

CALAVERAS COUNTY PLANNING COMMISSION

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REGULAR MEETING AGENDA OCTOBER 8, 2026

This meeting will be held in the **BOARD OF SUPERVISORS CHAMBERS** 891 Mountain Ranch Road, San Andreas, CA 95249.

This Planning Commission meeting is open to the public.

Alternatively, you may observe the meeting and address the Commission via Zoom or email, as dictated below:

You may listen to the meeting, and make public comments virtually, using the Zoom link listed under **CALL TO ORDER**.

You may also comment on a specific agenda item prior to the hearing via email. To do so, submit your comment via email to the Clerk of the Planning Commission at <https://calaverasgov.us/Feedback/Planning-Commission-Clerk> no later than 4:00pm on the Monday prior to the Commission meeting. Please clearly indicate which agenda item number your comment pertains to. Comments are limited to 300 words or less.

In Compliance with the Americans with Disabilities Act (ADA), if you need special assistance to participate in this meeting, please contact the Clerk to the Planning Commission at (209) -754-6620 at least 48 hours prior to the start of the meeting. Notification in advance will allow reasonable arrangements to be made to ensure accessibility to this meeting. Government Code §54954.2(a).

The Planning Commission agenda is posted on the county website at <https://calaverasgov.us/Meeting-Calendar>. Applications, environmental documents, staff reports, and project files are available for review at the Calaveras County Planning Department during regular business hours. Copies of the file documents, including the staff report and/or environmental reviews, may also be purchased.

A decision of the Planning Commission may be appealed to the Board of Supervisors by following the appeal procedures in Section 17.98.070, and by submitting a written request, accompanied by the appropriate fee, within 15 calendar days from the date of the Commission decision. (Ord. 2289 § 3(part), 1992: Ord. 1812 § 1(part), 1986).

Pursuant to Government Code 65009, a legal challenge to any of the projects described below may be limited to addressing only those issues raised at the public hearing or in written correspondence delivered to the Planning Commission at or prior to the public hearing.

If you wish to address the Commission on an agenda item, please come to the rostrum when public comment on that item is opened and give your name, if you choose, your address, and your comments. Time limits and order of items shall be the discretion of the Chair, including a break for lunch.

9:00 AM CALL TO ORDER

To view or give public comment virtually, register in advance:

https://us06web.zoom.us/meeting/register/W5cBp_yZTSG4MjoQRatsHg

Once registered you will receive a confirmation email containing information about joining the meeting. Upon joining the meeting, your audio will be muted. During the public comment periods, you will be asked to raise your hand via Zoom if you want to comment. You may speak for up to five minutes.

PLEDGE OF ALLEGIANCE

STAFF ANNOUNCEMENTS

AGENDA CHANGES

GENERAL PUBLIC COMMENT PERIOD

Any land use item of interest to the public that is within the subject matter jurisdiction of the Commission and is not posted on the Consent or Regular agendas may be addressed during the Public Comment period. California law prohibits the Commission from taking action on any matter which is not posted on the agenda unless it is determined to be an emergency by the Commission. **Five minutes per person**, fifteen (15) minutes per topic.

CONSENT AGENDA

Consent agenda items are expected to be routine and non-controversial. They will be acted upon by the Commission at one time without discussion. Any Commission member, staff member or interested party may request removal of an item from the consent agenda for discussion.

None

REGULAR AGENDA

1. **Project 2025-043 General Plan Amendment SB 1425 Open Space Update**
Calaveras County is proposing to amend elements of the General Plan in accordance with Senate Bill 1425 which requires cities and counties to update their open space and conservation elements to address equitable access to open space, climate resilience, and rewilding opportunities. The amendment will affect the entirety of Calaveras County. The amendment is determined to be a later activity within the scope of the General Plan EIR, SCH# 2017012043 (certified in November 2019) pursuant to Section 15168 of the California Environmental Quality Act (CEQA) Guidelines. It was found that the EIR adequately describes this activity for purposes of CEQA. (Katherine Stefani, Senior Planner)

COMMISSIONER REPORTS

PLANNING DIRECTOR REPORTS

ADJOURNMENT



CALAVERAS COUNTY PLANNING DEPARTMENT
891 Mountain Ranch Road,
San Andreas, California 95249
(209) 754-6394

Planning Commission Staff Report

Hearing Date:	October 8, 2026
Project Number/Name	2025-043 GPA SB 1425 Open Space Element Update
Supervisory District Number	All
Assessor's Parcel Number(s)	N/A
Planner	Katherine Stefani, Senior Planner

Date September 25, 2026

PROJECT DESCRIPTION Calaveras County is proposing to amend elements of the General Plan in accordance with Senate Bill 1425 (Government Code § 65565.5) which requires cities and counties to update their open space and conservation elements to address equitable access to open space, climate resilience, and rewilding opportunities.

BACKGROUND

California state law requires cities and counties to have General Plans and that they be updated periodically. There is no specific timeline for updating the General Plan Elements, except for the Housing Element. Calaveras County's General Plan was last comprehensively updated in November 2019. No updates have been made to the Elements since then, apart from the adoption of the Copperopolis Community Area Plan in 2024. However, state laws have subsequently been adopted that require cities and counties to update their Open Space Elements.

[Senate Bill \(SB\) 1425](#) (Stern, 2022), codified as Section (§) 65565.5 of Article 10.5 of California Government Code, requires all cities and counties to review and update their General Plan Open Space Element to address the following:

- Equitable access to open space for all residents (correlated with the Environmental Justice Element, as applicable);
- Climate resilience and other co-benefits of open space (correlated with the Safety Element); and
- Rewilding opportunities (correlated with the Land Use Element).
 - o "Rewilding Opportunities" may include, but are not limited to, the following:
 - Opportunities to preserve, enhance, and expand an integrated network of open space to support beneficial uses such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics; and
 - Establishing a natural communities conservation plan to provide for coordinated mitigation of the impact of new development.

Per Government Code § 65565.5 and 65564, the local open-space plan update must include plans and specific programs which the legislative body intends to pursue to address these factors.

Per Government Code § 65563, local open space plans must include a description of the methods by which open-space resources will be inventoried. A map inventorying open space for the preservation of natural resources, the managed production of resources, for outdoor recreation, for public health and safety, in support of the mission of military installations, for the protection of cultural and archaeological places, features, and objects described in § 5097.9 and 5097.997 of the Public Resources Code is proposed to be adopted as part of the Conservation and Open Space Element.

Although not required through SB 1425 or Government Code, staff is also proposing to update *Table LU-2: Relationship of General Plan Land Use Designations and the Current Zoning Districts* to include the newly adopted Open Space and Historic Center zones and remove obsolete zones to conform with the zoning code updates that have taken place since 2019.

ANALYSIS

The current Calaveras County General Plan was adopted in November 2019 and includes the following Elements:

- Land Use
- Circulation
- Housing
- Resource Production
- Conservation & Open Space
- Noise
- Safety
- Public Facilities & Services
- Community Planning

The purpose of the Conservation and Open Space Element is to provide policy direction for the conservation, development, preservation, and use of natural and cultural resources (e.g. water, forests, soils, rivers and other waters, fisheries, wildlife, outdoor recreation, areas necessary for the protection of health and safety, and areas of outstanding scenic, historic and cultural value) devoted to or managed for open space uses. It includes goals, policies, and programs addressing the effects of development on these resources. This Element is correlated with the Land Use, Resource Production, Safety, and Public Facilities & Services Elements.

Senate Bill (SB) 1425

Planning Department staff conducted a comprehensive review of the County General Plan to identify gaps and opportunities to support SB 1425 compliance. Based on its review, staff has determined that existing general plan policies and measures largely meet SB 1425 requirements. Staff has proposed amendments and additions to address the gaps that have been identified. The existing policies and goals of the General Plan that are relevant to the requirements of SB 1425 are briefly discussed below, along with proposed amendments to the General Plan. The list of relevant policies and

implementation measures of the general plan can be found in Attachments 6 through 8.

Equitable Access to Open Space

SB 1425 requires that the Open Space Element address access to open space for all residents in a manner that considers social, economic, and racial equity, correlated with the environmental justice element or environmental justice policies in the General Plan, as applicable. [Senate Bill 1000](#), incorporated in the Government Code in §56302(h), required the County to include an environmental justice element or integrate environmental justice policies in another element in its general plan if it had a disadvantaged community. There are no disadvantaged communities as defined by SB 1000 in Calaveras County ([CalEPA DAC Map](#)); therefore, the General Plan does not include an environmental justice element. However, the topic is considered in the Public Facilities & Services Element, and the County identified six (6) “disadvantaged legacy communities” pursuant to California Government Code § 65302.10(b) – Mokelumne Hill, Mountain Ranch, Rail Road Flat, San Andreas, Vallecito, and West Point. To be designated as a disadvantaged legacy community, a residential area must meet the following criteria:

- Includes 10 or more inhabited dwelling units adjacent to or in close proximity to each other
- Have a median income of 80% or less of the statewide median household income
- Are geographically separated from other communities
- Have existed for at least 50 years

These communities were analyzed considering water, wastewater, stormwater drainage, and structural fire protection needs or deficiencies.

While there are many policies and implementation measures (IM) related to the creation and maintenance of open space, staff has proposed amendments to prioritize open space access for underserved communities. In this context, underserved communities are those that face barriers to accessing open space due to constraints such as geographical distance or transportation challenges. The Calaveras County Parks and Recreation Master Plan (PRMP) (2025), a long-range document that creates a road map to address the recreational needs of the community, provides an inventory of County-owned parks as well as non-County-owned parks, facilities, and school sites which are available for public use after school hours that were counted as part of the County’s park system. Staff can identify underserved communities to be prioritized using the locations of these facilities in addition to the other recreation facilities within the county including, but not limited to, Calaveras Big Trees State Park, Lake Camanche, and New Hogan Lake, as well as County’s knowledge of social, economic, and/or racial demographic information and disadvantaged legacy communities.

Staff reviewed the General Plan and found several policies and implementation measures across different elements related to open space and recreational facilities. A particularly relevant section is Goal COS-6 of the Conservation & Open Space (COS) Element, which envisions a high-quality system of recreational facilities in the County, and its subsequent policies. Minor modifications are proposed to Policies LU 1.3, C 3.2, COS 6.1, and COS

6.3 and IM COS-7I to include language that prioritizes access to and involvement with open space for underserved communities. IM COS-7H *Recreation Master Plan*, regarding the adoption of a recreation master plan, is proposed to be amended to implement the Park and Recreation Master Plan adopted March 2025 in a way that better addresses access to open space. Additionally, three new policies are proposed to be added to the Conservation & Open Space Element. These policies propose to explore partnerships with other agencies that would help connect underserved communities with open spaces, support educational and voluntary stewardship programs that connect people with open spaces and encourage civic engagement with these spaces, and to maintain the Calaveras County Parks and Recreation website to promote access to and events in open spaces.

Staff finds that the existing policies and implementation measures in place, in conjunction with the minor modifications proposed and an implementation measure to identify underserved communities, sufficiently address the topics required to be considered by SB 1425 and substantially conform to its requirements. A redlined version of the existing policies and measures as well as the proposed changes are available in Attachment 5 – Policies and Implementation Measures Related to Equitable Access.

Climate Resilience

As with the equitable access requirement, the Conservation & Open Space (COS) Element is predominantly relevant to SB 1425's requirements for climate resilience. SB 1425 requires open spaces elements to address climate resilience and provides the opportunity for the management of open space to provide nature-based solutions to climate issues. General Plan Implementation Measure (IM) COS-5C *GHG Reduction Plan* requires the development of a greenhouse gas reduction plan outlining the strategies, goals, and actions for contributing to the overall reduction in greenhouse gas (GHG) emissions consistent with AB 32 and SB 32 be developed. Reducing greenhouse gases that contribute to climate change, and sequestering carbon by preserving existing vegetation and trees are significant ways of enhancing climate resilience in a rural county with large areas of intact native vegetation communities. A draft Greenhouse Gas Reduction Plan (GHGRP) has been completed and, and County staff will endeavor to bring it before the Board of Supervisors for adoption in 2027. The plan includes measures and actions to address GHG reduction in several areas, including agriculture and carbon sequestration. The agriculture section includes the promotion of sustainable agricultural and land management practices, and the carbon sequestration section aims to sequester carbon throughout the County via the conservation and preservation of natural and working lands.

Additionally, the General Plan includes several other policies and IMs that address the topics that are required to be considered under SB 1425. The COS and Safety Elements contain several policies and measures related to the management of the County's natural resources, particularly in relation to wildfire mitigation, and the Local Hazard Mitigation Plan. Furthermore, IMs RP-1D and RP-1F of the Resource Production Element require the County to establish methodology and guidelines to evaluate and mitigate impacts from

the conversion of Resource Production land. IM RP-1B also requires discretionary development applications involving or adjoining Resource Production (RP) lands (the prime designation for agricultural and natural resources) to be evaluated to determine whether there will be any negative impacts, such as significant loss through conversion, to RP lands.

Staff finds that the existing policies and implementation measures in place, in conjunction with the prioritization of the GHGRP, sufficiently address and plan for climate resilience within the meaning of SB 1425. However, the General Plan contains policies and implementation measures meant to reduce the effects of severe weather conditions and resulting impacts such as wildfires and reduced water supplies by promoting retention and maintenance of natural habitats, thus addressing climate resilience. The relevant policies and implementation measures, as well as the draft Greenhouse Gas Reduction Plan, can be viewed in full in Attachment 6 – Policies and Implementation Measures Related to Climate Resilience and Attachment 8 – Draft Calaveras County Greenhouse Gas Reduction Plan, respectively.

Rewilding Opportunities

SB 1425 also requires counties to update their general plans to include rewilding opportunities, a term which is undefined but may include opportunities to preserve, enhance, and expand an integrated network of open space to support beneficial uses, such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics. Large areas of the County are still undeveloped and designated for agricultural and natural resource purposes; however, there are several areas of the County that have been more densely developed. The General Plan includes many measures to maintain existing open space and incorporate the preservation of natural habitats in future development, as well as opportunities to integrate a network of restored open space.

Several policies and measures that align with the requirements of SB 1425 were adopted as part of the 2019 General Plan update. They include adopting guidelines establishing mitigation measures to mitigate impacts to sensitive biological resources (IM COS-4B), development of a countywide habitat conservation plan for amphibians (IM COS-4C), and identifying and protecting corridors important to wildlife movement and dispersal (Policy COS 4.3). These policies and measures allow opportunities for the preservation and/or expansion of existing open space areas to be used by native species. Opportunities to integrate open space networks include adopting a landscape ordinance that requires new development include over 50% of vegetation be native and or drought tolerant (COS-4J), the eradication of invasive species (COS-4K), constructing wildlife corridor road crossings (COS-4O), and reclamation of mine sites (IM RP-4H). These policies and measures, along with others such as those requiring open space as part of specific plans, allow for development to take place in the county while allowing opportunities for linkages between existing spaces to be created. The General Plan also focuses on promoting the management of natural resources, especially as it relates to wildfires, so as to restore and maintain natural areas in a healthy manner. Additionally, policies and measures also

address water conservation and protection of water resources through project designs and participation in the regional planning efforts.

Staff finds that many existing policies and implementation measures sufficiently address the topics required to be considered by SB 1425. Staff proposes adding an implementation measure to identify and protect connections between habitats, as well as minor amendments to existing policies and IMs for clarity. Additionally, IM LU-2F has been amended to require open space and other measures to preserve and protect biological and cultural resources be considered during review of specific plans and adopt evaluation standards. A redlined version of the existing policies and measures as well as the proposed changes are available in Attachment 7 - Policies and Implementation Measures Related to Rewilding Opportunities.

General Plan Implementation Measure RP-2F requires the maintenance of an Agricultural Advisory Committee (AAC) to review and recommend action concerning compatible relationships between agricultural and nonagricultural uses. The AAC discussed the SB 1425 at the February 5, 2026, AAC meeting and provided no comments regarding the proposed general plan update.

Open Space Inventory Map

The *Conservation & Open Space Element* of the General Plan references Figure COS-1, which was intended to identify various categories of existing natural resource protection (federal, state, and private), managed production of resources, and recreation lands in Calaveras County (page COS 1 of the General Plan). However, there is no Figure COS-1 in the General Plan. The *Calaveras County Open Space Inventory Map 2015*, which showed open space for the preservation of natural resources, the managed production of resources, and for outdoor recreation, was included as Figure 18 of the General Plan Technical Background Report. This map was not adopted as part of the General Plan itself though.

The GIS department has updated the 2015 map to include the most recent information for the three categories mentioned above. They have also added a layer for flood zones. Calaveras County does not have military installations, and the resources mentioned in § 5097.9 and 5097.997 of the Public Resources Code are not publicly available information. The map will be adopted as part of the update; a link will be included in the General Plan and made publicly available on the County website: <https://experience.arcgis.com/experience/d77b36a28bb54a8092f7b1b78d965a8e>.

Tentative Implementation Schedule

Government Code § 65564 requires that every open space plan includes an action program of specific programs which the legislative body intends to pursue in implementing the plan. Staff is proposing the inclusion of an aspirational implementation schedule (Attachment 9), a flexible schedule to help the Board of Supervisors organize and prioritize the implementation of the measures. The Planning Department does not

recommend that the County commit itself to hard deadlines given the impossibility of predicting staffing continuity and funding limitations from year to year.

General Plan Table LU-2 Update

The 2020 zoning code update for compatibility with the General Plan rezoned all Unclassified (U) and Highway Service (HS) zoned parcels in the county to one of the permanent base zones. Additionally, the Open Space (OS) and Historic Center (HC) zones were adopted as part of the 2024 comprehensive zoning code update, which also renamed the many of the residential zones. Table LU-2: Relationship of General Plan Land Use Designations and the Current Zoning Districts (Basic Guidance) (Attachment 10) has been updated to reflect these changes.

ENVIRONMENTAL REVIEW

Planning Department staff reviewed the proposed Open Space Element amendments in accordance with the provisions of the California Environmental Quality Act (CEQA) guidelines and determined they are exempt from CEQA.

An Environmental Impact Report was prepared for the General Plan and certified when the Board adopted the plan in November 2019 (State Clearinghouse #2017012043). The Draft and Final EIR may be viewed or downloaded at: <https://planning.calaverasgov.us/General-Plan#gsc.tab=0>. Copies of the EIR are also available at the Planning Department for review or purchase. Pursuant to § 15168 of the State CEQA Guidelines, a subsequent Environmental Impact Report (EIR) is not required if the subsequent approval is within the scope of the program EIR and if changes to the project are necessary but none of the conditions described in § 15162 calling for preparation of a subsequent EIR have occurred. None of the conditions requiring a subsequent or supplemental CEQA document exist. The proposed amendment is fully within the scope of the General Plan EIR pursuant to § 15168 of the CEQA Guidelines and it was found that the EIR adequately describes this project for purposes of CEQA.

RECOMMENDATION

Staff recommends that the Planning Commission take the following actions:

1. Adopt Resolution 2026-015, recommending that the Board of Supervisors find that the project is fully within the scope of the General Plan EIR and that a subsequent EIR is not required pursuant to § 15168, and
2. Adopt the proposed general plan amendment amending the General Plan in accordance with SB 1425.

ATTACHMENTS

- Attachment 1 – Planning Commission Resolution 2026-015
- Attachment 2 – Senate Bill 1425
- Attachment 3 – Government Code § 65560

- Attachment 4 – Draft Conservation & Open Space Element Introduction Revision
- Attachment 5 – Policies and Implementation Measures Related to Equitable Access
- Attachment 6 – Policies and Implementation Measures Related to Climate Resilience
- Attachment 7 – Policies and Implementation Measures Related to Rewilding Opportunities
- Attachment 8 – Draft GHG Reduction Plan
- Attachment 9 – Sample Implementation Timeline for Open Space
- Attachment 10 – Updated General Plan Table LU-2

Attachment 1

Planning Commission Resolution 2026-015

**COUNTY OF CALAVERAS, STATE OF CALIFORNIA
PLANNING COMMISSION**

>>>RESOLUTION NO. 2026-015

A RESOLUTION RECOMMENDING THE BOARD OF SUPERVISORS APPROVE A NOTICE OF DETERMINATION AND ADOPT AMENDMENTS TO THE GENERAL PLAN IN COMPLIANCE WITH SB 1425

WHEREAS, on November 12, 2019, the Calaveras County Board of Supervisors certified the Environmental Impact Report (SCH# 2017012043) and adopted the Calaveras County General Plan; and

WHEREAS, in September 2022, the Governor of California approved Senate Bill 1425, which requires cities and counties to update their general plans by 2026 to address access to open space for all residents, climate resilience and other co-benefits of open space, and rewilding opportunities; and

WHEREAS, this General Plan Amendment was referred to applicable California Native American tribes as required by County Code § 17.39.060(B) and State law, and they were given an opportunity to consult with the County; and

WHEREAS, this General Plan Amendment does not authorize any new development and serves only to amend the County's General Plan to address and better prioritize the three additional factors required to be addressed in Open Space Plans pursuant to Senate Bill 1425, which added Government Code § 65565 to the State's requirements for general plans; and

WHEREAS, the adoption of this General Plan Amendment is fully within the scope of the programmatic Environmental Impact Report (EIR) prepared for the Calaveras County General Plan within the meaning of the California Environmental Quality Act (CEQA); and

WHEREAS, staff will therefore prepare a Notice of Determination pursuant to the California Environmental Quality Act (CEQA) guidelines, relying on Environmental Impact Report SCH# 2017012043 for the adoption of this Amendment; and

WHEREAS, during the public hearing on October 8, 2026, the Planning Commission considered all of the information presented to it, including its staff report and public testimony presented in writing and at the meeting;

BE IT THEREFORE RESOLVED that the Planning Commission recommends that the Board of Supervisors 1) authorize the filing of a Notice of Determination; and 2) adopt Project 2025-043, amending the General Plan in compliance with Senate Bill 1425, based on the following findings:

1. The project was processed consistently with the requirements of the California Environmental Quality Act (CEQA), California Public Resources Code §21000 et seq.

Based on the whole record, it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment. This project is fully within the scope of programmatic Environmental Impact Report (SCH# 2017012043) within the meaning of CEQA Guideline § 65858, and no supplemental or subsequent environmental document is required. This determination reflects the independent judgment and analysis of the County.

EVIDENCE.

As discussed in the staff report, the open space element update is a newly required State law component of general plans, requiring cities and counties to address access to open space for all residents, climate resilience and other co-benefits of open space, and rewilding opportunities in the County's General Plan. The project proposes minor amendments and additions to the existing policies and implementation measures of the General Plan to comply with State law and to further equitable access to open space; to further climate resilience; and to further the "rewilding" of open spaces by requiring discretionary development projects to consider and, as necessary, mitigate impacts to the connectivity of spaces containing biological and cultural resources. No revisions are proposed that would allow uses or construction that were not originally contemplated in the 2019 general plan update or the EIR prepared and certified for it when the Board adopted the plan in November 2019 (State Clearinghouse #2017012043). The Draft and Final EIR may be viewed or downloaded at: <https://planning.calaverasgov.us/General-Plan#gsc.tab=0>.

Pursuant to §15168 of the State CEQA Guidelines, a subsequent Environmental Impact Report (EIR) is not required if the subsequent approval is within the scope of the program EIR and if changes to the project are necessary but none of the conditions described in §15162 calling for preparation of a subsequent EIR have occurred. These conditions are as follows:

- (a) When an EIR has been certified or a negative declaration adopted for a project, no subsequent EIR shall be prepared for that project unless the lead agency determines, on the basis of substantial evidence in the light of the whole record, one or more of the following:*
 - (1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;*

The amendments to the General Plan will not involve new significant environmental effects or a substantial increase in the severity of the previously identified effects. The amendments enhance existing policies and implementation measures in the General Plan that apply county-wide and will further protect environmental resources. No new uses or construction will be allowed because of the amendments. Instead, the changes will serve to better identify opportunities to identify and mitigate impacts to existing open space resources in a way that furthers equitable human access as well as the improved interconnectivity of biological and

cultural resource corridors. The added policies and measures either have no impact, such as prioritization of where to place recreation facilities that were already considered in the original EIR, or they strengthen environmental protections by requiring further review of and mitigation for potential impacts.

(2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or

No changes in circumstances under which the project was undertaken have occurred. The General Plan was adopted in November of 2019 and development approved since that time has been consistent with the General Plan. No changes to the land use map have been proposed. There have not been substantial changes in the County since the General Plan EIR was adopted that would affect that document's relevance in describing local open space resources and the manner in which new development authorized by the General Plan could affect them. It can therefore be relied on to inform the implementation of SB 1425 through this General Plan Amendment.

(3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the negative declaration was adopted, shows any of the following:

(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

No new significant effects have been identified that were not known or could have been known at the time of certification of the previous EIR. The changes proposed through this Amendment will enhance the usefulness of the General Plan to ensure that the local open spaces identified in the document are better conserved, connected, and accessible to County residents.

(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

The staff report and its attached exhibits demonstrate that the significant effects previously examined will not be more severe now than shown in the previous EIR. The changes proposed through this Amendment will instead enhance the usefulness of the General Plan to ensure that the local open spaces identified in the document are better conserved, connected, and accessible to County residents.

(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible and would substantially reduce one or more significant

effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

There have not been any changes to the feasibility of mitigation measures or alternatives identified by the EIR. The proposed changes enhance mitigation of open space impacts in a manner required by new State law. All mitigation measures identified in the previous EIR will continue to apply after the adoption of the amendments, apart from COS-7H Recreation Master Plan, which has already been completed. The measure has been enhanced to now require the implementation of the adopted Parks and Recreation Master Plan, which will further the goals of SB 1425.

(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.

No mitigation measures considerably different from those analyzed in the previous EIR have been identified that would reduce one or more significant effects on the environment. The proposed changes enhance mitigation of open space impacts in a manner required by new State law.

For the reasons described in the staff report, the adoption of the open space element update to comply with SB 1425 is within the scope of the General Plan EIR, and that program EIR adequately describes this project for purposes of CEQA. The EIR contemplated the impact of development under the general plan on biological and cultural resources and required protection of open space. SB 1425 requires counties to ensure that three specific topics are addressed in the open space component of their general plans, enhancing the protection and maintenance of open space in ways that further climate resilience, equitable access, and rewilding. The open space element update is required and does not prevent the application of any of the General Plan's implementation or mitigation measures within the county.

2. The proposed amendment is consistent with the General Plan and adequately implements SB 1425 (Gov. Code § 65565.5).

EVIDENCE The intent of the General Plan is to guide orderly growth and development, promote equity, strengthen the economy, protect the environment, and promote public health and safety. This is accomplished through the goals, policies, and implementation measures set forth in the plan. The proposed amendments compliment the policies contained within the entirety of the General Plan.

Senate Bill 1425 requires counties to review and update plans and specific programs in its General Plan to ensure that the following three topics are addressed.

- 1) "Access to open space for all residents in a manner that considers social, economic, and racial equity." The proposed amendment describes the extent to which existing General Plan plans and programs address equitable access, and updates were

made to ensure that ongoing open space planning prioritizes access to parks and other open spaces by residents of the County's underserved communities. Updates were also made to enhance Native American tribal participation opportunities in the development and maintenance of open space. These updates enhance and do not conflict with environmental justice policies in the existing General Plan.

- 2) "Climate resilience and other cobenefits of open space." While the terms "climate resilience" and "cobenefits" are not defined for purposes of SB 1425 implementation, the General Plan was reviewed to ensure that it included plans and programs that recognize and discuss the benefits of open space – and protections for open space (including agricultural open space) – on climate resilience. Because this review and update must be correlated with the safety element, the review included consideration of the hazards addressed in that element, the most salient of which is the interaction between open space and wildfire hazards. The existing General Plan contains many programs and plans addressing the climatic need for open spaces that are developed and maintained in a manner that reduces the risk of catastrophic wildfire, which would eliminate the carbon sequestration benefits the County enjoys due to its large areas of native vegetation and sparsely developed agricultural lands.
- 3) "Rewilding opportunities", a term which is not defined for purposes of SB 1425 but for which two examples were given – one being opportunities to further an "integrated network of open space" to support a wide range of beneficial uses, and the other being a "natural communities conservation plan" to provide for coordinated mitigation of new development impacts. Because this review and update must be correlated with the land use element, this element was reviewed in conjunction with the addition and enhancement of specific programs to enhance the connectivity of existing and future open spaces containing biological and cultural resources. Because the General Plan and CEQA already require discretionary development to be informed by biological and cultural resource analyses, amendments were made to require consideration of interconnectivity by the experts who prepare these studies and, as appropriate, mitigation measures that are designed to enhance interconnectivity.

SB 1425 does not require any specific action to be taken or any specific benchmark to be met. No timelines for implementation are required. The new State law only requires that the existing open space components of general plans be analyzed and updated as necessary to ensure that these three aforementioned topics are addressed and correlated as described. The County's analysis and updates to its General Plan through this action adequately comply with and implement SB 1425.

3. This General Plan Amendment is "within the public interest" as contemplated by Government Code § 65358.

EVIDENCE California Senate Bill 1425 was adopted with the purpose of preserving and maintaining open space for all residents throughout the state and in a manner that considers the climatic benefits of doing so and the need to better connect open spaces to support beneficial uses by and for humans, plants, and animals. The State

legislature determined that the public would benefit from adding these requirements. The amendments to the Calaveras County General Plan are in the public interest because they implement SB 1425 by describing goals, policies, and implementation measures that address equitable access to open space, climate resilience and other co-benefits of open space, and rewilding opportunities within the county.

PASSED AND ADOPTED by the Planning Commission of the County of Calaveras, at a regular meeting of the Planning Commission held on October 8, 2026, on a motion by Commissioner _____ and seconded by Commissioner _____.

AYES:

NOES:

ABSTAIN:

ABSENT:

Chair, Planning Commission

ATTEST:

Katherine Stefani, Senior Planner

Attachment 2

Senate Bill 1425



Bill Text: CA SB1425 | 2021-2022 | Regular Session | Chaptered California Senate Bill 1425 (***Prior Session Legislation***)

Bill Title: Open-space element: updates.

