil) thereby acting as a carbon sink. The conversion of vegetated lands to land uses that store less carbon or no carbon relative to the former use is equivalent to a GHG emission. The conversion of vegetated lands results in the release of the stored carbon stock as well as a decrease in the strength of the annual carbon sink.

The Napa County General Plan provides for additional lands to be devoted to residential, commercial, and light industrial development (RCI) and/or new vineyards by 2030. Between 2005 and 2030, the General Plan Update FEIR projected that there would be between 10,000 and 12,500 new acres of vineyard and approximately 7,100 acres of land conversion attributable to RCI development. These projections were used in the January 2011 Draft CAP, and revised in response to comments received. (See Section 2.5 Revisions to the Draft CAP for an explanation.)

Between 2005 and 2020, this CAP assumes approximately 586 acres per year will be converted from its current land cover type to vineyard (301 acres) or RCI development (285 acres) each year. In aggregate, an additional 4,500 acres is estimate to become vineyards and an additional 4,270 acres will be converted to RCI uses between 2005 and 2020. The conversion of natural lands to RCI or vineyard uses in 2005 resulted in the release of 26,300 MT CO2e in 2005. In the absence of any action to curb or alter the pattern of land use change in the County, in 2020, the conversion of natural lands to RCI/vineyard uses is projected to result in the release of 28,630 MT CO2e in 2020. [13]

2.4 Setting a GHG Reduction Goal

The AB 32 Scoping Plan indicates that the state cannot reach its GHG reduction goal of 1990 levels by 2020 without assistance and action by local governments. The AB 32 Scoping Plan recommends that local governments set a GHG reduction target for both their municipal operations and the community as a whole that is 15 percent below "current" emissions. The Scoping Plan did not define the specific base year for defining what "current" meant, but a review of the state's emissions forecasts indicate that a base year should be between 2005 and 2008 to utilize the 15 percent reduction target. Figure 2 and Table 3 show what this goal means for Napa County, with a baseline year of 2005.

[12] Napa Baseline Data Report, 2005.

[13] GHG emissions that result from land use change are categorized as scope 3 and are not commonly included in local government inventories in California. This sector is discussed in detail, including methods used to estimate emissions in 2005 and 2020, in appendix A. Also see Section 2.5 Revisions to the Draft CAP for an explanation of the changes in development projections.

Figure 2: 2020 GHG Emissions and Reduction Target

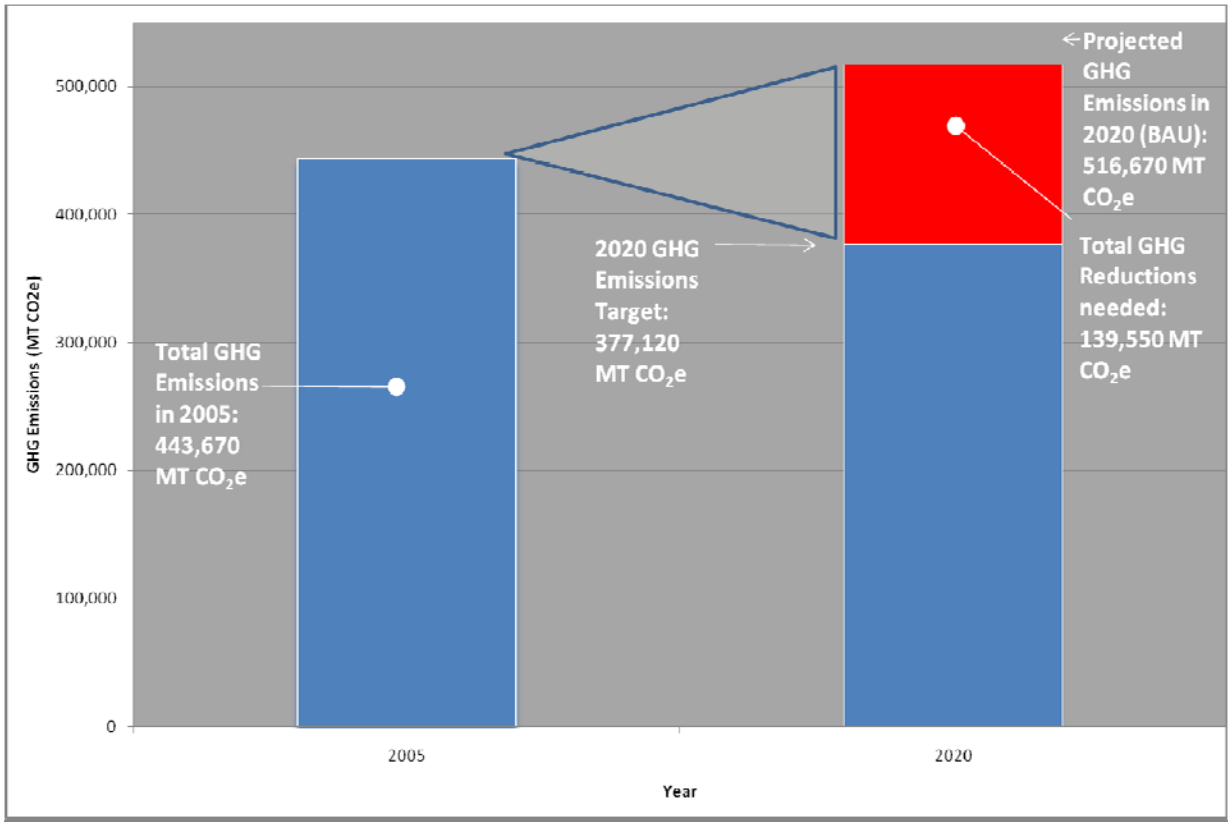


Table 3: 2020 GHG Emissions and Reduction Target

Target Tracking	(MT CO2e)
2005 Emissions	443,670
2020 BAU Emissions	516,670
2020 Emissions Target (15% Below 2005 Levels)	377,120
Reductions Needed to Reach Target	139,550

Total GHG emissions in 2005 were 443,670 MT CO_2e. A level of GHG emissions 15% less than the 2005 level would be 377,120 MT CO_2e. Based on projected population and job growth in the City, GHG emissions in 2020 are expected to be 516,670 MT CO_2e. In order for the County to reach a target level of GHG emissions in 2020 that is 15% below the 2005 level, the County needs to identify 139,550 MT CO_2e in GHG reductions through the CAP process. The specific actions (state, local and project level) that allow the county to avoid 139,550 MT of CO2e in 2020 and reach the target are described in Chapter 3.

2.5 Revisions to the Draft CAP

The Draft CAP was released for public review in January 2011. Pursuant to comments and suggestions provided by environmental and agricultural stakeholders, the Bay Area Air Quality Management District (BAAQMD), and other members of the public, the following key revisions were made to the Draft CAP:

- **Adjusted Projections of Vineyard Development to Reflect Current Data.**
  - The Draft CAP was based on the General Plan projections. The General Plan projections were based on Agricultural Commissioner data ("bearing acres" from 1958-2004 crop reports). The General Plan assumed that the pace of development would gradually slow, but 10,000 to 12,500 acres would be developed between 2005 and 2030. This rate of growth translated into 400-500 ac/year in the early years, and less in the out years (6,000 – 7,500 acres between 2005 and 2020).
  - Actual Vineyard Erosion Control Plan approvals on slopes > 5% between 2000-2011 support a rate of slower growth since the year 2000. There is evidence that the rate of vineyard approvals and the rate of vineyard construction is less than projected in the General Plan
  - A more robust projection, taking into account economic factors and development constraints is clearly warranted. In the meantime, using recent data on the actual acreage approved per year and GIS analysis of aerial photos suggests that 250 to 300 acres/year of vineyard development on average is a reasonably assumption for the near term.
  - The General Plan also made broad assumptions about the potential land cover types affected by vineyard conversion. GIS analysis of historic aerial photos can be used along with vegetation data layer to better project the impact of recently constructed vineyards on land cover types. The County completed this analysis and used the percentages from the analysis as the assumptions for near-term vineyards for the CAP analysis.
  - Due to this more refined analysis, the assumed amount of vineyard conversions for the Revised CAP is 4,500 acres, compared to approximately 6,700 acres in the Draft CAP. In addition, the assumed percentage of different land covers converted was changed for the Revised CAP compared to the Draft CAP to reflect the more recent type conversion trends.
- **Vineyard Conversion Added to the 2005 Base Inventory.**
  - In the Draft CAP, vineyard conversion emissions were not included in the 2005 base year inventory. In order to ensure that comparisons between 2005 and 2020 are a comparison of the known emissions in each time period and to treat GHG emissions associated with vineyard conversion on an equal basis with other emission sectors, it was decided that vineyard emissions should be included in the base year. This result in an increase in base year emissions compares to the Draft CAP.
- **Change in Presentation of Carbon Stock/Sequestration Emissions**
  - In the Draft CAP, the focus was on the net annual change in GHG emissions related to carbon stock and sequestration between 2005 and 2020. Thus emissions presented for 2020 were not actual emissions in 2020, but rather an annual change number from 2005. This presentation was confusing to a number of commenters.
  - In order to present annual emissions for each inventory/forecast year more clearly, emissions associated with change in land cover are presented in the Revised CAP for both 2005 and 2020. This allows for a more clear comparison of annual emissions in the inventory or forecast year. The change in presentation only resulted in a minor change in

the GHG emissions for this sector for the Revised CAP (28,534 metric tons) compared to the Draft CAP (27,534 metric tons).

- **Expanded Agricultural Emissions Inventory.**
  - Per comment from the BAAQMD, the agricultural sector inventory for 2005 and forecast for 2020 were expanded to include additional emission sources. Emissions associated with enteric fermentation (due to livestock), manure management (due to livestock), fertilizer use, and lime application were added to both the 2005 and 2020 totals. In addition, the emissions of agricultural equipment were updated using more current emissions factors from CARB's OFFROAD model. These additions and updates increased 2005 GHG emissions by approximately 15,000 metric tons and increased 2020 GHG emissions by approximately 10,000 metric tons. The increases were not the same in each time period because emissions associated with livestock are projected to decrease as the livestock herd decline in Napa County.
- **Inclusion of Commercial Wastewater.**
  - GHG emissions from municipal wastewater treatment was included in the Draft CAP inventory and forecast. The Revised CAP added commercial wastewater due to private wastewater treatment associated with winery processing. This estimate was based on the amount of gallons of wine produced in Napa County rather than a specific tally of actual processing emissions due to the lack of readily available data on wastewater treatment for local wineries. This addition increased 2005 GHG emissions by approximately 4,300 metric tons and increased 2020 GHG emissions by approximately 4,700 metric tons.
- **Addition of GHG emission reductions associated with the Certified Winery Program**
  - The Revised CAP included emissions reductions associated with the certified winery program. Data from 11 participating wineries were examined and GHG reduction rates were identified based on total electricity savings achieved. There are an estimated 28 current participating wineries, which the County expects to increase to 90 wineries by 2020 and approximately 3,300 metric tons of additional reduction are expected by 2020 compared to 2005.
- **Update of Calculated Project Level Reductions Needed to Meet County Target**
  - The Draft CAP included additional reductions needed at a project level from new land use development and new vineyard conversions. The percentage reduction for these two sectors was set at the same level in order to treat each sector equally. In the Draft CAP, the percentage reduction for new projects was estimated as 51.5% compared to an unmitigated condition. Due to the changes in inventories and forecasts described above, and due to the addition of reductions from the certified winery program, the estimated percentage reduction for new projects was reduced to 38 percent for the Revised CAP.
  - In the Draft CAP, the equalization of burden sharing was not explicitly stated, but was driving the identification of the amounts of reduction for new development and vineyard conversions. In the Revised CAP, these burdens are more explicitly explained. Burden sharing is discussed in greater detail in Master Response No. 3 in Appendix C.
- **Explanations of Terms and Methods**
  - The Revised CAP was clarified to better explain certain technical terms and methodology in response to comments.

The Master Responses in Appendix C also provide further clarification of issues raised in comment regarding the GHG inventory and forecast used for the CAP.

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Chapter 3
Emissions Reduction Measures

3.1 Reaching the Reduction Target – State, Local and Project Level Actions

It is the County's goal that in 2020, the community's GHG emissions will be 15% less than the 2005 level of emissions. To achieve this goal, the County needs to implement actions, policies or programs (referred to collectively as "measures" in this plan) that would avoid approximately 139,550 MT CO2e in 2020.

Through the development of this climate action plan (or CAP) the County has identified a menu of 35 actions or measures that when implemented will achieve this reduction target. Full implementation of the CAP and reaching of the reduction target will require a combination of state, local and project level action. The respective GHG reductions achieved by each entity are shown in Figure 3 and Table 4. A complete list of measures is provided in Appendix A.

Figure 3: Reaching the GHG Reduction Target - State, Local and Project Level Actions

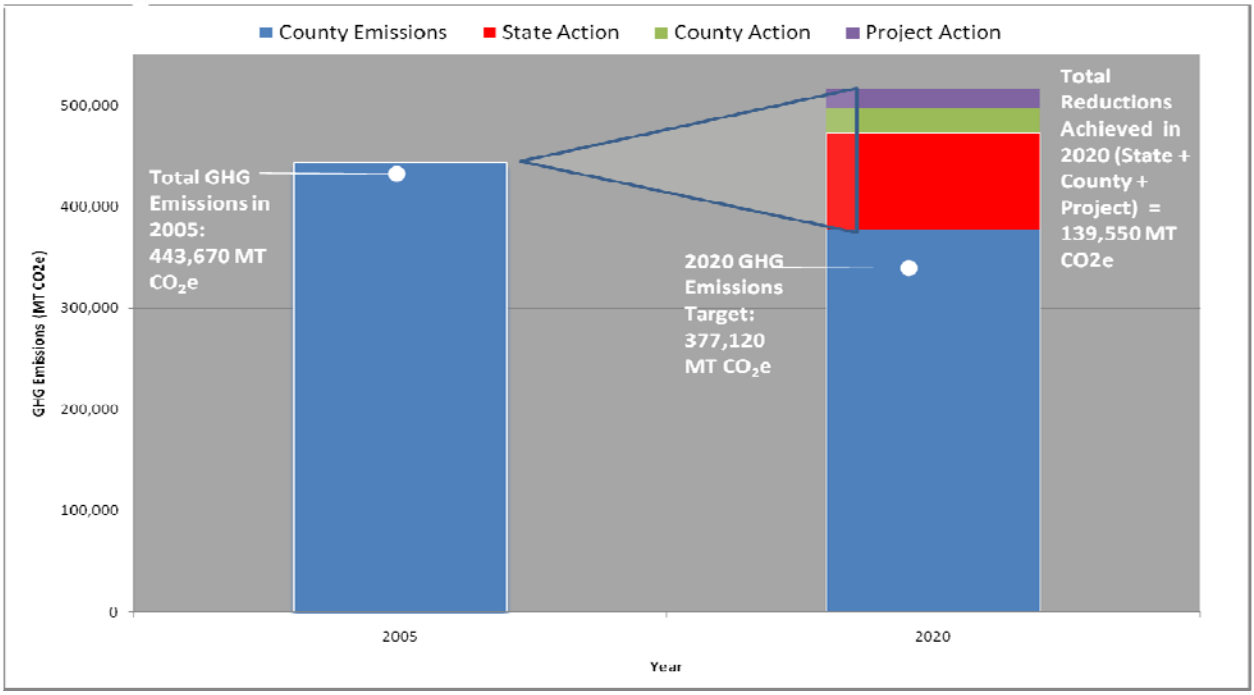


Table 4: Reaching the GHG Reduction Target – State, Local and Project Level Action

Target Tracking	(MT CO2e)
2005 Emissions	443,670
2020 BAU Emissions	516,670
2020 Emissions Target (15% Below 2005 Levels)	377,120
Reductions Needed to Reach Target	139,550
State Level Reductions	(96,480)
County Level Reductions	(23,720)
Project Level Reductions	(19,350)
Total GHG Reductions In 2020	(139,550)

All values have been rounded to the nearest 10 metric tons consistent with estimates for error in both inventory and reduction quantification

3.1.1 State Level Actions

The state of California has already committed to a suite of actions that will result in GHG reductions within Napa County that do not require additional action by the County. These measures are listed in Table 5 and again in Appendix A as *State Measures.*

Table 5: State GHG Reduction Measures

Measure	Description
S1	AB 1493 Pavley I and II
S2	Low Carbon Fuel Standard
S3	Other Vehicle Efficiency Measures
S4	Renewable Portfolio Standard
S5	Landfill Methane Regulation

As shown in Table 4, statewide reduction measures are expected to reduce 2020 BAU emissions in the County by 96,480 $MTCO_2e$. The statewide reduction measures are primarily associated with reductions in on-road and off-road GHG emissions, increased energy efficiency, and the increased use of renewable power. Statewide reduction measures will achieve approximately 68% of the total reductions needed by Napa County to meet its target for 2020 (Table 4). These measures are discussed again in the sector summaries below (Section 3.2).

3.1.2 County Level Actions

The County has broad influence and unique jurisdictional control over certain activities that produce GHG emissions – control that that state cannot exercise. Thus, The County can develop programs or policies targeting GHG emissions that are not addressed through state level actions. The County is committed to implementing the measures listed in Table 5 in order to reduce GHG emissions from a variety of sectors within the County.

The programs and policies listed in Table 6 result in 23,700 MT CO2e in avoided GHG emissions in 2020, relative to the BAU projection. This is 17% of the GHG reductions needed to reach the target. Individual programs and policies are described in more detail in Section 3.2 – Sector View.

Table 6: County GHG Reduction Measures

Energy Efficiency Measures	
EE-1	Green Building Ordinance (Meet Title 24, including Cal-Green)
EE-2	Energy Efficiency Financing District (California FIRST or equivalent program)
EE-3	Weatherization of Low-Income Homes
EE-4	Plant Trees for Shading for Discretionary Projects
EE-5	Passive Design for Discretionary Projects
Water Measures	
W-1	Comprehensive Water Efficiency Ordinance
W-2	Landscape Ordinance
W-3	Recycled Water
W-4	Agricultural Water Conservation Programs
Waste Measures	
WST-1	Expand/start a kitchen waste composting program
WST-2	Expand/start C&D waste program (C& D benefits are accounted for as part of Cal-Green [EE-1])
WST-3	Waste Minimization and Public Outreach
Renewable Energy Measures	
RE-1	Renewable Energy Financing District (California FIRST program or equivalent)
RE-2	Biofuels and Landfill GTE at Clover Flat
RE-3	Remove Barriers to Renewable Energy Development
Transportation Measures	
T-1	Promote Dense, Mixed-Use Developments
T-2	Integrate Below Market Rate Housing
T-3	Requirements for Use Permit Applicants
T-4	Traffic Calming Improvements
T-5	Bicycle Network and Bicycle Parking
T-6	Improve Transit Network
T-7	Station Bike Parking
T-8	Park-and-Ride Lots
T-9	Required Contributions for Transit Access Improvements
T-10	Employer-Based Commute Trip Reduction Program
T-11	Provide Employer Sponsored Vanpool/Shuttle
T-12	Reduce Parking Requirements and Establish Parking Maximums
T-13	Preferential Parking
T-14	Improve Traffic Flow

3.1.3 Project Level Actions

The Napa County CAP also contains a GHG reduction measure to be applied at the project level for new discretionary development, including new discretionary vineyard conversions. Through this measure, all project proponents are required to do the following:

- Estimate total emissions of the project under a BAU scenario including emissions due to land use change (i.e. the loss in carbon stock and sequestration)
- Account for GHG benefits of the state and County level actions
- Select additional actions unique to the project that result in an overall reduction of 38% taking into account state, local and project-level actions.

Individual emission sectors do not have unique goals for reduction. Consequently, at a project level, certain sectors can be leveraged to accomplish a large portion of the GHG reduction goal, based on the project's opportunities and preferences. Project level commitments must meet a standard using mitigation from any sector or sector combination selected by the proponent. This approach provides proponents the flexibility to meet the project specific GHG target through a large menu of options across all sectors, including actions that increase carbon sequestration or avoid the loss of carbon sequestration. Through this program, project proponents can select the means that are best suited to the specific project.

Project level mitigation is the only means in the CAP whereby GHG emissions due to land use change are addressed. GHG emissions associated with the conversion of natural lands to other uses represent approximately 6% of total community emissions in the baseline and future year, making this the 5th largest source of emissions in Napa County.

3.2 Reaching the Reduction Target – Sector View

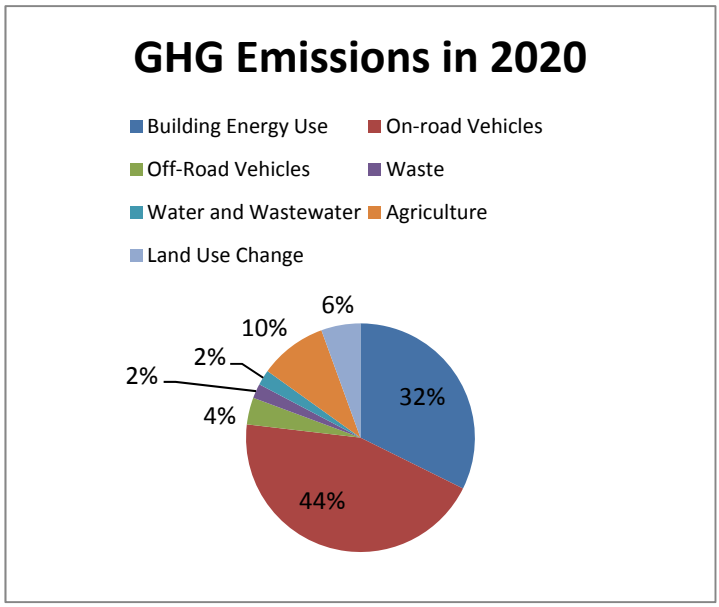
GHG emissions from the following sectors were captured in the inventory and forecast: residential and commercial building energy use; on-road transportation; off-road transportation; water and wastewater; waste generation; agriculture and land use change. The CAP contains reduction strategies that target each of these sectors and collectively the strategies result in the County achieving its goal to reduce emissions by 15%.

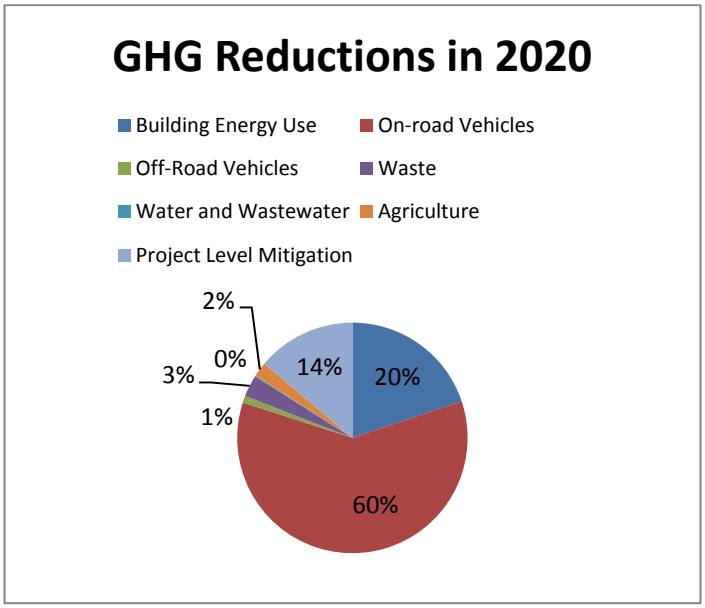
Table 7 shows the GHG reductions achieved by sector. Each sector total may contain the benefits of actions implemented by the state, county or project proponent. Figure 4 shows a distribution of emissions by sector in 2020 and the corresponding reductions within each sector. Figure 4 shows that the largest four emitting sectors in 2020 (on-road transportation, building energy use, agriculture and project level mitigation (including land use change) are also the sectors where the majority of reductions will be achieved. Reductions by sector are described in the following sections.

Table 7: Reaching the GHG Reduction Target – Sector View

Target Tracking	(MT CO2e)
2005 Emissions	443,670
2020 BAU Emissions	516,670
2020 Emissions Target (15% Below 2005 Levels)	377,120
Reductions Needed to Reach Target	139,550
Building Energy	(27,720)
On-Road Transportation	(83,900)
Off-Road Vehicles	(1,320)
Waste Generation	(4,280)
Water and Wastewater	(190)
Agriculture	(2,790)
Project Level Mitigation (Including land use change mitigation)	(19,350)
Total GHG Reductions In 2020	(139,550)
All values have been rounded to the nearest 10 metric tons consistent with estimates for error in both inventory and reduction quantification	

Figure 4: GHG Emissions and Reductions in 2020





Residential and Commercial Building Energy Use

The building energy use sector represented a significant source of GHG emissions in 2005 (33%) and is projected to be a large source of total County emissions in 2020 (33%). Future GHG emissions in this sector can be reduced through the retrofitting of existing buildings to make them more energy efficient, through the construction of new buildings to a high standard of energy efficiency or through the increased use of renewable power by both new and existing buildings. The County has opted for a three-pronged approach targeting energy efficiency in new construction and existing

buildings as well as renewable energy. Implementation of measures EE1-EE6 and RE1-RE3 will result in 10,410 MT CO2e of avoided GHG emissions in 2020. Through the California Renewable Portfolio Standard, the electricity that buildings consume in 2020 will be less carbon intensive, providing an additional 17,310 MT CO2e in GHG benefits. Total GHG reductions in the building energy sector in 2020 are 27,720 MT CO2e, or 20% of the total reductions needed.