Sponsorship: Partisan Bill (Democrat 2)

Status: (*Passed*) 2022-09-30 - Chaptered by Secretary of State. Chapter 997, Statutes of 2022. [SB1425 Detail]

Download: California-2021-SB1425-Chaptered.html

Senate Bill No. 1425

CHAPTER 997

An act to add Section 65565.5 to the Government Code, relating to local government.

[Approved by Governor September 30, 2022. Filed with Secretary of State September 30, 2022.]

LEGISLATIVE COUNSEL'S DIGEST

SB 1425, Stern. Open-space element: updates.

Existing law requires cities and counties to prepare, adopt, and amend general plans and elements of those plans, as specified. Existing law requires the general plan to include a housing element and an open-space element, which is also called an open-space plan. Existing law sets forth various deadlines for updates to the housing element.

This bill would require every city and county to review and update its local open-space plan by January 1, 2026. The bill would require the local open-space plan update to include plans and an action program that address specified issues, including climate resilience and other cobenefits of open space, correlated with the safety element. By imposing additional duties on local officials, the bill would create a state-mandated local program.

The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

The bill would include findings that changes proposed by this bill address a matter of statewide concern rather than a municipal affair and, therefore, apply to all cities, including charter cities.

Digest Key

Vote: majority Appropriation: no Fiscal Committee: yes Local Program: yes

Bill Text

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. Section 65565.5 is added to the Government Code, to read:

65565.5. (a) Every city and county shall review and update its local open-space plan by January 1, 2026. The update shall include plans and an action program, as required by Section 65564, that address all of the following:

- (1) Access to open space for all residents in a manner that considers social, economic, and racial equity, correlated with the environmental justice element or environmental justice policies in the general plan, as applicable.

(2) Climate resilience and other cobenefits of open space, correlated with the safety element.

(3) Rewilding opportunities, correlated with the land use element.

(b) For purposes of this section, “rewilding opportunities” may include, but are not limited to, the following:

(1) Opportunities to preserve, enhance, and expand an integrated network of open space to support beneficial uses, such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics.

(2) Establishing a natural communities conservation plan to provide for coordinated mitigation of the impacts of new development.

SEC. 2. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because a local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act, within the meaning of Section 17556 of the Government Code.

SEC. 3. The Legislature finds and declares that the preservation of open space is a matter of statewide concern and is not a municipal affair as that term is used in Section 5 of Article XI of the California Constitution. Therefore, Section 1 of this act adding Section 65565.5 to the Government Code applies to all cities, including charter cities.

Attachment 3

Government Code § 65560-65570


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GOVERNMENT CODE - GOV

TITLE 7. PLANNING AND LAND USE [65000 - 66499.58] (*Heading of Title 7 amended by Stats. 1974, Ch. 1536.)*

DIVISION 1. PLANNING AND ZONING [65000 - 66342] (*Heading of Division 1 added by Stats. 1974, Ch. 1536.)*

CHAPTER 3. Local Planning [65100 - 65763] (*Chapter 3 repealed and added by Stats. 1965, Ch. 1880.)*

ARTICLE 10.5. Open-Space Lands [65560 - 65570] (*Article 10.5 added by Stats. 1970, Ch. 1590.)*

65560. For purposes of this chapter:

(a) "Amount of land converted to agricultural use" means those lands that were brought into agricultural use or reestablished in agricultural use and were not shown as agricultural land on Important Farmland Series maps maintained by the department in the most recent biennial report.

(b) "Amount of land converted from agricultural use" means those lands that were permanently converted or committed to urban or other nonagricultural uses and were shown as agricultural land on Important Farmland Series maps maintained by the department and in the most recent biennial report.

(c) "Category of agricultural land" means prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance, as defined pursuant to the United States Department of Agriculture's land inventory and monitoring criteria, as modified for California, and grazing land. "Grazing land" means land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock.

(d) "Department" means the Department of Conservation.

(e) "Interim Farmland maps" means those maps prepared by the department for areas that do not have the current soil survey information needed to compile Important Farmland Series maps. The Interim Farmland maps shall indicate areas of irrigated agriculture, dry-farmed agriculture, grazing lands, urban and built-up lands, and any areas committed to urban or other nonagricultural uses.

(f) "Important Farmland Series maps" means those maps compiled by the United States Soil Conservation Service and updated and modified by the department's Farmland Mapping and Monitoring Program pursuant to Section 65570.

(g) "Local open-space plan" means the open-space element of a county or city general plan adopted by the board or council, either as the local open-space plan or as the interim local open-space plan adopted pursuant to Section 65563.

(h) "Open-space land" means any parcel or area of land or water that is devoted to an open-space use as defined in this section, and that is designated on a local, regional, or state open-space plan as any of the following:

(1) Open space for the preservation of natural resources, including, but not limited to, areas required for the preservation of plant and animal life, including habitat for fish and wildlife species; areas required for ecologic and other scientific study purposes; rivers, streams, bays, and estuaries; and coastal beaches, lakeshores, banks of rivers and streams, and watershed lands.

(2) Open space used for the managed production of resources, including, but not limited to, forest lands, rangeland, agricultural lands, and areas of economic importance for the production of food or fiber; areas required for recharge of groundwater basins; bays, estuaries, marshes, rivers, and streams that are important for the management of commercial fisheries; and areas containing major mineral deposits, including those in short supply.

(3) Open space for outdoor recreation, including, but not limited to, areas of outstanding scenic, historic, and cultural value; areas particularly suited for park and recreation purposes, including access to lakeshores, beaches,

and rivers and streams; and areas that serve as links between major recreation and open-space reservations, including utility easements, banks of rivers and streams, trails, and scenic highway corridors.

(4) Open space for public health and safety, including, but not limited to, areas that require special management or regulation because of hazardous or special conditions such as earthquake fault zones, unstable soil areas, flood plains, watersheds, areas presenting high fire risks, areas required for the protection of water quality and water reservoirs, and areas required for the protection and enhancement of air quality.

(5) Open space in support of the mission of military installations that comprises areas adjacent to military installations, military training routes, and underlying restricted airspace that can provide additional buffer zones to military activities and complement the resource values of the military lands.

(6) Open space for the protection of places, features, and objects described in Sections 5097.9 and 5097.997 of the Public Resources Code.

(i) "Priority land" means any part, or all of a category of, agricultural or open space lands, identified by a local government in that local government's agricultural land component of its open-space element or agricultural land element of the general plan, that are prioritized for conservation, taking into consideration the need to balance competing land uses.

(Amended by Stats. 2017, Ch. 434, Sec. 4. (SB 732) Effective January 1, 2018.)

65561. The Legislature finds and declares as follows:

(a) That the preservation of open-space land, as defined in this article, is necessary not only for the maintenance of the economy of the state, but also for the assurance of the continued availability of land for the production of food and fiber, for the enjoyment of scenic beauty, for recreation and for the use of natural resources.

(b) That discouraging premature and unnecessary conversion of open-space land to urban uses is a matter of public interest and will be of benefit to urban dwellers because it will discourage noncontiguous development patterns which unnecessarily increase the costs of community services to community residents.

(c) That the anticipated increase in the population of the state demands that cities, counties, and the state at the earliest possible date make definite plans for the preservation of valuable open-space land and take positive action to carry out such plans by the adoption and strict administration of laws, ordinances, rules and regulations as authorized by this chapter or by other appropriate methods.

(d) That in order to assure that the interests of all its people are met in the orderly growth and development of the state and the preservation and conservation of its resources, it is necessary to provide for the development by the state, regional agencies, counties and cities, including charter cities, of statewide coordinated plans for the conservation and preservation of open-space lands.

(e) That for these reasons this article is necessary for the promotion of the general welfare and for the protection of the public interest in open-space land.

(Added by Stats. 1970, Ch. 1590.)

65562. It is the intent of the Legislature in enacting this article:

(a) To assure that cities and counties recognize that open-space land is a limited and valuable resource which must be conserved wherever possible.

(b) To assure that every city and county will prepare and carry out open-space plans which, along with state and regional open-space plans, will accomplish the objectives of a comprehensive open-space program.

(Added by Stats. 1970, Ch. 1590.)

65562.5. On and after March 1, 2005, if land designated, or proposed to be designated as open space, contains a place, feature, or object described in Sections 5097.9 and 5097.993 of the Public Resources Code, the city or county in which the place, feature, or object is located shall conduct consultations with the California Native American tribe, if any, that has given notice pursuant to Section 65092 for the purpose of determining the level of confidentiality required to protect the specific identity, location, character, or use of the place, feature, or object and for the purpose of developing treatment with appropriate dignity of the place, feature, or object in any corresponding management plan.

(Amended by Stats. 2005, Ch. 670, Sec. 5. Effective October 7, 2005.)

65563. On or before December 31, 1973, every city and county shall prepare, adopt and submit to the Secretary of the Resources Agency a local open-space plan for the comprehensive and long-range preservation and conservation of open-space land within its jurisdiction. Every city and county shall by August 31, 1972, prepare, adopt and submit to the Secretary of the Resources Agency, an interim open-space plan, which shall be in effect until December 31, 1973, containing, but not limited to, the following:

(a) The officially adopted goals and policies which will guide the preparation and implementation of the open-space plan; and

(b) A program for orderly completion and adoption of the open-space plan by December 31, 1973, including a description of the methods by which open-space resources will be inventoried and conservation measures determined.

(Amended by Stats. 1973, Ch. 120.)

65564. Every local open-space plan shall contain an action program consisting of specific programs which the legislative body intends to pursue in implementing its open-space plan.

(Added by Stats. 1970, Ch. 1590.)

65565. (a) A city or county may develop an agricultural land component of the city or county's open-space element or a separate agricultural land element. If a city or county chooses to develop an agricultural land component of the open-space element or an agricultural land element, the agricultural land component of the open-space element or the agricultural land element shall do the following:

(1) Identify and map, utilizing the designations in the Farmland Monitoring and Mapping Program pursuant to Section 65570 or soil surveys conducted by the United States Natural Resources Conservation Service where applicable, agricultural lands within the city's or county's jurisdiction. That portion of the plan shall include all of the following:

(A) All parcels subject to a contract executed pursuant to the Williamson Act (Chapter 7 (commencing with Section 51200) of Part 1 of Division 1 of Title 5).

(B) All parcels subject to a conservation easement.

(C) All agricultural preserves established pursuant to Article 2.5 (commencing with Section 51230) of Chapter 7 of Part 1 of Division 1 of Title 5.

(D) All parcels subject to a farmland security zone contract established pursuant to Article 7 (commencing with Section 51296) of Chapter 7 of Part 1 of Division 1 of Title 5.

(E) All parcels being used for agricultural purposes within a sphere of influence or municipal service boundary and not subject to a permanent easement.

(F) The total acreage of land classified as a category of agricultural land and a breakdown of agricultural land by Farmland Monitoring and Mapping Program classification.

(G) The total acreage of agricultural land that is located within two miles of land zoned for housing, including rural residential uses, business, or industry in the land use element prepared pursuant to subdivision (a) of Section 65302. The city or county shall not identify the individual parcels subject to this subparagraph.

(H) All public agencies with responsibility for preservation of agricultural land within the jurisdiction, including resource conservation districts established pursuant to Division 9 (commencing with Section 9001) of the Public Resources Code.

(I) The total acreage and Farmland Monitoring and Mapping Program classification of former agricultural land that has been developed since 1984. All land that was, at any time, classified as agricultural land shall be included, even if it was subsequently classified as "other" land.

(J) The total acreage of land that qualifies as a category of agricultural land that is likely to be developed in the next eight years.

(K) An identification and designation of priority land for conservation.

(2) Establish a comprehensive set of goals, policies, and objectives based on the information identified pursuant to paragraph (1) to support long-term protection of agricultural land. In developing these goals, policies, and objectives, a city or county may include, but is not limited to, the following:

(A) Evaluating and amending as necessary the action plan developed pursuant to Section 65564.

(B) Avoiding or minimizing, when feasible, new development that is located on priority land.

(C) Locating, when feasible, new essential public facilities no less than one mile from priority land.

(D) Adopting land use and zoning policies to discourage leapfrog development.

(E) Creating procedures for cooperating with other public agencies and agricultural associations to protect priority land.

(F) Developing strategies to promote the development of multicounty and city-county agreements for the protection of priority land.

(G) Identifying the total acreage of agricultural land to be preserved within the jurisdiction.

(H) Prioritizing the development of housing, including affordable housing, and commercial development within existing areas zoned for housing and commercial development, when feasible.

(3) Identify and establish a set of feasible implementation measures designed to carry out and promote the goals, policies, and objectives established pursuant to paragraph (2). Implementation measures may include, but are not limited to, all of the following:

(A) Establishing, or entering into an agreement with a resource conservation district, pursuant to Chapter 3 (commencing with Section 9151) of Division 9 of the Public Resources Code.

(B) Establishing public-private partnerships for the long-term protection and stewardship of agricultural lands.

(C) Establishing streamlined procedures for the development of housing within areas identified as adequate housing sites in the housing element developed pursuant to Section 65583.

(D) Promoting the development of housing and utilizing the reforms and incentives to facilitate and expedite the construction of affordable housing that are identified in Section 65582.1.

(E) Repealing ordinances that limit development in existing or planned urban areas, including, but not limited to, density limitations, permit caps, and height restrictions.

(F) Identifying all urban parcels suitable for infill development.

(b) Subject to available funding, and pursuant to the grant application requirements of Section 10281.5 of the Public Resources Code, the department may award grants to cities or counties to implement the requirements of this section.

(c) (1) At least 45 days before adopting or amending the open-space element, or at least 45 days before adopting or amending an agricultural land element, each county and city shall submit to the department one copy of a draft of the agricultural land component of the open-space plan or amendment, or the agricultural land element or amendment, and any maps used in creating that component or element.

(2) The department may review drafts so submitted to determine whether the drafts incorporate all known agricultural land and reasonable measures for the long-term protection of agricultural land, and report its recommendations to the city or county within 30 days of receipt of the draft of the open-space element or amendment, or the agricultural land element or amendment, pursuant to this subdivision.

(3) The legislative body of the city or county shall consider the department's recommendations before the final adoption of the open-space element or amendment, or the agricultural land element or amendment, unless the department's recommendations are not available within the above-prescribed time limits as described in paragraph (4), or unless the department has indicated to the city or county that the department will not review the agricultural component of the open-space element or amendment or the agricultural land element or amendment.

(4) If the department's recommendations are not available within those prescribed time limits, the legislative body of the city or county may take the department's recommendations into consideration at the time it considers future amendments to the agricultural component of the open-space element or agricultural land element.

(5) All recommendations made by the department shall be advisory to the planning agency and legislative body of the city or county.

(d) This section does not require a city or county with an existing adopted agricultural land component of their open-space element, or an existing separate agricultural land element, that is in place before January 1, 2018, to update that element to require the information specified in this section.

(Added by Stats. 2017, Ch. 434, Sec. 5. (SB 732) Effective January 1, 2018.)

65565.1. (a) The department shall give priority consideration for any grants, bond proceeds, and other local assistance funding provided by the department to a city or county that does all of the following:

(1) Completes the agricultural land component of the open space element or an agricultural land element as described in Section 65565.

(2) Provides the department with any geographical information system (GIS) data corresponding with the information identified in paragraph (1) of subdivision (a) of Section 65565.

(3) Continues to review, and revise if necessary, the agricultural land component of the open-space element or the agricultural land element upon each revision of the housing element to identify new information that was not available during the previous revision of the open-space element or the agricultural land element.

(b) A city or county with an existing agricultural land component of their open-space element or an existing separate agricultural land element that substantially complies with Section 65565 may apply to the department for priority consideration pursuant to subdivision (a) by doing all of the following:

(1) Submitting a copy of the agricultural land component of their open-space element or the separate agricultural land element to the department. The department shall determine whether the component substantially complies with Section 65565.

(2) Submitting any other supporting background documentation that corresponds with the information identified in paragraph (1) of subdivision (a) of Section 65565.

(3) Continuing to review, and revise if necessary, the agricultural land component of the open-space element or the agricultural land element upon each revision of the housing element to identify new information that was not available during the previous revision of the open-space element or the agricultural land element.

(c) The department may promulgate regulations, pursuant to the Administrative Procedure Act (Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2), that are necessary to carry out its duties under this chapter.

(d) The department, in consultation with the Office of Planning and Research and the Department of Housing and Community Development, may develop nonbinding guidance for local governments on agricultural land conservation planning and policy, including model policies.

(Added by Stats. 2017, Ch. 434, Sec. 6. (SB 732) Effective January 1, 2018.)

65565.5. (a) Every city and county shall review and update its local open-space plan by January 1, 2026. The update shall include plans and an action program, as required by Section 65564, that address all of the following:

(1) Access to open space for all residents in a manner that considers social, economic, and racial equity, correlated with the environmental justice element or environmental justice policies in the general plan, as applicable.

(2) Climate resilience and other cobenefits of open space, correlated with the safety element.

(3) Rewilding opportunities, correlated with the land use element.

(b) For purposes of this section, "rewilding opportunities" may include, but are not limited to, the following:

(1) Opportunities to preserve, enhance, and expand an integrated network of open space to support beneficial uses, such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics.

(2) Establishing a natural communities conservation plan to provide for coordinated mitigation of the impacts of new development.

(Added by Stats. 2022, Ch. 997, Sec. 1. (SB 1425) Effective January 1, 2023.)

65566. Any action by a county or city by which open-space land or any interest therein is acquired or disposed of or its use restricted or regulated, whether or not pursuant to this part, must be consistent with the local open-space plan.

(Added by Stats. 1970, Ch. 1590.)

65567. No building permit may be issued, no subdivision map approved, and no open-space zoning ordinance adopted, unless the proposed construction, subdivision or ordinance is consistent with the local open-space plan.

(Added by Stats. 1970, Ch. 1590.)

65568. If any provision of this article or the application thereof to any person is held invalid, the remainder of the article and the application of such provision to other persons shall not be affected thereby.

(Added by Stats. 1970, Ch. 1590.)

65570. (a) The department may establish, after notice and hearing, rules and regulations, and require reports from local officials and may employ, borrow, or contract for such staff or other forms of assistance as are reasonably necessary to carry out this section, Chapter 3 (commencing with Section 16140) of Part 1 of Division 4 of Title 2, and Section 612 of the Public Resources Code. In carrying out the department's duties under those sections, it is the intention of the Legislature that the department shall consult with the Director of Food and Agriculture and the Director of State Planning and Research.

(b) Commencing July 1, 1986, and continuing biennially thereafter, the department shall collect or acquire information on the amount of land converted to or from agricultural use, and between agricultural categories, using 1984 baseline information as updated pursuant to this section for every county for which Important Farmland Series maps exist. Commencing on December 31, 2018, and continuing biennially thereafter, the department shall report to the Legislature on the data collected pursuant to this section. In reporting, the department shall specify, by category of agricultural land, the amount of land converted to, or from, agricultural use, by county and on a statewide basis. The department shall also report on the nonagricultural uses to which these agricultural lands were converted or committed.

(c) Commencing on December 31, 2018, and continuing biennially thereafter, the department shall update and send counties copies of current Important Farmland Series maps. Counties may review the maps and notify the department within 90 days of any changes in agricultural land pursuant to subdivision (b) that occurred during the previous fiscal year, and note and request correction of any discrepancies or errors in the classification of agricultural lands on the maps. The department shall make those corrections requested by counties. The department shall provide staff assistance, as available, to collect or acquire information on the amount of land converted to, or from, agricultural use for those counties for which Important Farmland Series maps exist.

(d) The department may also acquire any supplemental information which becomes available from new soil surveys and establish comparable baseline data for counties not included in the 1984 baseline, and shall report on the data pursuant to this section. The department may prepare Interim Farmland maps to supplement the Important Farmland Series maps.

(e) The Legislature finds that the purpose of the Important Farmland Series maps and the Interim Farmland maps is not to consider the economic viability of agricultural lands or their current designation in the general plan. The purpose of the maps is limited to the preparation of an inventory of agricultural lands, as defined in this chapter, as well as land already committed to future urban or other nonagricultural purposes.

(Amended by Stats. 2017, Ch. 434, Sec. 7. (SB 732) Effective January 1, 2018.)

Attachment 4

Draft Conservation & Open Space Element Introduction Revision

Conservation & Open Space Element – Introduction

Proposed changes are in red and underlined.

The Conservation and Open Space Element provides policy direction for the conservation, development, and use of natural resources and the preservation and utilization of lands and waters devoted to or managed for open space uses. Open space land, as addressed in the California Government Code, includes land that is essentially unimproved and devoted to an open space use as set forth below, and designated in this Conservation and Open Space Element as any of the following:

- Open space for the preservation of natural resources such as wildlife habitat, land for scientific study, and rivers, streams and other aquatic resources
- Open space for the managed production of resources, including forests, rangeland, and agricultural lands important for economic production of food and fiber, mineral deposits, and groundwater recharge basins
- Open space for outdoor recreation such as parks, trails, lakeshores and beaches, and scenic highway corridors
- Open space for the protection of public health and safety, including floodplains, fault zones, and areas presenting high fire risks
- Open space for the protection of archaeological and cultural resources.

Figure COS-1 The Open Space Application Map
(<https://experience.arcgis.com/experience/d77b36a28bb54a8092f7b1b78d965a8e>)

identifies various categories of existing natural resource protection (federal, state and private), managed production of resources, and recreation lands in Calaveras County. Resource production lands include Williamson Act-contracted lands and land in the Timber Production Zone. Public lands include Stanislaus National Forest lands in the higher elevations, Bureau of Land Management administered lands and other federal lands scattered throughout the county including land around New Hogan and New Melones Reservoirs, Calaveras Big Trees State Park, and lands owned by water districts, including land around Camanche and Pardee Reservoirs owned by the East Bay Municipal Utility District. Recreation lands include public parks in various communities and private recreation areas such as caves and snowplay areas. Several tracts of land also have conservation easements for various purposes, including lands near Salt Springs Reservoir and near Glencoe.

[...]

Other general plan elements addressing conservation and open space-related issues are:

- Public Facilities and Services Element: Land accommodating floodwater and for groundwater recharge; Areas required for groundwater basin recharge; Water supply
- Resource Production Element: Land and water reclamation; Location, quantity and quality of the rock, sand, and gravel resources; Areas containing mineral deposits, including those in short supply; Land used for the managed production of resources, including forest lands, rangeland, agricultural lands and areas of economic importance for the production of food or fiber
- Safety Element: Open areas for public health and safety; soil conservation (e.g., protecting soil productivity through erosion prevention, control, and correction); Land accommodating floodwater for stormwater management

- Land Use Element: Open space lands classified as Resource Management (public and quasi-public land), and lands classified as Resource Production (agriculture and timberland) as shown on the Land Use Map; Goals, policies and implementation programs intending to maintain open space, conserve and promote effective use of natural resources, and preserve the rural character of the county through encouraging clustering, infill, and designing new development to conserve natural, scenic, and cultural resources
- Community Plan Element: Resource protection, resource production, and recreation.

Calaveras County does not currently have commercial fisheries and, therefore, this is not addressed in the General Plan.

Senate Bill (SB) 1425 (Stern, 2022) requires all cities and counties to review and update their General Plan Open Space Element to address the following topics:

- Equitable access to open space for all residents (correlated with the Environmental Justice Element, as applicable);
- Climate resilience and other co-benefits of open space (correlated with the Safety Element); and
- Rewilding opportunities (correlated with the Land Use Element).
 - o “Rewilding Opportunities” may include, but are not limited to, the following:
 - Opportunities to preserve, enhance, and expand an integrated network of open space to support beneficial uses such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics; and
 - Establishing a natural communities conservation plan to provide for coordinated mitigation of the impact of new development.

Planning Department staff conducted a comprehensive review of the County General Plan to identify gaps and opportunities to support compliance with SB 1425. Based on this review, staff determined that the requirements of SB 1425 are already largely satisfied through existing General Plan policies and related implementation measures. A list of relevant policies and implementation measures can be found attached to the staff report for Planning Project 2025-043 General Plan Amendment.

Equitable Access to Open Space

SB 1425 requires that the Open Space Element address access to open space for all residents in a manner that considers social, economic, and racial equity, correlated with the environmental justice element or environmental justice policies in the General Plan, as applicable. Senate Bill 1000, incorporated in the Government Code in §56302(h), required the County to include an environmental justice element or integrate environmental justice policies in another element in its general plan if it had a disadvantaged community. There are no disadvantaged communities as defined by SB 1000 in Calaveras County (CalEPA DAC Map); therefore, the General Plan does not include an environmental justice element. However, the topic is considered in the Public Facilities & Services Element, and the County identified six (6) “disadvantaged legacy communities” pursuant to California Government Code § 65302.10(b) – Mokelumne Hill, Mountain Ranch, Rail Road Flat, San Andreas, Vallecito, and West Point. To be

designated as a disadvantaged legacy community, a residential area must meet the following criteria:

- Includes 10 or more inhabited dwelling units adjacent to or in close proximity to each other
- Have a median income of 80% or less of the statewide median household income
- Are geographically separated from other communities
- Have existed for at least 50 years

These communities were analyzed considering water, wastewater, stormwater drainage, and structural fire protection needs or deficiencies.

While there are many policies and implementation measures (IM) related to the creation and maintenance of open space, staff has proposed amendments to prioritize open space access for underserved communities. In this context, underserved communities are those that face barriers to accessing open space due to constraints such as geographical distance or transportation challenges. The Calaveras County Parks and Recreation Master Plan (PRMP) (2025), a long-range document that creates a road map to address the recreational needs of the community, provides an inventory of County-owned parks as well as non-County-owned parks, facilities, and school sites which are available for public use after school hours that were counted as part of the County's park system. Staff can identify underserved communities to be prioritized using the locations of these facilities in addition to the other recreation facilities within the county including, but not limited to, Calaveras Big Trees State Park, Lake Camanche, and New Hogan Lake, as well as County's knowledge of social, economic, and/or racial demographic information and disadvantaged legacy communities.

Staff reviewed the General Plan and found several policies and implementation measures across different elements related to open space and recreational facilities. A particularly relevant section is Goal COS-6 of the Conservation & Open Space (COS) Element, which envisions a high-quality system of recreational facilities in the County, and its subsequent policies. Minor modifications are proposed to Policies LU 1.3, C 3.2, COS 6.1, and COS 6.3 and IM COS-7I to include language that prioritizes access to and involvement with open space for underserved communities. IM COS-7H *Recreation Master Plan*, regarding the adoption of a recreation master plan, is proposed to be amended to implement the Park and Recreation Master Plan adopted March 2025 in a way that better addresses access to open space. Additionally, three new policies are proposed to be added to the Conservation & Open Space Element. These policies propose to explore partnerships with other agencies that would help connect underserved communities with open spaces, support educational and voluntary stewardship programs that connect people with open spaces and encourage civic engagement with these spaces, and to maintain the Calaveras County Parks and Recreation website to promote access to and events in open spaces.

Staff finds that the existing policies and implementation measures in place, in conjunction with the minor modifications proposed and an implementation measure to identify underserved communities, sufficiently address the topics required to be considered by SB 1425 and substantially conform to its requirements. A redlined version of the existing policies and measures as well as the proposed changes are available in Attachment 5 – Policies and Implementation Measures Related to Equitable Access.

Climate Resilience

As with the equitable access requirement, the Conservation & Open Space (COS) Element is predominantly relevant to SB 1425's requirements for climate resilience. SB 1425 requires open spaces elements to address climate resilience and provides the opportunity for the management of open space to provide nature-based solutions to climate issues. General Plan Implementation Measure (IM) COS-5C *GHG Reduction Plan* requires the development of a greenhouse gas reduction plan outlining the strategies, goals, and actions for contributing to the overall reduction in greenhouse gas (GHG) emissions consistent with AB 32 and SB 32 be developed. Reducing greenhouse gases that contribute to climate change, and sequestering carbon by preserving existing vegetation and trees are significant ways of enhancing climate resilience in a rural county with large areas of intact native vegetation communities. A draft Greenhouse Gas Reduction Plan (GHGRP) has been completed and, and County staff will endeavor to bring it before the Board of Supervisors for adoption in 2027. The plan includes measures and actions to address GHG reduction in several areas, including agriculture and carbon sequestration. The agriculture section includes the promotion of sustainable agricultural and land management practices, and the carbon sequestration section aims to sequester carbon throughout the County via the conservation and preservation of natural and working lands.

Additionally, the General Plan includes several other policies and IMs that address the topics that are required to be considered under SB 1425. The COS and Safety Elements contain several policies and measures related to the management of the County's natural resources, particularly in relation to wildfire mitigation, and the Local Hazard Mitigation Plan. Furthermore, IMs RP-1D and RP-1F of the Resource Production Element require the County to establish methodology and guidelines to evaluate and mitigate impacts from the conversion of Resource Production land. IM RP-1B also requires discretionary development applications involving or adjoining Resource Production (RP) lands (the prime designation for agricultural and natural resources) to be evaluated to determine whether there will be any negative impacts, such as significant loss through conversion, to RP lands.

Staff finds that the existing policies and implementation measures in place, in conjunction with the prioritization of the GHGRP, sufficiently address and plan for climate resilience within the meaning of SB 1425. However, the General Plan contains policies and implementation measures meant to reduce the effects of severe weather conditions and resulting impacts such as wildfires and reduced water supplies by promoting retention and maintenance of natural habitats, thus addressing climate resilience. The relevant policies and implementation measures, as well as the draft Greenhouse Gas Reduction Plan, can be viewed in full in Attachment 6 – Policies and Implementation Measures Related to Climate Resilience and Attachment 8 – Draft Calaveras County Greenhouse Gas Reduction Plan, respectively.

Rewilding Opportunities

SB 1425 also requires counties to update their general plans to include rewilding opportunities, a term which is undefined but may include opportunities to preserve, enhance, and expand an integrated network of open space to support beneficial uses, such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics. Large areas of the County are still undeveloped and designated for agricultural and natural resource purposes; however, there are several

areas of the County that have been more densely developed. The General Plan includes many measures to maintain existing open space and incorporate the preservation of natural habitats in future development, as well as opportunities to integrate a network of restored open space.