Table 8: GHG Reduction Measures in the Building Energy Use Sector

GHG Emissions		(MT CO2e)
	2005 Building Energy Emissions (commercial and residential	143,540
	2020 Building Energy Emissions	167,000
GHG Reduction Measures		(MT CO2e)
S-4	Renewable Portfolio Standard	17,310
EE-1	Green Building Ordinance (Meet Title 24, Including Cal-Green)	3,670
EE-2	Energy Efficiency Retrofit Financing District (California FIRST or equivalent program)	940
EE-3	Weatherization of Low Income Homes	50
EE-4	Plant Trees for Shading for Discretionary Projects	220
EE-5	Passive Design for Discretionary Projects	NQ+[1]
EE-6	Napa Certified Winery Program[2]	3,320
RE-1	Renewable Energy Financing District (California FIRST or equivalent program)	1,610
RE-2	Biofuels and landfill GTE at Clover Flat Landfill	470
RE-3	Remove Barriers to Renewable Energy Development	130
TOTAL GHG REDUCTIONS IN 2020 – BUILDING ENERGY SECTOR[3]		27,720

[1] NQ+ - measure likely results in positive GHG benefit but could not be quantified

[2] Accounts for building energy savings (majority) and water conservation achieved through this program

All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations

A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

On-Road Vehicles

In 2005, fuel combustion by on-road vehicles was the largest single source of GHG emissions in the unincorporated County (43%). This sector is projected to be the largest source of in GHG emissions in 2020 as well (45%). Future GHG emissions in this sector can be reduced by either reducing the number of single passenger trips (i.e. vehicle miles traveled) by Napa County residents, visitors and workers OR by reducing the amount of fuel or carbon associated with those trips (i.e. making vehicles more fuel and/or carbon efficient). Because the state has vast authority over state-wide fuel standards, they have initiated a multi-faceted program to increase vehicle efficiency and reduce auto trips. [14]

State level programs (Pavley I and II, Low Carbon Fuel standard and other vehicle efficiency measures as outlined in the AB 32 Scoping Plan) will increase fuel economy starting in model year 2012 and reduce the carbon content of fuels sold in California. These programs alone, which require no action on the part of the County, will reduce GHG emissions in this sector by 31 % in 2020.

[14] The California legislature has also passed SB 375 which will increase transit oriented development throughout the region. However, until the MPO develops a Sustainable Communities Strategy (SCS) as required by SB 375, the exact GHG benefits of this law cannot be estimated.

Implementation of measures T1-T14 by the County will reduce GHG emissions by an additional 5 %, relative to the BAU scenario. Total GHG reductions in the on-road transportation sector in 2020 are 83,900 MT CO2e.

Table 9: GHG Reduction Measures in the On-Road Vehicles Sector

GHG Emissions		(MT CO2e)
	2005 On-road Transportation Emissions	191,270
	2020 On-road Transportation Emissions	230,100
GHG Reduction Measures		(MT CO2e)
S-1	AB 1493 Pavley I and II	50,790
S-2	Low Carbon Fuel Standard	15,420
S-3	Other Vehicle Efficiency Measures	4,600
T-1	Promote Dense, Mixed-Use Development	4,400
T-2	Integrate Below Market Rate Housing	50-100
T-3	Requirements for Use Permit Applications	NQ + [1]
T-4	Traffic Calming Improvements	100
T-5	Bicycle Network and Bicycle Parking	10
T-6	Improve Transit Network	500-2,200
T-7	Station Bike Parking	NQ + [2]
T-8	Park and Ride Lots	NQ + [3]
T-9	Required Contributions for Transit Access Improvements	NQ + [4]
T-10	Employer-Based commute Trip Reduction Programs	3,500 – 6,000
T-11	Employer Sponsored Vanpool/Shuttle	100 -2,400
T-12	Reduce Parking Requirements and Require Parking Maximums	500 – 1,600
T-13	Preferential Parking	NQ + [5]
T-14	Improve Traffic Flow	< 100
TOTAL GHG REDUCTIONS IN 2020 – ON-ROAD TRANSPORTATION SECTOR[6]		83,900

[1] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; complementary to parking strategies

[2] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; complementary to transit network strategies

[3] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; complementary to transit network and commute strategies

[4] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; complementary to transit network strategies

[5] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; complementary to parking strategies

[6] Range of GHG benefits for measures T1-T14 = (9,260 – 16,910). Total uses average 13,085 MT CO2e.

All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations

A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

Off-Road Vehicles and Equipment (non agriculture uses)

In 2005, fuel combustion by lawn, garden, recreational off-road and commercial or industrial vehicles resulted in the release of 16,620Mt CO2e of GHG emissions. This does not include fuel combusted by vehicles or equipment in the agricultural industry but does include construction and

other offroad equipment. In 2020, GHG emissions from this sector are expected to be 19,700MT CO2e, or approximately 4 % of the County's total emissions.

The Low Carbon Fuel Standard will reduce the carbon content and consequent GHG emissions associated with all diesel and gasoline sold in California, regardless of the vehicle type that ultimately consumes the fuel. Implementation of this measure by the state will result in 1,320 MT CO2e off avoided GHG emissions in 2020.

Table 10: GHG Reduction Measures in the Off-Road Vehicles/Equipment Sector

GHG Emissions		(MT CO2e)
	2005 Off-Road Transportation Emissions	16,620
	2020 Off-Road Transportation Emissions	19,700
GHG Reduction Measures		(MT CO2e)
S-2	Low Carbon Fuel Standard	1,320
TOTAL GHG REDUCTIONS IN 2020 – OFF-ROAD TRANSPORTATION SECTOR		1,320

All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations

A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

Waste Generation

Waste generated by Napa County residents, visitors and workers in 2005 will result in 9,240 MT CO2e in GHG emissions over the lifetime of the waste. Projected waste generation in 2020 will result in 10,630 MT CO2e in GHG emissions over the lifetime of the waste. Because Napa County does not own or operate landfills and because numerous successful waste diversion programs were already in place in the baseline GHG inventory year, opportunities for large GHG savings in the waste sector are limited.

Although the county does not own or operate landfills, they will benefit from the installation (required or voluntary) or improvement of gas capture technologies at landfills that receive Napa County waste. The state's Landfill Methane Capture rule (measure S-5) will require upgrades or first-time installations at many landfills across the state, including Keller Canyon and Clover Flat Landfill which receive Napa waste. The GHG cost associated with disposing of waste at these sites will be reduced as a result. Additional, but modest GHG reductions will be achieved through expansion of the kitchen waste composting program. Total GHG reductions in this sector in 2020 are 4,280 MT CO2e.

Table 11: GHG Reduction Measures in the Waste Sector

GHG Emissions		(MT CO2e)
	2005 Waste Generation Emissions	9,240
	2020 Waste Generation Emissions	10,630
GHG Reduction Measures		(MT CO2e)
S-5	Landfill Methane Regulation	4,250
WST-1	Expand/start a Kitchen Waste Composting Program	30
WST-2	Expand/start a C&D Waste Program	NQ + [1]
WST-3	Waste Minimization and Public Outreach	NQ + [2]
TOTAL GHG REDUCTIONS IN 2020 – WASTE SECTOR		4,280

[1] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; some portion captured through EE-1, CalGreen.

[2] NQ+ - measure likely results in positive GHG benefit but could not be quantified alone; supports success of existing and planned diversion programs.

All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations

A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

Water and Wastewater

Water Consumption

Unincorporated Napa County obtains much of its needed water from local groundwater supplies and does not currently rely on water imports from the State Water Project. Consequently, energy intensity of water consumed in the County is low relative to many communities in California. Further, because all energy associated with water use in Napa County is consumed locally, the GHG emissions are captured in the building energy use sector and in the off-road equipment sector. [15] Despite modest GHG benefits, the County is committed to supporting a sustainable, long-term regional water supply and will pursue measures W1-W4 as part of the CAP. Total GHG reductions in the water supply are 190 MT CO2e.

Wastewater

Energy use and fugitive emissions associated with the treatment of residential and commercial wastewater generated 9,900 MT CO2e in 2005, approximately 2% of total County emissions. GHG emissions from this sector are projected to be 11,210 MT CO2e in 2020, also 2% of total projected emissions. Future emissions in this sector can be reduced through technologies installed at wastewater treatment facilities. These technologies increase energy efficiency at the plant and capture fugitive CH4 and/or N2O. The GHG intensity of wastewater that is treated at the centralized plant is thus reduced. The County does not own or operate the centralized wastewater treatment facility servicing Napa County. No GHG reduction measures are proposed in this sector.

It is estimated that the winery industry in Napa County generates in on the order of 100 million gallons of wastewater per year[16]. Some fraction of which is treated on-site at individual wineries.

[15] Energy use associated with water consumption was not disaggregated from other building energy uses in the inventory prepared by MIG in 2005. Data was not available to disaggregate this sector as part of this effort.

[16] Assumes production of 9 million cases of wine per year and approximately 12 gallons of wastewater produced per case

GHG emissions associated with the on-site treatment of winery wastewater could be greatly reduced if certain BMPs were standardized or required. At this time, the County has not conducted a detailed survey of winery wastewater treatment practices and has not determined the magnitude of GHG benefit potential. No measures are proposed, although some benefits are likely already being achieved through the Napa Certified Winery Program.

Table 12: GHG Reduction Measures in the Water and Wastewater Sectors

GHG Emissions		(MT CO2e)
	2005 Water Consumption Emissions	Unknown[1]
	2020 Water Consumption Emissions	Unknown
	2005 Wastewater Emissions (residential and commercial)	9,900
	2020 Wastewater Emissions (residential and commercial)	11,210
GHG Reduction Measures		(MT CO2e)
W-1	Comprehensive Water Efficiency Ordinance	20
W-2	Landscape Ordinance	10
W-3	Recycled Water	NQ [2]
W-4	Agricultural Water Conservation Programs	160
TOTAL GHG REDUCTIONS IN 2020 – WATER AND WASTEWATER SECTORS		190

[1] Energy use due to water pumping and distribution is captured in the building energy use and is not disaggregated

[2] NQ – Although measure supports a sustainable water supply, measure may not result in significant GHG savings, as energy use associated with water in Napa County is low. Future benefits would be larger if the County requires water imports in the future.

All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations

A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

Agriculture

The agriculture sector was the 4th largest source of GHG emissions in the County in 2005, producing 46,800 MT CO2e. These emissions were associated with vehicles and equipment, livestock and the use of fertilizer. Fuel combustion by farm/vineyard equipment and vehicles accounted for nearly 75 % of all agriculture emissions. Emissions attributable to fertilizer use is modest (3% of all agricultural emissions) because Napa County's primary agricultural activity involves growing wine grapes, which do not require fertilizers in quantities comparable to row crops or other agricultural activities (e.g. rice or grain crops).

Agriculture is vital to Napa County's economy and character. In 2005, 40,000 acres were devoted to vineyards (~23,000 additional acres devoted to other crops) and the economic impact of the wine industry was estimated at approximately 9 billion dollars. 17 The County continues to be a leader in agricultural land preservation and is committed to the long-term economic vitality of this sector. Consequently, this sector will continue to represent a large fraction of total County emissions, even if the nature and pattern of agriculture is changing. For example, the livestock population in the county is projected to decrease by approximately 40 %18 before 2020, with a coincident decrease in GHG emissions.

[17] MKF Research, 2005, as reported in Napa County General Plan, 2009, Agricultural Preservation and Land Use.

[18] Based on trends between 1997 and 2007 as reported in the USDA Census

The Low Carbon Fuel Standard will reduce the carbon content and consequent GHG emissions associated with all diesel and gasoline sold in California, regardless of the vehicle type that ultimately consumes the fuel. Implementation of this measure by the state will result in 2,790 MT CO2e of avoided GHG emissions in 2020.

The CAP does not include any County level requirements or policies directed at fertilizer use, equipment or livestock at this time. However, the project level mitigation program allows individual projects to pursue GHG mitigation in these categories if selected by a project proponent.

Table 13 – GHG Reduction Measures in the Agriculture Sector

GHG Emissions		(MT CO2e)
	2005 Agriculture Emissions	46,800
	2020 Agriculture Emissions	49,400
GHG Reduction Measures		(MT CO2e)
S-2	Low Carbon Fuel Standard	2,790
TOTAL GHG REDUCTIONS IN 2020 – AGRICULTURE SECTOR		2,790

Note: Does not include land use change reduction measures which are included in project-level mitigation.
All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations
A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

Project Level Mitigation (Including Land Use Change Mitigation)

GHG emissions result when lands that currently sequester carbon are converted to lands that sequester less or no carbon. The GHG emissions are essentially the loss in the carbon sink. In 2005, GHG emissions due to land use change were 26,300 MT CO2e, or 5.5% of total county emissions. Projected GHG emissions in this sector in 2020 are 28,630 MT CO2e, an increase of approximately 9%.

Future GHG emissions related to land use change can be reduced by:

- Conservation of lands that the County considers otherwise certain for conversion
- Opting to convert lands of lower carbon intensity
- Planting of new vegetation, preferably of high carbon content.

These activities are options under the project level mitigation program (PL-1). However, it is not a requirement that a specific amount of carbon stock loss be mitigated as part of this program – it is only required that the total emissions of an individual development project or vineyard conversion be reduced by 38%, taking into account the effect of state and local action. Other County requirements will still apply, some of which may mandate actions that will result in carbon sequestration. For example, per County General Plan Policy CON-17, the County requires preservation or creation of habitat to compensate for project losses on a 2:1 ratio basis. Where this habitat preservation or creation concerns habitats with high carbon sequestration such as forests or oak woodlands, it can also serve as mitigation for GHG emissions, provided it meets all relevant requirements.[19]

[19] Mitigation in the form of "avoided conversion" of natural land covers must be consistent with the criteria found in the Climate Action Registry Forest Project Protocol requiring demonstration that the land faces a probability of conversion due to a feasible development/conversion potential otherwise allowable by local, state, and federal law.

For many projects, it may not be possible to meet the project-specific GHG target without pursuing one or more of the activities listed above and specifically implementing actions to increase carbon sequestration and/or avoid otherwise probable forest or woodland conversion. Further, project proponents may opt to pursue these activities in lieu of project-level mitigation that affects other sectors such as on-site renewable or employee commute programs. In this manner, the County intends to allow flexibility on the part of development and vineyard conversion projects to identify the most cost-effective means to provide the mandated project-level GHG reductions.

The County estimates that through this program, project-level mitigation will result in reductions of 19,350 MT CO2e[20]/year in 2020.

Table 14 – GHG Reduction Measures – Project Level Mitigation

GHG Emissions		(MT CO2e)
	2005 Land Use Change Emissions	26,300
	2020 Land Use Change Emissions	28,630
GHG Reduction Measures		(MT CO2e)
PL-1	Project Level Mitigation	19,350
TOTAL GHG REDUCTIONS IN 2020 – Project Level mitigation		19,350

All values rounded to nearest 10, commensurate with estimated overall error in reduction calculations

A complete description of each measure and the calculation of the associated avoided GHG emissions is provided in appendix A.

[20] 19,475 Mt CO2e is the total amount of emissions reductions needed from this sector in order for the County to meet the overall reduction goal. The project specific reduction target is designed to achieve this amount of emissions reductions at a minimum.

Chapter 4
CEQA Considerations and Tiering

This CAP is consistent with General Plan Goals CON-15 (requiring reduction of local GHG emissions), CON-16 (promoting energy conservation, energy efficiency, and local renewable energy) and Policy CON-65 (requiring study of GHG emissions, study and preservation of carbon sequestration, promotion of alternative transit, and consideration of GHG emissions and carbon sequestration in project review) as well as other relevant goals and policies. This Plan implements General Plan Action Items CON CPSP-1 (development of a GHG inventory) and CPSP-2 (development of a reduction plan). This Plan also fulfills Mitigation Measure 4.8.7a in the adopted EIR for the General Plan (which required General Plan Action Item CON CSPS-2).

As a discretionary action, prior to adoption of the CAP by Napa County, CEQA review will be required. The CAP does not change the level of development or agricultural activity in the County compared to that disclosed in the EIR for the General Plan. The community measures in the CAP, in most cases, mirror adopted General Plan measures calling for energy efficiency, water conservation, waste minimizations and diversion, reduction of vehicle-miles travelled, and preservation of and compensation for loss of natural vegetation land covers. As such, many of the potential effects of implementation of this Plan were covered broadly by the EIR analysis in the General Plan. The County will review the specific actions in this CAP relevant to the prior EIR analysis. If necessary, additional CEQA evaluation will be conducted to disclose any new or substantially more severe impacts not already disclosed in the prior EIR, including any required public notification and review requirements.

Amendments to the CEQA guidelines in March 2010 describe that CEQA project evaluation of GHG emissions can tier off a programmatic analysis of GHG emissions provided that the GHG analysis (or CAP) includes the following (CEQA Guidelines Section 15183.5):

- *Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.* The Napa County CAP has quantified all primary sectors of GHG emissions within the unincorporated County, including carbon stock and sequestration emissions that are not included in the BAAQMD GHG inventory for the region.
- *Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable.* The Napa County CAP includes a reduction target of 15% below 2005 levels, which is consistent with the recommendations in the AB 32 Scoping Plan for municipalities to support the overall AB 32 reduction targets
- *Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.* The Napa County CAP analyzes community emissions for all of Napa County and includes predicted growth and vineyard conversions expected by 2020.
- *Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.* The Napa County CAP includes both specific local measures as well as project-level reduction standards to achieve the overall reduction target.
- *Monitor the plan's progress.* The Napa County CAP includes periodic monitoring of plan progress.
- *Adopt the GHG Reduction Strategy in a public process following environmental review.* The Napa County CAP will be adopted in a public process following compliance with CEQA.

Once adopted, subsequent project-level CEQA evaluation of greenhouse gas emissions can tier off of this CAP provided it is being fully implemented by the County and the specific project is consistent with all applicable requirements from this CAP.

The Bay Area Air Quality Management District (District) adopted new CEQA Guidelines in June 2010, including recommended significance thresholds for project and plan evaluation. The District encourages local governments to adopt a qualified GHG reduction strategy consistent with AB 32 goals and the new statewide CEQA guidelines described above. The District recommends that projects consistent with an adopted qualified GHG reduction strategy that meet the standards described in the CEQA guidelines can be presumed to not have significant GHG emissions and do not need to be evaluated against the District's recommended mass emissions or efficiency thresholds. The District provides specific criteria for interpreting the broader language of the CEQA guidelines concerning what defines a qualified GHG reduction strategy. The District recommends that a GHG reduction strategy must meet one of three targets, one of which is reduction of emissions 15% below 2008 or earlier (e.g. 2005) levels by 2020.

As such, emissions associated with projects that are consistent with this CAP can be considered less than significant and their contributions to cumulative emissions are not considered cumulatively considerable. Clearly projects that are consistent with this CAP will still create emissions, however, they can be approved knowing that overall emissions projected to occur in 2020 will be less than the baseline emissions in 2005 and less than the emissions that would occur in 2020 if we continued "business as usual" and did not implement the CAP.

Chapter 5
Monitoring and Adaptive Management

5.1 CAP as a framework

This CAP is intended as the first step towards integrating GHG planning and monitoring into the County's policies and planning. The CAP is a living document and it is the County's intent that the CAP will improve, expand and evolve over time. The County anticipates the CAP evolving in response to: 1) feedback from Napa County residents and businesses 2) the continued development of GHG policy at the local, state and national levels 3) the continued availability of more sophisticated data and methodologies for estimating and monitoring GHGs from a variety of sources.

Initial Goals

The goal of this CAP is to reduce total GHG emissions in Napa County, from all sectors, to a level that is 15% below current levels (2005) before 2020. This is Napa County's first CAP and its necessary first goal is the collective reduction of the County's GHG emissions to a target level by 2020, in compliance with state level regulation and CEQA mitigation.

This CAP is not intended as a comprehensive plan for addressing overall ecosystem health or conservation. Many of the activities that produce GHG emissions have other adverse effects on the environment. Conversely, actions to mitigate GHGs may also have co-benefits. The actions and policies set forth in the CAP are, at this time, tailored to maximize GHG reduction and not other co-benefits. However, subsequent updates to the CAP can augment or modify actions to streamline overlapping policies associated with water, habitat or other areas, as long as the actions are implemented at a level sufficient to achieve the required GHG reductions.

Flexibility for the Future

This plan is a living document that will be updated and improved over time. This plan outlines a process and schedule for regular updates. Although specificity and rigor may be added over time, this basic framework accomplishes the following: 1) delineates major emissions sectors 2) captures the benefits of state programs 3) captures planned and likely actions for which the County can already take credit 4) identifies major "early actions" for GHG reduction 5) establishes a precedent and framework for the equal burden sharing among key stakeholders in the County. This plan was designed to be transparent such that quantification could be reproduced or used as a template for subsequent improvements. This plan was designed to be flexible such that actions can be added or subtracted from a menu, yet always measured against the standard to reduce emissions by 15%.

5.2 CAP Updates – Scheduling and Process

Update Cycle

In order to monitor progress toward achieving the 2020 reduction target, the County will annually review the progress of implementation of individual measures, including assessment of how new development projects have been incorporating the Plan's requirements. The County will monitor GHG emissions every three years, starting in 2013. If GHG emissions are not trending toward achieving the 2020 reduction target, the County will amend this Plan, as necessary to more

effectively promote GHG reductions. Any substantive amendments will be subject to environmental review and will be adopted in a public process by the Board of Supervisors.

Responsible Parties

The County Department of Conservation, Development and Planning will be the lead department in implementation of the Plan in regards to community emissions, but implementation will require the participation of applicants and others as well. The Conservation, Development and Planning Department will be responsible to discern between voluntary and mandatory measures for new development and will ensure that appropriate mandatory measures are being adequately applied to new development projects.

The Public Works Department will be the lead department in implementing the separate ERP for municipal emissions. Public works will provide annual reporting in regards to progress in implementing the ERP, monitor municipal GHG emission every three years starting in 2013, and will support and monitor implementation of specific municipal reduction measures in cooperation with other County Departments.

Beyond 2020

While GHG management in the state of California is currently focused on a 2020 target, Executive Order S-03-05 articulates a GHG reduction goal for California in 2050. Executive Order S-03-05 states that by 2050 California shall reduce their GHG emissions to a level that is 80% below the level in 1990. However, as an executive order, S-03-05 is only binding on state departments and is not legally binding on local governments and private development. It is reasonably foreseeable that as California approaches its first milestone in 2020, focus will shift to the 2050 target. At this time, the state does not have a plan for achieving reductions beyond 2020 and its resources are focused on meeting the 2020 requirements of AB32.

The County will monitor developments at the national and state level and their implications for the Napa County CAP. However the County will continue to look for opportunities to proactively and creatively reduce their GHG emissions, regardless of national or state requirements, where feasible and cost effective. Beginning in 2017, the County will commence planning for the post-2020 period. At this point, the County will have implemented numerous programs in the CAP and will have a better understanding of the effectiveness and efficiency of different reduction strategies and approaches, including those being implemented at the regional level such as SB 375. The post 2020 CAP will include a specific target for GHG reductions for 2030, 2040, and 2050. The targets will be consistent with broader state and federal reduction targets and with the scientific understanding of the needed reductions by 2050. The County will adopt the new CAP by January 1, 2020.

5.3 CAP Updates – Recommendations

The Napa CAP is composed of the following components: 1) the baseline GHG inventory (2005) 2) a projection of GHG emissions in 2020 under a business as usual (BAU) scenario 3) a list of actions taken by either the state or the County to reduce GHG emissions and the amount of avoided GHG emissions (metric tons of CO2e) associated with that action in the year 2020 (GHG Reduction Plan). All components can be improved or expanded in future updates, although care should be taken such that standard GHG inventory and reduction calculation protocols are followed and consistency with AB 32 is maintained.

Based on comments received from stakeholders following review of a draft version of this CAP, the County will prioritize the following areas in subsequent updates to the CAP:

- ***Local offset program***. Following adoption of the CAP, the County plans to develop a local offset program in partnership with a non-profit organization. The program would provide project applicants with the opportunity to purchase local "credits", and would fund local projects to reduce carbon emissions. The advantages of a local program (as opposed to participating in a Statewide or other program) is that co-benefits will accrue locally (e.g. habitat restoration will occur here), and the emission reductions achieved can be verified more readily by County staff.
- ***Local and/or more specific data***. Recommended GHG inventory methodologies (IPCC, LGOP, and ICLEI) uniformly set as a first tier the use of locally specific data. In most sectors of Napa County's GHG inventory (representing > 90% of total emissions), locally specific data was used (e.g. building energy use from PG&E; transportation data from Napa Solano Travel Demand Model outputs; water use from the Napa County Urban Water Management Plan; Napa County waste generation from CalRecycle; estimates of acres and land cover types for new vineyards provided by the Napa County Conservation, Development and Planning Department). In estimating the carbon stock and annual sequestration associated with natural lands, Napa specific carbon stock and sequestration rate factors were not available for all land cover types. Care was taken to select only California based factors with tree species overlap to species found in Napa County. Much greater accuracy and specificity could be added to the plan with a comprehensive carbon stock survey of the County built on extensive on-the ground measurements OR with bulk factors developed specifically for the County.
- ***More comprehensive treatment of carbon sequestration***. Land use change differs from other GHG source sectors in that it requires the quantification of living, breathing and highly dynamic ecosystems. Consequently, estimation of GHGs from land use change is considerably more complex than from combustion based sources. The County acknowledges that the estimation of GHGs due to land use change is currently a coarse estimate that greatly simplifies many aspects of carbon cycling, such as timescales for reaching maturity, disturbance and CH4 and N2O fluxes. Further, the framework commonly used by governments when inventorying emissions is a "snapshot approach" (i.e. one snapshot in the baseline year and one in the future year) which is also ill suited to fully capture the complexity of carbon cycling. Nonetheless, the County is committed to accounting for and mitigating GHG emissions due to land use change as part of the CAP. The County will continue to seek ways to better address loss in carbon sequestration as part of the existing California GHG planning framework.
- ***GHG reductions through sustainable agriculture practice***. Napa farmers already include many practices in their daily operations that act to reduce GHGs. These practices include: water conservation; the use of cover crops; reduced or no till practices; composting; chipping; and waste practices. The GHG benefits of some of these practices cannot currently be accounted for because the baseline conditions of these practices were not explicitly included in the inventory and forecast. This is due to one or more of the following reasons: 1) Data at the individual farm and winery level was not collected as part of this effort 2) appropriate methodologies are not available for assessing the emissions and avoided emissions at the County scale (as opposed to the individual site scale), for example the GHG benefits due to tillage practices are highly site specific[21]. As the underlying science improves and methods for estimating the GHG benefits associated with agricultural BMPs become standard, the County can add specificity to the

[21] Literature studies have shown that the gains can depend on many factors and studies show a wide range of results and even conflicting results. The CAR is currently working on a protocol. It has not been released. It will be developed for project scale, not County scale, estimates and will almost certainly be based on extensive on-site measurements.

inventory and forecast such that a project will be able to "take credit" for a variety of different agricultural practices that act to replace or maintain soil carbon.

- ***GHG reductions through sustainable practices at wineries.*** Through the initial process of conducting a GHG inventory and forecast and developing a GHG reduction plan, the County has become aware that although the waste and wastewater sectors represent a small fraction of total GHG emissions (4% combined), these sectors offer significant potential for GHG reductions at the project level. Many vintners and farmers are composting waste or reducing the BOD5 content of winery wastewater such that GHG emissions are greatly reduced. If these practices were initiated at the individual site level after 2005, they can be credited towards the County's overall GHG reduction goal in future updates to the plan. Accurate accounting of GHG reductions at individual sites would require a "bottom-up" approach using data provided from individual property owners in the County.

  Sustainable practices at existing wineries related to alternative vehicles, water conservation and energy conservation are already counted towards the County's GHG reduction goal through the Green Business Program (kWh saved). For new wineries, energy efficiency beyond that required by Title 24 and renewable projects and the use of alternative vehicles can also be counted towards the County's GHG reduction goal through the project level mitigation program.

- ***Include GHG emissions due to limited importation of water.*** As noted in Appendix A, the current GHG inventory and 2020 forecast does not include any emissions associated with importation of water from outside the County. There is a limited amount of water being provided by the City of Napa to residences, commercial, and agricultural users in the southern part of Napa County. The City of Napa derives approximately 40 percent of their water from the State Water Project, which involves pumping of water to Napa and associated energy-related emissions. Inclusion of these indirect emissions would allow for a more complete evaluation of current water-related emissions and a more robust accounting of the value of water conservation measures.

- ***Include Fluorinated Compounds*** –The state of California and U.S. EPA national GHG inventories include the following gases: CO2, CH4, N2O, SF6, NF3, HFCs, and PFCs. CO2, CH4 and N2O represent approximately 99% of all GHG emissions in California. [22] The inclusion of SF6, HFCs and PFCs would add detail and result in a more comprehensive GHG inventory. At the local level, this data is difficult to obtain [23]. State level data can be extrapolated downwards, with considerable error. Local level data, specific to the types of uses and the activity pattern in Napa County should be used to estimate PFCs, HFCs and SF6 at a later date. The County will pursue the addition of other gases in subsequent updates, although these are not expected to alter the overall picture of County emissions or provide significant opportunities for GHG reduction.

- ***Climate Adaptation*** – California's response to climate change can generally be thought of as a two-part strategy: 1) Mitigation and 2) Adaptation. Mitigation is the reducing of GHG emissions while adaptation is changing behavior and infrastructure to match new climate conditions in a particular area, for example higher sea levels or increased fire frequency. The County expects to discuss specific climate change threats in subsequent versions of the CAP to the extent this is possible.

[22] http://www.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf

[23] Draft Napa Countywide Community Climate Action Plan, MIG and the Climate Campaign, October 2009.

Chapter 6
Conclusions

The pattern of GHG emissions differs greatly from community to community, reflecting the predominant economic activities, land use patterns, transportation needs and lifestyle of a community. The process of identifying GHG reduction measures is also unique to each community and reduction planning must reflect not only the emissions sources in the community but also what solutions are available and feasible in a particular community.

GHG emissions in Napa County include these features which are different than other more urban parts of the greater San Francisco Bay Area:

- Due to the primacy of agricultural preservation and the focus of growth within the incorporated cities, the annual growth in population, jobs and housing in the County is projected to be approximately 1% or less. As a result, new construction (and opportunities to build new and more energy efficient buildings) in the County are minimal.
- Napa County does not currently rely on extensive water imports and thus the energy intensity of each gallon of water used in the County is relatively low. Water conservation in Napa County therefore does not result in the same GHG savings as it would in southern California communities. Further, the County already had in place in 2005 notable programs for residential, commercial and agricultural water conservation.
- The rural character of the County means the nature and pattern of vehicle trips are not easily substituted by mass transit.
- Unlike larger municipalities, the County does not have sole control over large stationary emission sources such as landfills and cement production that can yield significant GHG reductions through the one-time installation of control technology.
- In 2005, Napa County was already diverting approximately 71% of its waste (CalRecycle 2010) which is much higher than the state average (52% in 2005), and thus significant reductions in this sector are not as readily possible in the short-term through new or expanded programs.

Although implemented for other purposes, Napa County already had in place numerous policies and programs that act to reduce GHG emissions in the County prior to conducting a formal GHG inventory in 2005. These measures have helped to control emissions in the County in the past. However, at a local, state, and global level, further reduction is needed, and the target of this plan is to reduce emissions further from 2005 levels consistent with the ambitions of AB 32.

The science and policy of reducing GHG emissions has generally been focused on urban and suburban areas. Thus, the suite of feasible solutions for predominantly rural areas is quite different than for urban communities. The measures contained in this CAP reflect Napa's unique character and capitalize on the best locally-appropriate opportunities to assist the state in meeting the goals of AB32.

Napa County has completed a GHG inventory, 2020 GHG forecast, and a plan for reducing GHG emissions to a level that is consistent with state goals. Together, these components are Napa County's Climate Action Plan (CAP). The CAP quantitatively demonstrates that through implementation of a list of specific actions the County will be able to reduce their GHG emissions to levels that are 15% less than current emissions levels. Finally, the CAP provides for a process of updates and improvements at regular intervals going forward.

Napa County has developed a plan that truly reflects its unique character, economic base, natural resources, and unique strengths with respect to assisting the state to reduce GHG emissions. This CAP fulfills commitments made with the County's General Plan and lays the foundation for a continued commitment to GHG mitigation in Napa County.

Chapter 7
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Appendix A
Methodology

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Appendix A
Methodology

A.1 Introduction

This appendix describes the analyses performed in support of the Napa County Climate Action Plan (Plan or CAP). This appendix covers the following topics in the order presented:

- Methods used to inventory current year GHG emissions and future year BAU emissions for the following sectors[1]: building energy use including water consumption; waste; wastewater; off-road vehicles and agriculture (on-road transportation and land use change are discussed separately) Section A-3.
- Methods used to inventory current year GHG emissions and future year BAU emissions from the on-road transportation sector. Section A-4.
- Methods used to inventory current year GHG emissions and future BAU emissions due to land use change (i.e. the loss in carbon stock and annual sequestration capacity) Section A-5.
- Methods used to estimate GHG emissions that would be avoided in the future due to actions taken by the state or County as part of this CAP. Section A-6.

A.2 Summary of Previous GHG Inventory Efforts

As described in Chapter 1 of this report, the County has completed several work efforts since 2005 towards reducing both community and municipal GHG emissions.

- In 2005, the incorporated cities and the unincorporated portions of Napa County prepared an initial GHG inventory for community-wide emissions[2] in all jurisdictions of Napa County (unincorporated Napa County, City of Napa, City of Calistoga, City of Yountville, City of St. Helena, and City of American Canyon). This GHG inventory was prepared in consultation with MIG Inc. and the Climate Campaign. Copies of the internal draft of this report are available by request through the Napa County Conservation, Development and Planning Department. Select results from that report were used and reported without modification in this document.
- In 2007, Napa County prepared an inventory and reduction plan for GHG emissions associated only with the unincorporated County's municipal operations (Napa County

[1] Future year emissions are projected for a *business as usual* (BAU) scenario i.e. conditions where no action to curb emissions is taken and current emissions grow in response to projected growth in population, jobs, housing or other metrics

[2] Community-wide emissions refer to those emissions that result from all activities within the jurisdictional boundary, including activities of residents, businesses, visitors as well as activities associated with municipal operations. Municipal operations emissions refer to those emissions that result only from the County government's operations and provision of services and include but are not limited to operation of County buildings, fleet, landfills and wastewater treatment facilities. The Municipal inventory is a sub-set of the community inventory where County operations occur in unincorporated areas; where County operations occur within incorporated cities the municipal inventory does not overlap with the community inventory.

2007a)[3]. The municipal GHG inventory was prepared in consultation with Kenwood Energy. The complete report is available through the County's website. [4]Napa County identified a suite of actions, defined as the Emissions Reduction Plan for County Operations (ERP), which would result in a 15% reduction of operational GHG emissions. Readers are referred to the ERP for a description of the assumptions and methodologies used. Select results from that report were used and reported without modification in this document.

- In 2010 (this effort), Napa County updated their initial community inventory (2005) and developed a GHG reduction plan for the community as a whole (unincorporated portions only). As part of this effort, it was necessary to update and expand upon the draft 2005 GHG inventory. Specifically, a comprehensive treatment of the agriculture sector was completed, more accurate traffic modeling was performed and the land use change sector was added in order to account for the loss in carbon sequestration. The reader is referred to the two prior documents for additional analytical detail. In order to maximize County resources, data from the two previous efforts were often utilized without modification. However, certain limitations exist in the original datasets, largely due to aggregation of data.

A.3 GHG Inventory Methodology

This report is Napa County's Climate Action Plan (unincorporated portions of the County) and is a compilation of the three work efforts listed above. Table A-1 list all data components of the Climate Action Plan, when and by whom the data was generated and the key data sources utilized. For all three work efforts, standard GHG quantification and guidance was followed, including the protocols and data sources listed below.

Transportation emissions were analyzed in detail and the methodology used is described separately in *Section A.4* of this appendix. In depth analyses are required to account for emissions in the land use change sector. A detailed description of this methodology is found in *Section A.5*.

GHG Inventory and Forecast Protocols

- Local Governments Operations Protocol (LGOP) for the quantification and reporting of greenhouse gas emissions inventories (California Air Resources Board 2010);
- Protocols contained in the California Greenhouse Gas Emissions Inventory 2000-2008 (California Air Resources Board, 2010)
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change 2006); and
- Protocols contained in ICLEI Clean Air Climate Protection Software (CACP) (ICLEI 2010a).

Data Sources:

- Napa County General Plan (June 2008)
- Napa County General Plan Draft Environmental Impact Report (DEIR) and Final Environmental Impact Report (FEIR);
- Napa County Baseline Data Report
- 2050 Napa Valley Water Resources Study

[3] See above for municipal emissions.

[4] www.countyofnapa.org/EmissionReductionPlan/

- Napa/Solano Travel Demand Model
- Bay Area Regional Transportation Plan
- Napa County Conservation, Development and Planning Department (personal communications)
- Napa County Emissions Reduction Plan (Municipal Operations)[5]
- Napa County Community-wide Climate Action Plan- Internal Draft[6]

Methods used to project GHG emissions in 2020 are described for all sectors in Table A1. Economic conditions and future projections for the Bay Area changed dramatically between 2005, when the initial/draft GHG inventory was performed and 2010, when this effort began. Therefore it was necessary revise projections of GHG emissions to better reflect the new economic outlook for the region. To update the 2020 BAU, growth factors for all sectors were developed based on population, housing and jobs growth data as provided in Table 9 of the Napa County General Plan DEIR and shown here in Table A-2 (Napa County 2007b). Respective annual growth factors for each sector were applied to the baseline emissions level in 2005 for each sector and emissions increased out to 2020. Scaling factors are based on a linear growth pattern. The scaling factors used are presented in Table A-3.

[5] Prepared by Napa County Department of Public Works and Kenwood Energy. 2007.

[6] Prepared by Napa Municipalities together with MIG Inc. and the Climate Campaign. 2005.

Table A-1: Summary of CAP components, CAP work efforts, Data Sources and Methods

SECTOR	2005 GHG EMISSIONS	2020 GHG EMISSIONS	2020 GHG REDUCTIONS	DATA SOURCES AND METHODS
Residential Building Energy Use	2005. Napa Countywide Community Climate Action Plan. MIG Inc. and the Climate Protection Campaign.[1]	2010. This effort.	2010. This effort.	2005 - Energy consumption provided by sector from PG&E; ICLEI CACP software.[3] 2020 - Future energy consumption projected using housing estimates from the Napa County General Plan Housing Element (tables A-2, A-3).
Comm./Ind. Building Energy Use	2005. Napa Countywide Community Climate Action Plan. MIG Inc. and the Climate Protection Campaign.[1]	2010. This effort.	2010. This effort.	2005 - Energy consumption provided by sector from PG&E; ICLEI CACP software. 2020 - Future energy consumption projected using jobs estimates from the Napa County General Plan Housing Element (tables A-2, A-3).
Waste	2005. Napa Countywide Community Climate Action Plan. MIG Inc. and the Climate Protection Campaign.[1]	2010. This effort.	2010. This effort.	2005 - Waste generation data provided by waste provider. ICLEI CACP software. 2020 - Future waste generation projected using population from Napa County General Plan Housing Element (tables A-2, A-3).
Residential Wastewater	2010. This effort.	2010. This effort.	2010. This effort.	2005 - Residential wastewater volumes and populations served (provided by County); LGOP methods. On-site septic based on # of homes with septic (provided by County); EPA methods.[4] 2020 - Residential wastewater scaled using population estimates from the Napa County General Plan Housing Element (tables A-2, A-3)

Table A-1: Summary of CAP components, CAP work efforts, Data Sources and Methods

SECTOR	2005 GHG EMISSIONS	2020 GHG EMISSIONS	2020 GHG REDUCTIONS	DATA SOURCES AND METHODS
Comm./Ind. Wastewater	2010. This effort.	2010. This effort.	2010. This effort.	2005 - Commercial wastewater based on volume of wine produced annually in Napa County and default values for wastewater produced per gallon of wine.[5] 2020 - Future wastewater projected using jobs from Napa County General Plan Housing Element (tables A-2, A-3).
On-Road Vehicles	2010. This effort.	2010. This effort.	2010. This effort.	2005 - VMT estimates using Napa-Solano TDM; origin-destination analysis; EMFAC. 2020 - VMT estimates using Napa-Solano TDM; origin-destination analysis; EMFAC. See section A-4.
Off-Road Vehicles (lawn/garden)	2005. Napa Countywide Community Climate Action Plan. MIG Inc. and the Climate Protection Campaign.[1]	2010. This effort.	2010. This effort.	2005 - ARB Off-Road model. 2020 - Future off-road equipment use projected using households from the Napa County General Plan Housing Element (tables A-2 and A-3)
Off-Road Vehicles (Const./Ind.)	2005. Napa Countywide Community Climate Action Plan. MIG Inc. and the Climate Protection Campaign.[1]	2010. This effort.	2010. This effort.	2005 - ARB Off-Road model. 2020 - Future off-road equipment use projected using households from the Napa County General Plan Housing Element (tables A-2 and A-3)

Table A-1: Summary of CAP components, CAP work efforts, Data Sources and Methods

SECTOR	2005 GHG EMISSIONS	2020 GHG EMISSIONS	2020 GHG REDUCTIONS	DATA SOURCES AND METHODS
Agriculture	2010. This effort.	2010. This effort.	2010. This effort.	2005 - Vehicles: ARB Off-Road model. Enteric fermentation and manure management: livestock populations from Napa County agriculture report, ARB methods; Fertilizer: crop acres from Napa County agriculture report; UC Davis Cost Return Studies; ARB methods.[6,7] 2020 - Vehicles: ARB Off-Road model. Enteric fermentation and manure management: livestock populations from Napa County livestock population trends, ARB methods; Fertilizer: vineyard acres from Napa County General Plan; UC Davis Cost Return Studies; ARB methods.
Land Use Change	2010. This effort.	2010. This effort.	2010. This effort.	2005 - acres and land cover types converted for period 1993-2007 provided by Napa County Conservation, Development and Planning Department. Existing acres and land cover types in Napa Baseline Data Report; IPCC methods.[8] 2020 - acres and land cover types to be converted before 2020 provided by Napa County Conservation, Development and Planning Department. IPCC methods. See section A-5.
Municipal Operations	2007 Emissions Reduction Plan for County Operations[2]			See report.

1 Report available by request from the Napa County Conservation, Development and Planning Department.
2 Report available at www.countyofnapa.org/EmissionReductionPlan/
3 http://www.icleiusa.org/action-center/tools/cacp-software
4 http://epa.gov/climatechange/emissions/usinventoryreport.html
5 http://www.napanow.com/wine.statistics.html
6 http://coststudies.ucdavis.edu/
7 http://www.arb.ca.gov/cc/inventory/doc/methods_v1/ghg_inventory_technical_support_document.pdf
8 http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

Table A-2. Population, Housing, and Jobs in Napa County (2005–2020)

	Napa County Projections [a]			
	2005	**2015**	**2020** [b]	**2030**
Population	28,600	31,397	33,290	36,114
Housing	11,492	12,687	13,393	14,718
Jobs	23,050	25,524	26,765	29,234

[a] Napa County General Plan Housing Element Table 9
[b] Data for 2020 are linearly extrapolated from other data years

Table A-3. Growth Factors used for estimating GHG emissions in 2020

GHG Emission Source	**Growth Factor (%/year)**	**Scales With**
Residential Building Energy Use	0.99	Households
Commercial/Industrial Building Energy Use	1.02	Total Jobs
Waste	0.94	Population
Off-road Vehicles (Lawn and Garden)	0.99	Households
Off-road Vehicles (Commercial/Industrial)	1.15	Manufacturing/Other Jobs
Agricultural Vehicles	1.26	Agricultural Jobs
Livestock Emissions	-0.03	Historical livestock populations (1997 – 2007)
Fertilizer Use	Crop Specific	Current and projected vineyard acres; historical trends for other crops
Wastewater and Septic	0.94	Population
On-Road vehicles and land use change discussed separately in sections A-4 and A-5		

A.4 GHG Inventory and BAU Forecast for On-Road Transportation

To update the previous GHG inventory and 2020 BAU forecast to be consistent with RTAC/SB-375 consistent approaches, a transportation origin/destination modeling approach was used to determine VMT attributable to the County in place of the ICLEI geographic-based approach. For on-road emissions, a select link analysis was used with the Napa-Solano Transportation Demand Model (TDM) in order to more accurately attribute GHG emissions based on trip origin and destination. A complete description of the traffic modeling effort including a comparison of VMT by Napa County jurisdiction using the origin/destination approach is provided below (Tables A4-A7).

Base year and future business as usual VMT were estimated by Fehr & Peers as part of the County of Napa Climate Action Plan. The Solano-Napa Travel Demand Model was used to develop the VMT estimates. Estimation of on-road transportation emissions and future emissions required the following main tasks:

- Modifications Made to the Solano-Napa Model
- Base Year (2008) VMT Estimates

- Base Year Comparison to ICLEI Report
- Future Year (2020) Business as Usual VMT Estimates

A.4.1 Modifications Made to the Solano-Napa Model

The Solano-Napa Model was validated in 2008 to existing conditions at that time. Land use and roadway networks were calibrated to existing conditions and then adjusted appropriately to validate to current traffic counts. No modifications were made to the 2010 model. The 2030 model was then evaluated for its appropriateness for use in the Napa County CAP. The relative growth in land use was comparable to that of the Napa County General Plan. For this reason, it was determined that the 2030 model was adequate for VMT forecasts.

A.4.2 Base Year (2008) VMT Estimates

Fehr & Peers conducted a model run to calculate base year daily VMT by speed bin and VHT/VHD estimates for following jurisdictions:

- American Canyon
- Calistoga
- City of Napa
- Saint Helena
- Yountville
- Unincorporated County

Using select link analysis, three types of vehicle trips were tracked separately for AM and PM peak periods for each of the above listed jurisdictions within Napa County.

- Vehicle trips that remained internal to the location.
- Vehicle trips with one end in the location and one end outside of location (IX/XI trips).
- Vehicle trips with neither end in the location (XX trips).

Using the set of *accounting rules* recommended for VMT inventories in Climate Action Plans by the Bay Area Regional Transportation Advisory Committee (RTAC), VMT from trips of type 1, 2 and 3 were counted 100%, 50%, and 0% respectively towards jurisdiction-generated VMT.

The Solano-Napa model is validated to AM and PM peak hour traffic counts. These volumes were then converted into daily trips based on historical count data on Napa County roadways. An estimate for daily volumes was calculated with the following equation: daily VMT = (AM VMT + PM VMT) * 5. In addition, off-peak volume estimates were distributed amongst the speed bins based on Napa County off-peak speed curves to more accurately represent the off-peak travel characteristics. Table A-4 shows the 2008 Baseline VMT estimates by 5 miles per hour (mph) speed bin. Table A-5 shows the estimated daily vehicle hours traveled (VHT) and vehicle hours of delay (VHD) using the same accounting rules. Column and row totals may not completely reconcile with associated individual values due to rounding errors with Excel. 2008 VMT data was scaled linearly to 2005.

Table A-4. 2008 Baseline Daily VMT Estimates by Speed Bin

Speed (mph)		American		City of	Saint			
From	To	Canyon	Calistoga	Napa	Helena	Yountville	Unincorp.	Total
0	5	1,872	281	6,203	285	197	5,357	14,195
5	10	1,402	341	6,489	212	177	4,334	12,955
10	15	1,663	802	10,656	413	325	7,172	21,031
15	20	1,281	806	5,288	497	196	4,104	12,172
20	25	5,526	1,917	37,015	4,109	1,446	32,526	82,540
25	30	36,073	20,485	224,762	34,610	8,540	245,951	570,420
30	35	18,668	32,453	174,844	29,537	6,248	199,584	461,332
35	40	14,645	7,148	79,955	8,766	3,273	93,174	206,961
40	45	14,798	9,224	148,188	23,353	6,512	134,123	336,198
45	50	14,362	8,752	52,945	13,125	4,035	73,621	166,839
50	55	46,828	35,316	227,385	48,651	16,133	297,712	672,025
55	60	7,008	2,183	67,618	4,664	5,639	61,715	148,827
60	65	27,667	5,706	183,700	11,682	17,849	127,208	373,811
65	70	35,091	6,477	102,449	6,232	4,369	100,033	254,652
70	75	810	85	1,786	194	85	6,823	9,783
75	80	-	-	-	-	-	-	-
80	+	827	908	3,266	855	143	6,189	12,188
Total		228,520	132,885	1,332,550	187,185	75,165	1,399,625	3,355,930

Source: Fehr & Peers 2010.

Table A-5. 2008 Baseline Daily VHT/VHD Estimates

		American Canyon	Calistoga	City of Napa	Saint Helena	Yountville	Unincorp.	Total
	II	600	370	12,280	575	25	6,135	19,985
VHT	IXXI1	12,345	5,390	51,070	7,120	3,000	71,810	150,735
	Total	12,945	5,760	63,350	7,695	3,025	77,945	170,720
	II	100	90	860	20	-	575	1,645
VHD	IXXI1	7,135	2,120	28,220	2,710	1,275	40,815	82,275
	Total	7,235	2,210	29,080	2,730	1,275	41,390	83,920

Source: Fehr & Peers 2010.
Note: IXXI counted 50%

A.4.3 Conversion to CO_2 Emissions

After obtaining VMT estimates by speed bin, the data was post-processed to convert to estimated CO_2 emissions. Emissions factors were obtained from EMFAC for year 2008 for Napa County. EMFAC provides emissions factors only up to speed bin 70–75 mph. For VMT with speeds greater than 75 mph, the emission factor for 70–75 mph were used. Previous research with the emissions factors has also shown some error in the EMFAC factors for speeds in excess of 65 mph. These results must be interpreted cautiously. Note that the emissions results are only for CO_2 and not for CO_2e.