Several policies and measures that align with the requirements of SB 1425 were adopted as part of the 2019 General Plan update. They include adopting guidelines establishing mitigation measures to mitigate impacts to sensitive biological resources (IM COS-4B), development of a countywide habitat conservation plan for amphibians (IM COS-4C), and identifying and protecting corridors important to wildlife movement and dispersal (Policy COS 4.3). These policies and measures allow opportunities for the preservation and/or expansion of existing open space areas to be used by native species. Opportunities to integrate open space networks include adopting a landscape ordinance that requires new development include over 50% of vegetation be native and or drought tolerant (COS-4J), the eradication of invasive species (COS-4K), constructing wildlife corridor road crossings (COS-4O), and reclamation of mine sites (IM RP-4H). These policies and measures, along with others such as those requiring open space as part of specific plans, allow for development to take place in the county while allowing opportunities for linkages between existing spaces to be created. The General Plan also focuses on promoting the management of natural resources, especially as it relates to wildfires, so as to restore and maintain natural areas in a healthy manner. Additionally, policies and measures also address water conservation and protection of water resources through project designs and participation in the regional planning efforts.

Staff finds that many existing policies and implementation measures sufficiently address the topics required to be considered by SB 1425. Staff proposes adding an implementation measure to identify and protect connections between habitats, as well as minor amendments to existing policies and IMs for clarity. Additionally, IM LU-2F has been amended to require open space and other measures to preserve and protect biological and cultural resources be considered during review of specific plans and adopt evaluation standards. A redlined version of the existing policies and measures as well as the proposed changes are available in Attachment 7 - Policies and Implementation Measures Related to Rewilding Opportunities.

Attachment 5

Policies and Implementation Measures Related to Equitable Access

EQUITABLE ACCESS TO OPEN SPACE

Proposed changes are in red and underlined.

SB 1425 Requirement: Access to open space for all residents in a manner that considers social, economic, and racial equity, correlated with the environmental justice element or environmental justice policies in the General Plan, as applicable.

Environmental justice is contemplated in the Public Facilities & Services Element in relation to disadvantaged communities. The County has no disadvantaged communities as described by SB 1000 and CalEPA but there are disadvantaged legacy communities in the County. Staff has chosen to use the language “underserved communities” which refers to communities that have limited access to open space due to factors such as geographical distance and transportation challenges. Below are existing goals, policies, and implementation measures in the General Plan applicable to equitable access to open space. Proposed changes are shown via track changes.

- LU 1.3** Encourage development of infill parcels and redevelopment of underused properties. As appropriate, identify vacant and underutilized land and existing green spaces in the county that can be revitalized into publicly accessible open spaces, particularly in underserved communities. (IM LU-2B and LU-2C)
- LU 5.3** Recognize the county's unique recreational, scenic, cultural, historic and agricultural resources as strong economic generators and encourage their retention and expansion.
- C 3.2** Encourage the expansion of public transit services to nearby urban areas and open spaces in order to reduce automotive dependency, access intercity and open space transportation services, and improve mobility for County residents, prioritizing underserved communities that lack these facilities. (IM C-3A, C-3B)
- COS-6** A high-quality system of recreational facilities enhancing the quality of life and health of residents and visitors and contributing to the County’s economy.
- COS 6.1** Work with the Calaveras County Parks & Recreation Committee, community organizations and special districts to develop park and active recreation facilities, striving to provide a minimum of 3 acres of local park land for every 1,000 County residents, prioritizing underserved communities that lack these facilities. (IM COS-7A, COS-7B, COS-7C and COS-7G)
- COS 6.2** Establish recreational facility development standards for new development.
- COS 6.3** Pursue partnerships with public and private entities that make the most of limited funding, share maintenance costs, provide important linkages between recreational facilities and generally expand the quality and quantity of recreational opportunities countywide, prioritizing investments and development in underserved communities. (IM COS-7D)
- COS 6.4** Facilitate the provision of and access to local and regional trail systems.

COS 6.7 Calaveras County will explore opportunities to connect residents of underserved communities to local parks and open spaces through partnerships with local and regional park districts such as the Calaveras County Parks & Recreation Committee, local school districts, and others, including exploring development of a bus scholarship or parks transportation program.

COS 6.8 Support educational and voluntary stewardship programs that:

- Promote recognition of the importance of open space to Calaveras County.
- Create opportunities for programming that encourages civic engagement, inclusion and ownership within the community, and active lifestyles.
- Connect people, especially those in underserved communities, with opportunities to access open spaces.

COS 6.9 Maintain and update the Calaveras County Parks and Recreation website to promote opportunities for events in and involvement with open space and link people to resources such as transportation options.

COS-1A Open Space Zoning Ordinance Review the County Code and revise as necessary, or adopt a new open space zoning ordinance pursuant to Government Code §65910 et seq., as a means to identify lands which have been dedicated to open space purposes for managing unique, important, or significant natural and cultural resources

COS-7A Recreational Facilities Revise Calaveras Code Chapter 16.24 to reflect a minimum standard of 3 acres of park and recreational facilities per 1000 residents. If a higher level of parkland to residents ratio exists, a higher standard, not to exceed 5 acres per 1000 residents, will be considered, as provided in Section 66477 of the Government Code.

COS-7C Develop a Program to Identify and Provide Access to Public Waterways Develop a program to identify public waterways, lakes and reservoirs that do not already provide reasonable public access, but which are required to provide such access pursuant to state statutes.

COS-7D Coordinated Recreation and Parks Planning Pursue partnerships and develop mutually beneficial recreation planning efforts with schools, utility agencies, community groups, Angels Camp, state and federal agencies, private, non-profit agencies, agritourism activities on private land, and others to promote shared use, expand the variety and quantity of available facilities, and to distribute costs and manpower to acquire, construct, and maintain facilities. Link or incorporate recreational facilities from other entities with County facilities whenever feasible.

COS-7E Local and Regional Trail Systems Support and participate in efforts to prepare a consolidated, comprehensive master plan for biking, walking, riding, hiking/no-motorized and motorized transportation identifying existing and proposed facilities to assist in integrating future development into regional trail networks, tie train systems to

commercial centers and tourist destinations, identify locations for new trailheads and trail access points, connect trail heads with public transportation systems, and related planning activities.

COS-7G Recreation Facility Inventory Maintain an inventory of existing recreational facilities.

COS-7H Recreation Master Plan Implement the Parks and Recreation Master Plan dated March 14, 2025, adopted on April 8, 2025, as well as any updated and future versions.

COS-7I Parks and Recreation Funding Pursue funding and support efforts to provide funding for local community parks, recreation facilities, and trail facilities using available funding sources, prioritizing underserved communities.

COS-7J Identify Underserved Communities for Equitable Access to Open Space The County shall endeavor to identify underserved communities by reviewing available information including, but not limited to, the Parks and Recreation Master Plan, socioeconomic and racial demographics, and the location of open space recreational facilities by December 31, 2027. This information will be re-evaluated as the County implements measures to provide access to open spaces in various communities.

CPC 3.1 Support development of a high-quality system of recreational facilities enhancing the quality of life and health of residents and visitors and contributing to the community's economy. (COS-7D, COS-7I)

CPG 2.1 Develop walking paths throughout the town center which maintain the rural, atmosphere. Develop hiking, bicycling and equestrian trails for low intensity recreational use with property owner consent.

CPG 2.2 Encourage creation of a local park to serve the Glencoe area.

CPG 2.3 Support trail planning and development including use of historic roads, ditches and canals, and routes to the South Fork and Main Stem of the Mokelumne River and the North Fork of the Calaveras River.

CPMH 3.1 Pursue opportunities to expand the existing offering of park and recreational facilities.

CPMR 1.6 The existing park shall remain at least as big as it is at the current time and the public buildings in the park area should remain for public use.

CPRF 1.2 Support the establishment or re-establishment of a public park in or near the community.

CPRF 2.1 Develop walking paths throughout the town center which maintain the rural, atmosphere. Develop hiking, bicycling and equestrian trails for low intensity recreational use with property owner consent.

CPSA 4.1 Work with the San Andreas Recreation and Park District to provide sufficient park and recreation facilities to meet the needs of the community by pursuing funding opportunities, including state and federal grants, development fees, and other funding sources.

CPVS 4.1 Support development of additional parks, trails, and recreational facilities for children, youth, vulnerable populations, and adults to safely and efficiently engage in both organized and spontaneous activities. (COS-7A, COS-7B and COS-7I)

CPWV 1.5 Support development of and access to regional open space, park and recreation facilities, including Schaads Reservoir and Camp Lodestar, to encourage tourism and social capital.

Attachment 6

Policies and Implementation Measures Related to Climate Resilience

CLIMATE RESILIENCE

Proposed changes are in red and underlined.

SB 1425 Requirement: Climate resilience and other co-benefits of open space, correlated with the safety element.

Below are existing goals, policies, and implementation measures in the General Plan applicable to climate resilience. Minor changes are proposed and shown via track changes.

- LU 1.7** Future specific plans shall include 10% of the total project area as open space, buffers and other measures to preserve and protect biological and cultural resources, enhance public access to recreational assets and include a diverse range of housing types including multi-family housing where appropriate.
- H 1.4** Promote the use of cluster housing, density transfers, or planned development concepts that preserve open space.
- COS-1** Healthy forests, woodlands, and rangelands free from unnatural accumulation of trees and brush, close to their historic, natural (pre-fire-suppression) condition, thereby decreasing the risk of catastrophic wildfires and increasing water supply and quality, wildlife habitat and forage, air quality, scenic resources, and recreational opportunities.
 - COS 1.1** Support the use of prescribed burning, mechanical removal, or other means to remove brush, small trees, and dead and dying trees in the county's forests. (IM COS-2B, COS 2C, COS-2D, COS-2E and COS-2F)
 - COS 1.2** Support the management of oak woodlands, chaparral, and other brushlands to minimize fire hazards and promote healthy habitat and productive grazing land through use of prescribed burning, mechanical removal, and other means. (IM COS-2A, COS-2B, COS-2D and COS-2E)
 - COS 1.3** Encourage initiatives to utilize vegetation removed from forests, oak woodlands, and brush lands for energy production and greenhouse gas reduction. (IM COS-2E)
 - COS 2.1** Participate in regional, watershed-level and integrated resources management planning efforts to improve watershed health and water quality. (IM COS-2A, COS-2D and COS-3D)
 - COS 3.3** Require new development to identify and mitigate impacts to wildlife habitat and wetlands, riparian habitats and other aquatic resources consistent with state and federal regulations. (IM COS-4C COS-4D, COS-4H, COS-4I, COS-4K, COS-4L, COS-4N and COS-4O)
 - COS 3.6** Conservation easements may be acceptable means to mitigate impacts to protect wildlife habitat, wetland areas, and oak woodlands from new

development. (IM COS-4D, COS- 4F, COS-4H, COS-4I, COS-4K, COS-4L, COS-4N and COS-4O)

COS 3.7 Support efforts to eradicate invasive species and encourage practices that reduce their spread. (IM COS-4G, COS-4J and COS-4K)

COS 3.9 Preserve and enhance healthy woodlands consistent with state law, reasonable development and fire safety considerations. (IM COS-4D)

COS 4.5 Encourage retention of existing mature trees in landscaping for new development, consistent with fire protection needs, to facilitate carbon sequestration. (IM LU-4A, LU- 4C and COS-5M)

COS 4.7 Encourage energy conserving construction techniques and the use of alternative energy sources. (IM COS-5E and COS-5M)

COS 4.8 Encourage the use and installation of alternative energy generating systems, including solar, wind, bio fuel, and other systems, in new development and in retrofitting existing structures. (IM COS-2E, COS-5E and COS-5M)

COS-1A Open Space Zoning Ordinance Review the County Code and revise as necessary, or adopt a new open space zoning ordinance pursuant to Government Code §65910 et seq., as a means to identify lands which have been dedicated to open space purposes for managing unique, important, or significant natural and cultural resources.

COS-2A Watershed Management Work with water agencies that use water generated in Calaveras County to share costs of watershed management, including vegetation removal, to increase water flows.

COS-2B Prescribed Burning Encourage the USFS, BLM, Calfire, the Department of Fish and Wildlife, and other interested agencies to support the increased use of prescribed burns on public and private lands.

COS-2C Air Quality Regulations re Prescribed Burning Support modification of air quality regulations to accommodate the increased use of prescribed burning and other disposal methods on public and private lands.

COS-2D Watershed Improvement Program Support and participate in efforts such as the Sierra Nevada Watershed Improvement Program that strive to establish and maintain healthy forests.

COS-2E Green Waste Review the zoning ordinance and Air Pollution Control District regulations and amend as necessary to facilitate the development of green waste to energy projects and other projects that convert green waste to products.

COS-3C Stream and Wetland Setback Guidelines* For new development, adopt building and/or grading setback standards for intermittent and perennial streams (as identified on USGS topographic maps and verified by field survey) and wetlands. The standards may contain a provision for reduction of the setback based on a qualified biologist's recommendation. In the interim, require new development to identify wetlands

and riparian habitat areas. Where feasible, the developer shall designate a buffer around each area sufficient to protect them from degradation, encroachment, or loss or shall develop a mitigation compensation plan consistent with state and federal policies.

**Stream and wetland setbacks were adopted as part of the comprehensive zoning code update adopted in July 2024.*

COS-4D Oak Woodlands Develop local mitigation measures pursuant to PRC §21083.4(b)(4) in addition to the mitigation measures provided in Public Resources Code Section 21083.4(b)(1-3) to facilitate the environmental review process relative to mitigating significant direct and cumulative impacts to oak woodlands in conjunction with discretionary project approval and address pre-development removal of oaks.

In the interim, require development that is subject to a discretionary entitlement and subject to CEQA review to enlist the services of a qualified professional (meaning a qualified biologist, botanist, arborist, or Registered Professional Forester) to survey the property in question for oak woodlands and to recommend options for avoidance and/or mitigation consistent with the provisions of RPC 21083.4 if potentially significant impacts to oak woodlands are identified. If a potentially significant impact to oak woodlands is identified, the following shall apply:

- The oak woodland on the project site shall be mapped and the extent of woodland canopy proposed to be removed as a result of the proposed project shall be identified.
- If avoidance is utilized for all or part of the mitigation, the oak woodland to be avoided by the project shall be protected by identifying the dripline of the oak woodland canopy to be preserved on all construction plans and by implementation of best management practices or other measures recommended by the qualified professional to prevent damage to the woodland to be preserved.
- Mitigation consistent with the provisions of PRC 21083.4, other than avoidance, shall be applied at a ratio of 1:1 to 2:1. The ratio and the type(s) of mitigation chosen shall be informed by the recommendations of the qualified professional with respect to providing similar habitat functions and values as the woodland habitat removed as part of the project.
- If mitigation consisting of replacement planting, transplanting and/or identification of off-site mitigation through acquisition of a conservation easement is utilized, it shall be applied based on the recommendations of the qualified professional that the replacement habitat will provide similar habitat functions and values as the woodland habitat removed as a part of the project. Mitigation shall take place in Calaveras County.

COS-4K Invasive Species Control For development that is subject to a discretionary entitlement and subject to environmental review under the CEQA on properties proposed for development or redevelopment that have been identified by a qualified botanist to support those invasive plant species that are identified on the California Invasive Plant

Council inventory as having a ranking of “high” invasiveness (or in the case of the plant, stinkwort, which has a “moderate” ranking), removal efforts shall be undertaken to the extent feasible. The best means to remove the invasive species (for example, hand-removal or the use of herbicides) would be determined on a property by property basis by the contracted botanist/qualified biologist/restoration ecologist.

COS-5A Regional Air Quality Planning Efforts Provide representation from Calaveras County at regional planning events that address the issues and opportunities available for effective air quality management [e.g., preparing a regional Air Quality Plan or State Implementation Plan (SIP)] and implement those components applicable to Calaveras County as prescribed by state and federal regulations, as feasible, and continue to comply with the rules set forth by the CCAPCD and CARB.

COS-5B GHG Baseline for Calaveras County* Undertake a greenhouse gas (GHG) emissions inventory to establish baseline levels of GHGs generated from all major emission sources in the County, including those in the City of Angels Camp, consistent with the requirements of Assembly Bill 32 (California Global Warming Solutions Act of 2006) and SB 32. Endeavor to complete the inventory by December 31, 2020.

**A greenhouse gas inventory was completed in 2018.*

COS-5C GHG Reduction Plan* Develop a GHG reduction plan outlining the strategies, goals, and actions for contributing to the overall reduction in greenhouse gas (GHG) emissions consistent with AB 32 and SB 32 by the end of 2022. The GHG Reduction Plan shall incorporate measures from the *Model Policies for Greenhouse Gases in General Plans* document produced by the California Air Pollution Control Officers Association (2009), as applicable. The GHG reduction plan shall:

- Establish a forecast of what the GHG emissions would be for all of Calaveras County in 2030 if only the current GHG measures continued in force;
- Calculate what reduction from the forecast would be needed to comply with AB 32 and SB 32’s statewide performance standard of 40% below 1990 emission levels;
- Add whatever additional GHG measures are necessary to accomplish reductions of GHG emissions as of 2030 from all sectors within the county to no more than that amount;
- Cooperate with the City of Angels Camp, other public agencies, the business community, the agriculture community, community groups, and other stakeholders in reaching this goal

**A draft plan has been completed and, with Board approval, will be prioritized for adoption in 2027. A copy is attached to the staff report (Attachment 8).*

COS-5L Woody Biomass Investigate the potential use of woody biomass generated through forest management, such as thinning and defensible space clearing.

COS-6A Flexible Development Standards Review and amend, as applicable, the County Code to incorporate flexible development standards that encourage the retention of scenic resources, landmarks and the natural landscape.

RP-1B Findings for Approval Before granting approval of a discretionary development application involving or adjoining land designated Resource Production a determination shall be made by the approving authority that the proposed use:

- A. Will not intensify significantly existing conflicts or add new conflicts between uses on Resource Production lands and adjoining residential or incompatible uses; and
- B. Will not create an island effect wherein Resource Production lands are located between the proposed project site and incompatible land uses; and
- C. Will not significantly reduce or destroy the buffering effect of existing large parcel sizes adjoining Resource Production lands; and
- D. Will not hinder timber production, harvesting practices, mineral production, mining practices, agricultural production and practices, access to water and public roads or otherwise conflict with the continuation of resource production operations or activities.

S1.9* The County adopts, by reference, the 2015 Local Hazard Mitigation Plan, or any update thereto, as a part of this General Plan.

**The 2021 LHMP acknowledges climate change as a significant hazard and discusses mitigation activities and resources to reduce risk from the hazards.*

S 3.8 Protect natural resources from the effects of wildland fire consistent with fire protection planning documents adopted by Calaveras County and CalFire and when developing wildfire prevention, protection and recovery plans. (IM S-3L and S-3M)

S 3.9 Require property owners to maintain wildlands in a fire resistant manner consistent with Section 4291 of the Public Resources Code in conjunction with new development and including ongoing maintenance after project construction. Assist fire protection agencies in their efforts to enforce PRC 4291. (IM S-3E, S-3G, S-3I, S-3O, S-3Q and S-3S)

S-1A Local Hazard Mitigation Plan Include Planning Department and/or Public Works representation in the LHMP planning process to ensure that LHMP safety criteria applicable to the design of new development are fashioned in a manner that facilitates incorporation into County codes and conditions of project approval.

S-3K Burn Area Recovery Plans Support the efforts of CalFire, the Calaveras County Fire Department, local fire agencies, firesafe councils, other fire protection organizations and property owners to develop burn area recovery plans that include rapid post fire assessment and implementation actions that encourage salvage of burned trees and

reforestation activities, create resilient and maintainable landscapes and restore functioning ecosystems.

S-3L Consider Effects of Wildfire Protection Plans for New Development on Wildlife and Cultural Resources Evaluate the effects on wildlife habitat, special status species and cultural resources when developing wildfire prevention, protection and recovery plans in connection with new development. Incorporate measures to mitigate potentially significant impacts into adopted plans. Use plant species native to the area when designing revegetation plans.

Cooperate with CalFire, the Calaveras County Fire Department, local fire agencies, and California Department of Fish and Wildlife to identify acceptable levels of wildland fuel reduction in areas conserved for biological resources to mitigate impacts of development.

S-3M Protect Natural Resource Values Recognize natural resource values when updating the Calaveras County Community Wildfire Protection Plan, the Tuolumne/Calaveras Unit Cal, Fire Strategic Fire Plan and other adopted fire prevention, protection and response.

S-3S Fuel Management New Development In conjunction with the approval of new subdivisions, require preparation and implementation of a fire fuel management plan including provisions for ongoing fuel maintenance throughout the life of the project. The plans should be reviewed and approved by the local fire district or CalFire, as applicable. The plan should include provisions for completing fuel reduction activities within common areas and any perimeter fuel reductions prior to filing a final map (or providing adequate assurances to complete the work). The plan should address the necessity for recording fire fuel management easements on parcels to ensure sufficient area is provided between housing units to permit adequate defensible space. Developers should be encouraged to have projects become recognized as Firewise Communities.

PF 2.1 Require new development and expansions of existing developments to demonstrate that sufficient, sustainable water supply and wastewater capacity exist to support the proposal including during times of severe drought. (IM PF-2B, PF-2C and PF-2E)

PF 2.2 Facilitate water conservation and recycling efforts, including the use of reclaimed water and stormwater retention, for irrigation, mining, and compatible agricultural, public, commercial, and industrial applications. (IM PF-2H)

CPC 3.4 Support the retention of existing mature trees where practicable in landscaping for new development, consistent with fire protection needs, to facilitate carbon sequestration. (LU-4C)

CPVS 4.2 Encourage the creation and expansion of greenway and park spaces for recreational and trail use utilizing the Cosgrove Creek and Spring Valley Creek riparian corridors, wetlands, and flood areas. (COS-7E and COS-7F)

CPVS 5.3 Encourage preservation, where practicable, of a number of healthy, well-scattered oak trees, of varying stages of maturity, in development design to maintain a natural rural character. (LU-4C and COS-4D)

Attachment 7

Policies and Implementation Measures Related to Rewilding Opportunities

REWILDING OPPORTUNITIES

Proposed changes are in red and underlined.

SB 1425 Requirement: Rewilding opportunities, correlated with the land use element. Opportunities may include those to preserve, enhance, and expand an integrated network of open space to support beneficial uses, such as habitat, recreation, natural resources, historic and tribal resources, water management, and aesthetics, and establishing a natural communities conservation plan to provide for coordinated mitigation of the impacts of new development.

Large areas of the County are still undeveloped and designated for agricultural and natural resource purposes; however, there are several areas of the County that have been more densely developed. Below are existing goals, policies, and implementation measures in the General Plan applicable opportunities for rewilding in these areas as well as incorporating the preservation of natural habitats into future development. There are also policies and measures for maintaining the resources that currently exist. Minor changes for clarity are proposed, as well as the addition of a measure to identify and protect habitat connectivity.

LU 5.3 Recognize the county's unique recreational, scenic, cultural, historic and agricultural resources as strong economic generators and encourage their retention and expansion. (IM LU-5D)

LU-2F Future Specific Plans Specific plans shall be evaluated for their contribution to their adjacent communities; open space, buffers, habitat continuity, and other measures to preserve and protect and connect biological and cultural resources; economic sustainability; tourism development, walkability; reduction in need for vehicle trips; and other components that enhance the existing community as well as the proposed development. Adopt evaluation standards for specific plans.

CPSR 1.7 Ensure that development is consistent with the natural beauty of this low-density area and protects important wildlife habitats.

CPVS 1.2 Encourage open space or buffers where practicable between subdivisions and external streets to protect open views to surrounding foothills and provide space for off-street trails, habitat conservation, and stormwater management.

HABITAT

LU 2.1 Respect and protect the property rights of people in their efforts to maintain or develop productive resources. Encourage voluntary conservation efforts, both public and private.

COS 3.1 To protect sensitive biological resources, new development shall use site planning techniques, including buffers and setbacks, and encourage other techniques such as clustering of development. (IM COS-4B)

- COS 3.3** Require new development to identify and mitigate impacts to wildlife habitat and wetlands, riparian habitats and other aquatic resources consistent with state and federal regulations. (IM COS-4C COS-4D, COS-4H, COS-4I, COS-4K, COS-4L, COS-4N and COS-4O)
- COS 3.4** Identify and protect corridors important to wildlife movement and dispersal. (IM COS-4C and COS-4E)
- COS 3.5** Encourage preservation of oak woodlands in accordance with state law. (IM COS-4D)
- COS 3.6** Conservation easements may be acceptable means to mitigate impacts to protect wildlife habitat, wetland areas, and oak woodlands from new development. (IM COS-4D, COS-4F, COS-4H, COS-4I, COS-4K, COS-4L, COS-4N and COS-4O)
- COS 3.7** Support efforts to eradicate invasive species and encourage practices that reduce their spread. (IM COS-4G, COS-4J and COS-4K)
- COS 3.8** Where practicable, improve the ability of listed species and any native wildlife to safely cross highways and roadways to reduce human injuries and fatalities resulting from vehicle-animal collisions. (IM COS-4O)

COS-4B Mitigation Options for Biological Resources Adopt written guidelines establishing mitigation measures acceptable to Calaveras County for mitigating impacts to sensitive biological resources. Applicants may apply these mitigation options or hire a qualified professional biologist to identify alternative mitigation.

COS-4C Habitat Conservation Plan for Amphibians Subject to available funding and in cooperation with the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife, pursue a countywide habitat conservation plan to allow incidental take of California tiger salamander and California red-legged frog habitat. Consider expanding the plan to include special status species occupying similar habitats. Consider coordinating the effort with neighboring counties to assist in sharing the costs of preparing the plan and to expand mitigation opportunities.

COS-4D Oak Woodlands Develop local mitigation measures pursuant to PRC §21083.4(b)(4) in addition to the mitigation measures provided in Public Resources Code Section 21083.4(b)(1-3) to facilitate the environmental review process relative to mitigating significant direct and cumulative impacts to oak woodlands in conjunction with discretionary project approval and address pre-development removal of oaks.

In the interim, require development that is subject to a discretionary entitlement and subject to CEQA review to enlist the services of a qualified professional (meaning a qualified biologist, botanist, arborist, or Registered Professional Forester) to survey the property in question for oak woodlands and to recommend options for avoidance and/or

mitigation consistent with the provisions of RPC 21083.4 if potentially significant impacts to oak woodlands are identified. If a potentially significant impact to oak woodlands is identified, the following shall apply:

- The oak woodland on the project site shall be mapped and the extent of woodland canopy proposed to be removed as a result of the proposed project shall be identified.
- If avoidance is utilized for all or part of the mitigation, the oak woodland to be avoided by the project shall be protected by identifying the dripline of the oak woodland canopy to be preserved on all construction plans and by implementation of best management practices or other measures recommended by the qualified professional to prevent damage to the woodland to be preserved.
- Mitigation consistent with the provisions of PRC 21083.4, other than avoidance, shall be applied at a ratio of 1:1 to 2:1. The ratio and the type(s) of mitigation chosen shall be informed by the recommendations of the qualified professional with respect to providing similar habitat functions and values as the woodland habitat removed as part of the project.
- If mitigation consisting of replacement planting, transplanting and/or identification of off-site mitigation through acquisition of a conservation easement is utilized, it shall be applied based on the recommendations of the qualified professional that the replacement habitat will provide similar habitat functions and values as the woodland habitat removed as a part of the project. Mitigation shall take place in Calaveras County.

COS-4E Wildlife Corridors Consider California Department of Fish and Wildlife data for the purpose of establishing guidelines for protecting important wildlife movement corridors to be applied in conjunction with environmental reviews for discretionary projects. [The California Department of Fish and Wildlife's Northern Sierra Nevada Foothills Wildlife Connectivity Project \(https://wildlife.ca.gov/data/analysis/connectivity\) provides information to help identify important wildlife movement corridors to consider in conjunction with discretionary applications.](https://wildlife.ca.gov/data/analysis/connectivity)

COS-4F Voluntary Biological Resource Conservation Activities Support efforts where appropriate to identify and acquire high value biological resource areas from willing sellers on private lands for the purpose of mitigating impacts to biological resources.

COS-4G Invasive Species Cooperate with state and Federal agencies and programs and other organizations to control the spread of invasive species. Work to secure funding where available to support these efforts.

COS-4H Impacts to Biological Resources For development that is subject to a discretionary entitlement and subject to environmental review under the CEQA, require project applicants to enlist the services of a qualified biologist and to minimize, avoid

and/or mitigate significant impacts to the following special-status species or as otherwise required by State or Federal law:

- Threatened and endangered plant and animal species listed by the Federal Endangered Species Act (FESA).
- Rare, threatened and endangered plant and animal species listed by the California Endangered Species Act (CESA).
- Other special-status species including, but not limited to:
 - o Federal candidate species for listing under the FESA;
 - o State candidate species for listing under the CESA;
 - o California Fully Protected Species (protected pursuant to Fish and Game Code);
 - o California Species of Special Concern (protected pursuant to CEQA Guideline §15382);
 - o Plant species listed by the California Native Plant Society as Ranks 1A, 1B, 2A and 2B (protected pursuant to CEQA Guideline §15382)
 - o Nesting birds (protected pursuant to California Fish and Game Codes §§3503, 3503.5, 3511, and 3513 which prohibit the “take, possession, or destruction of birds, their nests or eggs.”);
 - o Birds of prey. All raptors (that is, hawks, eagles, owls) their nests, eggs, and young are protected under California Fish and Game Code (§3503.5);
 - o Birds protected pursuant to the federal Migratory Bird Treaty Act;
 - o Bald eagles and golden eagles as protected pursuant to the federal Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) and California Fish and Game Code (Section 3503.5).

Mitigation for impacts to special status species and/or their habitats may be accomplished by purchasing species compensation credits from an agency-approved conservation bank with CDFW and/or USFWS approval. For mitigation that includes avoidance on project sites or offsite mitigation preserves established to compensate for a project's effects on CESA/FESA listed species, a qualified biologist shall be required to develop a long-term maintenance and management plan, and a Property Analysis Record (PAR) or PAR-Like Endowment Spreadsheet Analyses for any onsite species avoidance area. Offsite mitigation shall take place in Calaveras County to the extent feasible if habitat is available.

COS-4I Biological Impact Evaluation Development that is subject to a discretionary entitlement and subject to CEQA review shall be required to evaluate potential impacts to sensitive communities using the methodologies identified below and shall require mitigation for potentially significant and significant impacts.

- Enlist the services of a qualified biologist or botanist to survey the property in question for sensitive plant communities including riparian woodland and lone chaparral;
- If any sensitive plant community is identified on the proposed property, the qualified biologist or botanist shall map the dripline (canopy) and/or extent of the rare plant community using global positioning system (GPS) technology;

- The dripline/canopy and/or sensitive plant communities that are to be preserved shall be shown on all site development plans, grading plans, and/or engineering drawings so that all contractors are aware that this community is sensitive and as such, impacts must be minimized by project plans to the extent feasible. Riparian drip line impacts require additional scrutiny and may require additional permitting from the CDFW pursuant to Section 1602 of the Fish and Game Code.
- Mitigation for project impacts on the sensitive habitat may include onsite planting mitigation compensation, or offsite mitigation through preservation via recordation of a conservation easement that facilitates the perpetual protection of similar habitat types as those that are impacted, consistent with COS-3.6, as necessary to reduce impacts to a less-than-significant level. Offsite mitigation shall take place in Calaveras County if habitat is available.

COS-4J Landscaping Ordinance Adopt an ordinance that requires new developments to submit landscape plans that are comprised of more than 50% native California and/or drought tolerant plant species and prohibits landscaping with invasive plant species.

COS-4K Invasive Species Control For development that is subject to a discretionary entitlement and subject to environmental review under the CEQA on properties proposed for development or redevelopment that have been identified by a qualified botanist to support those invasive plant species that are identified on the California Invasive Plant Council inventory as having a ranking of “high” invasiveness (or in the case of the plant, stinkwort, which has a “moderate” ranking), removal efforts shall be undertaken to the extent feasible. The best means to remove the invasive species (for example, hand-removal or the use of herbicides) would be determined on a property by property basis by the contracted botanist/qualified biologist/restoration ecologist.

COS-4M Upland Habitat For development subject to a discretionary entitlement and environmental review under CEQA, work with applicants to preserve or enhance upland habitat for wildlife species to the extent feasible on parcels containing suitable habitat (e.g. areas used for foraging, breeding, dispersal, etc.). Habitat preservation and enhancement shall be encouraged throughout the County in a way that promotes regional connectivity of open space habitats. The County shall work with applicants to design development to be compatible with wildlife movement. Mitigation measures may include installing wildlife friendly fencing or lighting to minimize interference with wildlife movement. If open spaces are to be preserved within developed areas, they shall have connectivity to/with other dedicated or undevelopable open space lands to the extent feasible.

COS-4N Riparian Corridors Adopt an ordinance or resolution conserving riparian corridors. In the interim, for development that is subject to a discretionary entitlement and environmental review under CEQA, buffer areas shall be established along rivers, streams, and intervening lakes and ponds, based on the recommendation of a qualified biologist to avoid any barrier to wildlife movement along the water corridor. The County shall adopt the feasible recommendations of the biologist.

COS-4O Wildlife Corridor Road Crossings Provide information to the public regarding significant wildlife corridors. In areas of the County where a significant wildlife corridor has been identified (e.g., a deer migration corridor, a federally or state listed amphibian migration route), the County and applicants for discretionary projects proposing improvements in these areas, shall prepare and submit any improvement plans that must be approved by the County. Those plans must show properly sized and constructed wildlife passage culverts or other under or over crossing plans that will provide safe passageways over or under constructed, improved or modified roadways. In significant wildlife corridors areas, when feasible, fencing will be used to direct animals to these under crossings or other roadway crossings. Safety signage may also be utilized to alert drivers to specific areas used by mule deer and other large wildlife for roadway crossings.

COS-4Q Habitat Connectivity For development subject to a discretionary entitlement and environmental review under CEQA, all required biological surveys conducted by a qualified biologist shall include a component discussing potential impacts of the project on habitat connectivity and recommending mitigation measures, when feasible, to protect, restore, or improve ecological pathways that allow wildlife and plant species to move freely across the project site. **CPVS 1.3** Encourage conservation subdivision design concepts or other techniques to preserve open space in new residential development. (LU-2E)

RECREATION

COS 6.1 Work with the Calaveras County Parks & Recreation Committee, community organizations and special districts to develop park and active recreation facilities, striving to provide a minimum of 3 acres of local park land for every 1,000 County residents. (IM COS-7A, COS-7B, COS-7C and COS-7G)

COS 6.2 Establish recreational facility development standards for new development. (IM COS-7A)

COS 6.3 Pursue partnerships with public and private entities that make the most of limited funding, share maintenance costs, provide important linkages between recreational facilities and generally expand the quality and quantity of recreational opportunities countywide, prioritizing investments and development in underserved communities. (IM COS-7D)

COS 6.4 Facilitate the provision of and access to local and regional trail systems.

COS 6.5 Design recreational facilities to minimize ongoing maintenance costs and reduce potential environmental impacts. (IM COS-7H)

COS-7F Corridor Plans Participate in comprehensive and regional highway, roadway, creek, river and other corridor planning efforts in cooperation with neighboring jurisdictions to identify opportunities for creating new, and integrating existing,

recreational facilities and achieving other General Plan goals and policies (e.g. facilitating economic development, conserving scenic vistas, preserving water quality).

CPVS 4.2 Encourage the creation and expansion of greenway and park spaces for recreational and trail use utilizing the Cosgrove Creek and Spring Valley Creek riparian corridors, wetlands, and flood areas. (COS-7E and COS-7F)

NATURAL RESOURCES

COS-1 Healthy forests, woodlands, and rangelands free from unnatural accumulation of trees and brush, close to their historic, natural (pre-fire-suppression) condition, thereby decreasing the risk of catastrophic wildfires and increasing water supply and quality, wildlife habitat and forage, air quality, scenic resources, and recreational opportunities.

COS 1.1 Support the use of prescribed burning, mechanical removal, or other means to remove brush, small trees, and dead and dying trees in the county's forests. (IM COS-2B, COS 2C, COS-2D, COS-2E and COS-2F)

COS 1.2 Support the management of oak woodlands, chaparral, and other brushlands to minimize fire hazards and promote healthy habitat and productive grazing land through use of prescribed burning, mechanical removal, and other means. (IM COS-2A, COS-2B, COS-2D and COS-2E)

COS 1.3 Encourage initiatives to utilize vegetation removed from forests, oak woodlands, and brush lands for energy production and greenhouse gas reduction. (IM COS-2E)

COS 3.9 Preserve and enhance healthy woodlands consistent with state law, reasonable development and fire safety considerations. (IM COS-4D)

COS-2B Prescribed Burning Encourage the USFS, BLM, Calfire, the Department of Fish and Wildlife, and other interested agencies to support the increased use of prescribed burns on public and private lands.

COS-5L Woody Biomass Investigate the potential use of woody biomass generated through forest management, such as thinning and defensible space clearing.

S-3K Burn Area Recovery Plans Support the efforts of CalFire, the Calaveras County Fire Department, local fire agencies, firesafe councils, other fire protection organizations and property owners to develop burn area recovery plans that include rapid post fire assessment and implementation actions that encourage salvage of burned trees and reforestation activities, create resilient and maintainable landscapes and restore functioning ecosystems.

H 1.4 Promote the use of cluster housing, density transfers, or planned development concepts that preserve open space.

RP 1.1 Limit the intrusion and encroachment of incompatible uses that may affect Resource Production Lands. (IM RP-1A, RP-1B, RP-1C, RP-1D and RP-1E)

- RP 1.2** Require newly created or lot line adjusted parcels adjoining Resource Production Lands be of adequate size and compatibly zoned to minimize potential conflict between the uses or potential uses on Resource Production Lands. (IM RP-1A, RP-1B, RP-1D and RP-1E)
- RP 1.3** Buffer Resource Production Lands through setbacks or other measures to prevent noncompatible uses from impacting resource production uses. (IM RP-1A, RP-1B, RP-1D and RP-1E)
- RP 1.6** Public facilities that are not compatible with, or constrain the use of, the current and future productivity of Resource Production Lands shall not be located on or adjacent to Resource Production lands unless no other suitable site is available to meet the public service needs. (IM RP-1C)
- RP 2.1** Continue participation in the California Land Conservation Act of 1965 (Williamson Act/agricultural preserve program), and other agriculture-related long term conservation programs. (IM RP-2C)
- RP 2.3** Support educational and voluntary stewardship programs that:
- promote recognition of agriculture’s importance to Calaveras County,
 - encourage implementation of best management practices,
 - enhance the economic viability of the County’s agricultural industry,
 - provide for multiple or alternative beneficial uses of agricultural lands. (IM RP-2D)
- RP 2.5** Promote a compatible relationship between agricultural and non-agricultural activities. (IM RP-1B and RP-1C,)
- RP 2.6** Identify and protect important farmland in the county. (IM RP-2G, RP-1D and RP-1E)
- RP 3.1** Continue supporting landowner participation in the CalFire Forest Legacy Program, USDA Forest Legacy Program, the California Forest Improvement Program, and other long term forest conservation programs. (IM RP-3A)
- RP 3.2** Continue to maintain a Timber Production Zone district as required by the California Timberland Productivity Act of 1982 to identify and protect valuable timberland resources. (IM RP-3A)
- RP 3.3** Recognize and encourage the well-managed use of timber resources for multiple beneficial purposes. (IM RP-1A)
- RP 3.4** Support educational and voluntary stewardship programs that:
- promote recognition of timber’s importance to Calaveras County,
 - encourage implementation of best management practices,
 - enhance the economic viability of the County’s timber industry,

- provide for multiple or alternative beneficial uses of timber lands. (IM RP-2D)

RP-1B Findings for Approval Before granting approval of a discretionary development application involving or adjoining land designated Resource Production a determination shall be made by the approving authority that the proposed use:

- Will not intensify significantly existing conflicts or add new conflicts between uses on Resource Production lands and adjoining residential or incompatible uses; and
- Will not create an island effect wherein Resource Production lands are located between the proposed project site and incompatible land uses; and
- Will not significantly reduce or destroy the buffering effect of existing large parcel sizes adjoining Resource Production lands; and
- Will not hinder timber production, harvesting practices, mineral production, mining practices, agricultural production and practices, access to water and public roads or otherwise conflict with the continuation of resource production operations or activities.

RP-1C Public Facilities on Resource Production Lands Before authorizing or approving construction of a public facility on or adjoining land designated Resource Production a determination shall be made by the approving authority that:

- Resource Production lands are conserved and protected, while meeting the need for adequate public facilities; and
- Other potential sites outside of Resource Production lands were considered by the agency or permitting authority and whether such sites were considered acceptable or not feasible as a public facility; and
- The effect of the proposed public facility upon adjoining Resource Production lands was considered, as was whether the proposed site would be incompatible with resource production operations on adjoining Resource Production lands.

RP-1D Evaluation of Impacts for Resource Production Land Conversions Establish a consistent methodology for evaluating the impacts of agricultural land conversions to non-agricultural uses pursuant to the California Environmental Quality Act (CEQA) for use in conjunction with evaluating impacts to resource production lands. In the interim, the County will utilize the ~~Calaveras County Agricultural Coalition Resource Production Lands Mitigation Program Guidelines, prepared November 8, 2011~~ Resource Production Land Conversion Guidelines, revised by the Planning Commission on November 19, 2015 (Appendix A).*

*The General Plan incorrectly titled Appendix A, and this amendment simply corrects the title. No changes to the content of Appendix A or adoption of other guidelines are proposed.

RP-1E Farmland Mapping Obtain official mapping data for Calaveras County from the California Department of Conservation Farmland Mapping and Monitoring Program, if and

when available. To the extent that the mapping data shows Prime Farmland, Unique Farmland, Farmland of Statewide Importance, or Farmland of Local Importance exists, require mitigation for any conversion of such land to non-agricultural purposes.

RP-2C Williamson Act Implementation Update the County Code relative to Agricultural Preserves for consistency with County needs and state Williamson Act requirements and include provisions for open space and recreational use contracts.

RP-2D Agricultural Best Management Practices, Education and Stewardship Undertake the following activities:

- Cooperate with the Calaveras County Resource Conservation District to facilitate the identification, acquisition, and promotion of programs and funding in support of these programs.
- Continue to maintain and update the Calaveras County Department of Agriculture's website content identifying the nature and extent of invasive species threats; consider including links to Integrated Pest Management programs and other technical and educational support through the Agricultural Commissioner's Office, USDA Natural Resources Conservation Service, University of California Cooperative Extension and associated organizations.

RP-2G Farmland Mapping Work with the California Department of Conservation to complete the Farmland Mapping and Monitoring Program for Calaveras County.

RP-4H Reclamation Continue to require a reclamation plan and financial assurances, consistent with state law including SMARA and adopted rules and regulations for the implementation of SMARA (California Code of Regulations California Code of Regulations, Title 14, Division 2, Chapter 8, Subchapter 1, and as may be amended), and other applicable state and federal standards, for all mining operations that are not otherwise expressly exempted by state law. In addition to State-mandated requirements, reclamation plans shall:

- When creating or restoring plant or wildlife habitats, aesthetically blend the reclaimed site into the surrounding area or provide an acceptable alternative so far as is reasonably practical.
- Provide for the utilization of existing facilities and/or infrastructure for compatible uses other than those associated with mining or mineral extraction upon the cessation of the mining operation.

CPVS 5.2 Encourage public awareness of certain features of the unique natural resources identified as California physical, cultural and historic features within the Valley Springs Community Area boundaries. (COS-6A)

CPVS 5.3 Encourage preservation, where practicable, of a number of healthy, well-scattered oak trees, of varying stages of maturity, in development design to maintain a natural rural character. (LU-4C and COS-4D)

HISTORIC AND TRIBAL RESOURCES

LU-3C Cooperation with Special Districts and Agencies Cooperate with special districts and agencies, including Native American tribes, to assess the availability and capacity of public facilities and services for future development and the need to improve those facilities and services to levels necessary to serve proposed new development. New development shall be required to build or pay the proportional amount to construct the necessary facilities.

COS 7.2 Develop and maintain strong working relationships and effective intergovernmental review procedures with local Native American tribes and representatives to identify, evaluate, and, where necessary, preserve unique Native American archaeological and significant Native American historical resources, including significant tribal cultural resources. (COS-8A, COS-8D, COS-8E and COS-8F)

COS-8A Identify Native American Resource Sensitivity Areas Update the County's Archaeological Sensitivity Map in cooperation with local Native American archaeology and history representatives. The County shall consult the updated Archaeological Sensitivity Map, in addition to other existing cultural resources information (e.g. pre- 1950 USGS topographic quadrangle maps, official townsite maps, Sanborn Insurance Maps, GIS database, and other appropriate resources) in conjunction with the environmental review process for all discretionary approvals to identify sensitive areas and resources. If such cultural resources information indicates that sensitive areas and/or resources are likely to occur within the subject area, site-specific cultural resources surveys and/or treatment plans shall be required, at the applicant's expense.

COS-8F Treatment of Archaeological Resources Adopt, apply and incorporate in the Calaveras County Code standards for the treatment of archaeological resources.

CPC 3.2 Support the restoration, enhancement, and preservation of prehistoric, archaeological, cultural, historical, and paleontological resources. (LU-4D)

WATER MANAGEMENT

PF 2.2 Facilitate water conservation and recycling efforts, including the use of reclaimed water and stormwater retention, for irrigation, mining, and compatible agricultural, public, commercial, and industrial applications. (IM PF-2H)

PF 2.3 Support efforts to allow agriculture use of raw surface water and/or recycled water consistent with state and federal water quality laws protecting public health and safety. (IM PF-2I)

PF 2.4 Design new development to encourage groundwater recharge in appropriate locations. (IM PF-2J)

PF 2.5 Protect ground and surface water quality. (IM PF-2F)

PF-2H Facilitate Water Conservation Amend the County Code to recognize appropriate uses for reclaimed water as an alternative for various land uses and keep apprised of the latest developments in the use of reclaimed water. Revise the County's landscaping standards and incorporate those 14 Non-LAFCo regulated providers include: Blue Lake Springs MWC, Snowshoe Springs Association, Fly-In Acres MWC, Lili Valley Water Company, Mineral Mountains Estates MWA, Utica Power Authority standards as conditions of project approval to facilitate the use of gray water and reclaimed water systems for landscape irrigation.

PF-2I Recycled Water for Agricultural The County will work with wastewater service providers to expand the use of recycled wastewater for agricultural uses.

PF-2J Protect Groundwater Recharge Areas Adopt standards for the protection of groundwater recharge areas including, but not limited to, limiting the extent of impervious surfaces in project design. The standards shall be sufficient to ensure that new development does not substantially interfere with groundwater recharge in the County. Integrate existing information available from water providers to identify natural groundwater recharge areas associated with the Northeastern San Joaquin Groundwater Basin within the County

PF-2F Integrated Regional Water Management Planning Efforts Participate in and keep apprised of Integrated Regional Water Management planning efforts and identified mutually beneficial solutions for regional water management.

CPC 3.5 Require the inclusion of design features in new development to capture stormwater and recharge groundwater where practicable. (PF-2J)

AESTHETICS

COS-5 Abundant scenic resources that preserve rural character, quality of life, and tourism based economic development, while protecting property rights.

COS 5.1 Encourage the conservation of natural and historic landscapes and important landmarks as scenic resources important to the County's rural character, scenic beauty and the tourism component of the economy. (IM COS-6A and COS-6B)

COS 5.2 Maintain scenic resources along designated scenic highways in the County. (IM COS-6A and COS-6B)

COS 5.3 Encourage the inclusion of design features in new development that enhance and complement the scenic qualities of the natural resources of the site and the surrounding area in the design of the project. (IM COS-6A and COS-6B)

COS-6A Flexible Development Standards Review and amend, as applicable, the County Code to incorporate flexible development standards that encourage the retention of scenic resources, landmarks and the natural landscape.

COS-6C Scenic Highway Protection Utilize the Ebbetts Pass National Scenic Byway 2013 Corridor Management Plan as guidance for review of development projects along the State Scenic Highway and National Scenic Byway.

CPC 3.3 Work with new development to identify and protect scenic resources that preserve rural character, quality of life, and tourism-based economic development, while protecting property rights. (COS-6B)

CPVS 5.1 Encourage limiting development on steep hillsides and hilltops to protect natural resources and scenic views that frame the area. (COS-6B)

CALAVERAS COUNTY

GREENHOUSE GAS REDUCTION PLAN 2023

PUBLIC DRAFT

prepared by:



partner orgs:



RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com



CALAVERAS COUNCIL
of GOVERNMENTS

Credits & Acknowledgement

Calaveras County

Gabriel Elliott, Director of Planning

Calaveras Council of Governments

Erin Kelly, Transportation Planner

Melissa Raggio, Executive Director

Sierra Business Council, Report Authors

Meredith Anderson, Climate & Energy Project Manager

Sherry Hao, Climate & Energy Program Director

Sam Ruderman, Climate & Energy Project Manager

Rincon Consultants, Inc.

Emily Saul, Sustainability Planner

Kelsey Bennett, Environmental & Sustainability Planning Director

Erik Feldman, Principal

Harris & Associates

Darin Neufeld, Environmental Planning & Compliance Director

Sharon Toland, Project Manager

Kelly Bray, Principal Sustainability Planner

Completed with support from the Calaveras Council of Governments and Sierra Nevada Energy Watch. The authors would like to thank staff at Calaveras County, the Calaveras Council of Governments, and special districts for providing much of the insight and local information necessary for the completion of this report.

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Abbreviations

AB	Assembly Bill
AG	Agriculture
ABAU	Adjusted Business-as-Usual
BAU	Business-as-Usual
CA LTAP	California Local Technical Assistance Program
CARB	California Air Resources Board
CCAPCD	Calaveras County Air Pollution Control District
CCI	California Climate Investments
CCOG	Calaveras Council of Governments
CDFA	California Department of Food and Agriculture
CEQA	California Environmental Quality Act
CO ₂	Carbon dioxide
CS	Carbon sequestration
CSZEVRP	Central Sierra Zero Emission Vehicle Readiness Plan
CPPA	Calaveras Public Power Agency
DC	Direct current
DER	Distributed energy resources
EB	Existing building
EO	Education and outreach
EPA	Environmental Protection Agency
EV	Electric vehicle
EVCS	Electric vehicle charging station
FHWA	Federal Highway Administration
GHG	Greenhouse gas

GHGRP	Greenhouse Gas Reduction Plan
HVAC	Heating, ventilation, and air conditioning
MTCO ₂ e	Metric tons of carbon dioxide equivalent
NC	New construction
OPR	Governor's Office of Planning
PEV	Plug-in electric vehicle
PRC	Public Resources Code
RCRC	Rural County Representatives of California
RE	Renewable energy
RPS	Renewables Portfolio Standard
SB	Senate Bill
SBC	Sierra Business Council
SORE	Small off-road engines
SW	Solid waste
TR	Transportation
UCCE	University of California Cooperative Extension
WW	Waste water
ZEV	Zero emission vehicle

INTRODUCTION

CHAPTER 1



Chapter 1. Introduction

Greenhouse Gas Reduction Plan Overview

Calaveras County (County) is committed to taking meaningful action to reduce greenhouse gas (GHG) emissions and build community resilience. The purpose of this Greenhouse Gas Reduction Plan (GHGRP) is to provide a roadmap for the County to achieve its greenhouse gas reduction goals and outline the steps to promote sustainable development and enhance community resilience. The County's GHGRP will focus on reducing GHG emissions in all sectors of the community, including energy, transportation, solid waste, water and wastewater, and agriculture. These GHG emissions were detailed in the Calaveras County Community-Wide and Government Operations 2018 Greenhouse Gas Emissions Inventories report, which was completed in 2021 and can be found in **Appendix B**. The inventory also included an analysis of wildfire as an emissions source, however, the wildfire sector was not included in the GHGRP measures, as these emissions are beyond the control of the County.

The County recognizes that addressing GHG reductions is a complex challenge that requires a collaborative, integrated, and comprehensive approach. This GHGRP is the result of a coordinated effort between County staff, elected officials, and a community engagement process, and also builds off of the County's 2019 General Plan. The County views this plan as a starting point and recognizes that fast-evolving technology and data require that the GHGRP be considered a living document subject to ongoing updates and adjustments. These ongoing updates will reflect the best information available and provide the most constructive means for achieving County and state goals.

Climate Status in California and the Sierra Nevada

California Senate Bill (SB) 32¹ defines climate change impacts under the following language: “Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, winter sports, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.”

The California Air Resources Board's (CARB) 2017 and 2022 Climate Change Scoping Plans^{2,3} provide details on the specific threats of climate change, particularly relevant for rural, forested regions like the

¹ [California Assembly Bill 32, 2006.](#)

² [California's 2017 Climate Change Scoping Plan, California Air Resources Board, 2017.](#)

³ [California's 2022 Climate Change Scoping Plan, California Air Resources Board 2022.](#)

County. The 2022 plan includes more information on specific local actions. The CARB scoping plans state: “In California, as in the rest of the world, climate change is contributing to an escalation of serious problems, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.”

The drought that plagued California for years devastated the state’s agricultural and rural communities, leaving some of them with no drinking water. In 2015 alone, the drought cost agriculture in the Central Valley an estimated \$2.7 billion, and more than 20,000 jobs.

Changes include: A recorded increase in annual average temperatures, as well as increases in daily minimum and maximum temperatures. An increase in the occurrence of extreme events, including heat waves. A decrease in winter chill hours, necessary for the production of high-value fruit and nut crops.

In recent years, California has experienced the deadliest wildfires in its history.

Extensive tree mortality is already prevalent in California. The western pine beetle and other bark beetles have killed a majority of the ponderosa pine in the foothills of the central and southern Sierra Nevada.

California will experience a reduction in spring runoff volumes, as a result of declining snowpack.

While more intense dry periods are anticipated under warmer conditions, extremes on the wet end of the spectrum are also expected to increase due to more frequent warm, wet atmospheric river events and a higher proportion of precipitation falling as rain instead of snow.

In recent years, atmospheric rivers have also been recognized as the cause of the large majority of major floods.

Climate change is making events, like those listed above, more frequent, more catastrophic and more costly. Climate change impacts all Californians, and the impacts are often disproportionately borne by the state’s most vulnerable and disadvantaged populations.

These are the many challenges associated with climate change that face the County, along with other communities in the Sierra Nevada. A healthy ecosystem provides cultural, social, and economic benefits that local communities rely on for agriculture, tourism, recreation, fishing, and other industries that are important to the County and its economic vitality.^{4,5}

⁴ Core Writing Team, Pachauri, R.K., Meyer, L.A., (2014). Climate Change 2014: Synthesis Report. Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

⁵ Dettinger, M., Alpert, H., Battles, J., Kusel, J., Safford, H., Fougères, D., Knight, C., Miller, L., Sawyer, S. (2018). Sierra Nevada Region Report. California’s Fourth Climate Change Assessment.

Legislative Context

Since 2005, the State of California has responded to growing concerns over the effects of climate change by addressing emissions in the public and private sectors through legislative action. California mandates and guidance on measuring and reducing GHG emissions include:

- establishing renewable portfolio standards (SB 1078, 2002)⁶
- executive order on California global warming impacts and targets (EO S-3-05, 2005)⁷,
- the California Global Warming Solutions Act (Assembly Bill (AB) 32, 2006)⁸ and its successor bill (SB 32, 2016)⁹,
- executive order for low carbon fuel standards (EO S-1-07, 2007)¹⁰,
- the Sustainable Communities and Climate Protection Act (SB 375, 2008)¹¹,
- the Water Conservation Act (SB X7-7, 2009)¹²,
- establishing mandatory commercial recycling (AB 341, 2012)¹³,
- executive order on Advanced Clean Cars (B-12-016, 2012)¹⁴ and successor order (N-79-20, 2022)¹⁵,
- the California Clean Energy and Pollution Reduction Act (SB 350, 2015)¹⁶,
- local government requirements for climate adaptation and resilience strategies (SB 379, 2015)¹⁷,
- the California Short-Lived Climate Pollutant Reduction Strategy (SB 1383, 2016)¹⁸,
- the CARB 2017¹⁹ and 2022²⁰ Climate Change Scoping Plan,
- the 100% Clean Energy Act of 2018 (SB 100, 2018)²¹,
- executive order to achieve carbon neutrality (EO B-55-18, 2018),²² and
- the California Climate Crisis Act (AB 1279, 2022)²³.

⁶ [California SB 1078. 2002.](#)

⁷ [California Executive Order S-03-05. 2005.](#)

⁸ [California AB 32. 2006.](#)

⁹ [California SB 32. 2016.](#)

¹⁰ [California Executive Order EO S-1-07. 2007.](#)

¹¹ [California SB 375. 2008.](#)

¹² [California SB X7-7. 2009.](#)

¹³ [California AB 341. 2012.](#)

¹⁴ [California Executive Order B-12-016, 2012.](#)

¹⁵ [California Executive Order N-79-20.](#)

¹⁶ [California SB 350. 2015.](#)

¹⁷ [California SB 379. 2015.](#)

¹⁸ [California SB 1383. 2016.](#)

¹⁹ [California's 2017 Climate Change Scoping Plan. CARB. 2017.](#)

²⁰ [California's 2022 Climate Change Scoping Plan. CARB 2022.](#)

²¹ [California SB 100. 2018.](#)

²² [California Executive Order B-55-18. 2018.](#)

²³ [California AB 1279. 2022.](#)

All of the above legislation provides guidance and protocols for local governments to participate in the State's GHG reduction efforts.

In response, many communities in the United States are addressing emissions at the local level. As many of the major sources of GHG emissions can be directly or indirectly controlled through local policies and actions, local governments have an opportunity to play a key role in reducing GHG emissions within their boundaries. Through proactive measures related to land use, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can contribute to emissions reductions in their communities. This GHGRP will build capacity for the County to address local climate impacts, allowing them to set goals that will increase their resilience and comply with California's greater climate strategy and mandates.

GREENHOUSE GAS EMISSIONS INVENTORY

CHAPTER 2

Chapter 2. Greenhouse Gas Emissions Inventory

Overview of Emissions

In November 2021, the Calaveras County 2018 GHG inventory was completed for community-wide and government operations emissions. The inventory is a critical component of the GHGRP, as it provides a baseline measurement of emissions that can be used to track progress towards greenhouse gas reduction goals. The inventory identifies and quantifies specific sources of emissions from within the County. By understanding the sources and respective quantities of GHG emissions, the County can identify opportunities for reducing emissions and developing targeted and effective mitigation strategies.

With support from the Calaveras Council of Governments (CCOG) and guidance from County staff, Sierra Business Council (SBC), along with subconsultant team of Rincon Consultants and Harris & Associates, completed all emissions estimates in accordance with the United States Community Protocol and the Local Government Operations Protocol. More details on inventory boundaries, protocols, and methodology can be found in the County GHG Inventory Report in **Appendix B**.

After the County's inventory was completed, newer and more accurate data was released, and the County's inventory was updated to reflect changes in data sources, methodology, and assumptions. Updating the inventory helps to ensure that the data accurately reflects the current emissions profile and provides a solid foundation for developing effective climate action plans and policies. The updated inventory memo can be found in **Appendix A**.

This section outlines the key findings from the County's community-wide and government operations 2018 GHG emissions inventories.