A.4.4 Future Year (2020) Business as Usual VMT Estimates

Fehr & Peers ran the 2030 Solano-Napa model and obtained a Year 2030 BAU VMT estimate, representing the future VMT without any specific greenhouse gas-reduction measures. The 2020 forecast was subsequently calculated by linearly interpolating between the 2008 base year results and the 2030 BAU results. Tables A-6 and A-7 show the results of this run:

Table A-6. 2020 BAU Daily VMT Estimates by Speed Bin

Speed (mph)		American		City of	Saint			
From	To	Canyon	Calistoga	Napa	Helena	Yountville	Unincorp.	Total
0	5	3,353	768	15,536	813	500	11,645	32,614
5	10	2,759	998	14,566	777	393	11,045	30,537
10	15	2,580	818	13,539	1,236	377	10,496	29,046
15	20	2,667	1,090	12,440	1,544	447	13,012	31,199
20	25	6,733	2,307	45,026	4,671	1,766	39,776	100,279
25	30	38,431	23,720	267,032	40,848	10,299	289,750	670,079
30	35	28,362	34,278	235,953	36,281	7,851	271,956	614,681
35	40	18,799	10,264	100,768	9,666	4,208	112,651	256,356
40	45	23,467	13,374	179,850	26,628	8,004	155,782	407,106
45	50	11,709	9,004	52,480	12,574	4,325	73,878	163,970
50	55	48,767	38,889	268,764	50,049	18,340	344,089	768,899
55	60	6,171	2,200	47,065	4,288	5,088	50,871	115,684
60	65	33,602	7,189	203,841	14,089	19,522	150,769	429,011
65	70	33,903	9,988	118,332	7,525	4,921	114,541	289,210
70	75	379	42	887	91	41	3,133	4,573
75	80	160	6	655	17	18	419	1,275
80	+	1,045	960	4,099	864	164	6,617	13,750
Total		262,886	155,898	1,580,830	211,960	86,265	1,660,431	3,958,270

Source: Fehr & Peers 2010.

Table A-7. 2020 BAU Daily VHT/VHD Estimates

		American Canyon	Calistoga	City of Napa	Saint Helena	Yountville	Unincorp.	Total
VHT	II	567	463	13,799	804	33	8,183	23,850
	IXXI[1]	20,516	9,375	97,164	12,032	4,887	124,798	268,771
	Total	21,083	9,837	110,963	12,836	4,920	132,981	292,621
VHD	II	81	125	1,471	154	-	1,576	3,407
	IXXI[1]	14,455	5,600	68,633	7,011	2,895	87,839	186,432
	Total	14,536	5,725	70,104	7,165	2,895	89,415	189,839

Source: Fehr & Peers 2010.
Note: IXXI counted 50%

Tables A-3 and A-5 show that in the absence of any GHG reduction strategies, VMT for the County would increase by 18% from 2008 to 2020 and Tables A-4 and A-6 show that VHT would increase by 71% and VHD would increase by 126%.

A.5 Carbon Stock, Carbon Sequestration, and Land Use

As part of this inventory and climate action planning effort, Napa County accounted for existing carbon stock and carbon sequestration in the County and the consequences of land use change patterns that might result in a loss of carbon stock and annual carbon sequestration. Although protocols are available for assessing carbon stocks at the national level, at the time of preparation of this document, recommended protocols are not yet available for county-level inventories. Inclusion of carbon stocks and sequestration is not yet standard practice for local level inventories and climate action plans. Background information and a detailed description of the carbon stock and sequestration analysis conducted for the Napa Climate Action Plan is described below.

A.5.1 What are Carbon Stock and Carbon Sequestration?

Through the process of photosynthesis, plants remove CO_2 from the atmosphere, converting a portion of the CO_2 to organic compounds that form structural components of the plant such as roots, leaves and branches. The carbon that was removed from the atmosphere is thus stored or *sequestered*, until the plant dies and decays or is removed. [7] Within this context, two specific terms are used: 1) carbon stock and 2) annual carbon sequestration.

Carbon stock refers to the total amount of carbon stored in the existing plant material including trunks, stems, branches, leaves, fruits, roots, dead plant material, downed trees, understory and soil organic material. Carbon stock is expressed in units of metric tons of carbon per acre (t C ac^{-1}). When land is cleared, some percentage of the carbon stored is released back to the atmosphere as CO_2. Land clearing or the loss of carbon stock is thus a type of GHG emission.

A*nnual carbon sequestration* is the amount of CO_2 that plant material, within a specified boundary, removes from the atmosphere within a single year. The sequestration rate is expressed in units of

[7] Carbon can also be sequestered in several other biological, chemical or physical processes, but for the purposes of this CAP, the term sequestration refers only to carbon stored in plant material.

metric tons of C per acre per year (t C ac^{-1} yr^{-1}) and can essentially be thought of as the plant's growth rate. Different species of plants remove CO_2 from the atmosphere at rates that vary by several orders of magnitude. The rate at which plants within a single species grow (i.e. take up CO_2) is also highly variable over the lifetime of the plant. Carbon stock and annual sequestration are correlated as a loss in stock results in a loss in annual CO_2 uptake.

Methods and standard protocols are available for assessing carbon stocks and annual carbon sequestration at the national level (Intergovernmental Panel on Climate Change 2006; U.S. Environmental Protection Agency 2010) and carbon sequestration is accounted for in the U.S. and California GHG inventories.[8] Assessment protocols are not included in commonly used GHG Inventory software such as ICLEI Clean Air and Climate Protection (CACP) software. Several protocols for assessing carbon stocks and changes in stock for forests/woodlands are available for use in the voluntary carbon market (Climate Action Reserve 2010).This analysis relies on methodologies recommended by the IPCC and is described below.

A.5.2 Data Sources – baseline land cover, total acres converted and land cover types converted

Carbon stocks and annual sequestration were estimated for the baseline year 2005 and for 2020 for a single vineyard development scenario and a single urban development scenario. Land cover types and acres covered in 2005 are listed in Table A-8. Acreages in the baseline year, 2005, were taken from GIS data included in the Napa County Baseline Data Report (WICC 2006).

Table A-8: Acres covered by various land cover types in the baseline year (2005)

Land cover type	2005 Acres
Grasslands	53,706
Chaparral/Shrublands	107,583
Oak Woodlands	161,976
Riparian Woodlands	8,060
Coniferous Forests	42,984
Croplands (not vines)	23,984
Vineyards	40,439
Wetlands	4,492
Rock Outcrops/Other	35,951
Developed Areas	28,244

The primary loss of natural land cover types in Napa County is due to vineyard development[9]. In order to estimate typical conversion (total acres and land cover types converted) in 2005, historical data for the period 2002-2007 was assessed. An average of the 5 year period (table A-9) was considered to be representative of conversion to vineyards during the year 2005. Because project application and approval varies year to year, a 5 year average was considered representative.

[8] In 2008, the CO_2 uptake associated with forests and natural lands were equivalent to 13% of total U.S. emissions, even when considering GHG emissions associated with these lands. In California, CO_2 uptake in 2008 was equivalent to approximately 1% of the state's annual emissions (U.S. Environmental Protection Agency 2010; California Air Resources Board 2010).

[9] Natural lands are also lost to development that is not related to vineyards.

Table A-9: Historical vineyard development by land cover type 2002-2007

	2002-2005 (acres)	2005-2007 (acres)
Coniferous Forest	101.4	22.7
Developed Land[1]	83.4	46.7
Grassland	307.3	159.5
Oak Woodlands	115	88.5
Other[2]	11.2	3.3
Riparian Woodlands	2.1	3
Rock Outcrop	0	0
Shrubland	64.7	133.3
Streams	0	0.4
Wetlands	0.1	1.3
TOTALS	685.2	458.7
[1] Includes former agriculture land [2] Includes urban and suburban uses		

Napa County Conservation, Development and Planning Department examined actual vineyard Erosion Control Plan approvals on slopes > 5% between 2000-2011 to identify the baseline rate of vineyard development . GIS analysis of historic aerial photos was used along with vegetation data layer to better project the impact of recently constructed vineyards on land cover types. The County completed this analysis and used the percentages from the analysis as the assumptions for near-term vineyards for the CAP analysis. The results of this analysis are shown in Table A-10.

Table A-10: Vineyard development projections by land cover type 2005-2020 and 2005-2030

	2005-2020 (acres)	2005-2030 (acres)
Forest	225	375
Woodland	810	1350
Shrub	810	1350
Grassland	2205	3675
Wetland	9	18
Other	450	750
TOTALS	4509	7518
Data Provided by Napa County Conservation, Development and Planning Department		

A secondary loss of natural lands in the County is due to residential, commercial and industrial development (RCI) i.e. urban or suburban uses. The Napa County General Plan outlines several development scenarios (A-C). This analysis examined conversion of natural lands to RCI uses according to Alternative A (Table A-11). Loss of carbon stock and annual carbon sequestration due to RCI development was considered together with loss associated with vineyard development.

Table A-11: RCI development projections in the General Plan (Alternative A)

	2005-2020 (acres)	2005-2030(acres)
Coniferous Forest	121.2	202
Oak Woodland	67	111
Riparian Woodland	20	34
Grassland	1278	2130
Chaparral/Shrubland	192	320
Cropland Not Vines	2501	4168
Wetlands	91	151
TOTAL	4270	7116
Napa County General Plan DEIR		

A.5.3 IPCC Methods for Accounting for Net Carbon Flux

Natural lands can act as both a source (emissions) or a sink (removals) of carbon, depending on the land cover type and the activities on the land cover type in a given year. For GHG inventory purposes, the net carbon flux (sum of sources and sinks) in the baseline year is compared against the net carbon flux in the future year.

Emissions and removals of CO_2 on natural lands are the result of changes in carbon stock. Changes in carbon stock can result from growth, planting, death, disturbance or removal. Tables A-10 and A-11describe the reasonably forseeable scenario where various natural land cover types will be converted to either vineyards or RCI uses by 2020. Table A-9 describes the conversion pattern in the baseline year, 2005. The net carbon flux (all sources and sinks on the land cover types considered) was calculated for the baseline year 2005 and for the future year 2020. Results are shown in table A-12.

Table A-12: Net carbon flux in the baseline year 2005 and in 2020

	2005		2020	
	(MT C yr^{-1})	(MT CO_2e yr^{-1})	(MT C yr^{-1})	(MT CO_2e yr^{-1})
Loss in Carbon Stock -RCI --EMISSION	1,730	6,350	1,730	6,350
Gains in Carbon Stock -RCI --UPTAKE	0	0	0	0
Loss in Carbon Stock -VIN -EMISSION	5,670	20,780	6,390	23,440
Gains in Carbon Stock -VIN -UPTAKE	(280)	(1,020)	(360)	(1,340)
Loss in Sequestration Capacity - RCI - EMISSION	20	60	20	60
Gains in Sequestration Capacity - RCI -UPTAKE	0	0	0	0
Loss in Sequestration Capacity - VIN - EMISSION	40	130	30	120
Gain in Sequestration Capacity -VIN -UPTAKE	0	0	0	0
EMISSIONS DUE TO LU Δ		26,300		28,630

The analysis used generic methods applicable to multiple land use categories as recommended by the IPCC (IPCC 2006) in the Guidelines for National Greenhouse Gas Inventories.

Changes in carbon stock were estimated for: (1) Lands that remain in the same land use category; and (2) Land that is converted to another land use category.

A.5.3.1 Land that Remains in a Land Use Category

Changes in carbon stock on land that remains in a land use category are due essentially to vegetative growth, death and disturbance. Equation 1 was used (Equation 2.7 in Intergovernmental Panel on Climate Change 2006) to estimate the changes in carbon stock on land remaining in the following land use categories in Napa County: Grasslands, Shrublands, Oak Woodlands, Riparian Woodlands, Coniferous Forests, Croplands (not Vineyards) and Vineyards.

Eq. 1 $\Delta C_B = \Delta C_G - \Delta C_L$

ΔC_B = annual change in carbon stocks for each land cover type, considering the total area, tonnes C yr^{-1}

ΔC_G = annual increase in carbon stocks due to biomass growth for each land cover type, considering the total area, tonnes C yr^{-1}

ΔC_L = annual decrease in carbon stock due to biomass loss for each land cover type, considering the total area, tonnes C yr^{-1}

To estimate ΔC_B on lands remaining in the same land cover type, the default factors listed in Table A-12were multiplied by the acres of each land cover type. The default factors represent the combination of gains and losses (ΔG-ΔL), essentially the net carbon change each year that on average is expected (i.e. the annual sequestration). ΔC_B was calculated for the baseline year 2005 and for land remaining in the same land use category in 2020 following projected vineyard and RCI development . Carbon loss or gain was converted to emissions or sinks of GHGs by multiplying MT C by 44/12[10].

Table A-13. Default Factors for Calculating Annual Carbon Sequestration

	Annual Sequestration Factors	
Land Use Category	**Source**	**Factor (MTC/acre/year)**
Oak Woodlands	CEC [a]	0.425
Riparian Woodlands	CEC [a]	0.425
Coniferous Forest	CEC [a]	0.666
Grasslands	CEC [a]	0.000
Shrublands	CEC [a]	0.000
Croplands Not Vineyards	Kroodsma and Field 2006 [b]	0.057
Vineyards Only	CEC[a]	0.00[c]

[a] Brown, S., T. Pearson, A. Dushku, J. Kadyzewski and Y. Qi. 2004. Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California. CEC-500-04-069F. Prepared for the California Energy Commission by Winrock International.

[b] Kroodsma, D. and C.B. Field, 2006. Carbon Sequestration in California Agriculture. Journal of Ecological Applications, 16 (5). pp 1975–1985.

[c] Grasslands and shrublands add minimal permanent biomass each season, as opposed to trees which continually add biomass. Biomass added by these land cover types each season is considered to be in a steady state with annual losses, consistent with the CA GHG Inventory methodology. Vineyards also, once mature, are optimized to concentrate annual biomass gains in the fruit which is removed. Stock for all grasses, shrubs and vineyards are accounted for separately.

[10] This ratio is the ratio of the molecular weight of carbon dioxide (44) to that of carbon (12).

A.5.3.2 Land That is Converted to another Land Use Category

To estimate the change in carbon stocks associated with land use change—in this case the change of Grasslands, Shrublands, Oak Woodlands, Riparian Woodlands, Coniferous Forest or Croplands to vineyards or RCI lands – equation 2 was used (Equation 2.15 in IPCC 2006).

Eq. 2 $\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$

ΔC_B = annual change in carbon stocks in biomass on land converted to other land-use category, in tonnes C yr^{-1}

ΔC_G = annual increase in carbon stocks in biomass due to growth on land converted to another land-use category, in tonnes C yr-1

$\Delta C_{Conversion}$ = initial change in carbon stocks in biomass on land converted to other land-use category, in tonnes C yr^{-1}

ΔC_L = annual decrease in biomass carbon stocks due to losses from harvesting, fuel wood gathering and disturbances on land converted to other land-use category, in tonnes C yr^{-1}

The quantity $\Delta C_G - \Delta C_L$ was calculated as described above using default values listed in Table A-9 that represent the net of all gains and losses occurring on a per acre basis for each land cover type. To calculate $\Delta C_{Conversion}$ acres lost of each land cover type were multiplied by the default carbon stock factors listed in Table A-13 and summed to yield a county-wide value of carbon stock lost as a result of land conversion to vineyard or RCI development as well as the carbon gained through planting of vines. These values are then compared against the pace and pattern of land conversion that was occurring in 2005 i.e. accounting only for the change in carbon stock loss relative to the baseline year. For converted lands, a 50% soil carbon retention was assumed, but no permanent storage in wood products was assumed, representing a worst case scenario for carbon loss. Carbon loss or gain was converted to emissions or sinks of GHGs by multiplying MT C by 44/12.

Table A-14. Default Carbon Stock Factors

		Carbon Stock Factors	
Land Use Category	**Source**	**Factor w/ 100% Soil Loss (MT C /acre)**	**Factor w/ 50% Soil Loss (MT C /acre)**
Oak Woodlands	EPA [1]	95.1	89.6
Riparian Woodlands	EPA [1]	80.9	73.1
Coniferous Forest	EPA [1]	58.1	52.5
Grasslands [c]	CEC [2]	1.4	0.8
Shrublands [c]	CEC [2]	16.2	12.1
Croplands Not Vineyards [c]	CEC [2]	3.8	3.5
Vineyards Only	CEC [2]	1.2	1.2

[a] U.S. EPA. 2010. 2010 U.S. Greenhouse Gas Inventory Report–Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008 (Annex 3). U.S. EPA # 430-R-10-006. Released April 2010.

[b] Brown, S., T. Pearson, A. Dushku, J. Kadyzewski and Y. Qi. 2004. Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California. CEC-500-04-069F. Prepared for the California Energy Commission by Winrock International.

[c] Soil loss percentage estimated by ICF

A.5.3.3 Default Stock and Sequestration Factors

The IPCC inventory methods, in general, allow for a tiered approach to data collection. The tiered approach allows for default values or coarse level data to be used as the first tier (Tier 1) which can be improved upon with increased locally or nationally specific data (Tier 2) when available or sophisticated models combined with a robust and comprehensive sampling program (Tier 3). The IPCC states that in general, "moving to higher tiers improves the accuracy of the inventory and reduces uncertainty, but the complexity and resources required for conducting inventories also increases for higher tiers."[11] Given the County's financial resources and current data availability, the County opted for a Tier 1 approach with the option to improve at a later date when a site-based or other more County specific data set became available.

In determining the net carbon stock flux the County has used a combination of Tier 1 and Tier 2 data sources:

- Tier 1 – Default Values: carbon stock and sequestration factors for vegetation types found in Napa County (Source U.S. EPA[12] and California State GHG[13] emission inventories). (Tables A-13 and A-14).

- Tier 2 - Napa Specific: acres of each land cover type lost or gained by 2020 (Source: Napa County Baseline Data Report (BDR) and personal communication with Napa County Conservation, Development and Planning Department). (Tables A-8 – A11).

As mentioned above, default values used in this analysis were developed as part of the U.S. national and California state GHG inventory efforts. In the case of the U.S. national GHG inventory, the carbon stock factors are based on U.S. Forest Service datasets for specific tree types sampled at the regional level. Carbon stock factors developed as part of the California state GHG inventory are based on satellite and ground based measurements for dominant (5 groups) vegetation types in several California sub-regions. Annual sequestration values were not developed as part of the U.S. national inventory and are only available (for all species desired as a product from the state level inventory). Stock and sequestration values for vineyards were taken from the scientific literature and are specific to California. Subsequent updates the GHG inventory and CAP will prioritize the appropriate Tier 2 or Tier 3 data sources for the analysis of carbon stock and sequestration loss.

A.5.3.4 Key Assumptions

At the time of writing of this document, inclusion of GHG emissions related to land use change is not yet standard in community GHG inventories. When assessing carbon stock and sequestration rates in natural land covers, national GHG inventories and state GHG inventories rely on detailed measurements and sophisticated models (IPCC—Tier 3 methods).

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[11] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 4 Agriculture, Forestry and Other Land Uses; Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. Page 10. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_01_Ch1_Introduction.pdf.

[12] U.S. EPA. 2011. U.S. Greenhouse Gas Inventory Report – Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2009. USEPA #430-R-11-005. Annex 3 – Methodological Descriptions for Additional Source or Sink Categories. http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Annex-3.pdf

[13] California Air Resources Board. 2010. California Greenhouse Gas Emissions Inventory. 1990-2004 Technical Support Document. http://www.arb.ca.gov/cc/inventory/doc/methods_v1/ghg_inventory_technical_support_document.pdf

Because a detailed field study of carbon content in natural land covers was not possible as part of this work, and because existing protocols for addressing carbon stock loss in local CAPs were not available, a unique approach was developed for the Napa CAP. The key, requisite assumptions are outlined here:

- The County assumed that all acres listed in the BDR for each land cover type are located in the unincorporated County.
- The BDR specifies acreages for developed lands, rock outcrops and wetlands. The County assumed that the carbon content of developed lands and rock outcrop/ other categories as defined by the BDR was 0 MT C/acre. Although the DEIR indicates that some acres of wetlands will be lost to vineyard development, state and federal law requires *no net loss* of wetlands. It was assumed that wetlands areas as well as their sequestration value would be replaced.
- Default carbon stock and sequestration rate factors available from several sources including EPA, California Energy Commission (CEC), and scientific literature were used. Species groups incorporated into the default factors were not always a perfect match for the species listed for each BDR land cover type. When several default factors were available, the default factor with the closest species match was selected.
- Lacking age distribution data for individual stands, an evenly mixed age distribution for all forested acres was assumed. The average age of the theoretical stands is approximately 60 years for oak and riparian woodlands and approximately 80 years for coniferous forest. Because trees grow at different rates over their lifetime, the annul sequestration and the total amount of carbon stored on site at any given time depends highly on the age of the stand. The default factors listed in Tables A-12 and A-13 reflect average conditions i.e. a mix of young trees growing rapidly but with less total carbon per tree and mature trees growing more slowly but with more total carbon per tree. Further, because an even age distribution was assumed, the annual sequestration was assumed to be constant on a per acre basis.
- Default factors in Tables A-12 and A-13 reflect average conditions in the region for the species of interest, not individual plots in Napa County. The default factors inherently account for the annual fluctuations in stock and sequestration due to natural and man-made disturbance as well as the continual presence of both standing dead trees, down dead trees and seasonal changes in understory growth. For a specific stand in a particular year that for example experiences a fire, the above factors would grossly over estimate carbon stock and sequestration. Consistent with Tier 1 and Tier 2 IPCC approaches, the default factors can be appropriately applied at a course level of scale. The CAP allows for these default factors to be updated through regular update process outlined in chapter 4.
- Default factors encompass carbon stock and stock change in all pools.
- The GHG inventory approach that is used by California communities in order to demonstrate compliance with AB 32 is a snapshot approach. A snapshot of emissions is taken in the baseline year and a snapshot of emissions is taken in the future year. Certain sources of GHG emissions sources cannot be fully and realistically captured in the snapshot approach. These emission sources are those where the activity occurs in the snapshot year but the emissions occur over several years (e.g. waste generation) or vice versa (e.g. landfills as a stationary source). In the case of waste generation, the full amount of the GHG emissions that will result from the land filled waste are counted in the year the waste was generated, even though the GHG emissions will occur over the lifetime of the waste. Gain and loss of carbon stocks are counted similarly, in that the full gain or loss of stock is counted in the year of conversion, even if accumulation of stock will occur over many years or the decay of wood chips will occur over many years. The County understands that the snapshot approach does not fully capture the complexity of forest maturation. Nevertheless, the County is committed to accounting for GHG emissions that result

from land use change, either in the current framework with other sectors or as a separate sector that does not utilize the snapshot approach.

A.6 Quantification of GHG Reduction Measures (non-transportation sectors)

To quantify the GHG emissions that are avoided in 2020 due to implementation of the measures listed in the CAP, a combination of in-house Excel based tools and ICLEI's CAPPA software (ICLEI 2010b) was used. A further description of methods used to estimate reduction in the transportation sector is provided in *Section A.7*. Table A-14 lists all GHG reduction measures, the unique quantity of $MTCO_2e$ associated with each measure and the key assumptions used to quantify the GHG reductions.

County specific data was used wherever possible and often cross referenced with CAPPA software defaults which are based on beta-testing in several U.S. cities of varying sizes. These data sources are listed in Table A-14 and include: Napa County General Plan and supporting appendices; Napa County General Plan DEIR and FEIR; 2050 Napa Valley Water Resources Study; Napa County ERD for County Operations; Napa County Baseline Data Report; Napa County Agricultural Report and personal communication with County departments. To calculate GHG reductions from state-level policy, expected state-wide reductions as reported in available ARB or CEC reports were scaled to Napa's emissions.

A.7 Quantification of GHG Reduction Measures (transportation sector)

Quantification of the selected GHG reduction measures was conducted using broad tools and factors rather than more labor-intensive tools/models given that the overall amount of reductions was expected to be limited and thus the effort was assumed to not require a highly refined level of quantification. A major report utilized for the quantification efforts was the recently released Quantifying Greenhouse Gas Mitigation Measures report authored by the California Air Pollution Control Officers Association (CAPCOA), ENVIRON, and Fehr & Peers. Fehr & Peers conducted an extensive literature review for the transportation related strategies to provide accurate and reliable quantification methods to be used throughout California.

The methodologies and calculations described in the report were applied to the Napa County specific strategies. The calculations were additionally refined to provide more accuracy based on the context of the strategy and environment. For example, in many cases, estimated reductions were discounted if they had limited application such as applying only to work trips or new development areas. Estimated reductions were also adjusted to account for their implementation in a more rural community, whereas much of the literature is based on research conducted in urban or suburban areas.

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
A. STATE MEASURES			
S-1	AB 1493 Pavley I and II	50,790	EMFAC fleet distribution for 2020. Adjusted emission factors developed by ICF based on ARB Technical Assessments. http://www.arb.ca.gov/cc/ccms/ccms.htm
S-2	Low Carbon Fuel Standard	19,530	Applied expected statewide reductions as estimated for the AB32 Scoping Plan to Napa County's 2020 emissions (all vehicles). http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm
S-3	Other Vehicle Efficiency Measures	4,600	Applied expected statewide reductions as estimated for the AB32 Scoping Plan to Napa County's 2020 emissions. http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm
S-4	Renewable Portfolio Standard	17,310	Followed methodology in the ARB Scoping Plan Appendix I. http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm Accounted for all kwh gained through energy efficiency, water efficiency, and renewables before applying the RPS.
S-5	Landfill Methane Regulation	4,250	Waste generated in Napa County currently goes to Clover Flat Landfill and Keller Canyon Landfills. Both of these landfills are listed in the ARB's databases as currently flaring methane gas. A 75 % destruction efficiency was assumed for the inventory and BAU forecast. Assumed that both landfills will have a destruction efficiency of 85% either through GTE or other technologies as specified in the ARB's rule by 2020. http://www.arb.ca.gov/regact/2009/landfills09/isor.pdf
TOTAL STATE MEASURES:		**96,480**	

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
B. ENERGY EFFICIENCY MEASURES			
EE-1	Green Building Ordinance (Meet Title 24, including Cal-Green)	3,670	Assumed 1341 D.U. constructed between 2005 and 2020 (based on 2235 built by 2030 -DEIR Alt A p 3.0-14). Assumed 2.87e6 sqft of commercial space constructed between 2005 and 2020 (Keyser Marston- Land Use Study DEIR Appendix B). Used an average of yearly construction rate for the period 1985-2005 (p.12). Used ICF's calculation of the average increase in efficiency for buildings built over this time as Title 24 updates relative to the baseline year.
EE-2	Energy Efficiency Financing District (California FIRST or equivalent program)	940	At this time, the CA FIRST program is not available in Napa County. The program is in its early stages and data about penetration and energy efficiency achieved, even for pilot communities, is not available. The EE gains depend on several unknown factors including: age of houses retrofit, aspects of building envelope that are eligible, and community response to financial incentives. Assume program (or like program) is available in Napa County before 2020 and 2,400 retrofits completed with the program by 2020 (equivalent to approximately 25% of the existing building stock). Assumed retrofits achieved energy efficiency gains similar to those of Title 24 as a conservative estimate.
EE-3	Weatherization of Low-Income Homes	50	Assume 60 units weatherized by 2020. Assume CAPPA (ICLEI CAPPA software, http://www.icleiusa.org/cappa) default values for the increase in efficiency achieved for typical retrofits.