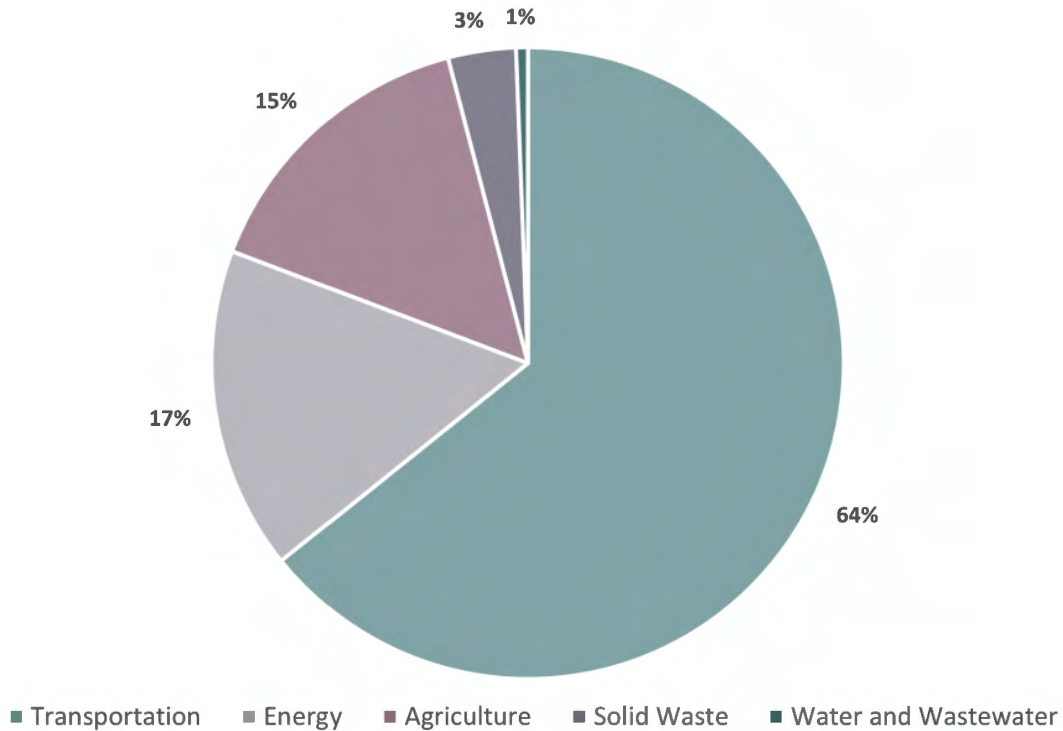
Community-Wide GHG Emissions Inventory

In 2018, sources within the County and activities of the County's residents, businesses, and visitors emitted 347,311 metric tons of carbon dioxide equivalent (MT CO₂e). These emissions are attributed to five different sectors: energy use, transportation, solid waste, water and wastewater, and agriculture. The transportation sector was the most significant contributor of emissions. In summary (from highest to lowest emissions)²⁴:

- Transportation accounted for 64% and 223,094 MT CO₂e
- Energy use accounted for 17% and 57,402 MT CO₂e
- Agriculture accounted for 15% and 52,657 MT CO₂e
- Solid waste accounted for 3% and 12,054 MT CO₂e
- Water and wastewater accounted for 1% and 2,104 MT CO₂e

²⁴ Total percentages may not sum exactly due to independent rounding.

Figure 1. 2018 Community-Wide Emissions Summary



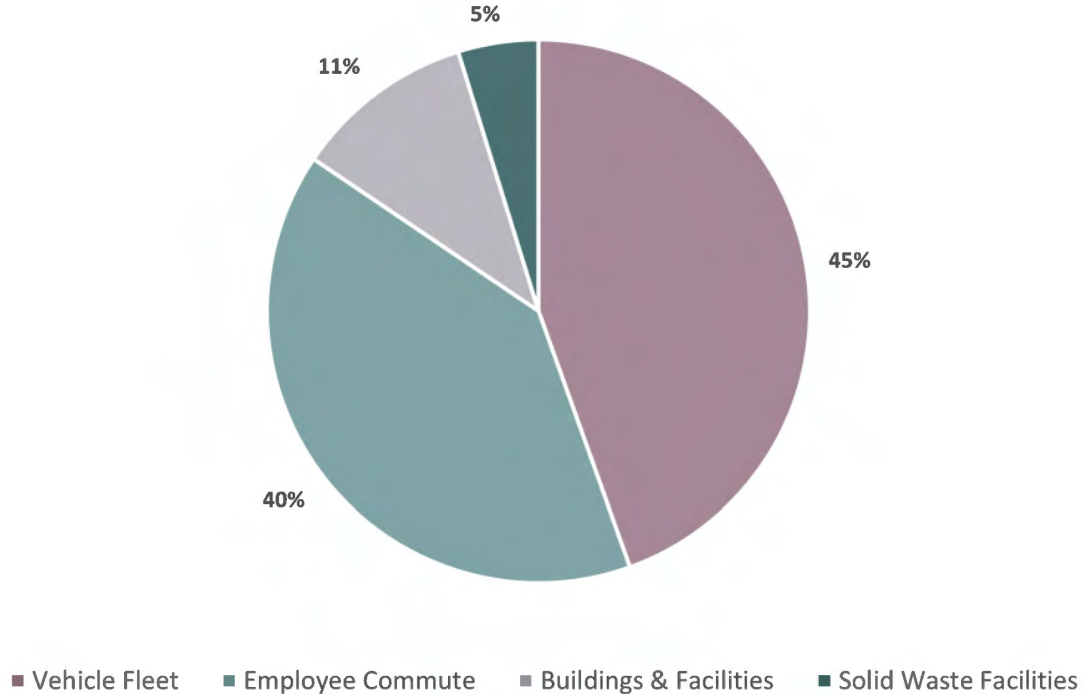
Government Operations GHG Emissions Inventory

In 2018, County government operations generated 4,433 MT CO₂e for the sectors reported in this inventory. The vehicle fleet sector was the most significant contributor of emissions²⁵.

- Emissions from the County's vehicle fleet accounted for 45% and 1,974 MT CO₂e
- Emissions from County employee commutes accounted for 40% and 1,770 MT CO₂e
- Energy from the County's buildings and facilities accounted for 11% and 477 MT CO₂e
- Emissions from County facility-generated solid waste accounted for 5% and 212 MT CO₂e

²⁵ Total percentages may not sum exactly due to independent rounding.

Figure 2. 2018 Government Operations Emissions Summary



Forecast

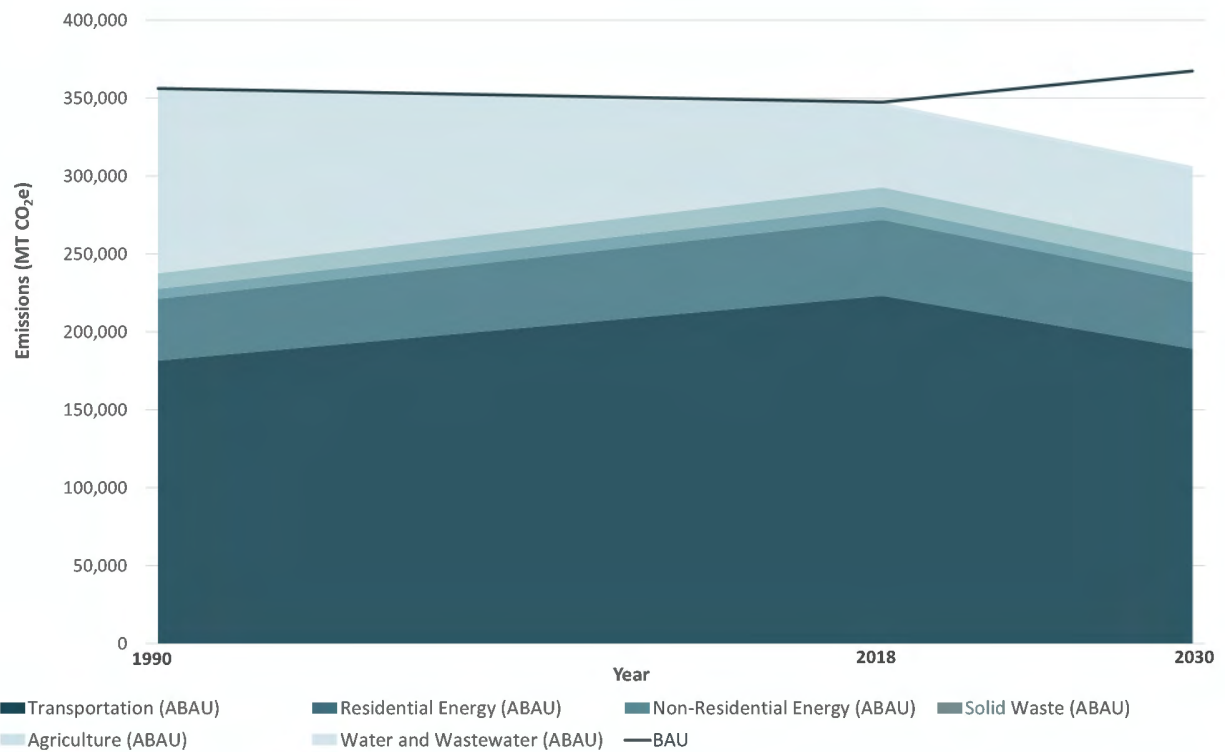
Two forecast scenarios were developed for the County: a business-as-usual (BAU) forecast and a legislative-adjusted scenario forecast (ABAU) of community-wide GHG emissions. A BAU forecast is a projection of GHG emissions that would occur in the absence of any new GHG reduction measures or policies and accounts for expected changes in population, economic growth, energy use, and other factors that are likely to influence GHG emissions. An ABAU forecast is similar to a BAU forecast, but reflects the anticipated impacts of existing or upcoming state and federal climate policies. This includes regulations, mandates, or other policies that are expected to affect energy use, transportation, and other sources of GHG emissions. By including the anticipated impacts of climate policies, the ABAU forecast provides a more accurate estimate of emissions reductions that may be achieved. This projection serves as a baseline against which progress towards GHG reduction goals can be measured and allows for specific GHGRP measures to be prioritized.

The inventory projects the County's GHG emissions from 2018 out to 2045, based on a BAU forecast and an ABAU forecast of community-wide GHG emissions.²⁶ The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, emissions are projected to increase by 12%, equating to 389,850 MT CO₂e projected to be

²⁶ Note: this does not include forecasting projections for wildfire.

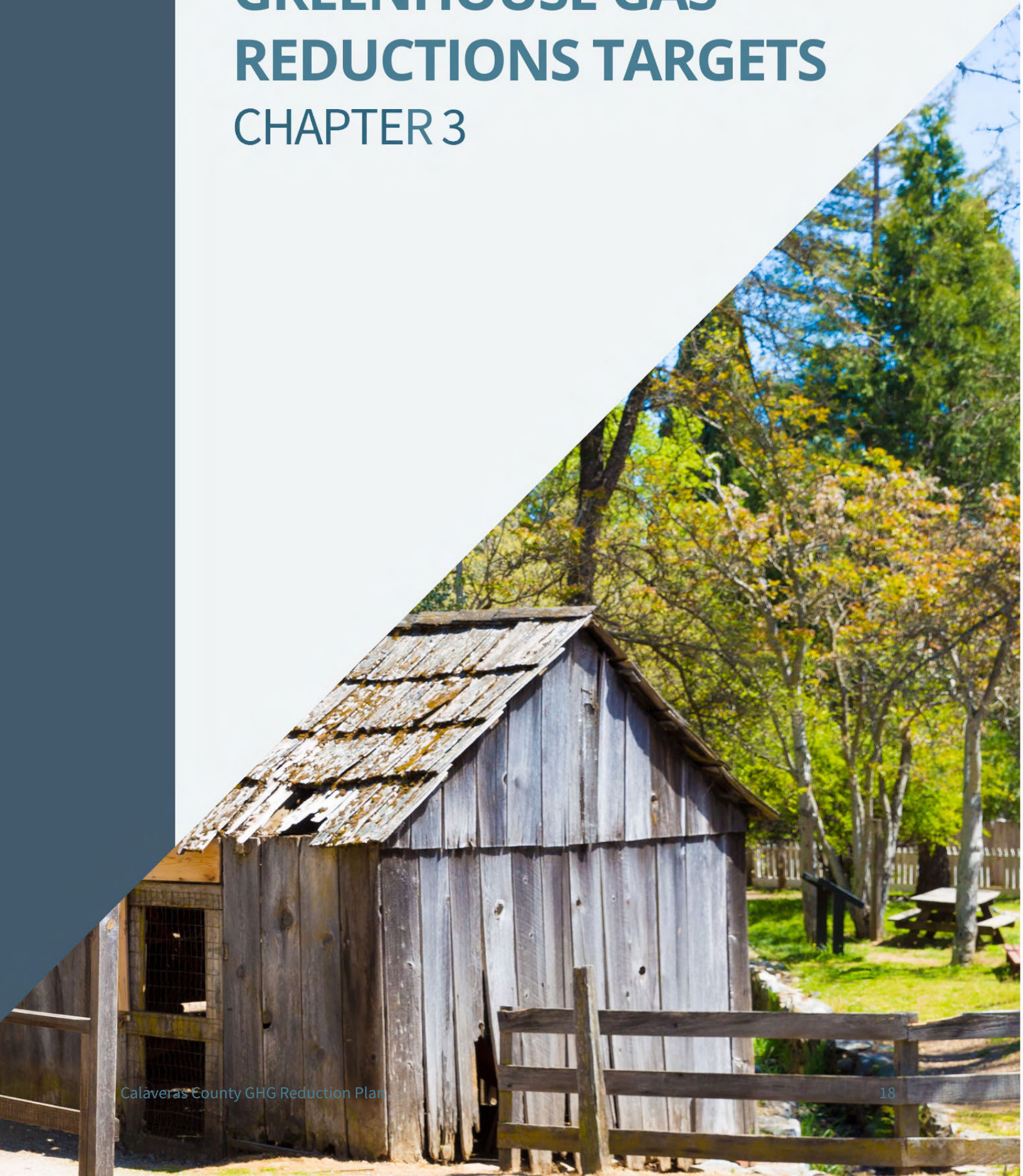
emitted in 2045. Under the ABAU scenario, emissions are projected to decrease by 20%, equating to 276,780 MT CO₂e projected to be emitted in 2045.

Figure 3. BAU and ABAU Forecasts



GREENHOUSE GAS REDUCTIONS TARGETS

CHAPTER 3



Chapter 3. Greenhouse Gas Reduction Targets

Goals & Development Process

The first step in developing GHGRP goals was to conduct a GHG emissions inventory, outlined in **Chapter 2**, to identify the major sources of emissions within the County. This information was used to establish a baseline for emissions and to pinpoint how each sector contributed to emissions totals. Once the GHG emissions inventory was completed, the next step was for the County to adopt GHG reduction goals. These goals are based on a percentage reduction from the baseline emissions level and are outlined in the **Reduction Targets** section below.

During the process of developing GHGRP goals and measures, it was helpful to look to other jurisdictions for inspiration and guidance. Measures that have been successful in other Sierra Nevada communities, for example, can be adapted and implemented to suit the specific needs and circumstances of the County. The County considered and incorporated best practices from other jurisdictions in the development of the GHGRP. The County also collaborated with the City of Angels on the GHGRP development process. This collaborative approach helped ensure that the plan is comprehensive, effective, and tailored to the unique characteristics and challenges within the County. The measures that were developed will become the County's detailed plan for achieving its adopted emissions reduction targets.

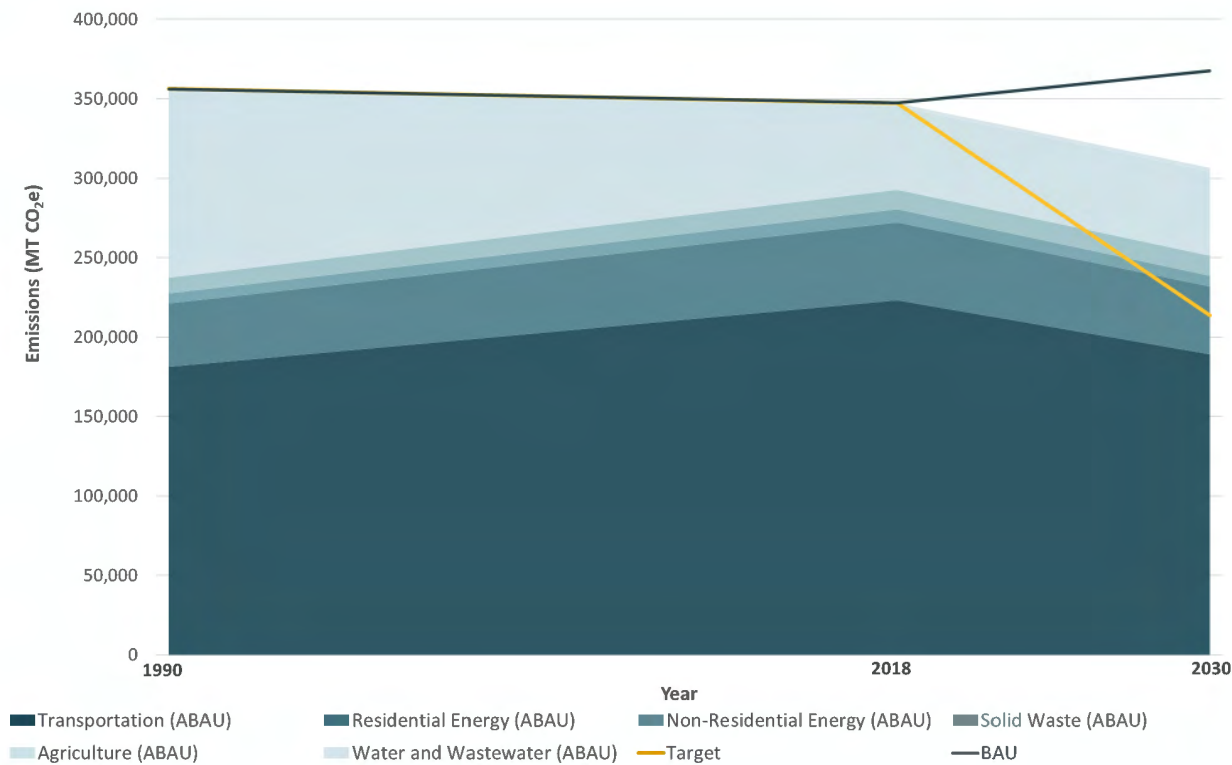
Reduction Targets

In California, local emissions reduction targets are often aligned with state goals to ensure that all jurisdictions are working towards the same overall target. The State of California has set ambitious emissions reduction targets to mitigate the impacts of climate change. Under SB 32, California has committed to reducing GHG emissions to 40% below 1990 levels by 2030. The County committed to achieving this target with its 2019 General Plan.

The County may also want to take into consideration target setting compliance in regards to the California Environmental Quality Act (CEQA). CEQA section 15183.5 provides guidance on how a GHG plan can be designed to be consistent and comply with criteria for CEQA requirements. Qualified plans that meet CEQA requirements include ones that meet or exceed SB 32.

The County has identified and prioritized specific strategies and actions to meet these targets, including increasing energy efficiency, expanding renewable energy, reducing waste, promoting sustainable transportation, and engaging with the community.

Figure 4. BAU and ABAU Forecasts with Target Reductions



PUBLIC PARTICIPATION

CHAPTER 4



Chapter 4. Public Participation

Stakeholder Engagement Process

Throughout the GHGRP development process, the County has been committed to engaging stakeholders and soliciting public feedback. Effective engagement with stakeholders and the public ensures that the GHGRP reflects the priorities and values of the community and helps to build support for its implementation. This section outlines the strategies used to engage stakeholders and gather public feedback.

In order to effectively engage with the public, the County released an online survey to collect feedback. The survey outlined draft measures that the County was initially considering including in the GHGRP. The measures were separated by sector: energy, transportation, solid waste, water and wastewater, wildfire, and carbon sequestration.

Seventy four community members responded to the survey, which ranked draft measures based on what they would like included or not included in the GHGRP. County staff also invested in multiple, in depth discussions with the Planning Commission over the GHG measures, which include public comment opportunities for additional input.

These engagement efforts provided opportunities for stakeholders to share their thoughts and ideas about the GHGRP measures and provide feedback on specific strategies and actions. The engagement process also helped to identify potential barriers to implementation and inform the development of more effective mitigation strategies. The County has considered all feedback received and has used it to inform the development of the GHGRP. In order to keep stakeholders informed, the County will provide regular updates to the public on the GHGRP's progress and seek ongoing feedback on implementation efforts.

GREENHOUSE GAS REDUCTION PLAN PUBLIC OUTREACH

Calaveras County | July & August 2022

GHG REDUCTION MEASURES

CHAPTER 5



Chapter 5. GHG Reduction Measures

Overview

The quantified measures to reduce GHG emissions associated with energy, transportation, solid waste, water and wastewater, agriculture, and carbon sequestration are included below. The GHG reduction impacts for each measure are included for target years 2030 and 2045.

Mitigation Measures & Actions

Energy

The following measures focus on reducing emissions associated with energy use in both residential and commercial buildings. Buildings consume a significant amount of energy. By implementing measures that will improve efficiency, increase renewables and storage, and decarbonize the built environment, emissions from this sector will decrease.

Renewable Energy (RE)

Measure RE-1: Increase Community Renewable Energy

Convert 14% of existing residential grid electricity and 18% of existing commercial grid electricity to renewable electricity by 2030.

Increase the use of renewable energy in the community and support efforts to increase renewable and carbon-free energy generation, including wind, solar, hydro, and biomass, and to ensure customer access to this renewable energy. Encourage on-site renewable energy generation and storage systems for residents and businesses. Develop a robust renewable energy program that provides outreach, financing opportunities, and technical assistance to residents and businesses. Pursue community renewable energy projects. Work with large energy users to transition towards renewable and zero net energy projects. Pursue distributed energy resources (DERs), microgrids, energy storage opportunities, and grid optimization projects. Pursue funding to support the above projects.

*Quantification in **Table 1** accounts for the impacts of EB-4, EB-3, EB-1, and EO-1, in order of operations. Measures RE-2, RE-3, and RE-4 are supportive of RE-1, and while they could not be quantified separately, they support the reductions associated with RE-1. RE-1 does not contribute to 2045 emissions reductions due to California's Renewable Portfolio Standard, which requires that all of the state's electricity will come from carbon-free sources by 2045.*

Table 1. Measure RE-1 GHG Reduction Impact (MT CO2e/Year)

	2030	2045
Total	1,418	--

Measure RE-2: Promote On-Site Renewable Energy Generation (Government Operations)

Support efforts on available government-owned land or buildings to increase renewable and carbon-free energy generation, including, wind, solar, hydro, biomass, and others. Promote on-site renewable energy generation and energy storage. Evaluate the renewable energy potential and assess barriers to increased renewable energy generation.

As a supportive measure, emissions for RE-2 have been included within the quantification of RE-1 in **Table 1**. The municipal emissions of RE-2 are a subset of community (commercial) emissions.

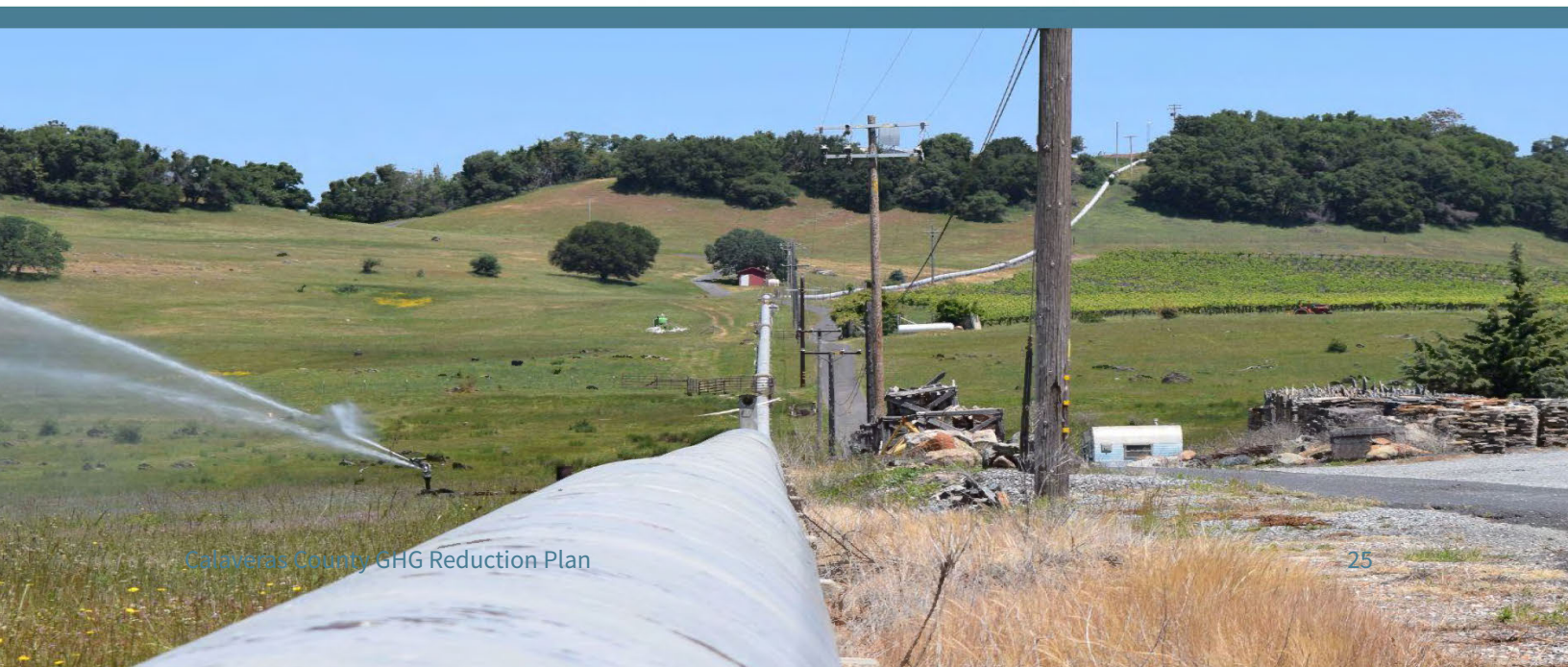
Measure RE-3: Incentives for Alternative Energy

Consistent with Implementation Measures COS-5E and PF-3F of the County's General Plan, provide incentives to facilitate alternative energy projects. Pursue funding to support the incentive program. Modify the County's development standards and zoning ordinance to provide incentives for providing alternative energy-producing facilities compatible with surrounding uses, such as solar arrays in parking lots that serve to provide shade and energy production. Cooperate with and support state and federal programs that assist landowners in energy conservation and production. Support programs that provide incentives for property owners to install alternative energy facilities such as solar arrays, small windmills, and other energy systems.

As a supportive measure, emissions for RE-3 have been included within the quantification of RE-1 in **Table 1**.

Measure RE-4: Codes and Standards for Alternative Energy

Consistent with Implementation Measures PF-3A, RP-5A, and RP-2A of the County's General Plan, amend codes to facilitate alternative energy projects. Amend the zoning code to encourage the incorporation of solar, wind, and other alternative energy infrastructure in project design to establish standards for locating and permitting solar farms, wind farms, and other alternative energy facilities to



ensure land use compatibility; addressing the potential visual impacts of alternative energy infrastructure to the extent permitted by law. Amend the Calaveras County Code to recognize the development of geothermal resources and their related land uses and refer proposals involving or affecting geothermal resources to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources. Amend the County Code to incorporate required findings and procedures for implementing state legislation and Department of Conservation requirements relative to solar-use easements and installations affecting Williamson Act Contracts.

As a supportive measure, emissions for RE-4 have been included within the quantification of RE-1 in **Table 1**.

Education & Outreach (EO)

Measure EO-1: Conduct Energy Conservation Outreach and Education

Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education.

Conduct energy conservation and efficiency education and outreach to residents and businesses. Pursue funding and add staff to support these initiatives. Support and promote programs for lower-income and disadvantaged populations. Increase awareness of resources and financing opportunities for homes and businesses to (1) replace old appliances with energy-efficient models, (2) conduct retrofits to heating, ventilation, and air conditioning (HVAC) systems and building envelope, (3) upgrade to efficient lighting, (4) replace old and inefficient wood- and propane-burning heaters, and (5) add smart controls and sensors. This includes property owners (primary, vacation, and second homeowners), property management groups, and landlords. Through education and outreach, increase participation in voluntary residential and commercial energy efficiency programs. Educate citizens about low-income home weatherization programs (U.S. Department of Energy's Weatherization Assistance Program, California's Low-Income Weatherization Program, utility-offered Energy Savings Assistance Program, local program). Educate about existing housing rehabilitation loan programs. Partner with the local utilities, Pacific Gas & Electric (PG&E) and Calaveras Public Power Agency, to promote existing energy programs for residents and businesses.

*The EO-1 quantification in **Table 2** accounts for the impacts of EB-4 and EB-3 on existing energy use, and NC-4, NC-1, and NC-2 on new energy use, in order of operations.*

Table 2. Measure EO-1 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	4,147	911

Existing Buildings (EB)

Measure EB-1: Establish a Green Business Program

Achieve participation of 5% of businesses in 2030 and 2045 within a Green Business Program. Reduce existing and new commercial energy use (all sources) by 10% in 2030 and 2045.

Establish a green business program that certifies businesses based on criteria such as energy efficiency, employee wellness, water and waste reduction, etc. Benefits to employee wellness could include active transportation, cleaner air, etc.

*The EB-1 quantification in **Table 3** accounts for the impacts of EB-4 and EB-3 on existing energy use, and NC-1 and NC-2 on new energy use, in order of operations.*

Table 3. Measure EB-1 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	23	7

Measure EB-2: Improve Building Energy Efficiency of Government Operations

Pursue grants to improve the energy efficiency of existing county buildings and infrastructure whenever a project is undertaken to improve or maintain them. This includes replacement, maintenance, or improvement of both interior and exterior lighting systems (streetlight, parking lot lighting, traffic signals, other outdoor area lighting, and controls), HVAC and water heating systems (equipment, controls, sensors, etc.), building envelope components (insulation, roofing, glazing, etc.), and other energy improvements, lighting, controls, sensors, building envelope, and any other energy loads. In accordance with General Plan Implementation Measure COS-5M, new and renovated County facilities shall be designed to exceed the requirements of the currently adopted California State Energy and Green Building Codes at the time of project approval. Buildings shall be a minimum of 5% more efficient than required and shall eliminate the use of fossil fuels to the extent feasible.

As a supportive measure, emissions for EB-2 have been included within the quantification of EB-3 in **Table 4**.

Measure EB-3: Facilitate Energy Efficiency Retrofits

Reduce existing residential and commercial energy use (all sources) by 10% and 15%, respectively, in 2030 and 25% and 30% in 2045, respectively, through energy efficiency retrofits.

The County will pursue funding to help facilitate (i.e., incentivize) energy-efficient upgrades for homes and businesses. Energy efficiency retrofits can include upgrades to lighting, heating, ventilation and air conditioning, appliances, water efficiency, and building envelope (insulation, windows). Consistent with COS-5G of the County's General Plan, cooperate with the Calaveras County Air Pollution Control

District (CCAPCD) to implement emissions reduction programs such as the Carl Moyer Program, and to find methods of incentivizing the replacement or retrofit of small emissions sources throughout the County, such as the replacement of existing wood stoves.

*The EB-3 quantification in **Table 4** accounts for the impact of EB-4, in order of operations.*

Table 4. Measure EB-3 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	3,868	1,727

Measure EB-4: Implement an Equipment Time-of-Replacement Ordinance

At equipment end of life, replace 45% of existing residential and commercial natural gas and propane water heaters with electric alternatives by 2030 and 90% by 2045 (based on 10-year life and 10% non-compliance). At equipment end of life, replace 23% of natural gas, propane, and wood space heating equipment with electric alternatives by 2030 and 90% by 2045 (based on 20-year life and 10% non-compliance).

By 2025, adopt an ordinance that requires residential and commercial fossil fuel-powered space and water heating appliances to be replaced with electric alternatives at time of replacement, with exceptions where electrical service is not available. Review and update ordinance every three years (at time of building code updates) as improved equipment becomes available.

Table 5. Measure EB-4 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	9,748	27,531

New Construction (NC)

Measure NC-1: Incentivize Highly Efficient New Development

Achieve participation from 10% of new residential buildings in high energy efficient building measures starting from 2025 through 2045. Reduce new residential energy use (all sources) by 53%. Achieve participation from 10% of new commercial buildings in high energy efficient building measures between 2025 and 2045. Reduce new commercial energy use (all sources) by 30%.

Provide incentives (e.g., easing permitting requirements) to new residential and nonresidential development projects for going beyond Title 24 compliance. Pursue funding to support the incentive program.

The NC-1 quantification in **Table 6** accounts for the impact of NC-4, in order of operations.

Table 6. Measure NC-1 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	58	98

Measure NC-2: Incentivize Zero Net Energy New Construction

Achieve participation in developing zero net energy buildings by 10% of new residential and commercial buildings from 2025 through 2045.

Incentivize new residential and nonresidential buildings to be built all-electric and highly energy efficient and install renewable energy generation and energy storage systems that can fully offset energy needs. Pursue funding to support the incentive program.

The NC-2 quantification in **Table 7** accounts for the impacts of NC-4 and NC-1, in order of operations.

Table 7. Measure NC-2 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	81	192

Measure NC-3: Reduce Criteria Air Pollutants and Emissions from New Development

Consistent with Implementation Measures COS-5F and COS-5H of the County's General Plan, reduce criteria air pollutants, including GHG emissions, from new developments. Evaluate proposed discretionary developments subject to CEQA evaluation to determine whether they will emit criteria air pollutants, including greenhouse gasses, exceeding CCAPCD's standards. Should proposed developments within the County be anticipated to result in significant impacts related to the emission of criteria air pollutants, the County shall require the applicable mitigation measures provided in the CCAPCD's Guidelines for Assessing and Mitigating Air Quality Impacts of Land Use Projects.

As a supportive measure, emissions for NC-3 have been included within the quantification of NC-1 and NC-2 in **Tables 6** and **7**.

Measure NC-4: Increase Clean Wood-Burning Appliances

By 2025, adopt an ordinance in alignment with Implementation Measure COS-5N of the County's General Plan that requires all newly installed wood-burning appliances, including stoves and factory-built fireplaces, installed in residential projects be Environmental Protection Agency (EPA) certified to the most current EPA standards, with an exception for projects permitted under the Limited Density Owner Built Rural Dwelling permit program, listed historic structures or as may otherwise be stated in the most currently adopted Housing Element. EPA-rated woodstoves are assumed to

generate 30% less emissions than non-EPA-rated woodstoves (EPA-Phase 2 certified stoves currently produce no more than 4.5 grams per hour).

Table 8. Measure NC-4 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	28	62



Transportation

The following measures focus on reducing emissions associated with transportation, which is the largest source of emissions in the County. By implementing measures that encourage the use of low-emission and electric vehicles (EVs), promote active transportation, improve public transit systems, and reduce the need for single-occupancy vehicles, emissions from this sector can be significantly reduced. These measures will help to create a more sustainable transportation system that benefits all community members.

Transportation (TR)

Measure TR-1: Increase EV/ZEV Adoption

By planning, incentives, and pursuit of public and private funding, accelerate zero emission vehicle (ZEV) adoption, including EVs, to 30% by 2030 in the unincorporated areas of the County. As new non-fossil-fuel vehicle technologies develop, provide for refueling/recharging alternatives in addition to battery chargers.

1. Develop and maintain County “grant team” staff to pursue significant funding from public and private sources, including those covered in Measures TR-6 through TR-10, to upgrade the EV charging and alternative fueling infrastructure to facilitate a robust ZEV network in the County and to assist in and accelerate acquisition of ZEVs.
2. As funding is secured, install 99 new publicly accessible plug-in electric vehicle (PEV) charging ports, including at least five direct current (DC) fast chargers, by the end of 2025 to support the resident and visitor demand projected in the Central Sierra Zero Emission Vehicle Readiness plan (CSZEVRP).
3. Develop and implement a Zero Emissions Vehicle Infrastructure Implementation Plan to determine the number and location of additional publicly available Level 2 (240V) EV chargers and DC Fast chargers, as well as private EV chargers, which, combined with the chargers provided in TR-1.2, will be sufficient, by 2030, to serve 15,000 ZEV vehicles on an ongoing basis

in unincorporated areas of the County. In developing that plan, consider the EV charging locations recommended in the CSZEVRP, including EV charging infrastructure for visitors at the recommended resorts/lodging locations, DC fast chargers at the recommended highway corridor locations, and EV charging stations (EVCS) at other recommended locations.

4. Amend the Calaveras County Zoning Code to provide ZEV incentives to encourage adoption and use of ZEVs (PF-3B). Keep incentives up to date to accommodate new developments of non-fossil-fuel vehicle alternatives to EVs.
5. Develop and adopt an EV charging infrastructure reach code applicable to new or remodeled commercial development with a total of ten or more parking spaces; under the reach code, require a percentage of all parking spaces to have EV chargers available: at least 30% if Level 2 chargers; at least 5% if DC fast chargers.
6. Consistent with the Calaveras Streamlined Permitting Guidebook of the CSZEVRP, develop and maintain an expedited, streamlined permitting process for electric vehicle charging stations in accordance with AB 1236 and employ the example Plug-in EV Infrastructure Permitting Checklist in the Guidebook to assess installation projects for expedited review.
7. Engage the local business community to site EV infrastructure (especially businesses that rely on tourism and business travelers) and develop and implement a plan for County supported accelerated business fleet electrification in partnership with the PG&E EV Fleet program.
8. Support and partner with ZEV car share companies in coming to the County.
9. As part of the Zero Emissions Vehicle Infrastructure Implementation Plan (see TR-1.3), support the regional transportation planning agency in creating a Regional Zero Emissions Vehicle Infrastructure Collaborative. Participate in the program to collaborate on infrastructure deployment and to increase buying/negotiation power.
10. Coordinate with County communities-based organizations, agencies, and nonprofits to conduct ZEV education events for residents and business owners and all county employees to promote benefits and programs such as the Clean Vehicle Rebate Program.
11. Work with the CCAPCD to pursue funding to develop a passenger clean vehicle and charger acquisition program for residents, with emphasis on low-income residents, of the unincorporated areas of the County to assist in purchasing ZEVs and installing chargers. Also, work with the CCAPD to pursue funding to assist businesses and organizations in installing publicly available chargers.

Table 9. Measure TR-1 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Passenger EV/ZEV	25,403	45,546
Commercial EV/ZEV	14,097	13,058
Total	39,500	58,604

Measure TR-2: Decarbonize the County Municipal Fleet and Employee Commute

Lead by example by pursuing funding to the County municipal fleet and related commuter vehicles to achieve a 40% ZEV fleet by 2030.

1. Adopt a County requirement that requires that new and replacement County municipal fleet vehicle purchases are EVs or ZEVs where feasible.
2. Conduct a study to determine total turnover time frame of County municipal fleet vehicles to EVs or ZEVs.
3. Through the “grant team” (see TR-1.1), pursue funding from programs such as the CARB's Clean Vehicle Rebate Project, Clean Cars 4 All Program, and the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program to increase procurement of EV or ZEV cars, trucks, and other vehicles and installation of EV/ZEV charging/fueling infrastructure at County facilities.
4. Allow eligible County employees to telecommute, with a target rate of 25% of eligible staff time telecommuting by 2030.

Table 10. Measure TR-2 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Municipal Fleet	790	45,546
Employee Commute	696	13,058
Total	1,486	3,744

Measure TR-3: Increase Public Transit Mode Share

Develop a robust public transportation network consistent with Pitkin County's, in Colorado, Roaring Fork Transportation Authority (RFTA) that employs ZEV buses, demand-responsive transport options, and ZEV ridesharing to increase County public transit mode share to 6% by 2030.

1. Conduct a study to identify specific and systematic gaps and barriers to mobility and access in the current public transit system. Include direct outreach to members of disadvantaged communities, commuters, tourist destinations, and other underserved groups.
2. Establish a regional transportation system that uses Pitkin County's Roaring Fork Transportation Authority's services as a model to serve all County residents and visitors through a connected network of express and local fixed-route bus services, regional commuter services, public tourist shuttles, on-demand shuttles/microtransit, consistent active transportation connections (e.g., bike racks) and coordinated first-last mile commuting options that may include micromobility options.
3. Establish an EV rideshare program (similar to "Green Raiteros") that allows for people with limited mobility options to rent a vehicle or request a ride in an electric vehicle for low cost.

4. In accordance with Calaveras County General Plan Implementation Measure C-3A, establish Park and Ride facilities at locations convenient for commuters, residents, and visitors to transfer from a single occupancy vehicle to transit buses, commuter services, shuttles, or EV rideshare vehicles. Incorporate planned Park and Ride facilities into the Zero Emissions Vehicle Infrastructure Implementation Plan (see TR-1.3 above) to outfit the facilities with sufficient EV/alternate fueling infrastructure.
5. Rely on significant funding from Measures TR-6 through TR-10 to fund a regional transportation system that is consistent with Pitkin County's RFTA services and build an EV charging infrastructure network to support the EV rideshare program.
6. Expand the Calaveras Transit Agency to plan for, develop and operate the regional transportation system. Employ technical assistance from the National Rural Transit Assistance Program and create a public transportation working group to provide the County expertise and community input.
7. Identify partners such as CCOG to develop, oversee, and manage the transit and EV rideshare program.
8. Implement a promotion and education campaign to inform the community of the availability of the EV rideshare program and available transit routes and options. This may include but is not limited to: tabling at community events, bilingual mailers, social media posts, direct engagement with employers, and partnerships with Google Transit or a mobile application developer to bring real-time maps and schedules to residents and visitors.
9. Prioritize EV rideshare program implementation in low-income communities and develop pricing plans that make the public transportation system and EV rideshare program affordable for low-income residents.

Table 11. Measure TR-3 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	11,376	26,769

Measure TR-4: Increase Active Transportation Mode Share

Increase active transportation mode share within the County by 1%, to a total of 4%, by 2030.

1. In accordance with Calaveras County General Plan Implementation Measure COS-7E, support and participate in efforts (such as an annual collision review) to update the bicycle and pedestrian master plan for biking, walking, riding, hiking/non-motorized, and motorized transportation. The updated plan(s) shall identify existing and proposed facilities to assist in integrating future development into regional trail networks, tie trail systems to commercial centers and tourist destinations, identify locations for new trailheads and trail access points, and connect trailheads with public transportation systems.

2. In accordance with Calaveras County General Plan Implementation Measure C-5A, implement priority projects of the updated bicycle and pedestrian master plan as funding allows and prioritize the development of projects in disadvantaged communities within the County.
3. As funding is secured, construct bikeway and pedestrian system connections within the County and connect to the City of Angels, nearby counties, state, and federal infrastructure, through integration of bicycle facilities as part of other roadway construction projects.
4. In accordance with Calaveras County General Plan Implementation Measure COS-7B, establish standards for when and how new residential subdivisions shall provide bicycle and pedestrian facilities and amend the Calaveras County Code accordingly. In accordance with Calaveras County General Plan Implementation Measure COS-5M, (a) where residential subdivisions are located within walking distance of facilities such as schools, parks, banks, grocery stores and restaurants, they shall be designed to include pedestrian access to such facilities to the extent practicable; (b) where feasible, residential subdivisions shall be designed to encourage alternate forms of transportation, including but not limited to sidewalks, trail systems, bike paths, and other measures connecting to existing development.
5. Rely on funding from Measures TR-6 through TR-10 to implement projects from the updated bicycle and pedestrian master plan.
6. Work and collaborate with local organizations and agencies, such as CCOG and City of Angels, to promote bicycle and pedestrian travel as well as the updated bicycle and pedestrian master plan.
7. Coordinate with County community-based organizations, agencies, and nonprofits to conduct bicycle and pedestrian education events for residents and business owners.
8. Establish a Calaveras County Green Streets Program to improve the walkability of streets by providing increased shade cover and increased carbon sequestration potential.
9. In accordance with Calaveras County General Plan Implementation Measure C-18, favorably consider projects which minimize GHG impacts and are appropriate to the rural nature of the County, including transit programs, ridesharing programs, and bicycle and pedestrian improvements.
10. In accordance with Calaveras County General Plan Implementation Measure C-1C, consider transit capital improvements and non-auto travel improvements necessary to serve new development in impact fee programs to fund public transportation infrastructure, park-and-ride lots, and bicycle and pedestrian facilities associated with the new development.

Table 12. Measure TR-4 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	187	428

Measure TR-5: Decarbonize Off-Road Equipment and Vehicles

Decarbonize (i.e., electrify or convert to biofuel) a sufficient amount of off-road equipment and vehicles in the unincorporated areas of the County to reduce their combined fossil fuel use by 30% by 2030. As new non-fossil-fuel technologies develop, provide for any new clean alternatives to off-road fossil-fuel vehicles and equipment.

1. Create a phased ordinance by the end of 2024 to reduce in stages to zero the local operation of gasoline and diesel powered off-road equipment by type. Provide in the ordinance that, when sufficient funding is obtained to fund effective incentives (such as payments for equipment turned into the County upon proof of purchase of non-fossil fueled replacement equipment), local operation of small off-road engines (SORE) that are subject to regulation by the CARB shall be phased out by 2030. For those off-road diesel vehicle and diesel equipment types that cannot be decarbonized (i.e., electrified or converted to biofuel) in the short-term, include a requirement for the use of renewable diesel (e.g., RD99, which is a drop-in renewable fuel and readily available on West Coast).
2. Establish and carry out an enforcement and implementation program to track transition of off-road equipment across the unincorporated areas of the County.
3. Pursue funding to conduct an assessment of off-road equipment and vehicles in the unincorporated areas of the County to determine feasible phases for the ordinance, identify fleets with high decarbonization potential and operators that will require targeted support to decarbonize, and identify available electric/biofuel options for each type. The assessment shall include direct outreach to such operators including those with recreational boats and agricultural/forestry equipment and vehicles.
4. Pursue funding to create an Off-road Equipment Replacement Program to work directly with operators identified in Action TR-5.3 to decarbonize their off-road equipment and vehicles. The program shall include (but is not be limited to) free consultations with fleet operators to identify equivalent alternatives to fossil-fueled off-road equipment, direct support to obtain rebates and incentives, and connect them with qualified local repair services to maintain the replacement equipment.
5. Through the “grant team” (see TR-1.1) and in accordance with Calaveras County General Plan Implementation Measure COS-5G, work with the CCAPCD to pursue funding from the Carl Moyer Program and rely on funding from Measures TR-6 through TR-10 to support off-road decarbonization efforts via transition to all-electric and/or bio-fuel off-road equipment and vehicles.
6. Work with the CCAPCD to develop and implement a rebate and incentive program for upgrading off-road equipment and vehicles and switching to electric or biofuels. Develop the program with a focus on procedural equity and prioritize funding distribution to members of disadvantaged communities.
7. Develop a multi-lingual Off-road Equipment Replacement Outreach Campaign that educates fleet operators on the public health and safety benefits of alternative equipment technology and connects them with the Off-road Equipment Replacement Program.

8. Work with electric off-road equipment manufacturers (such as Soletrac and Monarch) to host workforce development workshops to train local agricultural equipment repair shops to service electric off-road equipment and off-road equipment utilizing biofuels and renewable diesel.
9. Partner with the CCAPCD to establish the enforcement and implementation program, create the Off-road Equipment Replacement Program, pursue funding, and develop the rebate and incentive program.

Table 13. Measure TR-5 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	7,787	17,362

Measure TR-6: Create a Tourism Economy

Work to develop a tourism economy within the County to help fund the decarbonization of the transportation sector.

1. Work to develop a tourism economy within the County to help fund the decarbonization of the transportation sector.
2. Reallocate the tourism/hotel tax with revenue earmarked for the decarbonization of transportation within the County.
3. Develop a plan to help brand and market the County as a sustainable tourist destination and conduct a study to determine the price options and applicability for the tax.
4. Pursue funding from the Visit California's Rural Marketing Program to market the County as a sustainable tourist destination.
5. Partner with the Calaveras Visitors Bureau to secure funding from Visit California's Rural Marketing Program and partner with both the Calaveras Visitors Bureau and existing members of the County tourism industry to develop the plan, develop the tax, and implement the marketing efforts.
6. Work with partners and businesses to implement the plan/marketing campaigns to market the County and appropriate local businesses as sustainable tourist destinations.
7. Directly engage members of disadvantaged communities in the development of the plan and tax to understand and plan for equity concerns.

Emissions for TR-6 have been included within the quantification of TR-1 through TR-5.

Measure TR-7: Establish Calaveras County as a Pilot Program

Partner with the Rural County Representatives of California (RCRC) to establish the County as a pilot program for the decarbonization of the transportation sector in rural communities.

1. Establish a regional community foundation with neighboring rural communities to fund the decarbonization of the transportation sector in rural California.
2. Develop a vision and strategy for the regional community foundation to serve as a first mover/pilot in the State in the decarbonization of America's rural transportation systems.
3. As a first-mover in rural America, pursue funding from large philanthropy such as the Bezos Earth Fund, Rockefeller Foundation, Bill & Melinda Gates Foundation, etc. to fund the development of a County decarbonized rural transportation system.
4. Advocate for and promote the regional community foundation as a first-mover in the decarbonization of America's rural transportation systems to the Federal Government and state and regional governments and philanthropic organizations.
5. Directly engage members of disadvantaged communities in the development of the vision and strategy to convey a clear vision that aims to benefit all members of rural communities.
6. Partner with the RCRC and/or other regional organizations to develop the foundation, advocate for the foundation, lobby state and federal agencies for funding, and establish a network of private and public partners/members.

Emissions for TR-7 have been included within the quantification of TR-1 through TR-5.

Measure TR-8: Develop a Biofuel Industry

Partner with local utilities and state agencies to develop a biofuel industry throughout the County to fund decarbonization of the transportation sector.

1. Establish a memorandum of understanding with PG&E, CARB, California Department of Forestry and Fire Protection (CAL FIRE), the California Department of Agriculture, forest owners, and waste management companies to establish a plan to manage biomass and organic waste through the development of biofuel infrastructure in the County to position the County as a first mover in active forest management to support a carbon-free future for California.
2. Identify or create zoning designations whose definitions allow biofuel generation facilities; and identify specific properties throughout the County for development of biofuel generation facilities.
3. Partner with PG&E and state agencies to develop a green bond to help fund the development of biofuel infrastructure in the County and explore revenue options through the Low Carbon Fuel Standard.
4. Work with local utilities and state agencies to pursue grants earmarked for biofuel infrastructure from the Inflation Reduction Act.
5. Establish partnerships with organic waste haulers to collect biomass from forests and biowaste from residential and agricultural sources, and partnerships with forest service businesses/property owners to sustainably clear fuel from forests.
6. Establish a campaign to educate the forestry services, waste haulers, and the community on the economic and wildfire risk benefits of active forest management for bioenergy and

establish a working group/committee to involve local community members and businesses in the planning process.

7. Pursue funding to create workforce development programs to train the County local workforce for biofuel jobs. Specifically target training towards members of disadvantaged communities and establish criteria in the planning process that prioritizes/requires the employment of County residents and businesses in the industry.

Emissions for TR-8 have been included within the quantification of TR-1 through TR-5.

Measure TR-9: Pursue State Funding

Establish the County as a pilot program for a rural carbon-free transportation system through state investment and grants such as California Climate Investments (CCI).

1. Develop a report highlighting the unique opportunity for the County to become a pilot for the decarbonization of rural transportation systems in California.
2. Through the “grant team” (see TR-1.1), pursue funding from CCI and develop an investment program with private partners, including local utilities and local employers, to secure local match funding for the grants.
3. Partner with local agencies such as CCAPCD and Calaveras Connect to plan for, secure, and implement CCI grant funding.
4. Directly engage members of disadvantaged communities to analyze and convey transportation barriers in the report development.

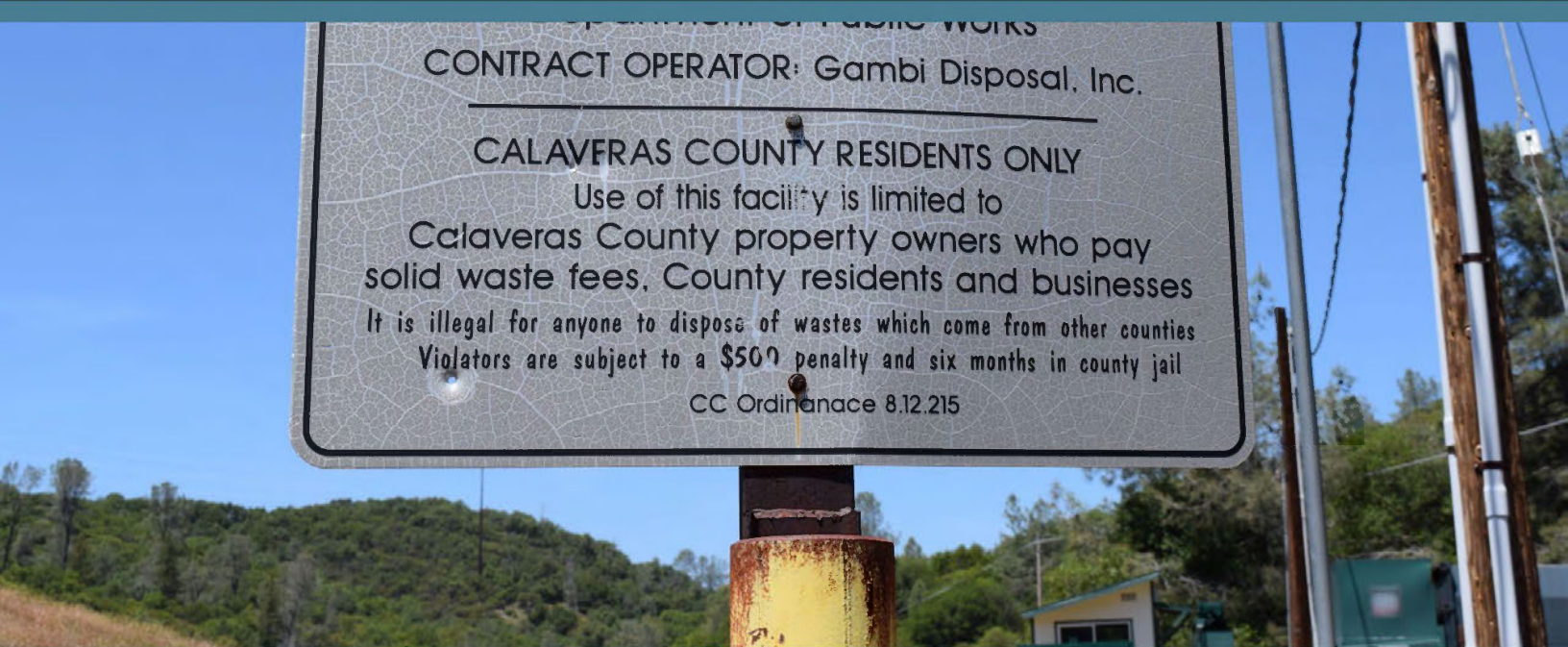
Emissions for TR-9 have been included within the quantification of TR-1 through TR-5.

Measure TR-10: Pursue Federal Funding

Pursue federal funding from federal programs to decarbonize the transportation sector.

1. Through the “grant team” (see TR-1.1), pursue significant funding from federal funding programs such as the Charging and Fueling Infrastructure Discretionary Grant Program by leveraging the Zero Emissions Vehicle Infrastructure Implementation Plan and County ability to expand access to EV infrastructure within rural areas and low- and moderate-income neighborhoods.
2. Partner with the Federal Highway Administration (FHWA) California Division, California Local Technical Assistance Program (CA LTAP), and/or the Governor's Office of Planning and Research (OPR) to obtain technical support and train staff to develop a successful federal grant application.
3. Develop an Equity First Program to provide early funding opportunities for members of disadvantaged communities and low- and moderate-income neighborhoods.

Emissions for TR-10 have been included within the quantification of TR-1 through TR-5.



Solid Waste

The measures outlined in this section aim to reduce the emissions associated with solid waste. The decomposition of organic waste in landfills and the transportation of waste to disposal facilities contribute to these emissions. To combat this issue, strategies to decrease waste generation, improve recycling and composting, and encourage sustainable materials management practices will help reduce emissions.

Solid Waste (SW)

Measure SW-1: Organic Waste Diversion

In accordance with General Plan Conservation and Open Space Element Air Quality/Greenhouse Gases Measures COS-5D and COS-5E, the County will implement waste management practices to support organics diversion. Programs will include: (1) providing green waste collection programs at County operated landfill and transfer stations when feasible (COS-5D); (2) utilizing public/private partnerships to utilize green waste in alternative uses and waste to energy facilities (COS-5D); and (3) including a review of the zoning ordinance and Air Pollution Control District regulations and amendment as necessary to facilitate the development of green waste to energy projects and other projects that convert green waste to products (COS-2E). Programs may also include investigating and incentivizing community composting hosted by individuals and organizations. In addition, the County will coordinate with individuals, community groups, and publicly funded and privately managed recycling and composting providers to educate the public about the benefits of composting. Through a combination of these programs, the County will divert 75% of food and green yard waste from landfills to home & community-based composting facilities, biomass plants, & other local facilities to reduce short-lived climate pollutants and minimize transportation-related emissions compared to existing conditions.

Table 14. Measure SW-1 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	2,924	3,007

Measure SW-2: Diversions to Rock Creek Landfill

The County will divert an additional 5% of total Calaveras County solid waste disposal from other landfills to Rock Creek Landfill, to the extent Rock Creek Landfill has the capacity to receive this diverted material.

Table 15. Measure SW-2 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	7.25	7.45

Measure SW-3: Methane Capture

The County will continue to manage Rock Creek Landfill to limit methane release and pursue funding to identify and implement measures sufficient to achieve an average increase in methane capture of 1% for all waste types by 2030.

Table 16. Measure SW-3 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	51.01	52.46



Water & Wastewater

The following measures aim to reduce emissions associated with water distribution and wastewater treatment. Energy-intensive treatment processes and the distribution of water and wastewater contribute to emissions in this sector. By implementing measures that improve the energy efficiency of treatment processes, and reduce water loss and treatment demands, emissions from this sector can be reduced.

Water & Wastewater (WW)

Measure WW-1: Use of Reclaimed (Non-Potable) Water

In accordance with General Plan Public Facilities and Services Element Water and Wastewater Measures PF-2G, PF-2H, and PF-2I, the County will (1) work with local water and wastewater agencies and provide land use or other data in the County's possession where such data will provide information necessary to prepare and update water and wastewater master plans, agency master plans and similar water and wastewater planning documents, including strategies for increasing energy efficiency (PF-2G); (2) amend the County Code to recognize appropriate uses for reclaimed water as an alternative for various land uses and keep apprised of the latest developments in the use of reclaimed water. Revise the County's landscaping standards and incorporate those standards as conditions of project approval to facilitate the use of gray water and reclaimed water systems for landscape irrigation (PF-2H); and (3) work with wastewater service providers to expand the use of recycled wastewater for agricultural uses (PF-2I). The County will pursue funding to work with local and regional agencies to create incentives and rebates for greywater systems, composting toilets, or other residential retrofits. Through a combination of efforts, the County will achieve a 10% reduction in total potable water use.