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
EE-4	Plant Trees for Shading for Discretionary Projects	220	65 Use Permit Applications per year + 35-40 vineyard projects per year assumed as a minimum for discretionary projects per year. (personal communication, October 4, 2010). Assume a requirement of 10 trees per project ((65+40)*10 = 1,050 trees per year). (As a point of reference, the CAPPA default is 500 trees/year for municipalities that are slightly larger than Napa County). Assume the policy is active beginning in 2010 (2010-2010 = 10,500 total trees planted). Assume 50% = mature trees providing shade in 2020 (5,025 trees). Use CAPPA defaults for energy savings achieved.
EE-5	Passive Design for Discretionary Projects	0	This measure is not quantifiable alone although it undoubtedly results in energy savings. Further, energy savings due to passive design are highly dependent on site location, other design features and end-use of the building and thus vary project to project. ICF has assumed that passive design supports a project's ability to exceed the Title 24 Standard. Because our analysis assumes that all future construction meets Title 24, an individual project that can demonstrate the kwh saved through passive design would represent additional GHG reductions relative to those achieved by the CAP.
EE-6	Napa Certified Winery Program	3,320	Data from 11 participating wineries examined and GHG benefits based on total electricity savings. Current participating wineries is 28 Savings achieved by participating wineries considered to be typical of new existing wineries that might chooses to participate in the future Reflects wineries that make retrofits to existing facilities NOT new construction County estimates that 90 wineries will be participating by 2020. These gains are captured and counted here. Does not include reductions in GHG emissions associated with winery wastewater.
TOTAL EE SECTOR:		***8,200***	

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
C. WATER EFFICIENCY MEASURES			
W-1	Comprehensive Water Efficiency Ordinance	20	Use 2020 Residential Water Use as reported in 2050 Napa Valley Water Resources Study, Tech Memo 3 (3640 afa). (http://www.countyofnapa.org/Pages/Search.aspx?keywords=Water%20Resources%20Study) Assume that this measure applies to indoor and outdoor use in existing homes. Assume that the plan resulted in a 10% decrease in use in 2020 compared to BAU.
W-2	Landscape Ordinance	5	Assume this applies only to new residential construction (1341 D.U. by 2020 -based on 2235 built by 2030 -DEIR Alt A p 3.0-14). Expected water savings per home estimated from study performed by the California Home Builders Assoc. January 2010. http://www.cbia.org/go/cbia/?LinkServID=E242764F-88F9-4438-9992948EF86E49EA

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
W-3	Recycled Water	0	Because Unincorporated Napa County obtains much of its needed water from groundwater supplies and uses only limited water from, the State Water Project (via City of Napa which provides water to unincorporated areas around the City which derives approximately 40% of its water from the State Water Project)[14], the energy intensity of water use is very low in the County i.e. it is not a major source of GHG emissions. Because current energy use per gallon consumed is already very low, construction of the recycled water infrastructure (although crucial to a sustainable water supply) may not result in energy savings. Rather- they may represent new (modest) municipal energy demands for distribution. The 2020 BAU projection assumed that the unincorporated County would continue to be able to meet water demands without a change in water sources or an increase in imported water. If in the future, the County does require increased water imports to meet demand, then the energy intensity of water used in the County could increase. Water demand that can be met locally with recycled water would then result in greater energy savings and GHG reductions than calculated herein, which does not include imported water embodied emissions.
W-4	Agricultural Water Conservation Programs	160	County actions include: education materials (mail, web, through agencies), efficiency workshops specifically for agriculture/winery, coordination with other agencies, advertising rebate programs (personal communication, October 4, 2010). County water conservation efforts target agriculture end-use, winery end-use and residential/ commercial end use. Assume that above listed efforts result in a 5% reduction in water consumption in agriculture and winery sectors as compared to BAU.
TOTAL WATER SECTOR:		***190***	

[14] The energy emissions associated with partial use of imported water for certain residential, commercial and agricultural users who receive water from the City of Napa was not included in the GHG inventory and forecast for this document. This is noted as an area of potential improvement in future updates to this CAP to more accurately reflect water-associated emissions and the full value of water conservation. The amount of emissions not included is not substantial but is recommended for future inclusion.

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
D. WASTE MEASURES			
WST-1	Expand/start a kitchen waste composting program	30	This program was started in 2009 (i.e. after the GHG inventory baseline year). Calculations based on original waste generation data collected by MIG and CalRecycle's waste profile which indicates ~330 lbs kitchen waste per person is available for diversion. As a point of reference, CAPPA defaults suggest a program would achieve ~ 300 lbs per person. Assume a 75% capture rate on the 330/person i.e. the program will result in 250 lbs of kitchen waste diverted per person per year in 2020. Assume 2020 Population of 33,290 (Housing Element Table 9).
WST-2	Expand/start C&D waste program	0	C& D benefits are accounted for as part of Cal-Green [EE-1]
WST-3	Waste Minimization and Public Outreach	0	Assume this measure supports all other measures. Not quantifiable alone.
TOTAL WASTE MEASURES		***30***	
F. RENEWABLE ENERGY MEASURES			
RE-1	Renewable Energy Finance District (California First or equivalent program)	1,610	At this time, the CA FIRST program is not available in Napa County. The program is in its early stages and data about community response to financial incentives for residential solar installations is not yet available. Participation in this program will likely vary by a large amount across California. Assume California First Program is available in Napa County and results in 2,400 solar PV installations before 2020 (approx. 25% of existing single family building stock). Assume the average CA solar PV installation = 1.5kw or 3000 kwh/year.

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
RE-2	Biofuels and Landfill GTE at Clover Flat	470	Assume maximum power output for the biofuels component as specified in the CFL MOD (1MW) for all weekdays, 8 hours per day. Clover Flat is estimated to have 1589315 tons of WIP in 2020. Assume 0.5MW generation based on landfills of comparable size described in the ARB's study of energy potential in CA landfills http://www.energy.ca.gov/reports/2002-09-09_500-02-041V1.PDF. Assume all power generated is NOT going back to the grid but is used locally to power Napa County local government facilities or other facilities within unincorporated Napa County.
RE-3	Remove Barriers to Renewable Energy Development	130	Permit streamlining for solar was done in 2004 (personal communication, October 4, 2010). This is prior to the baseline inventory year. At this time, ICF has not included resulting solar installations in the CAP. Data Source–IS/ND for Small Wind Energy Ordinance (Napa Planning commission website). IS/ND indicates small wind projects allowed on 2 acre parcels and no greater than 25kw. 437 acres with winds higher than 11.2, >700 acres with winds between 10-11 mph. Assume that the ordinance passes and results in 10 small wind energy projects (25kw) by 2020. Used the CAPPA default calculation for the # of kwh produced.
TOTAL RENEWABLE SECTOR:		**2,210**	
G. TRANSPORTATION MEASURES			
T-1	Promote Dense, Mixed-Use Developments	4,400	As land use/location strategies are only estimated for the Napa pipe and angina projects, this is a reasonable (though low) estimate of effectiveness
T-2	Integrate Below Market Rate Housing	50–100	
T-3	Requirements for Use Permit Applicants	0	Not quantified as a standalone strategy but important as a complementary strategy to parking strategies.

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
T-4	Traffic Calming Improvements	100	Since it is only considered for new projects (Napa pipe and angina), this will have low effectiveness. A more aggressive strategy (aimed toward existing roadways as well), will increase effectiveness. Or, also keep in mind, traffic calming has many other benefits beyond CO_2 reductions.
T-5	Bicycle Network and Bicycle Parking	10	753 square miles (Napa county) 40 miles of new bike plans (per general plan) Literature suggests a 1% increase in bike commuters for each mile of bike lane (per square mile). This equates to 0.05% increase given the large square miles of Napa county, and that employers are spread throughout the county. Bike lanes will promote increased recreational trips (though these likely will be new trips).
T-6	Improve Transit Network	500-2,200	Assumed 5-10% increase in network Assumed 25-50% reduction in headways 1.4% existing transit mode share (Napa short range transit plan fy2008-2014) Conservative assumptions on overall transit improvements since more detailed information will not be provided until the 2011 revisioning
T-7	Station Bike Parking	0	Not quantified as a standalone strategy but important as a complementary strategy to Transit Network.
T-8	Park-and-Ride Lots	0	Not quantified as a standalone strategy but important as a complementary strategy to Transit Network and commute based strategies.
T-9	Required Contributions for Transit Access Improvements	0	Not quantified as a standalone strategy but important as a complementary strategy to Transit Network.
T-10	Employer-Based Commute Trip Reduction Program	3,500–6,000	Assume 50-100% of employees are eligible. 22% of trips are work trips (Bay Area Travel Survey). Literature assumes a combination of carpooling, ride-matching, transportation coordinator, end-of-trip facilities, vanpool assistance, flex schedule for carpoolers. Note that this will only be effective if the measure reaches the majority of employers in the county (though this does NOT assume it is a mandated and monitored program).

Table A-14. Napa County Cap Measures Detailed Summary

		GHG Reductions in 2020 ($MTCO_2e$)	Key Assumptions and Data Sources
T-11	Provide Employer Sponsored Vanpool/Shuttle	100–2,400	Assume all small employers Assume 5-25% of employers will implement 22% of trips are work trips This measure can provide greater benefits if the strategy was required for majority of employers in the county.
T-12	Reduce Parking Requirements and Establish Parking Maximums	500–1,600	Assume 5–25% of employers will implement. Also applicable to Napa Pipe and Angwin. Assume 10% reduction in parking. Low impact due to this strategy only being applied to small parts of the County.
T-13	Preferential Parking	0	Not quantified as a standalone strategy but important as a complementary strategy to parking strategies
T-14	Improve Traffic Flow	< 100	Assumed only the Flosden/Newell Rd and Devlin Rd additions. Compared the travel model runs with and without these 2 improvements.
TOTAL TRANSPORTATION SECTOR:		***9,260 – 16,910 (Avg. of 13,085)***	
TOTAL LOCAL MEASURES:		**23,720**	**Excluding Project-Level Mitigation**
H. PROJECT LEVEL MITIGATION			
PL-1	Project Level Mitigation	19,350	38% of all project emissions must be avoided through any suite of actions above and beyond those already included in the CAP. Increases in carbon stock or legitimate avoided conversion (requirements TBD by county) can be used to reach the project level target. Mitigation burden rests on new development although 38% obligation was based on an equal burden sharing between the predominant types of new development in the County, RCI and vineyard. Step-by-step procedures for this program are available in Appendix B.
TOTAL PROJECT LEVEL MITIGATION:		**19,350**	

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Appendix B

GHG Checklist of Project Emissions

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Checklist of Project
Green House Gas Emissions & Emission Reductions

A Tradition of Stewardship
A Commitment to Service

The Napa County Climate Action Plan requires that staff calculate the GHG emissions of all discretionary projects assuming "business as usual" (BAU), and that applicants reduce those emissions by 39%. This checklist identifies the data needed to complete the required calculations and allows applicants to select the emissions reduction measures they wish to use. Applicants may retain consultants to prepare their own calculations if desired. Default calculations will be based on the URBEMIS and BGM model, as well as standard factors for vegetation removal and retention/replacement.

PROJECT NAME: _____ TARGET YEAR (OF BUILD-OUT): _____

PROJECT ADDRESS: _____

APPLICANT: _____

CONTACT INFO: _____

1. PROJECT DATA

1.1 Proposed Land Uses

(NOTE: to complete the required calculations, all non-residential uses will be translated into uses contained within the URBEMIS model)

		gross sq. ft.	acres
1.	Dwelling unit (number) _____ Dwelling unit		
2.	Non-Residential Uses		
	A. Office (General Office)		
	B. Warehouse (Warehouse)		
	C. Industrial/Winery Production (General Light Industry)		
	D. Hospitality/Wine Tasting/Retail (Quality Restaurant)		
	E. Retail (Regional Shopping Center)		
3.	Quality Restaurant (seats) _____ Restaurant		
4.	High Turnover/Sit Down Restaurant (seats)_____ Restaurant		
5.	Lodging (Hotel) rooms _____ Lodging		
6.	Planted & Landscaped Areas		
	A. Vineyard area, including roads		
	B. Other agricultural uses		
	C. Irrigated landscape		
7.	Other uses (explain)		

1.2 Utilities

(NOTE: URBEMIS and BGM will calculate default values based on the square footages provided above unless specific data is provided for BAU conditions)

1. Potable water use: ____ gallons per day
2. Recycled water use: _____ gallons per day
3. Please describe the sources of potable and recycled water: _____
   _____
4. Wastewater treatment volumes: _____ units
5. Will wastewater treatment occur on site? _____
6. Electricity consumption: _____ kilowatt-hours per year
7. Natural gas /propane consumption: _____ cubic feet per year
8. Will there be a diesel powered back-up generator on site? _____

1.3 Refigerants

(NOTE: BGM will estimate emissions based on default leakage rates if the type of refrigeration or air conditioning systems are known)

		Refigerant Charge (pounds)
1.	Project Refrigeration Systems	
	A. Centralized	
	B. Cold Storage	
	C. Process Cooling	
	D. Refrigerant Condensing Units	
2.	Project AC Systems	
	A. Centrifugal Chiller (large)	
	B. Centrifugal Chiller (medium)	
	C. Packaged Chiller (medium)	
	D. Unitary AC (small)	

1.4 Agriculture & Industry

(NOTE: BGM will estimate emissions from livestock, equipment, and fertilizer use, if any)

		Gal/year	Kwh/year
1.	Mobile Equipment		
	A. Gasoline		
	B. Diesel Fuel		
	C. Propane		
2.	Stationary Equipment		
	A. Gasoline		
	B. Diesel Fuel		
	C. Stationary Equipment		
3.	Electricity Consumption		
4.	Fertilizer Used	Tons/year	

1.5 Tree & Vegetation Removal

(NOTE: Standard factors from the CAP will be used to calculate sequestration rates, carbon in soil, and carbon stocks unless site specific data is provided.)

		acres
1.	Coniferous Forest (acres)	
2.	Oak Woodland (acres)	
3.	Shrub (acres)	
4.	Grassland (acres)	
5.	Wetland (acres)	
6.	Vineyard (acres)	
7.	Other vegetated area (explain)	
8.	Number of trees ≥6" diameter proposed for removal _____	

1.6 Other Construction Activities

(NOTE: URBEMIS will calculate construction emissions if data is available)

1. Total duration of construction: _____
2. Maximum number of employees on site: _____
3. Describe phasing & equipment used for each phase:

	number	months	hours per day
A. Bulldozer @ horsepower _____			
B. Graders @ horsepower _____			
C. Other @ horsepower _____			

1.7 Proposed Project Operations

(NOTE: URBEMIS will calculate transportation emissions based on land use square footage unless specific data is provided regarding vehicle trips or VMT)

1. Maximum number of employees on site (daily): _____
2. Maximum number of visitors on site (daily): _____

Information provided in Section 1 will be used to estimate the proposed project's GHG emissions under "business as usual" (BAU). Calculations will be based on generic factors derived from relevant literature unless project applicants/consultants provide site-specific information. Any emission reduction strategies (e.g. energy conservation, alternative energy generation, habitat restoration, etc.) proposed as part of the project will be factored into the emission reductions in Section 2.

FOR STAFF USE ONLY: BAU Emissions

SECTOR	***EMISSIONS PER BGM***	***ADJUSTMENTS****	***BAU EMISSIONS***
	(MT CO2e)	***(MT CO2e)***	***(MT CO2e)***
Buildings (Annual)			
Transportation (Annual)			
Agricultural Operations (Annual)			
	Land Use (Annual Sequestration)		
	Land Use (One-time stock loss)		
	Construction (One-time emissions)		
	Annual	***One-Time***	
TOTAL PROJECT EMISSIONS			
REDUCTIONS NEEDED TO MEET 39% GOAL			

*Emissions from vegetation loss and construction must be added to BGM results manually. Transportation adjustments back-out the State measures assumed in the BGM (Pavely & the Low Carbon Fuels Rule). See Table 2 & 3 of BAAQMD's User Manual, April 29, 2010. Building adjustments back-out the implementation of the CalGreen building code.

2. EMISSION REDUCTIONS (CHECK ALL THAT APPLY)

Applicants will be credited with GHG reductions for the CalGreen Building Code, State transportation measures, and any of the other measures selected below that can be quantified. The number of measures quantified will change based on the amount of project-specific data provided and the outcome of ongoing scientific research.

		Yes	No	Comment
2.1	**Construction**			
1.	Will the contractor use alternative fueled (e.g. biodiesel, electric) construction vehicles or equipment for at least 15% of the fleet?			BAAQMD recommend.
2.	Will the project use at least 10% local building materials?			BAAQMD recommend.
3.	Will the contractor recycle or re-use more than 50% of construction waste and demolition materials?			BAAQMD recommend.
4.	Will the contractor minimize idling time of diesel powered construction equipment to two minutes?			BAAQMD recommend.
5.	Will the project include other construction-related emission reductions (explain)?			BAAQMD recommend.
2.2	**Site Design & Energy Conservation**			
1.	Will the project comply with Title 24 and the CalGreen Building Code			Required by law
2.	Will the project plant trees to shade structures?			Required by the CAP
3.	Will the project be designed to take advantage of natural cooling and passive solar aspects?			Required by the CAP
4.	Will the project include a "cool" (lightly colored or reflective) or permeable/living roof?			
5.	Will the project install a solar water heater?			
6.	Will the project install Energy Star (EPA rated) appliances?			
7.	Will the project comply with CalGreen Tier 1?			
8.	Will the project comply with CalGreen Tier 2?			
9.	Will the project be LEED certified?			
2.2	**Energy Production**			
1.	Will the project include on-site energy generation & if so, how much will be generated? Please explain.			
2.	Will the project include off-site energy generation & if so, how much will be generated? Please explain.			
2.3	**Transportation**			
1.	Is there access to public transportation?			
2.	Is pedestrian and bicycle access provided for?			
3.	Will bicycle parking be provided?			
4.	Will there be preferential parking for carpools and alternative fuel vehicles?			
5.	Will the operator develop and implement a transportation demand management program?			
6.	Will the owner/operator offer employee trip-reduction incentives including transit passes if the site is accessible by transit?			
7.	Will the owner/operator offer or coordinate worker vanpools or carpools?			
8.	Will there be traffic calming measures implemented as part of the project?			
2.4	**Water Conservation**			
1.	Will the project include drought tolerant landscaping?			
2.	Will the project be subject to the County's Water Efficient Landscape Ordinance (projects with $\geq$2,500 sf of landscaping)?			
3.	Will the project include high-efficiency drip irrigation?			
4.	Will the project use water for frost protection?			
5.	Will the project install low flow toilets?			
6.	Will the project install a tankless water heater?			
7.	Will the project include ultra efficient fixtures and appliances?			
2.5	**Solid Waste & Material Recycling** (Also see farming & business practices, below)			
1.	Will the project include or facilitate composting of food waste?			
2.	Will the project achieve solid waste reductions by maximizing recycling? (Estimate % reduction if possible: _____)			
3.	Will the project use vegetation that is removed from the site for fuel, for other wood products, or for mulch? (Please explain)			
2.6	**Natural Resources**			
1.	Will the project include the restoration of degraded habitat on site? If so, please explain. Include the type of habitat, location, and acreage.			
2.	Will the project replace trees that are removed on site at $\geq$ 2:1 ratio?			
3.	Will the project use wood that is sustainably harvested or rapidly renewable (e.g. bamboo)?			

		Yes	No	Comment
2.7	**Farming & Business Practices**			
1.	Will the operator use alternatively fueled (e.g. biodiesel, electric) vehicles/equipment for at least 15% of the fleet?			
2.	Will there be a 70-80% cover crop?			
3.	Will the project use reduced or no-tillage?			
4.	Will the project reduce its use of nitrogen fertilizers?			
5.	Will the project retain biomass that is removed via pruning and thinning by chipping the material and using it in the vineyard?			
6.	Will refrigeration use ammonia instead of CFCs or HCFCs?			
7.	Will the project be enrolled in a third party certification program (e.g. Napa Green Winery, Napa Green Land or Fish Friendly Farming)?			

FOR STAFF USE ONLY (Emission Reductions):

Reductions attributable to State transportation measures (on road): _____

Reductions attributable to State transportation measures (off road): _____

Reductions attributable to State measures related to building energy use: _____

Reductions attributable to measures selected above: _____

Emissions Offsets Required: _____

3.	**EMISSION OFFSETS**	**Yes**	**No**	**Comment**
3.1	**Natural Resources** Will the project include the restoration of degraded habitat off site? If so, please explain. Include the type of habitat, location, and acreage.			
3.2	**Avoided Deforestation** Will the project permanently protect land that is suitable for vineyard development either on or off site? If so, please explain. Include the type of habitat, location, acreage, and proposed easement holder.			
3.3	**Purchase of Offsets from a Valid Source** Will the project purchase emission offsets that are real, surplus, permanent, quantifiable, and enforceable? (Please specify.)			Local source preferred

4. ADDITIONAL INFORMATION

4.1 Please use the space below or attach supplemental sheets to amplify on the information provided above & describe sustainable project features that may not have been captured:

4.2 Any comments, suggestions, or questions regarding the County's efforts to reduce GHG Emissions?

(Please attach supplemental sheets with supporting information & calculations as needed.)

Appendix C

Responses to Comments on January 2011 Draft Climate Action Plan

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Appendix C
Responses to Comments on the Draft CAP

Master Response No. 1: How the CAP will evolve over time?

What is this Plan?

This Plan demonstrates compliance with the AB 32 Scoping Plan and fulfills CEQA requirements

The Napa County Climate Action Plan (CAP) is a living document, the intent of which is two-fold. First, the AB 32 Scoping Plan recommend local governments to reduce their GHG emissions from both municipal operations and the community at large by 15% relative to current levels, where "current" is generally understood to mean the time period 2004-2008.[1] The Napa County CAP demonstrates that the County has completed analysis sufficient to determine what GHG levels were during the period 2004-2008 (in Napa's case, 2005 was selected as the baseline year). The CAP further demonstrates through quantitative analyses that a combination of state level actions and actions selected by the County, it is feasible for the County to reduce its GHG emissions to a level that is 15% below 2005 levels by 2020. Second, the Napa County CAP satisfies mitigation measure M 4.8.7a in the Napa County General Plan EIR. The revised Conservation Element of the General Plan includes policies and goals ensuring that the County will:

- Prepare a detailed inventory of current GHG emissions by January 1, 2009, for the County in a manner consistent with Assembly Bill 32. Prepare an estimate of forecasted emissions for 2020 and an estimate for emissions in 1990 by January 1, 2009.
- Prepare a greenhouse gas reduction plan (GGRP) after completion of the GHG emission inventory (to be completed by January 1, 2009) to reduce GHG emissions to 1990 levels by 2020.

This Plan provides the underlying calculations and analysis to establish the amount of avoided GHG emissions needed by the County in 2020, such that the County can conduct itself or develop policy to achieve the desired GHG reductions.

GHG planning at the local level in California is fundamentally tied to the state's GHG planning framework and the state's goal to reduce GHG emissions to a level that is 15% below current levels by 2020. The state does not specify sector-specific reduction goals, only that total GHG emissions for the state be reduced to a level that is 15% below current levels by 2020. In practice this provides flexibility in how the state reduces its emissions as some sectors may offer larger and more economical GHG reduction potential while the potential to reduce GHGs in other sectors may be quite limited in the short term. Similarly, the state does not prescribe sector specific GHG reduction targets to local governments. Each jurisdiction can chart their own path towards a collective GHG reduction of 15%, optimizing GHG reduction opportunities unique to each community. The CAP

[1] The AB32 Scoping Plan was developed in 2008 and adopted in December 2008. The Scoping Plan was based on GHG emissions inventories through 2004 that were available at the time and forecasts of emissions to 2020.

shows that the County can reach the target, assuming a set of physical actions (e.g. residential home retrofits) are taken.

This Plan ensures that the required amount of GHG reductions are achieved from selected County actions. This Plan does not preclude modification or expansion of policies in the future.