Table 17. Measure WW-1 GHG Reduction Impact (MT CO₂e/Year)

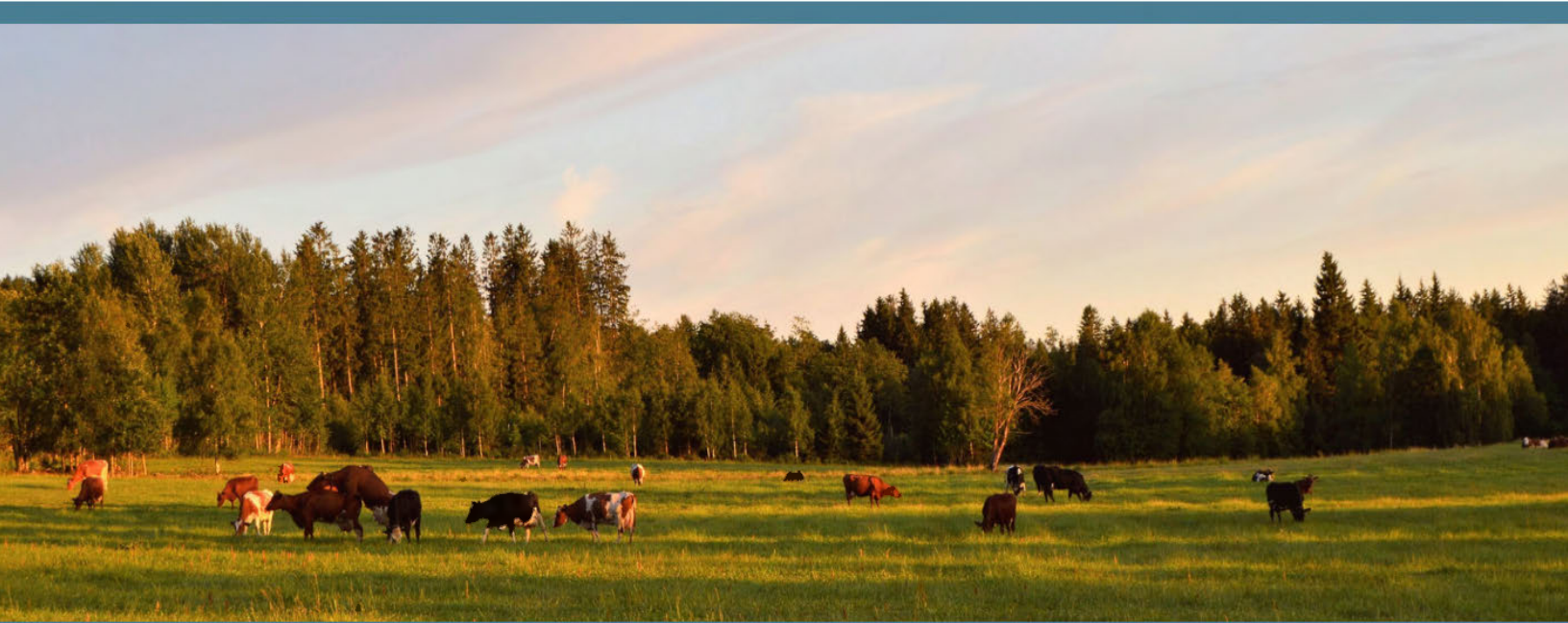
	2030	2045
Total	92	97

Measure WW-2: Increase Efficiency of Plumbing Systems in New Construction

Research, identify, and quantify measures to be included in a new ordinance to be adopted by 2025 that will reduce potable water usage in new residential and commercial projects by 5% over code minimum designs in alignment with Implementation Measure PF-2G of the County's General Plan. Such measures may include compact plumbing design requirements, alternate pipe sizing methods and materials, gray water systems, additional landscape irrigation controls, and lower flow plumbing fixtures if commercially and readily available at the time of drafting of the ordinance.

Table 18. Measure WW-2 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	66	68



Agriculture

The following measures aim to reduce emissions associated with agriculture within the County, which are mainly from methane and nitrous oxide. Measures include practices such as promoting alternative agriculture techniques, reducing synthetic fertilizer and pesticide use, and supporting sustainable land management.

Agriculture (AG)

Measure AG-1: Increase Crop Production Efficiency and Soil Health

Increase crop production efficiency and soil health to reduce associated GHG emissions 30% by 2030.

1. Improve fertilizer efficiency (increase in harvest yield per unit of nutrient supplied by fertilizer and liming material) across the County and monitor via soil test and soil pH reporting to understand which County crop fields are the most productive.
2. Prepare and adopt County Prescribed Grazing Practices that result in enhanced soil nutrition and increased carbon sequestration.
3. Stop or limit the loss of nutrients from the planted areas during top watering in an open system, including by containing irrigation effluent.
4. Conduct a study regarding which agroforestry methods (riparian forested buffers, silvopasture [i.e., planting of shrubs and trees in conjunction with crops and grazing], oak woodland establishment) would work best for County farmers in terms of climate mitigation practices.
5. Work with CARB regarding its proposed crop-based carbon offset protocol to allow County farmers to earn additional revenue for reducing GHG emissions associated with cultivation.
6. Partner with the University of California Cooperative Extension (UCCE) Central Sierra and the Calaveras County Agricultural Commissioner to work directly with farmers to implement best practices in fertilizer efficiency and pest management detailed in the University of California Agriculture and Natural Resources Nutrient Management Resources and Knowledge Sharing Tools for the California Agricultural Community.

7. Develop an educational campaign to share the most recent research and best practices with County farmers regarding most efficient fertilizers and technologies and how to match fertilizer application with plant nutrient needs as the plant grows.
8. In coordination with UCCE (see AG-1.6 above) and the County Agricultural Commissioner, provide assistance to smaller farmers for developing applications to soil and fertilizer grant programs such as the California Department of Agriculture Healthy Soils Program Incentive Program.
9. Partner with farming groups, academic institutions and the Calaveras County Resource Conservation District, to review and implement suggestions in the State's Healthy Soils Initiative, which facilitates the management of farms and ranches specifically for carbon sequestration and other benefits such as increased water holding capacity and soil fertility, including the Healthy Soils Program of the State's Sustainable Agricultural Lands Conservation Program.

Table 19. Measure AG-1 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	2,483	5,444

Measure AG-2: Implement Livestock Manure Management Strategies

Implement livestock manure management strategies to reduce associated GHG emissions by 10% by 2030.

1. Conduct a detailed countywide inventory of livestock and manure management practices to better understand and track GHG emissions from livestock and manure management practices.
2. Develop and implement a program for local farmers to purchase poultry manure and used bedding for use in fertilizing pasture and crops.
3. Pursue available state and federal energy efficiency grants to develop a revolving low interest loan program that will provide funding for the construction of methane digesters where feasible.
4. Investigate and pursue funding sources, such as California Department of Food and Agriculture's (CDFA's) Healthy Soils Initiative, to increase the application of livestock manure compost on rangelands, which in turn will increase carbon capture and storage in soil.
5. Provide assistance to Calaveras County farmers regarding how to apply for financial assistance through the Alternative Manure Management Program from CDFA, which provides funding to farmers implementing non-digest manure management techniques.
6. Utilizing CDFA guidance, develop education and outreach materials around grazing practices that sequester carbon.
7. Partner with the University of California Cooperative Extension Central Sierra and the Calaveras County Agricultural Commissioner to work directly with farmers on understanding

and implementing manure management best practices and reduction of the associated GHG emissions as detailed in the EPA's AgSTAR Practices to Reduce Methane Emissions from Livestock Manure Management.

8. Create an ordinance applying GHG emission reduction measures to any new feed lot, dairy farm, or similar operation.

Table 20. Measure AG-2 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	629	2,514

Measure AG-3: Reduce Methane Emissions from Livestock

Reduce methane emissions from livestock enteric fermentation 20% by 2030.

1. Investigate and promulgate grassland management strategies to improve feed digestibility and feed quality appropriate to Calaveras grazing operations and conditions.
2. Work with UCCE to conduct a study regarding balancing and fine-tuning livestock feed rations within the County, which in turn leads to less livestock enteric fermentation.
3. Annually conduct research on any upcoming grant funding opportunities to reduce enteric fermentation emissions.
4. Provide information and resources on the County Agricultural Commissioner website to inform farmers on optimizing feed digestibility/availability and pasture management practices, and how that translates into less livestock enteric fermentation emissions.
5. Partner with the University of California Cooperative Extension Central Sierra and the Calaveras County Agricultural Commissioner to work directly with farmers to understand the beneficial nature of food additives on enteric fermentation and help implement food additive techniques to reduce enteric fermentation emissions.

Table 21. Measure AG-3 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	7,721	13,512



Carbon Sequestration

The following measures aim to sequester carbon within the County. Measures include sustainable land management practices on natural and working lands and exploring composting techniques that minimize emissions.

Carbon Sequestration (CS)

Measure CS-1: Conserve and Preserve Natural and Working Lands

Pursue funding to increase carbon sequestration within the unincorporated areas of the County and continue to conserve and preserve natural and working lands. Pursue such funding to support the following measures:

1. Collaborate with the Calaveras County Resource Conservation District and local property owners (such as the California Rangeland Trust, State of California and U.S. Forest Service) to identify and achieve carbon farming, forest management, and rangeland management opportunities to sequester carbon within the County.
2. Reduce by 20% the rate undeveloped land and land used for agricultural purposes is converted into developed properties.
3. Actively promote carbon sequestration techniques, as outlined in the Sustainable Agricultural Lands Conservation Program under the California Department of Conservation.
4. Track development at the state level pertaining to sequestration of natural and working lands, including through the CARB's Natural and Working Lands GHG Inventory and the multi-agency California 2030 Natural and Working Lands Climate Change Implementation Plan.
5. Examine and implement the key recommendations for successful implementation outlined in the California 2030 Natural and Working Lands Climate Change Implementation Plan, including working with multiple partners; augmenting state funding and resources; coordinating cross-agency implementation; prioritizing capacity building, technical assistance, and collaborative planning; recognizing restoration and building workforce

capacity; investing in education and outreach; leveraging cross-sector interactions; supporting ongoing research; and considering and measuring non-carbon co-benefits.

6. Explore and apply innovative techniques to increase carbon sequestration on agricultural land, including but not limited to montane meadow restoration, oak woodland restoration, chaparral and shrubland restoration and management, agroforestry, grazing land, grassland and cropland management, crop covering, mulching, reduced or no-till practices and planting of windbreaks.
7. Work with CARB and other participating agencies to identify and implement actions to maximize the use of the County's natural and working lands, including exploration of funding opportunities such as green loans, mitigation and carbon banking or pursuit of grant funding.
8. Work with regional partners such as Calaveras Foothills Fire Safe Council to explore reuse opportunities for cleared forest residue.
9. Implement forest management activities from the California 2030 Natural and Working Lands Climate Change Implementation Plan, including avoiding forest conversion to other uses with less sequestration; clearing understory; vegetation management; fuel breaks; prescribed burns; partial cutting and/or thinning; enhanced biomass utilization; expansion of reforested areas; restoration of all habitats; urban forest expansion; silvopasture; and prescribed grazing, among others outlined in the plan.
10. In accordance with Calaveras County General Plan Implementation Measure RP-1F, establish mitigation program guidelines specific to carbon sequestration/GHG emissions impacts caused by conversion of land designated Resource Production on the General Plan Land Use Map to another nonresource production land use. The guidelines shall include, at a minimum, the following alternatives:
 - a. Acquisition of a conservation easement located within Calaveras County at a 1:1 ratio
 - b. Purchase of banked mitigation credits for use by a land bank operating in Calaveras County for use within the county
 - c. Payment into a fund to restore, enhance and improve Resource Production designated land. The fund would be managed by the County Agricultural Department. Use of the fund would be determined by the Board of Supervisors with input from the Agriculture Department, the Calaveras County Resource Conservation District, the University of California Cooperative Extension Office, the Agricultural Advisory Committee, and local landowners
 - d. On-site mitigation
 - e. Other mitigation measures developed and/or approved by the County
11. In accordance with Calaveras County General Plan Implementation Measure RP-2F, continue to maintain an Agricultural Advisory Committee to review and recommend action to the Board of Supervisors concerning California Land Conservation Contracts (Williamson Act) and to promote a compatible relationship between agricultural and non-agricultural activities and to ensure that appropriate provisions are incorporated as necessary into new land use proposals to preserve ongoing agricultural operations.

12. In accordance with Calaveras County General Plan Implementation Measure COS-5-M, apply the following measures to residential projects requiring discretionary approval and subject to CEQA review:
 - a. Where feasible, residential subdivisions shall include parks and open space with landscaping and/or native vegetation capable of carbon sequestration.
13. In accordance with Calaveras County General Plan Implementation Measure RP-2C, update the County Code relative to Agricultural Preserves for consistency with County needs and state Williamson Act requirements and include provisions for open space and recreational use contract.
14. Apply for grants from the California Strategic Growth Council and others for a planning grant regarding agricultural land strategy plans and other mechanisms that promote GHG reductions and carbon sequestration through preservation of such assets as grasslands and oak woodlands.
15. In accordance with Calaveras County General Plan Implementation Measure COS-4D, with regard to oak woodlands, develop local mitigation measures specific to carbon sequestration/GHG emissions impacts and pursuant to Public Resources Code (PRC) section 21803.4(b)(4), in addition to the mitigation measures provided in PRC section 21803.4(b)(1-3), to facilitate the environmental review process relative to mitigating significant direct and cumulative carbon sequestration/GHG emissions impacts relevant to oak woodlands, in conjunction with discretionary project approval and address pre-development removal of oaks.
16. Conduct a carbon sequestration status study in 2030 to identify further natural and working lands opportunities and emergent technology for carbon sequestration within the County.

Measure CS-1 is not quantified.

Measure CS-2: Apply Compost

Meet SB 1383 compost or organics procurement targets by applying 3,754 tons of compost to land areas throughout the County by 2030.

1. Require County agencies to procure and apply compost generated from County government organic waste to the exterior of suitable facilities as part of their operations.
2. Build partnerships with local growers, rangelands, and public use green spaces to distribute compost and procure at scale, allowing for reduced procurement costs.
3. Pursue funds to conduct a study to determine areas in the County with the highest carbon sequestration potential for compost application.
4. Work with local organizations and academic institutions to conduct ongoing outreach to users of compost to monitor soil carbon sequestration.
5. Explore partnerships with accredited carbon credit verifiers and technology providers who can quantify and monetize compost application credits.

Table 22. Measure CS-2 GHG Reduction Impact (MT CO₂e/Year)

	2030	2045
Total	863	888

Summary

The County adopted target for the year 2030 is 40% below 1990 levels, in accordance with SB 32. The emissions reduction target is provided in **Table 23** below. Qualified plans that meet CEQA requirements include ones that meet or exceed SB 32.

Table 23. Forecast and Target Values

Target Year	Business-as-Usual Emissions	Adjusted Business-as-Usual Forecast	Target Emissions
1990	356,163	--	--
2030	367,482	306,545	213,698

The County's GHGRP covers measures to reduce GHG emissions associated with the following sectors: energy, transportation, solid waste, water and wastewater, agriculture, and carbon sequestration.

Table 24 summarizes the impact of each GHG reduction measure by sector and calculates the amount of GHG emissions that will be reduced by the target years: 2030 and 2045. Unquantified supportive measures were not included in the table.

Table 24. GHG Reduction Summary (MT CO₂e)

Measure	Description	2030	2045
Energy			
RE-1:	Increase Community Renewable Energy	1,418	--
EO-1:	Conduct Energy Conservation Outreach and Education	4,147	911
EB-1:	Establish a Green Business Program	23	7
EB-3:	Facilitate Energy Efficiency Retrofits	3,868	1,727
EB-4:	Implement an Equipment Time-of-Replacement Ordinance	9,748	27,531
NC-1:	Incentivize Highly Efficient New Development	58	98
NC-2:	Incentivize Zero Net Energy New Construction	81	192
NC-4:	Increase Clean Wood-Burning Appliances	28	62
Energy Sector Total		19,371	30,528

Measure	Description	2030	2045
Transportation			
TR-1:	Increase EV/ZEV Adoption	39,500	58,604
TR-2:	Decarbonize the County Municipal Fleet and Employee Commute*	1,486	3,744
TR-3:	Increase Public Transit Mode Share	11,376	26,769
TR-4:	Increase Active Transportation Mode Share	187	428
TR-5:	Decarbonize Off-Road Equipment and Vehicles	7,787	17,362
Transportation Sector Total		58,850	103,163
Solid Waste			
SW-1:	Organic Waste Diversion	2,924	3,007
SW-2:	Diversions to Rock Creek Landfill	7.25	7.45
SW-3:	Methane Capture	51.01	52.46
Solid Waste Sector Total		2,982	3,067
Water and Wastewater			
WW-1:	Use of Reclaimed (Non-Potable) Water	92	97
WW-2:	Increase Efficiency of Plumbing Systems in New Construction	66	68
Water and Wastewater Sector Total		158	165
Agriculture			
AG-1:	Increase Crop Production Efficiency and Soil Health	2,483	5,444
AG-2:	Implement Livestock Manure Management Strategies	629	2,514
AG-3:	Reduce Methane Emissions from Livestock	7,721	13,512
Agriculture Sector Total		10,833	21,470
Carbon Sequestration			
CS-2:	Apply Compost	863	888
Carbon Sequestration Sector Total		863	888
All Sectors Total		93,059	159,281

*TR-2 is not included in sector total to avoid double counting.

Notes: Totals may not sum due to independent rounding.

The GHG reduction impacts per measure are summarized by sector above, then totaled to calculate the total reduction of GHG emissions via the GHGRP. The reduced total GHG emissions resulting from implementation of the GHGRP are then compared to the emissions reduction goals for each target year.

Table 25 below summarizes the total emissions under an ABAU scenario, the reduced total emissions with the implementation of the GHG reduction measures, and the emissions gap between the reduced total emissions from the GHGRP and the emissions reduction goal for each target year. The emissions

gap represents the difference between where GHG emissions are predicted to be with plan implementation and where GHG emissions should be based on the County's target setting. For example, a positive (greater than zero) value for the emissions gap means that the reduced total emissions will still exceed the emissions reduction goal; in other words, the emissions gap is the amount of reduction that is still needed to meet the targets.

Based on the total reductions provided by the GHGRP, the County would achieve its adopted 2030 target with the above measures.

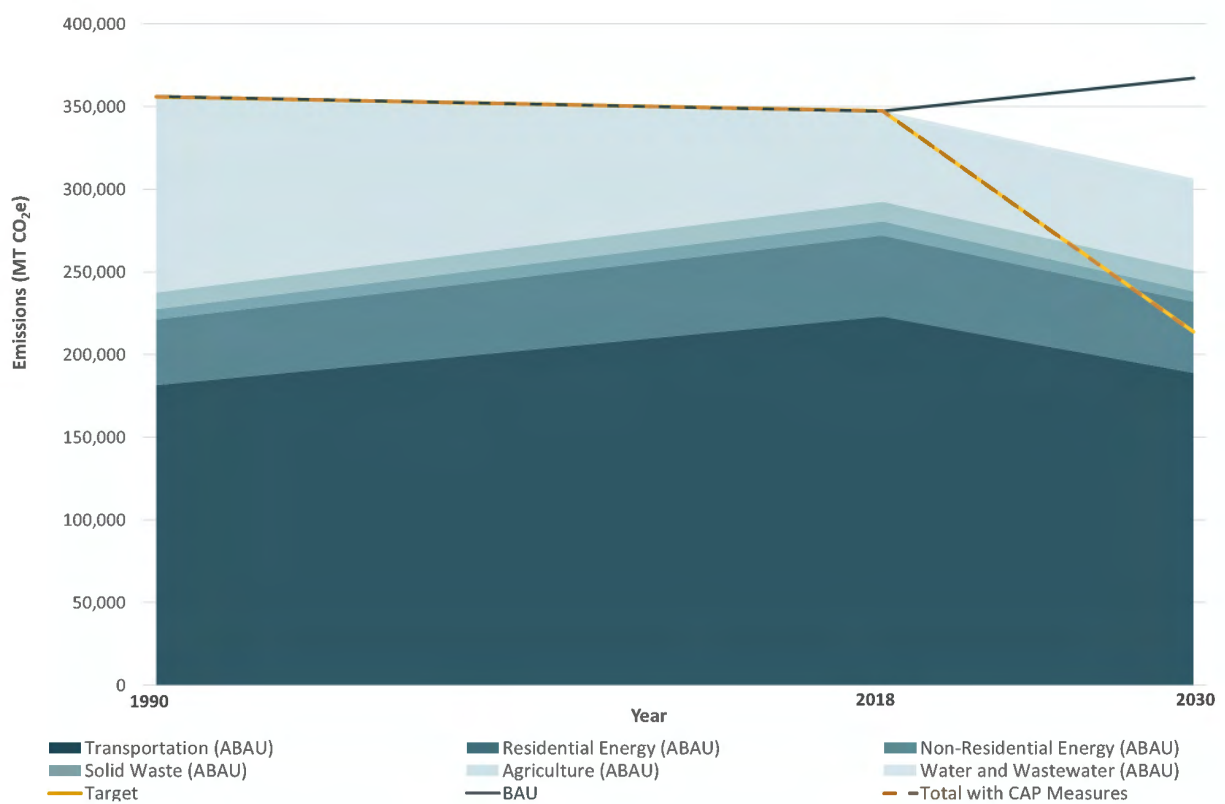
Table 25. County Inventory, Forecast, and Reduction Targets (MT CO₂e)

	1990	2018	2030	2045
Emissions Inventory and ABAU Forecast (MT CO ₂ e)	356,163	347,311	306,545	276,780
Target % Reduction below 1990 Levels	--	--	40%	N/A
Target Emissions Level (MT CO ₂ e)	--	--	213,698	N/A
Reductions from ABAU Forecast Needed to Achieve Target (MT CO ₂ e)	--	--	92,847	N/A
Total Emissions Reductions from GHGRP	--	--	93,059	159,281
Remaining Emissions Gap to Achieve Target (MT CO₂e)	--	--	(212)	N/A

Notes: Totals may not sum exactly due to independent rounding. The emissions gap value in parentheses indicates the target has been achieved with a surplus of emissions reductions. The County does not have an established emissions reduction target for 2045. However it is included in this table, as state regulations encourage 2045 goals.

Figure 5 provides a snapshot of the emissions projections for the County from 1990 through 2030, broken down by sector, and in relation to these emissions, the reduction target (solid yellow line) against the implementation of the GHGRP measures (dashed yellow line). The reduction measures demonstrate a path to achieve the 2030 target.

Figure 5. ABAU Forecast with Reductions from Mitigation Measures



IMPLEMENTATION, MONITORING & CEQA STREAMLINING CHAPTER 6

Chapter 6. Implementation, Monitoring & CEQA Streamlining

Implementation & Monitoring

This chapter outlines how the County of Calaveras (County) will implement the GHGRP Measures described above and monitor progress toward achieving the 2030 GHG emission reduction targets. The County has committed to reducing GHG emissions to 40% below 1990 levels by 2030.

Successful implementation of the GHGRP Measures will determine whether the GHG emissions reduction targets are met. As a result, measures must be regularly assessed and continuously monitored to ensure: 1) All measures include clearly defined steps necessary for implementation; 2) Individual measures are contributing to the overall GHG reduction target; 3) The GHGRP is on track to achieve its overall GHG reduction targets; and 4) Beneficial community outcomes are attained. This Implementation & Monitoring section summarizes the GHGRP Measures and assigns a County Department lead and support, and implementation timeline for a successful outcome.

Implementation of the GHGRP includes a combination of regulations, programs, incentives, capital improvements, and educational activities. County efforts complement and build on other federal and State efforts. Because County efforts align with federal and State priorities, it is anticipated that the County will be able to take advantage of public funding opportunities, such as funding programs made available through the Inflation Reduction Act. Regular monitoring will allow the County to track the effectiveness of the GHGRP Measures, update the emissions inventory, and make adjustments to keep on track toward achieving the GHG emissions reduction targets. The GHGRP may need to be updated to reflect and respond to changing technology, federal and State regulations, demographics, funding opportunities, and market conditions to be effective.

After adoption, the GHGRP will continue to be maintained by the Planning Department. Budgeting for implementation of GHGRP Measures will occur as part of the annual budgeting process for each lead and supporting department and grants will be pursued as applicable. The County commits to preparing an annual progress report on the progress of each measure annually and conducting comprehensive GHG emissions inventories at least every two years. Staff will track progress against the expected quantified outcome of each GHGRP Measure. Departments responsible for contributing to the implementation of each GHGRP Measure are listed below in **Table 22**. **Table 22** includes a relative cost associated with each measure represented by dollar signs as follows: \$ = Low Cost; \$\$ = Medium Cost; and \$\$\$ = High Cost. **Table 22** also includes an estimated timeframe to implement each measure. It is anticipated that a comprehensive update to the GHGRP will occur approximately every five years to respond to changes in federal and State regulations, reflect major changes to emissions sources and opportunities for emissions reduction, and for consistency with other County land use planning efforts.