This is Napa County's first CAP and is first goal is the collective reduction of the County's GHG emissions to a target level by 2020. This first CAP is focused on reducing GHG emissions and is not intended as a comprehensive plan for addressing overall ecosystem health or conservation. Many of the activities that produce GHG emissions have other adverse effects on the environment. For example, the driving of gasoline or diesel cars contributes to local air pollution and the cutting down of trees reduces shade and may alter microclimates and remove habitat for local flora and fauna. Conversely, actions taken to reduce GHGs often have co-benefits to the community. The actions and policies set forth in the CAP are, at this time, tailored to maximize only for GHG reduction and not other co-benefits. However, subsequent updates to the plan (discussed in part 2 below) can augment or modify actions to streamline overlapping policies associated with water conservation, habitat preservation or other areas, as long as the actions are implemented at a level sufficient to achieve the required GHG reductions.

This Plan is the foundation for building the County's comprehensive approach to reducing GHGs and will necessarily be updated and improved over time.

This Plan is Napa County's first CAP.[2] This Plan is intended as the first step towards integrating GHG planning and monitoring into the County's policies and planning. The Plan is a living document and it is the County's intent that this Plan will improve, expand and evolve over time (see sections 2 and 3 below). The County anticipates the Plan evolving in response to: 1) feedback from Napa County residents and businesses 2) the continued development of GHG policy at the local, state and national levels 3) the continued availability of more sophisticated data and methodologies for estimating and monitoring GHGs from a variety of sources and 4) the passage of time, as we get closer to the year 2020. In general, the quantification of combustion related emissions (vehicles, electricity generation, and stationary combustion) is well understood and highly accurate. However, the science supporting very accurate quantification of GHGs associated with agricultural practices and conversion of natural lands at the local level is rapidly improving both in terms of data availability and methods. The current estimate of GHG emissions due to land use change is a coarse although reasonable estimate and can be refined in the future as data availability and methods improve. The Plan also includes an implementation section describing the process of updating the CAP. Subsequent updates to the Plan, as anticipated by the County, will add detail and substance by building on this framework.

[2] Inclusion of carbon sequestration in local community GHG inventories is not yet standard practice in California. The state has articulated a general goal to maintain current levels of state-wide carbon sequestration in the forestry sector but has not set forth specific policy for accomplishing the no net loss goal or any specifics relative to land cover conversion outside the forestry sector. Napa County has taken a pioneering step in choosing to address the loss of carbon stock and sequestration capacity in the County as a GHG emission. On a global level, loss of carbon stock is the second largest source of GHGs, and is likely a significant source of GHGs for certain California communities as well. This Plan represents the first time that carbon stocks and sequestration capacity in the County were inventoried and the first time that the anticipated loss in carbon stock and sequestration due to reasonably foreseeable development was estimated. These estimates allow the County to examine the magnitude of emissions in this sector against other emission sources in the County and assess the options for mitigation in this sector, similar to other sectors. As the inclusion of land use change in local GHG inventories becomes more standard and the state develops its carbon sequestration policy, the County will consider all approaches that may better quantify carbon sequestration in the County, both as a single component of an overall GHG strategy and potentially as a separate plan with a unique goal.

What Future Improvements can be made to this Plan?

The Napa CAP is composed of the following components: 1) the baseline GHG inventory (2005) 2) a projection of GHG emissions in 2020 under a business as usual (BAU) scenario 3) a list of actions taken by either the state or the County to reduce GHG emissions and the amount of avoided GHG emissions (metric tons of CO2e) associated with that action in the year 2020 (GHG Reduction Plan) and 4) an emission reduction requirement for discretionary projects reviewed by the County. All components can be improved or expanded in future updates, although care should be taken such that standard GHG inventory and reduction calculation protocols are followed and consistency with AB 32 is maintained. The process and schedule for revisiting and updating the CAP is discussed below.

Recommendations for improvements to the Plan include the following:

- ***Local and/or more specific data***– Recommended GHG inventory methodologies (IPCC, LGOP, and ICLEI) uniformly set as a first tier the use of locally specific data. In most sectors of Napa County's GHG inventory (representing > 90% of total emissions), locally specific data was used (e.g. building energy use from PG&E; transportation data from Napa Solano Travel Demand Model outputs; water use from the Napa County Urban Water Management Plan; Napa County waste generation from CalRecycle; estimates of acres and land cover types for new vineyards provided by the Napa County Conservation, Development and Planning Department).

  In estimating the carbon stock and annual sequestration associated with natural lands, Napa specific carbon stock and sequestration rate factors were not available for all land cover types. Care was taken to select only California based factors with tree species overlap to species found in Napa County. Greater accuracy and specificity could be added to the plan with a comprehensive carbon stock survey of the County built on extensive on-the ground measurements. Were the land use change sector of the GHG inventory and forecast to be built on on-site measurements, mitigation requirements for vegetation removal could also be estimated using the same measurement based techniques including individual tree measurements or aerial photography. If bulk stock and sequestration factors specific to Napa become available (through UC Davis studies or other), these could be used in the interim as improvement on the "bulk approach" used now.

  Project applicants who are complying with the plan's emission reduction requirements will also have the option of using site-specific data rather than bulk calculations based on stock factors to calculate their emissions and the efficacy of proposed emission reduction measures.

- ***More comprehensive treatment of carbon sequestration*** – Land use change differs from other GHG source sectors in that it requires the quantification of living, breathing and highly dynamic ecosystems. Consequently, estimation of GHGs from land use change is considerably more complex than from combustion based sources. The County acknowledges that the estimation of GHGs due to land use change is currently a coarse estimate that greatly simplifies many aspects of carbon cycling, specifically varying timescales for reaching maturity and disturbance. Further, the framework commonly used by governments when inventorying emissions is a "snapshot approach" (i.e. one snapshot in the baseline year and one in the future year) which is also ill suited to fully capture the complexity of carbon cycling. Nonetheless, the County is committed to accounting for and mitigating GHG emissions due to land use change as part of the CAP. The County will continue to seek ways to better address loss in carbon sequestration as part of the existing California GHG planning framework and will consider the benefits of addressing loss of carbon sequestration separate from other GHG emissions in regularly scheduled CAP updates.

- ***GHG reductions through sustainable agriculture practices***– At the individual farm and winery level Napa famers and vintners already include many practices in their daily operations that act to reduce GHGs. These practices include: water conservation; the use of cover crops; reduced or no till practices; composting; chipping; and waste practices. The GHG benefits of some of these practices cannot currently be accounted for because the baseline conditions of these practices are not explicitly included in the inventory and forecast. This is due to the following reasons: 1) Data at the individual farm and winery level was not collected as part of this effort 2) appropriate methodologies are not available for assessing the emissions and avoided emissions at the County scale (as opposed to the individual site scale), for example the GHG benefits due to tillage practices are highly site specific.[3] The inventory and forecast assess an aggregated, worst case scenario for emissions due to land use change and agricultural practices. However, as the underlying science improves and methods for estimating the GHG benefits associated with soil practices become standard, the County can add specificity to the inventory and forecast such that a project will be able to "take credit" for a variety of different agricultural practices that act to replace or maintain soil carbon. The worksheets provide the project proponent the option of providing calculations of the aforementioned practices which will be reviewed on a case by case basis.

- ***GHG reductions through sustainable practices at wineries*** Through the initial process of conducting a GHG inventory and forecast and developing a GHG reduction plan, the County has become aware that although the waste and wastewater sectors represent a small fraction of total GHG emissions (4% combined), these sectors offer significant potential for GHG reductions at the project level. Many vintners and farmers are composting waste or reducing the BOD5 content of winery wastewater such that GHG emissions are greatly reduced. If these practices were initiated at the individual site level after 2005, they can be credited towards the County's overall GHG reduction goal in future updates to the plan. Data collection in these sectors for the initial inventory effort was highly aggregated and used a top-down approach (i.e. individual winery data for all wineries in the County was not collected). Accurate accounting of GHG reductions at individual sites would require a "bottom-up" approach using data provided from individual property owners in the County. This should be done as an improvement in inventory updates such that these practices can be accounted for.

  Sustainable practices at existing wineries related to alternative vehicles, water conservation and energy conservation are already counted towards the County's GHG reduction goal through the Green Business Program (kWh saved). For new wineries, energy efficiency beyond that required by Title 24 and renewable projects and the use of alternative vehicles can also be counted towards the County's GHG reduction goal through the project level worksheets.

- ***Include other GHGs*** – The current inventory, forecast and reduction plan account for emissions of CO2, CH4 and N2O from the following sectors: building energy use, on-road transportation, off-road transportation, waste, wastewater and agriculture. As mentioned previously, estimation of GHGs from land use change is considerably more complex than from combustion based sources. At present, the land-use change sector only accounts for CO2 emissions and does not yet include CH4 and N2O emissions related to carbon stock loss or gains (new vines). As methodologies for estimating these emissions become more standard and as appropriate data for use in Napa County becomes available, the inventory and forecast will be refined to include CH4 and N2O emissions in the land use sector.

[3] Literature studies have shown that the gains can depend on many factors and studies show a wide range of results and even conflicting results. The CAR is currently working on a protocol. It has not been released. It will be developed for project scale, not County, scale estimates and will almost certainly be based on extensive on-site measurements.

The state of California and U.S. EPA national GHG inventories include the following gases: CO2, CH4, N2O, SF6, NF3, HFCs, and PFCs. CO2, CH4 and N2O represent approximately 99% of all GHG emissions in California.[4] The inclusion of SF6, HFCs and PFCs would add detail and result in a more comprehensive GHG inventory. At the local level, this data is difficult to obtain.[5] State level data can be extrapolated downwards, with considerable error. Local level data, specific to the types of uses and the activity pattern in Napa County should be used to estimate PFCs, HFCs and SF6 at a later date. The County will pursue the addition of other gases in subsequent updates, although these are not expected to alter the overall picture of County emissions or provide significant opportunities for GHG reduction.

Include GHG emissions due to limited importation of water. As noted in Appendix A, the current GHG inventory and 2020 forecast does not include any emissions associated with importation of water from outside the County. There is a limited amount of water being provided by the City of Napa to residences, commercial, and agricultural users in the southern part of Napa County. The City of Napa derives approximately 40 percent of their water from the State Water Project, which involves pumping of water to Napa and associated energy-related emissions. Inclusion of these indirect emissions would allow for a more complete evaluation of current water-related emissions and a more robust accounting of the value of water conservation measures.

- ***Climate Adaptation –*** California's response to climate change can generally be thought of as a two-part strategy: 1) Mitigation and 2) Adaptation. Mitigation is the reducing of GHG emissions while adaptation is changing behavior and infrastructure to match new climate conditions in a particular area, for example higher sea levels or increased fire frequency. A certain amount of change in the global climate system is highly likely, even when considering society's current efforts to curb GHG emissions.[6] Likely threats to California as a result of a changing climate include: sea level rise in coastal areas and San Francisco Bay, increased wildfire frequency and intensity, increased frequency and duration of extreme heat events, changes in precipitation patterns and water availability, decreased Sierra snowpack, shifts in habitat, stresses to agriculture and the warming of Lake Tahoe.[7] Future versions of the CAP should consider addressing specific climate change threats, although climate adaptation plans at the City or County level are not yet common in California.[8]

In addition to the above refinements, the County intends to joint venture with a non-profit organization to develop a local offset program following adoption of the first CAP. When in place, a local offset program would offer a viable mitigation strategy for projects unable to achieve required emission reductions on site.

What is the process for updating the Plan?

- ***Revisit the Plan at a minimum of every 3 years*** – The County shall establish a formal process by which the GHG inventory, forecast and reduction plan are re-examined. The re-examination will assess: opportunities for improvement or refinement of existing sectors; opportunities for

[4] http://www.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf

[5] Draft Napa Countywide Community Climate Action Plan, MIG and the Climate Campaign, October 2009.

[6] Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[7] The future is Now: An Update on Climate Change Science Impacts and Response Options for California, CEC-500-2008-071, May 2009. http://www.energy.ca.gov/2008publications/CEC-500-2008-071/CEC-500-2008-071.PDF

[8] The Climate Adaptation Plan for the state of California can be found here: http://www.climatechange.ca.gov/adaptation/

addition of sectors not originally included in the inventory and forecast; revision of GHG reductions achieved through programs; addition or deletion of GHG reduction programs or policies; alteration of how a specific program or policy is implemented; assessment of GHG reductions being achieved through state level programs.

- ***Importance of the baseline and target -*** Through the AB 32 Scoping Plan, local governments are directed to reduce their municipal and community-wide GHG emissions to a level that is 15% less than *current* levels. Because this is a relative target and not an absolute target, all GHG planning is tied to the baseline level of GHG emissions for a jurisdiction, in Napa's case, GHG emissions in 2005. Any modifications to the plan must be careful to maintain integrity of the 2005 baseline and consistency amongst the baseline, BAU projections and calculated reductions. Basically, if the GHG emissions were not counted in the 2005 inventory, avoidance of emissions (through sustainable practices) cannot be credited towards the County's goal. However, sectors can be added to the inventory, forecast and reduction plan or refined, provided that the baseline is always updated using the appropriate 2005 data. Because the GHG emissions reduction target (15% below current levels) is calculated from the 2005 baseline, any changes to the baseline will result in a change in the reduction target. However, as long as the relative target remains constant (15% below current levels) and as long as the plan achieves the absolute amount of GHG reductions sufficient to reach this target by 2020, the plan will be consistent with the AB 32 scoping plan, and sufficient to meet mitigation as prescribed in the General Plan EIR.

- ***Monitor progress*** – The Plan identifies the level of action required in order to achieve the required GHG reduction target. The Plan does not specify *how* the level of activity will be achieved. For example, the Plan calculates the avoided GHG emissions in 2020 if 1200 homes in Napa County install a typical residential solar PV system. Given, known incentive programs in California, an *activity level* of 1200 installations was considered to be achievable. The Plan does not direct the County to choose a particular incentive program such as California First or Upgrade California. It is at the County's discretion to develop policy as needed to facilitate or encourage the necessary activity level (in this case solar installations). Although the County may change policy or augment policy related to the implementation of the Plan at any time, the County will continuously be monitoring the effectiveness of their implementation mechanisms i.e. how many solar installations are actually occurring. Monitoring procedures are not prescribed as part of the CAP, but will be established as part of implementation of this plan. In some cases, the County may find that a higher level of activity is being achieved through programs than was estimated in the Plan, in some cases less. State level programs may also have a larger or smaller impact on Napa's GHG emissions than is best estimated at this time. Monitoring data will be used to update the amount of GHG reductions estimated for 2020 and allow the County to adaptively manage its implementation strategy. For each action in the plan, the County will monitor progress within a spreadsheet and compile a report at the time of the tri-annual updates.

- ***Dedicate staff –*** the County will dedicate at least one staff person to monitoring the progress of the action items set forth in the Plan. The staff person will be responsible for maintaining a tracking sheet (Excel or other) and collecting information from Napa County departments or other agencies outside of the County (state of California ABAG, BAAQMD or Waste providers) in order to estimate yearly progress on the actions in the CAP. The staff person will prepare a report summarizing progress related to each action at the time of the tri-annual CAP review.

- ***Establish an appropriate level of public involvement -*** Napa County can establish a frequency and format of public involvement associated with updates to the Plan that is consistent with current practice in the County and reflects the desires and interest of the community. Examples of public involvement include but are not limited to: public meetings; workshops; publically available documents and comment periods and hearings.

- ***Develop a Plan for post 2020 -*** AB 32 establishes a GHG reduction goal for California (and through the Scoping Plan for local CA jurisdictions) for the year 2020. It does not establish a target beyond 2020 although a 2050 GHG reduction target of 80% below 1990 levels has been articulated in Executive Order S-3-05.[9] The state will almost certainly extend its GHG reduction planning beyond 2020 but is at present focused only on meeting the AB32 2020 goal and there is no long-term plan for achieving reductions beyond 2020 at this time. The County will monitor developments at the state and national levels related to long- term GHG reduction planning and commence preparation of a GHG reduction plan with a target year of 2050 no later than July 1, 2017.

Master Response 2: Mitigation for Carbon Sequestration in the CAP

A number of commenters asked how the Climate Action Plan would actually result in mitigation for lost carbon stock or sequestration.

The 2:1 Tree Replacement Ratio and the CAP

A number of commenters (including the Quercas Group, the Living Rivers Council, Kenyon/Yeates (representing the Redwood Chapter of The Sierra Club), and the Sierra Club Napa Group) asked about the use of a 2:1 ratio of replanting for lost trees would result in mitigation of lost carbon sequestration given the long growth cycle of oaks and other trees. The Sierra Club Napa Chapter also recommended that there should be a required percentage survival percentage for new plantings for the 2:1 policy.

The 2:1 replacement ratio was included in the Measures for Implementation by Discretionary Development Projects. The intent of the Draft CAP related to lost carbon stock/sequestration for discretionary development projects was to require 100% replacement over time.

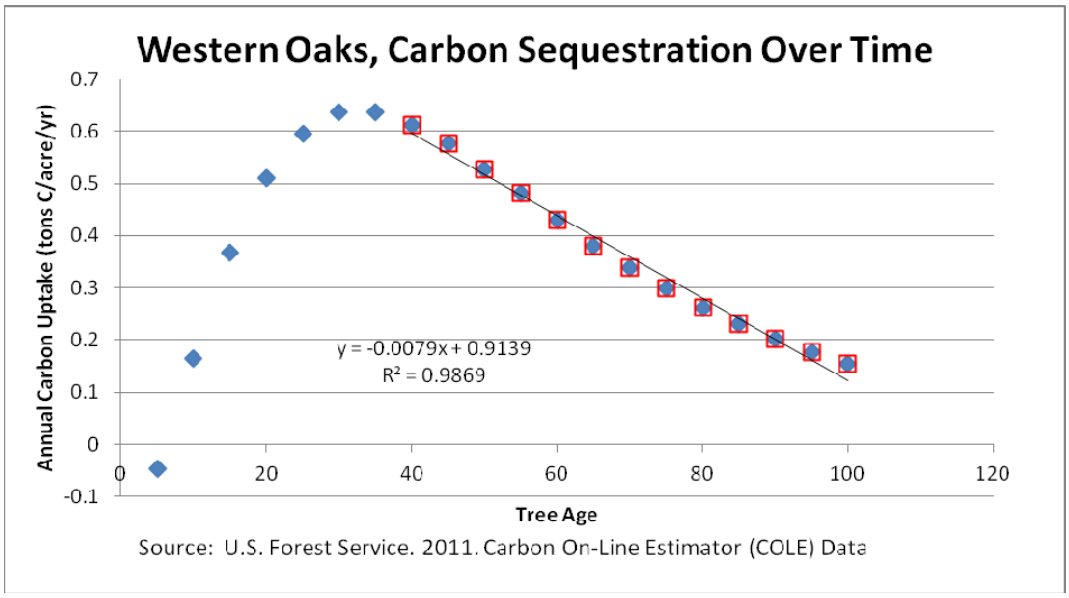
The 2:1 replacement ratio was included in the CAP measures because this replacement ratio is consistent with General Plan Policy CON-17 (requiring replacement or preservation of removed habitats and woodlands) and because it will, in time, result in new carbon sequestration. As explained in Master Response No. 3, the County has revised its approach to requirements for new development and new vineyard conversions to treat all sources of GHG emissions equally instead of establishing different reduction requirements for different sectors. As such, the County now proposes to require new development and new vineyard projects to mitigate 39% of their overall emissions (compared to an unmitigated condition), regardless of the source of emissions. This amount is based on the amount of reductions needed from new development, in combination with state and other local reduction measures, to meet the County's 2020 reduction target. In order to meet the 2020 reduction target, it is not necessary to offset 100% of new development emissions regardless of the source of those emissions, be they from fossil fuel consumption, waste generation, or lost carbon stock/sequestration.

New development will still be required to replace all lost trees on a minimum 2:1 ratio in order to provide, in the long run, for replacement of lost carbon stock/sequestration. The commenters are correct that due to the long time to maturity, planting at a 2:1 ratio now will not result in complete replacement by 2020 but will take many decades. As shown in the figures below, based on U.S. Forest Service Data, the amount of carbon sequestered is heavily dependent on tree age and species.

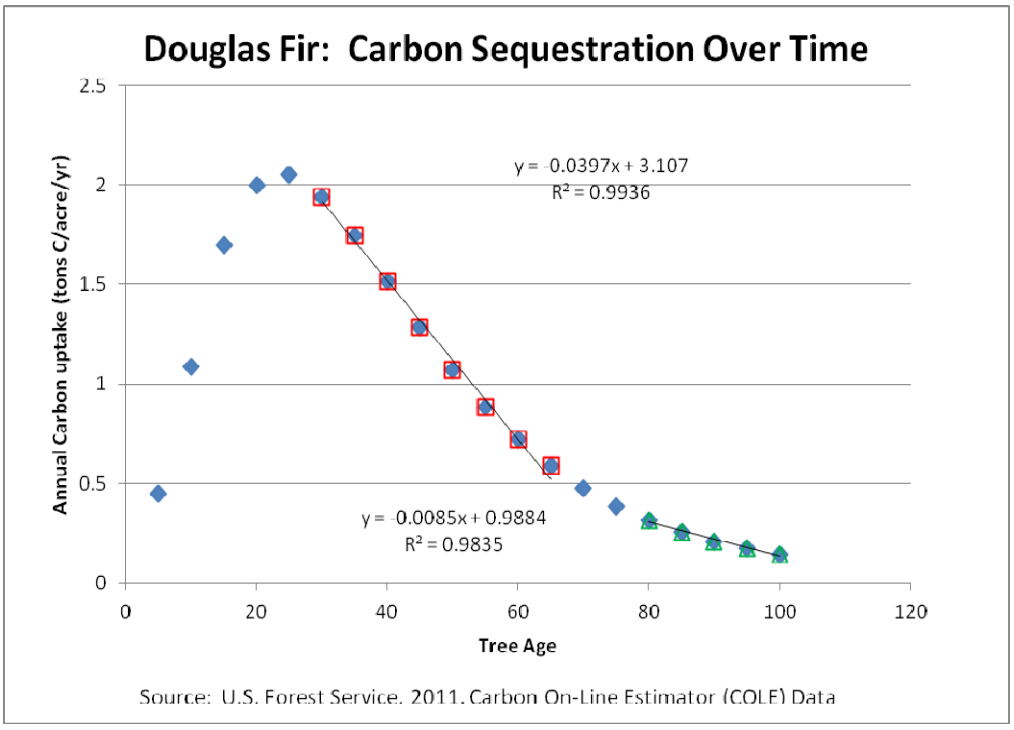
[9] Executive Orders are only binding on state department and are not legally binding on local governments and private development.

Nominally, to replace the lost carbon stock and annual sequestration of an individual tree by planting the same species will take the number of years the tree had grown prior to removal. So, to replace the carbon stock and the annual carbon sequestration of a 60 year old oak tree with a 1:1 replacement ratio would take 60 years (assuming survival of the new planted tree). Using the data below, replacement of lost stock/sequestration of the 60-year old tree with a 2:1 ratio would take approximately 35 to 40 years (assuming 100% survival of the planted trees). Because older/larger trees have larger amounts of carbon stock than younger trees, with a fixed ratio, it will take longer to mitigate older/larger trees than to mitigate younger/smaller trees.

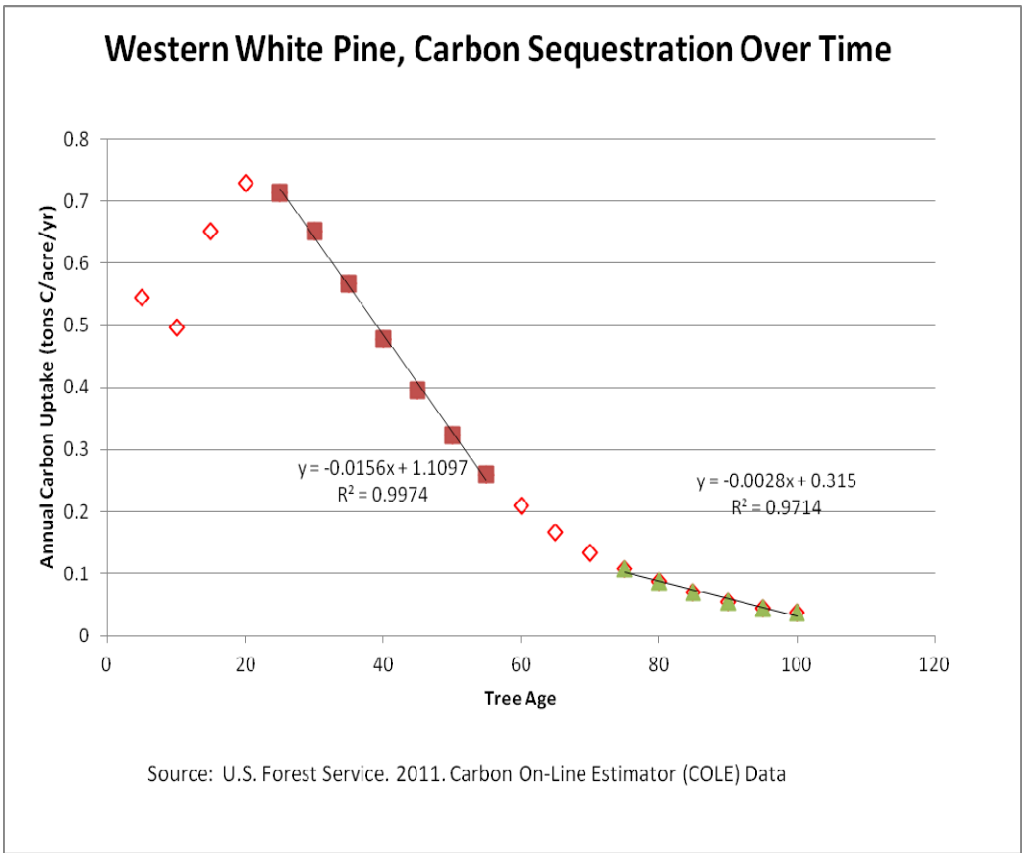
In summary, the 2:1 requirement has been retained to ensure long-term replacement of lost sequestration/stock from discretionary development over time. However, in recognition of the time necessary for trees to mature, the CAP has been revised to require a fixed percentage reduction of all emissions from new development and recognizes that the 2:1 requirement will only make a limited contribution to the required reduction by 2020.



Source: U.S. Forest Service. 2011. Carbon On-Line Estimator (COLE) Data



Source: U.S. Forest Service. 2011. Carbon On-Line Estimator (COLE) Data



Source: U.S. Forest Service. 2011. Carbon On-Line Estimator (COLE) Data

Mitigating for Carbon Stock/Sequestration Loss in the Long Run

The Quercus Group asserts that the CAP underestimates the carbon stock/sequestration loss for land conversions that occur before 2020. Kenyon-Yeates asserted that the CAP Mitigation does not fully offset carbon stock loss.

The Quercus Group asserts that the CAP underestimates the GHG emissions associated with vineyard conversions and asserts that 6,737-acres of vineyard would result in the generation of 5 to 8.5 million metric tons (MT) of CO2e in 100 years compared to the CAP's estimated emissions of 33,774 MT CO2e.

First, the Quercus Group is confusing annual emissions with lifetime emissions. The CAP only presents annual emissions for 2005 and 2020. As shown on Table A-8a in the Draft CAP, depending on vineyard scenario, GHG emissions from conversion of natural land to new vineyard land in 2020 could range from 28,1888 to 83,906 MT CO2e/year. As shown in the revised CAP, the County has reassessed the likely vineyard expansion scenarios to reflect the trend of conversions and the lands on which the conversions are occurring. The new estimate (see the revised CAP) is that approximately 4,059 acres would be converted for new vineyards between 2005 and 2020, with emissions in 2020 of 22,228 MTCO2e/year associated with vineyard conversion that would happen in 2020 itself. This number includes the average yearly loss of carbon stock, the average yearly loss of carbon sequestration due to vineyard conversion plus the average yearly increase in sequestration within the new vineyards itself.

The focus of the CAP is on annual emissions in 2020 to compare to a target to reduce annual emissions to a level 15 percent below 2005 annual emissions

The revised estimate for vineyard conversion for the Revised CAP between 2005 and 2020 is 4,059 acres (including 225 acres of coniferous forest conversion and 810 acres of woodland conversion and the remainder consisting of grassland, shrubland, and other land covers). Using the factors in the CAP for the land covers for carbon stock and for annual sequestration, vineyard conversion of 4,059 acres is estimates to result in GHG emissions of approximately 512,781 MTCO2e (331,611 MTCO2e due to stock loss and 181,170 MTCO2e for lost annual sequestration times 100 years). This results in a per acre estimate of GHG emissions of approximately 115 MT CO2e/acre on average.[10] Discretionary projects that comply with the CAP will have to be consistent with it, and may use stock factors (factors for carbon content and sequestration) if the type and density of vegetation warrants it. In some cases, where individual projects would affect land covers that are significantly different or denser than the stock factors like the 115MT CO2e/acre average, then site-specific data and calculations will be required.

The CAP is focused on reducing GHG emissions to meet the 2020 reduction target. The identification of GHG emissions in a single year (aka 2020) for vineyard conversion does not mean that the CAP ignores the GHG emissions that occur in the years leading up to 2020. Instead the CAP would require all vineyard conversion projects to mitigate 39% of their GHG emissions taking into account both carbon stock and annual sequestration up to 2020. Between 2012 and 2020, using the CAP's data, there would be conversion of approximately 2,405 acres, with associated emissions of 190,361 MTCO2e (3,865 MTCO2e of lost sequestration and 186,496 MTCO2e of lost stock). With

[10] Using the same methodology for the 6,737-acre average scenario in the Draft CAP would result in an estimate of GHG emissions of approximately 1,656,653 MTCO2e (915,699 MTCO2e due to stock loss and 740,953 MTCO2e for lost annual sequestration times 100 years) and per acre emissions of 236 MT CO2e/acre on average. The Final CAP is based on a more reasonable estimate of the type and amounts of likely vineyard conversions between 2005 and 2020 and reflects far less vineyard conversion in coniferous forest and woodlands compared to the average scenario used in the Draft CAP. The rationale for this adjustment is explained in Section 2.5 of the revised CAP.

implementation of the CAP, new vineyard projects would be required to provide approximately 74,240 MT CO2e of mitigation.

Thus, the CAP does not merely require mitigation of a single year of emissions, but rather takes into account the stream of emissions over time up to 2020 from both stock loss and sequestration loss.

The CAP does not address emissions beyond 2020. The reasons it does not are as follows:

- AB32 does not contain a reduction target beyond 2020, thus there is no governing precedent in law for a goal beyond 2020.
- The County's reduction target is for 2020 and the County has not adopted a reduction target beyond 2020.
- Executive Order S-03-05, which has a 2050 goal, only applies to California state government departments; it is not legally binding on local governments or private development.
- While more substantial reductions in GHG emissions will be required beyond 2020 in order to reduce the potential for the more catastrophic consequences of substantial climate change, the focus at present needs to be on changing Napa County and California's trajectory of increasing emissions to a trajectory of decreasing emissions. The 2020 CAP will reverse that trend and will be the first step toward a long-term reduction path, but will not in and of itself get the County to a 2050 goal.
- California has no operable plan to get to 2050 as of yet because it is focused on achieving the AB 32 2020 goal. Without state activity that far exceeds AB 32, it will not be feasible for any growing City or County to achieve the substantial reduction goals in S-03-05. Given the unknown nature of future state activity, it would be speculative for the County to conduct detailed planning and mitigation at this time. It should be noted that there is no jurisdiction in California that has a Climate Action Plan to achieve a 2050 reduction target.
- As noted in Master Response No. 1, the County will revisit the timing and need for goals beyond 2020 starting in 2017.

Other Specific Comments by the Quercas Group on Mitigation

The Quercas Group made a number of specific comments about the nature of mitigation they suggest should be included in the CAP including the following:

- Recommendation that only oak woodland carbon credits be allowed to mitigate oak woodland GHG emissions and only timberland carbon credits be allowed to mitigate timberland GHG emissions.
- Recommendation that out of state credits not be allowed as project mitigation.
- Suggestion that Napa County can't use the off-site mitigation standards from Forest Project Protocol because it didn't use the Forest Project Protocol for the CAP land-use change analysis.

Each of these issues is responded to in turn below.

The purpose of the CAP is to identify the means to feasibly reduce GHG emissions in Napa County from both existing and new development to support the reduction goals found in AB 32. The CAP is not intended to mitigate all environmental effects of new development or new vineyard conversion. The policies of the General Plan and the project-specific environmental analysis under CEQA address other environmental impacts of loss of natural land covers such as impact on rare and common fish and wildlife species, sedimentation, runoff, etc. Discretionary projects are required under CEQA to

identify their significant impacts to oak woodlands and mitigate significant impacts where identified. As such, the mitigation identified in the CAP is only intended to address GHG emissions.

Regarding the suggestion that project's should only be allowed to use oak woodland carbon credits to mitigate oak woodland GHG emissions (and the same for timberland credits), this is not necessary to meet the County's 2020 reduction target. The effect of a ton of CO2 emissions from removing oak woodlands has the same effect on climate change as a ton of CO2 from removing a Douglas fir forest (or for that matter - from a ton of CO2 from vehicle exhaust). For the purposes of the CAP, the County does not intend to restrict the type of emission credits that could be used, as long as they meet an acceptable validation protocol. The County has other requirements to address other impacts associated with oak woodland removal, such as General Plan Policy CON-17, which requires replacement or preservation of removed woodlands (or other habitat) on a 2:1 basis. As a practical matter, project proponents are likely to seek efficiency by combining their mitigation for habitat removal with their mitigation for GHG emissions, but it is not necessary that they combine them as long as the separate requirements are met.

Regarding the suggestion that out of state credits not be allowed as project mitigation, this is also not necessary to meet the County's 2020 reduction target. While it is the County's intention to develop a local offset program, the removal of a ton of GHG emissions in another state or country has the same effect on climate change as removal of a ton of GHG emissions within Napa County. It is true, however, that offsets purchased locally will be easier to verify and will have co-benefits (like habitat restoration) that will accrue locally. This is why the County wishes to develop a local program following adoption of the CAP. (Adoption of the CAP is seen as a pre-requisite for a functional local offset program, because it will be what necessitates purchases of offsets in circumstances where other emission reduction strategies are not available.)

Regarding the suggestion that Napa County can't use the Forest Project Protocol standards for off-site mitigation if it didn't use the protocol measurements standards for the land-use change analysis, the comment misconstrues the purpose of the CAP and the purpose of the Forest Project Protocol. The purpose of the CAP is to identify the broad policy initiatives and requirements needed to meet the County's identified 2020 reduction target. The purpose of the Forest Project Protocol is to provide a validation method for establishing offset credits associated with individual offset projects. The Forest Project Protocol (Climate Action Reserve, Version 3.2, Approved August 20, 2010) is described as follows:

> *The Forest Project Protocol (FPP) provides requirements and guidance for quantifying the net climate benefits of activities that sequester carbon on forestland. The protocol provides project eligibility rules; methods to calculate a project's net effects on greenhouse gas (GHG) emissions and removals of CO_2 from the atmosphere (—removals‖); procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e. released back to the atmosphere); and approaches for long term project monitoring and reporting. The goal of this protocol is to ensure that the net GHG reductions and removals caused by a project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported to the Climate Action Reserve (Reserve) as the basis for issuing carbon offset credits (called Climate Reserve Tonnes, or CRTs).*

As discussed in Master Response No. 4, the Forest Project Protocol is not a GHG inventory protocol and has not been used for any jurisdiction-based GHG inventory that ICF is aware of. Due to the intensity of the data required under the Forest Project Protocol, it is cost prohibitive to collect such data for a broad geography. As discussed in Master Response No. 4, the methods used for the Napa County CAP are consistent with accepted professional practice for jurisdictional inventories. The CAP mentions the Forest Project Protocol as a source of useful guidance for evaluating offset mitigation associated with avoided conversion or land conversion and a standard for evaluating forest credits inside or outside California.

Mitigating for Impacts other than GHG emissions

EDEN/Living Rivers Council commented that the CAP should address the conversion of natural wildlands to vineyards in greater detail including impacts related to loss of habitat, (through creation of monoculture landscapes) and water depletion.

The purpose of the CAP is to address GHG emissions only. While some of the mitigation strategies used to address GHG emissions may also benefit other purposes, it is not the function of the CAP to address such impacts. The General Plan and the EIR on the General Plan examined impacts due to conversion of wildlands to vineyards in regards to impacts on species and habitat, water resources, and other environmental aspects.

Avoided Conversion as a Mitigation Strategy

The Quercus Group stated in their comments that the CAP misinterprets the purpose and use of the "avoided conversion" credit. However, the Quercus Group statement is without any explanation as to how or why they believe this to be so and they did not provide any substantiation to this assertion. Nevertheless, the following clarification is provided.

The Forest Project Protocol (Climate Action Reserve 2010, V. 3.2) describes an avoided conversion project as follows:

> *An Avoided Conversion Project involves preventing the conversion of forestland to a non-forest land use by dedicating the land to continuous forest cover through a conservation easement or transfer to public ownership. An Avoided Conversion Project is only eligible if:*
>
> *1. The Forest Owner can demonstrate that there is a significant threat of conversion of project land to a non-forest land use by following the requirements for establishing the project's baseline in Section 6.3 of this protocol.*
>
> *2. The project does not employ broadcast fertilization.*
>
> *3. The project does not take place on land that was part of a previously registered Forest Project, unless the previous Forest Project was terminated due to an Unavoidable Reversal (see Section 7).*
>
> *An Avoided Conversion Project may involve tree planting and harvesting as part of the project activity.*
>
> *Avoided Conversion Projects are eligible only on lands that are privately owned prior to the project start date.*

For the Forest Project Protocol, an avoided conversion project meeting its protocol requirements can be validated as an offset credit by the Climate Action Registry. For the Napa County, the reference to the Forest Project Protocol in regards to avoided conversion in the CAP was intended to make it clear that project-level mitigation that is reliant on conservation of land to mitigate GHG emissions will need to be consistent with the protocol requirements for avoided conversion. The County will require avoided conversion projects used as mitigation to demonstrate consistency with the key principles in the protocol (such as those noted above).

Napa County does believe that avoided conversion is a valid mitigation approach, provided that it can be demonstrated that the site is truly under threat of conversion and could feasibly be converted taking into account land condition and all applicable local, state, and federal requirements, including environmental regulations. In the long run, the preservation of such areas is consistent with County

General Plan Policy (such as CON-17), and increases the amount of natural lands that will be retained into the future, compared to a business as usual approach.

Master Response 3: Balancing Mitigation Burdens to Different Sectors

A number of commenters (including The Quercas Group, Kenyon Yates (representing the Redwood Chapter of the Sierra Club) and the Sierra Club, Napa Group, asked for an explanation of how the 51.5 percent mitigation requirement in the Draft CAP was derived and how it is equitable. The Napa Valley Vintners, the Napa County Farm Bureau, and the Winegrowers of Napa County questioned whether it was fair to require the same level of mitigation for vineyards/agriculture if most of the GHG emissions in the County are due to non-agricultural sources. The Vintners also commented that mitigation should focus on new residential/commercial as well as new vineyards. Sustainable Napa County also asked that the methodology used to estimate carbon sequestration and to determine the mitigation requirement be explained better.

The overall intent of the CAP as a whole is to identify GHG reduction measures to address both existing and new development and agriculture to reach the 2020 target of reducing emissions by 15% compared to 2005. Concerning GHG emissions and their affect on atmospheric concentrations of GHGs, emissions associated with vineyard conversions are no different than emissions associated with fossil fuel burning by vehicles or other GHG emission sectors. As such, what is important is that the plan overall reach its target. In order to achieve that reduction target, the County will require reductions across the different sectors and in both existing and new development.

For new development and vineyard conversions, the Draft CAP identified a proposed 51.5% reduction performance standard for both sectors (relative to an unmitigated condition). As described in the revised CAP, the 2005 inventory was changed to include the baseline emissions associated with land use conversions and the 2020 inventory was changed to reflect a more accurate projection of likely land use conversions between 2005 and 2020. As a result of these changes, the revised estimate of needed reductions from new development and vineyard conversation to help meet the 2020 reduction target is 38%.

The methodology used for the revised CAP is the same as the methodology used for the Draft CAP and is as follows:

- The Business as Usual (or BAU) emissions for 2020 were estimated.
- The amount of reductions in 2020 needed to meet the target of 15% below 2005 levels was identified.
- The effect of the state reduction measures for 2020 was estimated.
- The effect of the identified local reduction measures for 2020 was estimated.
- The remaining reductions needed to meet the reduction target were assigned to new development and new vineyards.
- Based on the estimated emissions of new development and new vineyards, it was determined that a total of 38% reductions overall would be needed to close the gap and meet the target.

- For new development, state and local measures were estimate to result in 25% reduction, leaving 13% for project-level mitigation.[11]
- For vineyard conversions, state and local measures are very limited and were estimated to result in 1% reductions leaving 37% for project-level mitigation.

The resultant calculations are shown in Table C-1 below.

While vineyard conversions would have a higher percentage of project-level mitigation, overall the burden of mitigation GHG emissions would be the same as for new residential or commercial development. The state and local measures which produce 25% reductions for new development are not without cost. Examples of some of these burdens include:

- The state Title 24 building energy efficiency requirements add up front cost to the price of new homes
- The state Renewable Portfolio Standard will increase renewable energy electricity generation, it will also likely result in an increase in electricity prices which will be passed on to residential and commercial development.
- The state vehicle efficiency standards will reduce gasoline and diesel consumption but will likely also increase fuel prices that will be incurred by the residential and commercial sectors.

[11] In the Draft CAP, one of the local measures for new development was to require 100% mitigation of all land cover change emissions. In order to treat GHG emissions from lost carbon stock/sequestration the same as other sources of emissions, the specific measure was not included in the revised CAP in favor of the overall reduction standard. As a result, the level of reductions from state and local measures for new development decreased and the level of reductions needed form project-level mitigation increased.

Table C-1: BURDEN SHARING IN PROJECT LEVEL MITIGATION	
Residential Commercial Light Industrial (RCI) Development	
RCI Development Emissions	68,075
RCI Development Land Use Change	6,349
TOTAL Emissions - RCI Development	74,424
% of RCI Development Emissions due to LU change	8.53%
RCI Development - State Reductions	15,112
RCI Development - Local Reductions	3,152
TOTAL Reductions - RCI Development	18,264
Effectiveness of State and Local Measures	25%
Reduction Goal %	38%
Total (state, local, and project) Reductions Needed for RCI to meet Goal %	28,579
Project-Level Reductions Needed for RCI to meet Goal %	10,315
Vineyard Development (or Emissions related to Ag Conversion of any type)	
Vineyard Development Emissions	2,588
Vineyard Development Land Use Change	22,097
TOTAL Emissions - Vineyard Development	24,685
% of Vineyard Development Emissions due to LU change	90%
Vineyard Development - State Reductions	171
Vineyard Development - Local Reductions	156
TOTAL Reductions - Vineyard Development	327
Effectiveness of State and Local Measures	1%
Reduction Goal %	38%
Total (state, local, and project) Reductions Needed for RCI to meet Goal %	9,479
Project-Level Reductions Needed for RCI to meet Goal %	9,152
Project Level Mitigation (for both New RCI development and new vineyards)	
Reductions needed from Project Level Mitigation Programs	19,360
Reductions achieved through Project Level Mitigation	19,466

These are real costs that will be incurred during project construction and/or operation. Vineyard operations[12], in contrast, would only incur limited costs due to Title 24, the RPS, or the vehicle efficiency standards (which only apply to light duty vehicles) due to their relatively limited consumption of electricity and limited use of light-duty vehicles in comparison to the intensity of use of electricity and light-duty vehicles in residential and commercial operations.

[12] Vineyard operations, as referred to here, exclude winery operations, which are considered part of the commercial sector.

There are substantial differences in the profiles of emission from vineyard development vs. residential and commercial development. Based on the CAP estimates, land cover change only makes up 8.5% of GHG emission in the residential, commercial and light industrial sector but makes up 90% of the GHG emissions for vineyard development.

The choice of how to balance the mitigation burden is ultimately a policy issue. However, the CAP approach of trying to balance the mitigation amount overall appears to be an equitable basis to ensure that different economic sectors are contributing their fair share in light of the costs that will be incurred to sectors from different state, local, and project-level actions.

Master Response No. 4: Methodology used for the GHG Inventory and Forecast

Existing Guidance and Protocols for Including Land Use Change as a GHG Emissions Source in Local Inventories

There is currently no specific guidance or established protocol for the inclusion of GHG emissions due to land use change in county or city level GHG inventories. There is also no guidance directing that emissions due to land use change cannot be included in a local jurisdiction GHG inventory. City and county level GHG inventories in California (and the Bay Area) are typically conducted consistent with the following protocols and guidance documents:

- (ICLEI) Local Governments for Sustainability: Local Government Operating Protocol (LGOP) does not provide guidance on how to quantify carbon stocks but indicates that estimations of carbon stocks and project specific GHG reductions may be included optionally[13]. Further, the protocol allows for the individual preparer of an inventory to determine the sectors to be included in Scope 3 and that doing so provides for innovation in GHG management. The LOGP refers the reader to the IPCC and the World Resources Institute (WRI) as resources for inventory methodology (specifically for carbon stocks) and to select CCAR documents for resources on quantification of GHG mitigation projects.
- California Climate Action Registry (CCAR): General Reporting Protocol provides no guidance for estimating these emissions.
- ICLEI Clean Air and Climate Protection Software (CACP) does not currently allow a user to estimate GHG emissions due to land use change within the software. ICLEI is currently developing an agriculture, land-use and forestry protocol as part of the national standard for measuring greenhouse gas emissions across an entire city, county, town or other jurisdiction.[14]
- Bay Area Air Quality Management District (BAAQMD) allows for CEQA tiering of individual projects from a certified GHG Reduction Strategy. "A GHG reduction strategy should identify goals, policies and implementation measures that would achieve AB 32 goals for the entire community."[15]

[13] CARB. 2010. Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories Version 1.1. Pages 4, 13, 122.

[14] http://www.icleiusa.org/programs/climate/ghg-protocol/community-greenhouse-gas-emissions-inventory-protocol

[15] BAAQMD 2011. CEQA Air Quality Guidelines. Updated May 2011. http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx

- California Air Resources Board State GHG Inventory[16] includes an assessment of carbon stocks and sequestration in California and follows IPCC protocols.

In instances where the aforementioned protocols do not provide guidance, lack specificity, or otherwise provide discretion to a local jurisdiction, the state (or the federal) GHG inventory is typically used as the point of reference. The U.S. National GHG Inventory (prepared by the U.S. EPA) and the California State GHG Inventory (prepared by the ARB) include an assessment of the net carbon flux (sum of all sources and sinks of carbon within a boundary) in the inventory year. Both inventories use methodology consistent with that recommended by the IPCC. The U.S. GHG Inventory uses U.S. Forest Service Data (select plots) to develop carbon stock factors for specific regions for specific tree types. The California inventory uses satellite based canopy data and ground based data to develop factors for dominant land covers in California. Neither inventory is based on 100% sample coverage but rather uses select sampling to develop factors that are applied to larger areas.

At the present time, the IPCC guidance for how to quantify the net carbon flux within a specific boundary is the best guidance available for the purposes of a community-wide GHG inventory. Napa has used methodology consistent with that used by the state in its GHG inventory and has used carbon stock factors for specific land cover types found in California that were developed through the national and state inventories (see following section). Further, Napa has pursued mitigation in this sector as part of a multi-sectoral approach to reducing GHG emissions and the County has provided for updates and data improvements to the land use change section of the plan (see Master Response No. 1 above).

Description of the Methodologies and Selection of Carbon Stock Factors

A complete description of the methods used to estimate GHG emissions from all sectors is included as Appendix A of the CAP document. A brief description is provided here, with focus on key issues raised during the comment period, specifically the appropriateness of the carbon stock and sequestration factors selected for Napa County.

Methods described in the following document were followed in order to estimate the net carbon flux in Napa County for both the baseline year (2005) and the projection year (2020).

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 4 Agriculture, Forestry and Other Land Uses; Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

This method allows for the following changes to be calculated:

- For lands that are remaining in the same land cover type - the 1 year net change in carbon stock for each land cover type (in the Napa CAP, this is accounted as a reduction in GHG emissions)
- For lands that are changing to a new land cover type – the onetime loss in carbon stock for each land cover type removed (in the Napa CAP, this is accounted as an increase in GHG emissions) and the gain in carbon stock (applied in the year of planting) for new vegetation (vines) planted (in the Napa CAP, this is accounted as a reduction in GHG emissions).

The IPCC inventory methods, in general, allow for a tiered approach to data collection. The tiered approach allows for default values or coarse level data to be used as the first tier (Tier 1) which can be improved upon with increased locally or nationally specific data (Tier 2) when available or sophisticated models combined with a robust and comprehensive sampling program (Tier 3). The IPCC states that in general, "moving to higher tiers improves the accuracy of the inventory and

[16] http://www.arb.ca.gov/cc/inventory/inventory.htm

reduces uncertainty, but the complexity and resources required for conducting inventories also increases for higher tiers."[17] Given the County's financial resources and current data availability, the County opted for a Tier 1 approach with the option to improve at a later date when a site-based or other more County specific data set became available. This was the first time the County had conducted an assessment of the GHG emissions from all sectors, including those associated with land use change. The Tier 1 approach employed is sufficiently accurate to assess land use change as an emissions source relative to other emission sources in the County; to explore mitigation opportunities within the sector; to develop a basic policy framework for the sector; to determine if more detailed analysis within this sector (and more financial resources) would greatly improve the county's decision making and implementation steps; and to highlight and prioritize specific aspects of the analysis for future improvement.

In determining the net carbon stock flux the County has used a combination of Tier 1 and Tier 2 data sources:

- Tier 1 – Default Values: carbon stock and sequestration factors for vegetation types found in Napa County (Source U.S. EPA[18] and California State GHG[19] emission inventories).
- Tier 2 - Napa Specific: acres of each land cover type lost or gained by 2020 (Source: Napa County Baseline Data Report (BDR) and personal communication with Napa County Conservation, Development and Planning Department)

As mentioned above, default values used in this analysis were developed as part of the U.S. national and California state GHG inventory efforts. In the case of the U.S. national GHG inventory, the carbon stock factors are based on U.S. Forest Service datasets for specific tree types sampled at the regional level. Carbon stock factors developed as part of the California state GHG inventory are based on satellite and ground based measurements for dominant (5 groups) vegetation types in several California sub-regions. Annual sequestration values were not developed as part of the U.S. national inventory and are only available (for all species desired as a product from the state level inventory). Stock and sequestration values for vineyards were taken from the scientific literature and are specific to California. The following table lists the stock factors in metric tons of carbon per acre (MT C/acre) used and a description of the data source.

[17] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 4 Agriculture, Forestry and Other Land Uses; Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. Page 10. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_01_Ch1_Introduction.pdf.

[18] U.S. EPA. 2011. U.S. Greenhouse Gas Inventory Report – Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2009. USEPA #430-R-11-005. Annex 3 – Methodological Descriptions for Additional Source or Sink Categories. http://epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Annex-3.pdf

[19] California Air Resources Board. 2010. California Greenhouse Gas Emissions Inventory. 1990-2004 Technical Support Document.
http://www.arb.ca.gov/cc/inventory/doc/methods_v1/ghg_inventory_technical_support_document.pdf

Table C-2: Land Covers and Carbon Stock Factors

Land Cover Type	Stock Factor	Source/Description
	(MT C/ acre)	
Oak Woodlands	95.1	EPA[1] - Sub-region California. Sub-group Western Oak.
Riparian Woodlands	80.9	EPA[1] - Sub-region California. Sub-group Minor Types and Non-stocked.
Coniferous Forest	58.1	EPA[1] - Sub-region California. Sub-group California Mixed Conifer.
Grasslands	1.4	CEC[2] Aggregate of all California grasslands; based on data of Bartolome et al. 2002; Higgins et al., 2002; and Micheli and Kirchener 2002.
Shrublands	16.2	CEC[2] Aggregate of all California grasslands; based on data of Riggan and Dunn, 1982; Schlesinger 1987; Pierce et al 2000; Morais 2001.
Croplands (Not Vineyards)	3.8	CEC[2] Aggregate of all California but provided for specific crop types. Value represents a weighted average of the stock factors in the CEC report weighted by acres present of the specific crop type in Napa County (Ag commisioner's data).
Vineyards	1.2	Kroodsma and Field. [3]. 2006. (24 g C m^{-2} yr^{-1}) California specific study; provides unique values for vines. Used in existing Napa County CEQA documents.

[1] U.S. EPA. 2010. 2010 U.S. Greenhouse Gas Inventory Report - Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008 (Annex 3). U.S. EPA # 430-R-10-006. Released April 2010. Table A 211 *Average carbon density by carbon pool and forest area according o region and forest type, based on the most recent inventory survey available for each state from FIA, corresponding to an average year of 2005.*

[2] CEC.2005. Brown, S., T. Pearson, A. Dushku, J. Kadyzewski and Y. Qi. 2004. Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California. CEC-500-04-069F. Prepared for the California Energy Commission by Winrock International.

* EPA factors are provided for above ground, below ground, dead wood, litter and soil organic carbon. These were summed and inherently assume a mature stand of mixed age that is not being managed for timber. Both CEC and EPA inventory factors inherently account for disturbance – however likely introduces higher error at the County level .

In all cases, species listed in the BDR were matched, to the extent feasible, to species listed in the EPA or CEC category selected. So while the stock factors are not Napa County specific, they are at a minimum California specific and are developed from samples taken in the region and of species that are found in Napa County. The scientific literature may of course contain alternate carbon stock values for a particular Napa County BDR group, factors specific to only Napa County for all BDR groups are almost certainly not available at this time. At this stage, an exhaustive literature search for Napa County specific stock factors - all obtained from methods that similarly aggregate carbon pool data such that the factors can appropriately be used in the same County-wide analysis – was not conducted. As the CEC factors are based on measurements and recent scientific literature and the EPA factors based on U.S. Forest Service data, it is unlikely that a more expansive literature search would have returned factors of improved specificity to those currently being used and which are by default already consistent with the state inventory. A more accurate assessment of Napa carbon stocks could be obtained with factors developed specifically for Napa through a ground-based study conducted specifically for this purpose (see recommendations below).

What about the Climate Action Reserve Forest Project Protocol?

The California Air Resources Board (CARB) adopted the Climate Action Registry Forest Protocol to support voluntary (project level) GHG reductions encouraged by AB32. The protocol, now known as

the Forest Project Protocol, was subsequently revised and the latest version (V. 3.2) was adopted in September 2010. The forest protocol is an accounting methodology for voluntary GHG reduction projects, and is not meant as a tool for analyzing emissions or impacts under CEQA or as guidance for jurisdictional inventories. Napa County's CAP is not a vehicle for buying and selling of carbon credits but rather demonstrates that the community as a whole is doing its fair share to meet the obligations of AB 32 by 2020. The Forest Project Protocol supports a system where carbon credits are bought and sold for a present year. The protocol is based on alternative forest management practices and is specifically not designed for GHG inventory analysis. The CCAR forest protocol is not recommended for use in GHG inventories by CARB, ICLEI, CAPCOA, the BAAQMD or the U.S. Environmental Protection Agency (U.S. EPA), as listed above. Both CARB's California and the U.S. EPA's National GHG inventories quantify emissions from land clearing using Intergovernmental Panel on Climate Change (IPCC) methodology (IPCC methodology was used in the Napa CAP analysis; see discussion above).

Performing an emissions analysis using the Forest Project Protocol requires detailed biological studies on site with the oversight of a state registered professional forester certified by CCAR. Without this process (which was not feasible as part of the county's county-wide GHG inventory and reduction planning effort), an analysis using the forest protocol would be incomplete and potentially inaccurate.[20] Consequently, the IPCC methodology is more appropriate for estimating emissions associated with land use change at the county level. Through the CAP requirements for project-level mitigation, the Plan does link county level GHG emissions in the land use sector to project level actions. The Plan does not preclude an individual project proponent from obtaining and using site-specific data to analyze project emissions and emission reduction requirements. In fact, this is a foreseeable outcome of imposing emission reduction requirements on all discretionary projects that do not qualify as categorically exempt.

Recommendations for Future Improvements in the GHG inventory Relative to Land Use Change Emissions

In the short run, the majority of land use change emissions are related to loss in stock when land is removed as opposed to the change in annual uptake capacity for the county as a whole that results from land clearing. Improvements in the land use change analysis should be focused on the actual (versus projected) rate of change and stock factors for maximum benefit. Information that is gathered as part of individual project reviews may help in this regard.

This first CAP is focused on achieving the GHG reduction target for 2020. However, further substantial reductions in GHG emissions are going to be necessary to avoid the more catastrophic effects of unchecked climate change after 2020. As planning for the period beyond 2020 begins to take shape at the state and local level, the County should consider how to address the long-term loss of sequestration resultant from land conversions. As explained in Master Response No. 3, when looking at a 100-year time frame, the loss of sequestration can represent perhaps one third or more of total GHG emissions associated with land use conversion. While focus on quantification of carbon stock to support near-term policies about mitigating carbon stock loss are appropriate, focus on quantification of carbon sequestration over longer time cycles will become an increasingly important need as the County begins to plan for the post 2020 period starting in 2017.

Finally, the state has articulated goals to maintain the current level of carbon sequestration statewide as part of the AB 32 Scoping Plan. However, specific policy has not been developed nor

[20] A site specific analysis was not feasible for the simple reason that the County cannot anticipate the precise sites upon which vineyard development will be proposed between now and 2020. Instead, the County has developed reasonable projections of the amount of vineyard development that will occur, and the land cover types that are likely to be affected. These projections are based on a review of vineyard development trends in the County since 1993.

has specific guidance been provided at the county level. The County will continue to monitor policy development at the state level to ensure that policy and practice in Napa remain consistent with AB 32.

Master Response No. 5: Anthropogenic and Biogenic Emissions

Comments received from the Quercas Group suggest that the CAP may not be CEQA compliant as it does not appropriately quantify biogenic emissions. Supporting documentation to the Quercas letter included opinions from the California Natural Resources Agency and the California Wastewater Climate Change Group on the treatment of biogenic emissions under CEQA. There is no differentiation made between biogenic and anthropogenic emissions in the CEQA guidelines. However, certain types of biogenic emissions are generally excluded from national and state level GHG inventories. The classification of anthropogenic and biogenic emissions is crucial to the accuracy of a local GHG inventory with specific areas of concern related to biofuels, landfill gas and land use change. Definitions of biogenic and anthropogenic emissions follow as well as a summary of standard GHG inventory protocols and CEQA guidance.

What are biogenic emissions?

The IPCC defines biogenic carbon as "*carbon derived from biogenic (plant or animal) sources excluding fossil carbon".* [21] The natural decay of biogenic carbon under aerobic conditions produces CO_2 and is a natural part of the carbon cycle. Biogenic emissions are emissions that result from the destruction (either through decay or burning) of plant or animal carbon that mirrors the natural carbon cycle. For example, the burning of biomass as a fuel releases CO2, CH4 and N2O. The resulting CO2 emissions are considered biogenic since these emissions would have eventually occurred as the biomass decayed. The CH4 and N2O are a unique result of combustion and because the combustion was man-made and not the result of a natural fire, these emissions are not considered biogenic.

What are anthropogenic emissions?

The U.S. EPA defines anthropogenic as "made by people or resulting from human activities and usually used in the context of emissions that are produced as a result of human activities".[22] In general, these emissions are related to the burning of fossil carbon or the creation of anaerobic environments in which waste decays. In the example above, they can also include emissions that from a natural activity (burning) that has a man-made initiation.

State level inventorying guidance: Biogenic emissions

GHG emissions were analyzed for the unincorporated portion of Napa County for the years 2005 and 2020 based on the following protocols:

- Local Governments Operations Protocol (LGOP) for the quantification and reporting of greenhouse gas emissions inventories (California Air Resources Board 2010);
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change 2006); and

[21] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/0_Overview/V0_2_Glossary.pdf

[22] http://www.epa.gov/climatechange/glossary.html

- Protocols contained in ICLEI Clean Air Climate Protection Software (CACP) (ICLEI 2010a).

These protocols universally recommend not including biogenic CO2 emissions in inventories, and instead reporting them as informational items if at all. They all offer the same reason for this recommendation: biogenic CO2 emissions would have eventually occurred as the biomass decayed during the natural carbon cycle and are therefore not anthropogenic; a GHG inventory is generally defined as an account of anthropogenic GHG emissions.

The LGOP states the following:

> *Biogenic emissions related to forestry and land management should not be quantified under this Protocol as the Protocol is designed to account primarily for the anthropogenic sources of GHG emissions, and is not designed to assess the carbon stocks of government-owned lands (see Section 2.3). Biogenic emissions also occur from sources other than combustion, such as the aerobic decomposition of organic matter. These non-combustion biogenic emissions should not be included in your GHG inventory.*[23]

The 2006 IPCC Guidelines state the following:

> *Although CO2 emissions from biogenic carbon are not included in national totals, the combustion of biofuels in mobile sources generates anthropogenic CH4 and N2O that should be calculated and reported in emissions estimates.*[24]

And:

> *Carbon dioxide (CO2) emissions from wastewater are not considered in the IPCC Guidelines because these are of biogenic origin and should not be included in national total emissions.*[25]

In addition, the U.S. EPA and the U.S. Climate Change Science Program (USCCSP) all recognize the role of biogenic emissions in nature's natural carbon-cycle and thus biogenic CO2 is considered by these authorities to have no environmental impact. USCCSP states:

> *Carbon dioxide, generated from aerobic metabolism in waste removal and storage processes, arises from biological material and is considered GHG neutral.*[26]

Consequently, the CO2 emissions associated with the burning of biofuels and the flaring of landfill gas are not counted for in the California State or U.S. national GHG inventories. Emissions associated with land use change (carbon stock loss and loss in annual sequestration capacity when natural lands are converted to other uses) are considered anthropogenic and are counted in the state and national inventories. This destruction of organic carbon when land is converted occurs at a pace that does not mimic the natural carbon cycle. GHG emissions associated with land use change have been included in Napa County's CAP.

Current state of practice: Quantification of GHG emissions from land use change

Land use change is specifically addressed in the Assembly Bill 32: Global Warming Solutions Act of 2006 (AB32) Scoping Plan and accordingly the Napa County CAP. However, at this time, specific guidance on how to address land use change in local GHG inventories, CAPs, or in CEQA analysis is not available. There are currently multiple protocols and guidance documents which recommend against or provide no guidance on including land-use change emissions in CEQA documents:

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[23] http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf (page 24)

[24] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf (page 3.13)

[25] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_6_Ch6_Wastewater.pdf (page 6.6)

[26] http://www.climatescience.gov/Library/sap/sap2-2/final-report/sap2-2-final-all.pdf (page 86)

- California Climate Action Registry (CCAR): General Reporting Protocol[27] provides no guidance for estimating these emissions.
- Governor's Office of Planning and Research (OPR): Proposed CEQA Guidelines Amendments[28] does not specifically recommend including land use emissions in project level GHG inventories.
- OPR: Transmittal of the Governor's Office of Planning and Research's Proposed SB 97 CEQA Guidelines Amendments to the Natural Resources Agency[29] updates the CEQA Guidelines Amendments to avoid an implication that a "life-cycle" analysis is required.
- International Council for Local Environmental Initiatives (ICLEI): Local Government Operating Protocol (LGOP)[30] does not recommend quantifying emissions associated with land clearing.

The California Air Resources Board (CARB) adopted the Climate Action Registry Forest Protocol in October 2007 to support voluntary GHG reductions encouraged in The California Global Warming Solutions Act (AB32); it was subsequently updated in 2010. The forest protocol is an accounting methodology for voluntary GHG reduction projects, and is not meant as a tool for analyzing emissions or impacts under CEQA. Nor was it intended for use within the context of community-wide GHG inventories for local jurisdictions. The protocol is based on alternative forest management practices and is specifically not designed for GHG inventory analysis. The CCAR forest protocol is not recommended for use in GHG inventories by CARB, ICLEI or the U.S. Environmental Protection Agency (U.S. EPA), as listed above. Both CARB's California and the U.S. EPA's National GHG inventories quantify emissions from land clearing using Intergovernmental Panel on Climate Change (IPCC) methodology (IPCC methodology was used in the Napa CAP analysis; see discussion below).[31] Performing an emissions analysis using the forest protocol requires detailed biological studies on site with the oversight of a state registered professional forester certified by CCAR. Without this process, an analysis using the forest protocol would be incomplete and potentially inaccurate. Consequently, the IPCC methodology is more appropriate for estimating emissions associated with land use change and vegetation removal as is reasonably foreseeable in the County.

Although both guidance and a mandate for inclusion of land use change in local GHG inventories is lacking, it may indeed be a significant source of emissions for certain California communities. Although the state of California has not developed specific policy, it has set forth a goal as part of AB 32 to maintain carbon sequestration levels in the forestry sector, but has not established any specific guidance for non-forestry carbon sequestration. Similar to other emissions sectors, the state will likely require the assistance of local governments to achieve this goal. Recognizing its carbon resources and the nature of emissions in Napa County, the County has taken a pioneering step to include land use change in the inventory. In the absence of precedent by any other California community or guidance for local inventories, Napa has performed the land use change analysis consistent with the state and national inventories. In the event that a comprehensive field-based dataset can be completed, the analysis can be updated.

[27] CCAR 2009. General Reporting Protocol. Version 3.1.

[28] OPR 2009. Proposed CEQA Guidelines Amendments.

[29] OPR 2009. Transmittal of the Governor's Office of Planning and Research's Proposed SB 97 CEQA Guidelines Amendments to the Natural Resources Agency.

[30] ICLEI 2009. Local Government Operating Protocol. Page 112.

[31] California Air Resources Board 2009. California's 1990-2004 Greenhouse Gas Emissions Inventory and 1990 Emissions Level; U.S. Environmental Protection Agency 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007

Biogenic and anthropogenic GHG emissions in SB 97

According to the Quercus Group, SB 97 does not distinguish between anthropogenic and biogenic emissions and thus argues that, in the absence of a legislative amendment, the CEQA guidance does not distinguish between the two. As noted above, both the OPR's Proposed CEQA Guidelines Amendments and their Transmittal Letter to the Natural Resources Agency do not specifically recommend including land use emissions in project level GHG inventories, although this is not precluded by any of the above. The County feels strongly that GHG emissions from land use change are a significant component of their emissions portfolio and that this source of emissions be addressed. Through an iterative public process, is seeking to develop sound policy such that they can be.

The CEQA guidelines state the following:

> *A lead agency should make a good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:*
>
> *(1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; or*
>
> *(2) Rely on a qualitative analysis or performance based standards.*[32]

Napa County has chosen to use the methodologies listed above to quantify GHG emissions due to land use change at the County level and is developing a project level calculator such that project level estimations of GHG emissions from land use change are 1) consistent from project to project and 2) mathematically tied to the CAP. This decision is compliant with CEQA based on the guidance cited above. The Napa CAP has gone beyond the guidance provided by these protocols and completed a good-faith effort to quantify emissions from land use change, even in the absence of established protocol.

Master Response 6: CEQA Compliance for CAP Adoption

Bill Yeates, of Kenyon Yeates, writing on behalf of the Napa Group of the Redwood Chapter of the Sierra Club, raised questions about the County's CEQA compliance for adoption of the CAP. Specifically, his comments point out that the description of the Draft CAP as a mitigation plan ensuing from the General Plan, does not exempt the plan from CEQA and the General Plan EIR "did not and could not have included the baseline GHG emission inventory in the Draft CAP currently under review."

Mr. Yeates goes on to state that The General Plan EIR did not describe or analyze baseline information about the importance of oak woodlands and coniferous forests as significant carbon stores and did not analyze the environmental consequences of the loss of oak woodland and coniferous forest carbon stock "in the context of a CAP." He explains that proposed Measure PL-1 does not require sufficient off-sets for the net loss of carbon stocks, and would allow 10 acres of oak

[32] http://www.opr.ca.gov/ceqa/pdfs/PA_CEQA_Guidelines.pdf

woodlands to be removed in exchange for preservation or restoration of every 5.2 acres, meaning that 4.8 acres "would not have to be mitigated" despite the acknowledged goal of AB 32 to maintain the current amount of carbon sequestration in California forests. The comments also point out that Measure PL-1 offers several offsite offset options, so that the CAP could result in a 48-100% loss "of the existing and important carbon stock associated with oak woodlands and coniferous forests in Napa County."

For these reasons,[33] the commenter argues that a supplement to the General Plan EIR is needed and that the County should assess the feasibility of avoiding conversions of oak woodlands and coniferous forests or implementing other feasible mitigation strategies on site or within the immediate vicinity, "so that valuable carbon stores are not lost forever." The commenter also suggests that the County should investigate a carbon market where land owners could sell carbon credits in return for protecting their woodlands and forests.

The County is proposing to use the General Plan EIR as the CEQA document for adoption of the climate action plan and not to "exempt" the plan from CEQA. There are good reasons for this decision, as explained in the environmental checklist (initial study) previously prepared. While the General Plan EIR could not anticipate the precise contents of the proposed CAP that is now being considered for adoption, it did call for a CAP to be completed and it established a performance standard for the CAP by requiring it to reduce GHG emissions to 1990 levels (now interpreted as 15% below 2005 levels) by 2020, consistent with AB 32. The CAP that is now being proposed would meet this performance standard, and would have the effect of lessening but not avoiding the significant and unavoidable impacts already identified in the General Plan EIR related to plant communities and GHG emissions. This is because the CAP would require project-specific quantification and mitigation of GHG emissions, essentially steering development activities to areas with lower carbon stocks (where emission reduction or offset requirements would be less). Thus a land owner with the opportunity to develop a vineyard on either grassland or woodland areas will tend to choose the grassland to minimize his/her costs. A land owner with no choice but to impact woodland areas will face increased costs and will tend to reduce the area impacted.

The General Plan and the General Plan EIR acknowledge the significant environmental benefits of oak woodlands, coniferous forests, and other plant communities, and assessed impacts to these resources from a variety of perspectives. Draft EIR Section 4.5.1 contains a description of the biotic communities, paying special attention to sensitive natural communities "because of their rarity, high biological diversity, and/or susceptibility to disturbance" and biotic communities of limited distribution "due to their limited local distribution." Woodland and forest communities are well represented on both lists.

As discussed in the initial study checklist prepared for the CAP, the General Plan EIR's analysis of potential impacts on the County's woodlands, forests, and other sensitive biotic communities ultimately concluded that development activities (including vineyard development) over the life of the plan could result in significant and unavoidable impacts to these resources (Draft EIR pp. 4.5-63 & 64). Similarly, the General Plan EIR's analysis of GHG emissions concluded that GHG emissions resulting from development activities would constitute a significant and unavoidable impact.

The EIR's analysis attributes impacts such as loss of habitat and loss of sensitive natural communities to removal of vegetation (Draft EIR pp. 4.5-55&56), and also references (Final EIR p.

[33] The commenter raises several other points which have been addressed via revisions to the CAP. Specifically, he states that the County's CEQA analysis does not address what will happen if the GHG reductions expected as a result of state actions do not come to fruition, and that some of the County's climate action measures "appear highly speculative and unenforceable" in conflict with CEQA's requirement that mitigation measures be fully enforceable (Section 21081.6(b)). The CAP has been revised to discuss ongoing monitoring.

3.0-50) the potential loss of carbons stocks and the primary and secondary impacts of human activities, including clearing of forests (Final EIR p. 3.0-54). The EIR references but does not quantify (Final EIR p. 3.0-59) emissions from changes in land use (i.e. loss of vegetation). Instead, potential GHG emissions are estimated based on factors such as energy use and vehicle miles travelled, and the document concludes that "additional inventory analysis of every possible source of GHG emissions in the County would not… materially change the impact conclusions identified in the Draft EIR" (Final EIR p. 3.0-59).

As discussed in the initial study checklist prepared for the CAP, the General Plan EIR's gross estimates of GHG emissions have been updated in the CAP, which provides a more refined, quantitative analysis of all emission sources. The order of magnitude of projected annual GHG emissions in both documents is similar, and both estimates appropriately examine annual emissions, rather than the sum total of all possible emissions over the life of the plan (2005-2030 for the General Plan and 2005-2020 for the CAP).

The General Plan EIR also referred to goals, policies and action items in the General Plan which address the issue of carbon sequestration. Specifically, General Plan Policy CON-65 states that the County shall:

- support efforts to reduce and offset GHG emissions;
- strive to maintain and enhance the County's current level of carbon sequestration functions;
- preserve and enhance the values of plant life as carbon sequestration systems; and
- consider GHG emissions, including changes in carbon sequestration, in the review of discretionary projects.

The proposed CAP is intended to accomplish these things and would require discretionary projects to reduce of offset approximately 38% of their GHG emissions.[34] As the commenter notes, this requirement would not eliminate the potential for significant losses of woodlands and other habitats (losses anticipated in the General Plan EIR), but it would be sufficient to ensure that the County's overall GHG emissions in the year 2020 are equal to or less than emissions in 1990 (assumed at 15% below 2005 levels). The County's annual emissions have been calculated to include emissions associated with land cover changes (i.e. vegetation removal) and the resulting changes in carbon sequestration.

In a sense, decision makers who consider the CAP for adoption will be asked whether adopting a plan which has some environmental benefits but does not eliminate previously anticipated significant impacts is desirable. They will also have to consider whether a plan that does not wholly "maintain and enhance" existing vegetation and carbon sequestration is consistent with the General Plan, given that General Plan Policy CON-65 states that the County shall "strive to" accomplish this goal.

It is important to note that adoption of the CAP does not relieve discretionary projects of the need to address environmental impacts other than GHG emissions per General Plan policies and requirements identified through the project-level CEQA process. Thus, where mitigation for habitat

[34] The draft CAP's requirement that vineyard projects reduce or offset 51.5% of their emissions was revised based on new calculations of baseline and forecasted emissions. The revised CAP requires discretionary projects to reduce or off-set their emissions by 38% and also better accounts for agricultural emissions from a variety of sources (not just land cover changes). As a result, new vineyard projects could preserve otherwise developable vegetated areas (fitting the Climate Action registry's protocol for avoided deforestation) to achieve the 38% total emission reduction required. Applicants could also choose alternative emission reduction and off-set strategies or a combination of strategies.

purposes is required within Napa County, the CAP would not mandate that the habitat mitigation be changed per se, but only that the GHG emissions be mitigated in accordance with the standard established by the CAP.

Planning staff believes that the CAP is consistent with the General Plan because it would reduce annual GHG emissions and require quantification and reduction of emissions for all discretionary projects. As noted above, these requirements would somewhat increase the cost of development and would therefore have an inherently mitigative effect. In addition, planning staff anticipates that for many property owners, the most cost effective emission reduction or offset option available in the proposed CAP will involve the preservation of otherwise developable like habitat equivalent to the habitat impacted. This means that the CAP would likely decrease the acreage of vegetation that would otherwise be removed over the planning period and also increase the acreage of vegetation protected and preserved in perpetuity which would have multiple benefits including habitat preservation, watershed protection, open space, as well as carbon sequestration.

Separate and apart from the CAP, the County has adopted a Voluntary Oak Woodlands Management Plan and is both pursuing and assisting other agencies in pursuit of habitat restoration and open space acquisition projects intended to enhance and preserve the carbon sequestration value of vegetated areas. Also separate and apart from the CAP, the State Department of Forestry is charged with reviewing projects that affect timber, and must address the Scoping Plan goal of ensuring that forestry practices do not generate more emissions that are sequestered in the State's forests.

Finally, the commenter's suggestion that the County investigate a carbon market where land owners could sell carbon credits in return for protecting their woodlands and forests is appreciated. Once a CAP is in place that *requires* project applicants to accomplish GHG reductions or purchase offsets, a "market" for credits will essentially be created. The County intends to joint venture with a local non-profit organization and develop a local program that would permit property owners to sell credits when they agree to restore native habitats or preserve natural areas.