Table 22. GHGRP Implementation Plan

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Energy				
Measure RE-1: Increase Community Renewable Energy Convert 14% of existing residential grid electricity and 18% of existing commercial grid electricity to renewable electricity by 2030.	Education Funding/Grant Writing Technical Assistance Incentive Programs Capital Improvements	Planning Administrative Office Building & Safety Partners: Yosemite Clean Energy	2023 - 2030	\$\$\$
Measure RE-2: Promote On-Site Renewable Energy Generation (Government Operations) Support efforts on available government-owned land or buildings to increase renewable and carbon-free energy generation, including, wind, solar, hydro, biomass, and others. Promote on-site renewable energy generation and energy storage. Evaluate the renewable energy potential and assess barriers to increased renewable energy generation.	Education Feasibility Study Funding/Grant Writing Capital Improvements	Planning City Administration Partners: Yosemite Clean Energy, Calaveras Council of Governments	2023-2030	\$\$-\$\$\$
Measure RE-3: Incentives for Alternative Energy Consistent with Implementation Measures COS-5E and PF-3F of the County's General Plan, provide incentives to facilitate alternative energy projects. Pursue funding to support the incentive program. Modify the County's development standards and zoning ordinance to provide incentives for providing alternative energy-producing facilities compatible with	Education Feasibility Study Funding/Grant Writing Incentive Programs Capital Improvements Ordinance	Planning Building & Safety Public Works Partners: Yosemite Clean Energy, Calaveras Council of Governments, Department of Energy	2023-2030	\$\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
surrounding uses, such as solar arrays in parking lots that serve to provide shade and energy production. Cooperate with and support state and federal programs that assist landowners in energy conservation and production. Support programs that provide incentives for property owners to install alternative energy facilities such as solar arrays, small windmills, and other energy systems. Measure RE-4: Codes and Standards for Alternative Energy Consistent with Implementation Measures PF-3A, RP-5A, and RP-2A of the County's General Plan, amend codes to facilitate alternative energy projects. Amend the zoning code to encourage the incorporation of solar, wind, and other alternative energy infrastructure in project design to establish standards for locating and permitting solar farms, wind farms, and other alternative energy facilities to ensure land use compatibility; addressing the potential visual impacts of alternative energy infrastructure to the extent permitted by law. Amend the Calaveras County Code to recognize the development of geothermal resources and their related land uses and refer proposals involving or affecting geothermal resources to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources.	Education Feasibility Study Ordinance	Planning Administrative Office Building & Safety Partners: Department of Conservation	2023-2030	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Amend the County Code to incorporate required findings and procedures for implementing state legislation and Department of Conservation requirements relative to solar-use easements and installations affecting Williamson Act Contracts.				
Measure EO-1: Conduct Energy Conservation Outreach and Education Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education.	Education Regional Collaboration Incentive Programs	Planning Building & Safety Partners: Habitat for Humanity; Amador Tuolumne Community Action Agency; PG&E	2023-2045	\$
Measure EB-1: Establish a Green Business Program Achieve participation of 5% of businesses in 2030 and 2045 within a Green Business Program. Reduce existing and new commercial energy use (all sources) by 10% in 2030 and 2045.	Technical Assistance Education Incentive Programs	Planning Building & Safety	2023-2045	\$
Measure EB-2: Improve Building Energy Efficiency of Government Operations Pursue grants to improve the energy efficiency of existing county buildings and infrastructure whenever a project is undertaken to improve or maintain them. This includes replacement, maintenance, or improvement of both interior and exterior lighting systems (streetlight, parking lot lighting, traffic signals, other outdoor area lighting, and controls), HVAC and water heating systems (equipment, controls,	Funding /Grant Writing Capital Improvements	Planning Building & Safety Public Works Administrative Office Sheriff's Office Fire Prevention	2023-2045	\$-\$\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
sensors, etc.), building envelope components (insulation, roofing, glazing, etc.), and other energy improvements, lighting, controls, sensors, building envelope, and any other energy loads. In accordance with General Plan Implementation Measure COS-5M, new and renovated County facilities shall be designed to exceed the requirements of the currently adopted California State Energy and Green Building Codes at the time of project approval. Buildings shall be a minimum of 5% more efficient than required and shall eliminate the use of fossil fuels to the extent feasible.				
Measure EB-3: Facilitate Energy Efficiency Retrofits Reduce existing residential and commercial energy use (all sources) by 10% and 15%, respectively, in 2030 and 25% and 30% in 2045, respectively, through energy efficiency retrofits.	Funding/Grant Writing Education Incentive Programs	Planning Building & Safety Partners: Habitat for Humanity, Amador Tuolumne Community Action Agency; PG&E	2023-2045	\$\$
Measure EB-4: Implement an Equipment Time-of-Replacement Ordinance At equipment end of life, replace 45% of existing residential and commercial natural gas and propane water heaters with electric alternatives by 2030 and 90% by 2045 (based on 10-year life and 10% non-compliance). At equipment end of life, replace 23% of natural gas, propane, and wood space heating equipment with electric alternatives by 2030	Ordinance Incentive Programs Funding/Grant Writing	Planning Building & Safety Partners: Habitat for Humanity, Amador Tuolumne Community Action Agency; PG&E	2025-2030	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
and 90% by 2045 (based on 20-year life and 10% non-compliance).				
Measure NC-1: Incentivize Highly Efficient New Development Achieve participation from 10% of new residential buildings in high energy efficient building measures starting from 2025 through 2045. Reduce new residential energy use (all sources) by 53%. Achieve participation from 10% of new commercial buildings in high energy efficient building measures between 2025 and 2045. Reduce new commercial energy use (all sources) by 30%.	Education Funding/Grant Writing	Planning Building & Safety Partners: Habitat for Humanity, PG&E	2025-2045	\$
Measure NC-2: Incentivize Zero Net Energy New Construction Achieve participation in developing zero net energy buildings by 10% of new residential and commercial buildings from 2025 through 2045.	Funding/Grant Writing Ordinance Technical Assistance Incentive Programs	Planning Building & Safety Partners: Habitat for Humanity, PG&E	2025-2045	\$-\$\$
Measure NC-3: Reduce Criteria Air Pollutants and Emissions from New Development Consistent with Implementation Measures COS-5F and COS-5H of the County's General Plan, reduce criteria air pollutants, including GHG emissions, from new developments. Evaluate proposed discretionary developments subject to CEQA evaluation to determine whether they will emit criteria air pollutants, including GHGs, exceeding CCAPCD's standards. Should proposed developments within the County be anticipated to result in	Technical Assistance Education	Planning County EMA Partners: Calaveras County Air Pollution Control District	2023-2045	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
significant impacts related to the emission of criteria air pollutants, the County shall require the applicable mitigation measures provided in the CCAPCD's Guidelines for Assessing and Mitigating Air Quality Impacts of Land Use Projects.				
Measure NC-4: Increase Clean Wood-Burning Appliances By 2025, adopt an ordinance in alignment with Implementation Measure COS-5N of the County's General Plan that requires all newly installed wood-burning appliances, including stoves and factory-built fireplaces, installed in residential projects be EPA certified to the most current EPA standards, with an exception for projects permitted under the Limited Density Owner Built Rural Dwelling permit program, listed historic structures or as may otherwise be stated in the most currently adopted Housing Element. EPA-rated woodstoves are assumed to generate 30% less emissions than non-EPA-rated woodstoves (EPA-Phase 2 certified stoves currently produce no more than 4.5 grams per hour).	Education Ordinance	Planning Building & Safety	2025-2030	\$
Transportation				
Measure TR-1: Increase EV/ZEV Adoption Implement items 1 through 11 described in Chapter 5. By planning, incentives, and pursuit of public and private funding, accelerate ZEV adoption, including eEVs, to 30% by 2030 in the	Funding/Grant Writing Feasibility Study Capital Improvements Ordinance Education	Planning City Administration Partners: Calaveras Council of Governments, Calaveras Visitor's Bureau	2023-2030	\$\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
unincorporated areas of Calaveras County. As new non-fossil-fuel vehicle technologies develop, provide for refueling/recharging alternatives in addition to battery chargers. Measure TR-2: Decarbonize the City Municipal Fleet and Employee Commute Implement items 1 through 4 described in Chapter 5. Lead by example by pursuing funding to the Calaveras County municipal fleet and related commuter vehicles to achieve a 40% ZEV fleet by 2030. Measure TR-3: Increase Public Transit Mode Share Implement items 1 through 9 described in Chapter 5. Develop a robust public transportation network consistent with Pitkin County's (CO) Roaring Fork Transportation Authority that employs ZEV buses, demand-responsive transport options, and ZEV ridesharing to increase Calaveras County public transit mode share to 6% by 2030. Measure TR-4: Increase Active Transportation Mode Share Implement items 1 through 10 described in Chapter 5. Increase active transportation mode share within Calaveras County by 1%, to a total of 4%, by 2030.	Regional Collaboration EV/NEV Plan Policy Funding/Grant Writing Feasibility Study Capital Improvements Regional Collaboration Education Incentive Programs Funding/Grant Writing Feasibility Study Education Program Regional Collaboration Funding / Grant Writing Capital Improvements Education Program Regional Collaboration	Administration Office Public Works Planning Administrative Office Partners: Calaveras Council of Government, Calaveras Unified School District Planning City Administration Partners: Calaveras Council of Governments, Calaveras Unified School District	2023-2045 2023-2045 2023-2045	\$\$ \$\$ \$\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Measure TR-5: Decarbonize Off-road Equipment and Vehicles Implement items 1 through 9 described in Chapter 5. Decarbonize (i.e., electrify or convert to biofuel) a sufficient amount of off-road equipment and vehicles in the unincorporated areas of Calaveras County to reduce their combined fossil fuel use by 30% by 2030. As new non-fossil-fuel technologies develop, provide for any new clean alternatives to off-road fossil-fuel vehicles and equipment.	Feasibility Study Ordinance Technical Assistance Education Funding/Grant Writing Regional Collaboration Training	City Administration Planning Public Works	2024-2045	\$\$
Measure TR-6: Create a Tourism Economy Implement items 1 through 6 as described in Chapter 5. Work to develop a tourism economy within Calaveras County to help fund the decarbonization of the transportation sector.	Transient Occupancy of Gas Tax Education Regional Collaboration Funding/Grand Writing	Administrative Office Partners: City of Angels, Calaveras Visitor's Bureau, Calaveras County of Governments	2023-2045	\$
Measure TR-7: Establish Calaveras County as a Pilot Program Implement items 1 through 6 as described in Chapter 5. Partner with the RCRC to establish Calaveras County as a pilot program for the decarbonization of the transportation sector in rural communities.	Regional Collaboration Funding/Grand Writing Education	Planning Administrative Office Partners: Calaveras County of Governments, City of Angels, Rural County Representatives of California, Calaveras Visitor's Bureau, Calaveras Chamber of Commerce	2023-2045	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Measure TR-8: Develop a Biofuel Industry Implement items 1 through 7 as described in Chapter 5. Partner with local utilities and state agencies to develop a biofuel industry throughout Calaveras County to fund decarbonization of the transportation sector.	Regional Collaboration Funding/Grant Writing Education	Planning Administrative Office Partners: City of Angels, Yosemite Clean Energy, Calaveras Council of Governments	2023-2045	\$\$\$
Measure TR-9: Pursue State Funding Implement items 1 through 4 in Chapter 5. Establish Calaveras County as a pilot program for a rural carbon-free transportation system through state investment and grants such as CCI.	Regional Collaboration Funding/Grand Writing Education	Planning Administrative Office Partners: City of Angels, Yosemite Clean Energy, Calaveras Council of Governments	2023-2045	\$
Measure TR-10: Pursue Federal Funding Implement items 1 through 3 in Chapter 5. Pursue federal funding from federal programs to decarbonize the transportation sector.	Regional Collaboration Funding/Grant Writing Education Technical Assistance Lobbying	Planning Administrative Office Partners: Calaveras Council of Governments. Federal elected officials	2023-2045	\$
Solid Waste				
Measure SW-1: Organic Waste Diversion In accordance with General Plan Conservation and Open Space Element Air Quality/Greenhouse Gases Measures COS-5D and COS-5E, the County will implement waste management practices to support organics diversion. Programs will include: (1) providing green waste collection programs at County operated landfill and transfer stations when feasible (COS-5D); (2) utilizing public/private partnerships to utilize green waste in	Regional Collaboration Funding/Grant Writing Education Technical Assistance	Planning Administrative Office Integrated Waste Management County EMA Partners: CalWaste, Local businesses	2023-2045	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
alternative uses and waste to energy facilities (COS-5D); and (3) including a review of the zoning ordinance and Air Pollution Control District regulations and amendment as necessary to facilitate the development of green waste to energy projects and other projects that convert green waste to products (COS-2E). Programs may also include investigating and incentivizing community composting hosted by individuals and organizations. In addition, the County will coordinate with individuals, community groups, and publicly funded and privately managed recycling and composting providers to educate the public about the benefits of composting. Through a combination of these programs, the County will divert 75% of food and green yard waste from landfills to home & community-based composting facilities, biomass plants, and other local facilities to reduce short-lived climate pollutants and minimize transportation-related emissions compared to existing conditions. Measure SW-2: Diversion to Rock Creek Landfill The County will divert an additional 5% of total Calaveras County solid waste disposal from other landfills to Rock Creek Landfill, to the extent Rock Creek Landfill has the capacity to receive this diverted material.	Policy	Integrated Waste Management Public Works Administrative Office Partners: CalWaste	2023-2045	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Measure SW-3: Methane Capture The County will continue to manage Rock Creek Landfill to limit methane release and pursue funding to identify and implement measures sufficient to achieve an average increase in methane capture of 1% for all waste types by 2030.	Funding Capital Improvement	Integrated Waste Management Public Works	2023-2030	\$
Water & Wastewater				
Measure WW-1: Use of Reclaimed (Non-Potable) Water In accordance with General Plan Public Facilities and Services Element Water and Wastewater Measures PF-2G, PF-2H, and PF-2I, the County will (1) work with local water and wastewater agencies and provide land use or other data in the County's possession where such data will provide information necessary to prepare and update water and wastewater master plans, agency master plans and similar water and wastewater planning documents, including strategies for increasing energy efficiency (PF-2G); (2) amend the County Code to recognize appropriate uses for reclaimed water as an alternative for various land uses and keep apprised of the latest developments in the use of reclaimed water. Revise the County's landscaping standards and incorporate those standards as conditions of project approval to facilitate the use of gray	Capital Improvements Regional Collaboration Ordinance Funding/Grant Writing Incentive Programs	County EMA Public Works Administrative Office Partners: Local water and wastewater agencies, development community	2023-2045	\$\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
water and reclaimed water systems for landscape irrigation (PF-2H); and (3) work with wastewater service providers to expand the use of recycled wastewater for agricultural uses (PF-2I). The County will pursue funding to work with local and regional agencies to create incentives and rebates for greywater systems, composting toilets, or other residential retrofits. Through a combination of efforts, the County will achieve a 10% reduction in total potable water use. Measure WW-2: Increase Efficiency of Plumbing Systems in New Construction Research, identify, and quantify measures to be included in a new ordinance to be adopted by 2025 that will reduce potable water usage in new residential and commercial projects by 5% over code minimum designs in alignment with Implementation Measure PF-2G of the County's General Plan. Such measures may include compact plumbing design requirements, alternate pipe sizing methods and materials, gray water systems, additional landscape irrigation controls, and lower flow plumbing fixtures if commercially and readily available at the time of drafting of the ordinance.				
	Feasibility Study Ordinance Education Incentive Programs	Planning Building & Safety Administrative Office Partner: Habitat for Humanity	2023-2045	\$
Agriculture				
Measure AG-1: Increase Crop Production Efficiency and Soil Health	Feasibility Study Regional Collaboration Funding/Grant Writing	Agriculture Partners: CARB, University of California Cooperative	2023-2045	\$\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Implement items 1 through 9 in Chapter 5. Increase crop production efficiency and soil health to reduce associated GHG emissions 30% by 2030.	Education Technical Assistance	Extension Central Sierra, Calaveras County Agricultural Commissioner, Calaveras County Resource Conservation District Agriculture Partners: California Department of Food and Agriculture, University of California Cooperative Extension Central Sierra, Calaveras County Agricultural Commissioner Agriculture Partners: University of California Cooperative Extension, County Agricultural Commissioner	2023-2045	\$\$
Measure AG-2: Implement Livestock Manure Management Strategies Implement items 1 through 8 in Chapter 5. Implement livestock manure management strategies to reduce associated GHG emissions by 10% by 2030.	Feasibility Study Regional Collaboration Funding/Grant Writing Education Ordinance			
Measure AG-3: Reduce Methane Emissions from Livestock Implement items 1 through 5 in Chapter 5. Reduce methane emissions from livestock enteric fermentation 20% by 2030.	Feasibility Study Regional Collaboration Funding/Grant Writing Education		2023-2045	\$
Carbon Sequestration				
Measure CS-1: Conserve and Preserve Natural and Working Lands Implement items 1 through 16 in Chapter 5. Pursue funding to increase carbon sequestration within the unincorporated areas of the County and continue to conserve and preserve natural and working lands.	Feasibility Study Regional Collaboration Funding/Grant Writing Education Technical Assistance Policy	Planning Partners: CARB Calaveras County Agriculture Department, Calaveras County Resource Conservation District, California Rangeland Trust, U.S. Forest Service, California Department of Conservation, CARB,	2023-2045	\$

Summary of GHGRP Measure	Type of Action Needed	County Lead/Supporting Departments and Partners	Implementation Timeframe	Relative Cost
Measure CS-2: Apply Compost Implement items 1 through 5 in Chapter 5. Meet SB 1383 compost or organics procurement targets by applying 3,754 tons of compost to land areas throughout the County by 2030.	Regional Collaboration Funding/Grant Writing Education Policy	Calaveras Foothills Fire Safe Council	2023-2045	\$
		Planning Partners: Local growers, University of California Cooperative Extension Central Sierra, Calaveras County Agricultural Commissioner		

CEQA Streamlining

The County has prepared this GHGRP to be consistent with Section 15183.5 of CEQA Guidelines, Tiering and Streamlining the Analysis of Greenhouse Gas Emissions. Plans for reducing GHG emissions that are determined adequate for CEQA tiering are typically referred to as a “qualified plan”. A qualified plan allows a lead agency to analyze and mitigate potential environmental impacts related to GHG emissions at the programmatic level. Future projects can tier from the plan analysis; that is, the proposed project may incorporate by reference or rely on the programmatic analysis to evaluate project impacts. A public or private project that demonstrates consistency with the qualified plan and incorporates applicable reduction measures would also be determined to have a less than significant cumulative impact related to GHG emissions. A qualified plan streamlines individual project analysis and allows for consistency across project analysis to achieve Countywide goals, rather than determining GHG emissions’ significance on a case-by-case basis. To be considered a qualified plan, the GHGRP must meet the following criteria outlined in CEQA Guidelines Section 15183.5(b)(1):

- a) Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- b) 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;
- c) Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- d) 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;
- e) Establish a mechanism to monitor the plan’s progress toward achieving the level and to require amendment if the plan is not achieving specified levels;
- f) Be adopted in a public process following environmental review.

Chapter 2 of this GHGRP includes the inventory of existing and projected GHG emissions from community actions in the County. Chapter 5 outlines the suite of GHG reduction measures that would reduce community emissions to achieve the SB 32 statewide emissions reduction goal of 40% below 1990 levels by 2030, and put the County on the path to achieving its fair share contribution to achieve carbon neutrality by 2045. As such, this GHGRP is consistent with Criteria a, c, and d. This chapter outlines how the County would monitor plan progress in accordance with Criteria e. The appropriate CEQA document will be prepared for this GHGRP and adopted by the County, as required by Criteria f. Finally, in accordance with Criteria b, the County will outline a process for individual projects to determine consistency with the GHGRP.

The County will develop a Greenhouse Gas Reduction Plan Consistency Checklist for consistency with the GHGRP. The Consistency Checklist will apply to discretionary projects that are subject to CEQA. A project that is consistent with the land use assumptions in the GHGRP (i.e., consistent with the General Plan) and demonstrates consistency with applicable GHGRP reduction strategies can be determined to be consistent with the GHGRP without a project-specific quantitative GHG analysis. As such, public and

private discretionary projects may use this GHGRP to evaluate the potential significance of project-related GHG emissions in the CEQA process. Following the CEQA process and development of the GHGRP Consistency Checklist, a project that demonstrates consistency with the GHGRP as outlined in the process above would be determined to have a less than significant cumulative impact related to GHG emissions. If, and until, the GHGRP Consistency Checklist is developed, a discretionary project must show consistency with the GHGRP if streamlining using this qualified plan.

Appendices

Appendix A. Calaveras County Revised Inventory and Forecast Amendment

Introduction

The *Calaveras County Community-Wide and Government Operations 2018 Greenhouse Gas Inventories Report* (hereafter referred to as “original report”) was adopted by the Calaveras County (County) in November 2021. Since the adoption of the original report, the consultant team recognized that the availability of new data and techniques, as well as the use of best practices aligned with State of California’s (State’s) GHG emissions inventories, could be used to refine the County’s emissions estimates for the 2018 inventory and 2030 and 2045 ABAU forecasts. This *Calaveras County Revised Inventory and Forecast Amendment* technical memorandum (hereafter referred to as “revised report”) summarizes the original and updated GHG emissions estimates, describes the changes that were made to the original report, and explains the rationale behind the revisions.

Summary of Emissions

The County’s GHG emissions estimates in the original report and revised report for 2018, 2030, and 2045 are displayed in **Tables A-1** and **A-2** below. **Table A-2** reflects the update to the Government Operations Inventory, which does not have a corresponding forecast, so only 2018 numbers were included. The percent change in total GHG emissions between the two reports is also shown. The GHG emissions for the forecast years (i.e., 2030 and 2045) reflect the ABAU scenario. Specific descriptions of the revisions that resulted in changes to emissions are described in the following section.

Table A-1. Original Report and Revised Report Community-Wide GHG Emissions Inventory and ABAU Forecasts by Sector Summary (MTCO₂e)

Sector	2018		2030		2045	
	Original	Revised	Original	Revised	Original	Revised
Energy	56,310	57,402	43,762	49,437	35,353	37,317
Transportation	245,444	223,094	214,075	188,994	195,697	170,123
Solid Waste	12,054	12,054	12,655	12,655	13,015	13,015
Water & Wastewater	2,104	2,104	2,209	2,209	2,272	2,272
Agriculture	52,657	52,657	53,249	53,249	54,053	54,053
Total	368,569	347,311	325,945	306,545	300,385	276,780
% Change	-5.8%		-6.0%		-7.9%	

Table A-2. Original Report and Revised Report Government Operations GHG Emissions Inventory by Sector Summary (MTCO₂e)

Sector	2018	
	Original	Revised
Buildings & Facilities	537	477
Vehicle Fleet	1,974	1,974
Employee Commute	1,770	1,770
Solid Waste	212	212
Total	4,493	4,433
% Change	-1.3%	

Overview of Revisions

Off-Road Vehicles and Equipment Data

When the GHG emissions analyses for the original report were conducted, CARB's OFFROAD2017 model provided the best available data for off-road vehicles and equipment. To provide more accurate data associated with off-road vehicles and equipment, CARB updated the previous models and released a new version, OFFROAD2021. The revised report incorporates the updated data obtained from OFFROAD2021 to improve the accuracy of off-road-related emissions estimates for the county.

Additionally, OFFROAD2021 provides data at the countywide level and accounts for emissions from both incorporated and unincorporated areas (i.e., the City of Angels Camp and unincorporated Calaveras County), rather than at the level of individual jurisdictions. To estimate emissions attributable to the unincorporated county, and to exclude emissions associated with the incorporated area, countywide emissions from OFFROAD2021 for certain off-road vehicle and equipment categories were scaled using the proportion of population in the unincorporated county compared to the county as a whole. These categories include construction and mining, lawn and garden, light commercial, portable equipment, recreational equipment, and transport refrigeration units. Countywide emissions from OFFROAD2021 from the agricultural, forestry, industrial, oil drilling, and pleasure craft categories were assumed to be entirely attributable to the unincorporated county, as these activities are nonexistent or very minimal in the incorporated area of the county.

The revisions described above resulted in significant reductions in GHG emissions from off-road vehicles and equipment, particularly in 2018, which ultimately contributed to the decrease in total transportation sector emissions (i.e., on-road transportation and off-road vehicles and equipment).

Table A-3 below displays off-road vehicles and equipment and total transportation sector GHG emissions in the original and revised reports.

Table A-3. Original Report and Revised Report Off-Road Vehicles and Equipment and Transportation Sector Community-Wide GHG Emissions Inventory and ABAU Forecasts (MTCO₂e)

Report and Source/Sector	2018	2030	2045
Original Report: Off-Road Vehicles and Equipment	45,496	51,300	54,773
Revised Report: Off-Road Vehicles and Equipment	22,884	25,957	28,936
Original Report: Total Transportation	245,444	214,075	195,697
Revised Report: Total Transportation	223,094	188,994	170,123

Calaveras Public Power Agency Emissions Factor

To estimate emissions from Calaveras Public Power Agency (CPPA) electricity, the original report used a carbon dioxide (CO₂) emissions factor of 40.79 pounds of CO₂ per megawatt-hour (lb CO₂/MWh) obtained from the International Hydropower Association. To better align with the methodology that is used by CARB to prepare the State's annual statewide GHG emissions inventories, the CPPA electricity emissions factor for CO₂ was revised to 0 lb CO₂/MWh for both Community-Wide and Government

Operations inventories. CPPA supplies the County with electricity that is generated from hydroelectric sources, and hydroelectric power is considered a renewable (i.e., zero-emission) source in California.²⁷

This revision contributed to a minor reduction in commercial energy GHG emissions in 2018 and 2030 due to the elimination of emissions associated with CPPA electricity; however, additional revisions associated with forecasted electricity emissions factors, described in the “Electricity Adjusted Business-as-Usual Forecast” section below, offset these minor reductions, resulting in a net increase in total commercial energy GHG emissions in the revised report in 2030.

Tables A-4 and **A-5** below display CPPA electricity and total commercial energy sector GHG emissions in the original and revised reports for both community-wide and government operations.

Table A-4. Original Report and Revised Report CPPA Electricity and Non Residential Energy Sector Community-Wide GHG Emissions Inventory and ABAU Forecasts (MTCO₂e)

Report and Source/Sector	2018	2030	2045
Original Report: CPPA Commercial Electricity	603	241	0
Revised Report: CPPA Commercial Electricity	0	0	0
Original Report: Total Non Residential Energy	7,334	3,932	1,724
Revised Report: Total Non Residential Energy	8,429	6,482	3,688

Table A-5. Original Report and Revised Report CPPA Electricity Government Operations GHG Emissions Inventory and ABAU Forecasts (MTCO₂e)

Report and Source/Sector	2018
Original Report: CPPA Electricity from Buildings & Facilities	60
Revised Report: CPPA Electricity from Buildings & Facilities	0
Original Report: Total Buildings & Facilities Emissions	537
Revised Report: Total Buildings & Facilities Emissions	477

Electricity Adjusted Business-as-Usual Forecast

The ABAU forecasts in the original report accounted for the impact of the Renewables Portfolio Standard (RPS) included in SB 100. The RPS sets continuously escalating renewable energy

²⁷ https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf

procurement requirements for electricity utilities in California, with targets to achieve 60% and 100% renewable electricity by 2030 and 2045, respectively. These requirements were incorporated into the ABAU forecasts by calculating future electricity emissions factors based on the anticipated change in the share of renewable sources between the 2018 baseline year and the 2030 and 2045 forecast years.

During the process of developing GHG emissions reduction measure quantifications, the consultant team discovered that the methodology used in the original report's ABAU forecasts needed to be revised slightly to more accurately reflect the impact of the RPS requirement. The original report slightly overestimated the decrease in electricity emissions factors that are anticipated to result from the RPS. Therefore, the revised methodology resulted in an increase in electricity-related emissions in the 2030 ABAU forecast.

Table A-6 below displays electricity and total energy sector GHG emissions in the original and revised reports.

Table A-6. Original Report and Revised Report Community-Wide Electricity and Energy Sector GHG Emissions Inventory and ABAU Forecasts (MTCO₂e)

Report and Source/Sector	2018	2030	2045
Original Report: Electricity (all sources)	23,675	9,469	0
Revised Report: Electricity (all sources)	23,068	13,329	0
Original Report: Total Energy	56,310	43,762	35,353
Revised Report: Total Energy	57,402	49,437	37,317

Appendix B. Original GHG Inventory and Forecast: Calaveras County Community-Wide and Government Operations 2018 Greenhouse Gas Emissions Inventories

ATTACHED AS SEPARATE DOCUMENT

CALAVERAS COUNTY

Community-Wide and
Government Operations

2018 GREENHOUSE GAS
EMISSIONS INVENTORIES



November 2021



Credits & Acknowledgements

County of Calaveras Staff

Peter Maurer, Planning Director, retd.

Tim Pitt, Planner II

Calaveras Council of Governments Staff

Amber Collins, Executive Director

Scott Speer, Associate Transportation Planner

Sierra Business Council

GHG Inventory Report Authors

Meredith Anderson, Planning Technician

Sherry Hao, Energy Services Program Director

Justine Quealy, Project Manager

Jill Sanford, Communications Manager

Rincon Consultants, Inc.

Agriculture Inventory & Wildfire Assessment Reports Authors

Andrew Beecher, Sustainability Planner

Kelsey Bennett, Environmental / Sustainability Senior Program Manager

Erik Feldman, Sustainability Principal

Harris & Associates

Darin Neufeld, , Senior Project Manager

Completed with support from the Calaveras Council of Governments. The authors would like to thank staff at Calaveras County, the Calaveras Council of Governments, and special districts for providing much of the insight and local information necessary for the completion of this report.

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Executive Summary

Calaveras County (County) is addressing reducing greenhouse gas (GHG) emissions by taking climate planning action. This report serves as a guidepost to local GHG emissions reduction efforts, including future development of the County's GHG Reduction Plan that will address emissions resulting from energy use¹, transportation, solid waste disposal, treatment and transport of potable water and wastewater, and agricultural activities. Through these planning efforts, the County can achieve benefits beyond reducing emissions, including saving money – both community members' and the County's, improving economic vitality, public health, and the quality of life for residents and other community members.

This project has been split into two phases. Phase I establishes a replicable methodology for analyzing current and projected GHG emissions, develops a baseline measurement to benchmark progress over time, and proposes initial reduction targets. Phase II of this project includes developing emissions reduction plans outlining strategies, goals, and priority actions to reduce emissions consistent with state requirements, as well as communicating progress to the public, stakeholders, and policymakers. These actions will help to implement the County's General Plan goals, air quality goals, and other compliance issues related to GHG emissions reductions.

This report documents the results of community-wide and government operations GHG emissions inventories from sources within the County in 2018. Community-wide activities resulted in the emissions of 368,569 metric tons of carbon dioxide equivalent (MT CO₂e), which equates to a per capita emissions value of 8.27 MT CO₂e per year. And County government operations generated 4,493 MT CO₂e. Key findings from each inventory are listed below. More detailed discussion of each inventory is provided in the

Community-Wide Inventory Results and the **Government Operations Inventory Results** sections.

In addition, the inventory projects the County's GHG emissions from 2018 out to 2045, based on a business-as-usual (BAU) forecast and an adjusted scenario forecast (ABAU) of community-wide GHG emissions². The 2045 forecasts project an increase in growth for the

¹As of the published date of this report, the specific impacts of Public Safety Power Shutoff (PSPS) events on GHG emissions in Calaveras County are unknown. The first PSPS event took place in 2019, which is after the baseline year of 2018 used for this report. As energy sector data from 2019 and on becomes available, this can be used for future inventories and re-inventories of community-wide and government operations GHG emissions.

²Note: this does not include forecasting projections for wildfire.

BAU forecast and a decrease in growth for the ABAU scenario from the 2018 baseline. Under the BAU scenario, emissions are projected to increase by 10.8%, equating to 408,491 MT CO₂e projected to be emitted in 2045. Under the ABAU scenario, emissions are projected to decrease by 18.5%, equating to 300,390 MT CO₂e projected to be emitted in 2045. The report also includes emissions reduction target recommendations for the County to consider. More detailed information is provided in the **Emissions Forecasting** and **GHG Reduction Targets** sections.

The Calaveras County GHG inventories and reduction plans project also includes a wildfire report, a separate assessment that analyzes the carbon storage inventories for the County's natural and working lands, potential GHG emissions impact from wildfires, climate change vulnerability assessment related to wildfire, and wildfire impact reduction best practices. The 2020 Calaveras County natural and working lands total carbon stock inventories was calculated to be 74 million MT CO₂e. In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land has an emissions potential of over 8 million MT CO₂ from the conversion of carbon stocks to atmospheric carbon. Forest management can reduce the intensity and severity of wildfires in Calaveras County, reducing the GHG emissions potential per acre of forested land from 21.7 MT CO₂/acre burned down to 9.3 MT CO₂/acre burned. The full wildfire report can be viewed in **Appendix N**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

With the support from the Calaveras Council of Governments (CCOG) and guidance from County staff, Sierra Business Council (SBC), along with subconsultant team of Rincon Consultants and Harris & Associates, completed all emissions estimates in accordance with the United States Community Protocol³ (USCP) and the Local Government Operations Protocol⁴ (LGOP). Details on the inventory boundaries and the protocols can be found in the **Inventory Methodologies** section of this report.

Key Findings of the Community-Wide GHG Emissions Inventory

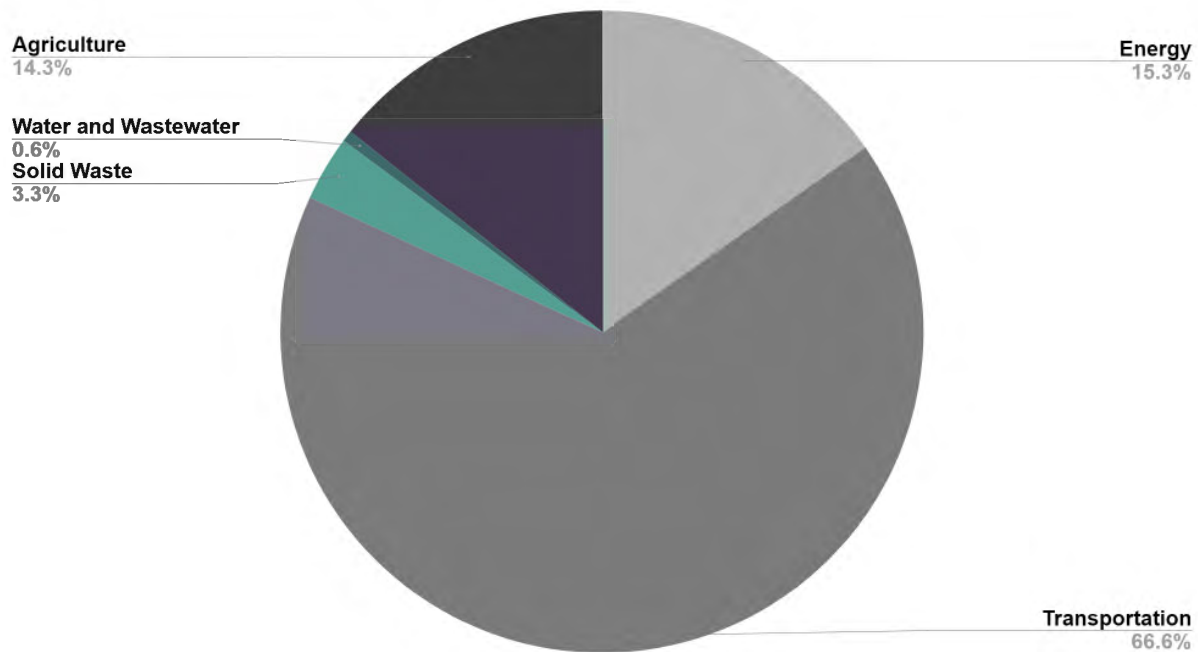
In 2018, sources within the County, and activities of the County's residents, businesses, and visitors emitted 368,569 MT CO₂e. These emissions are attributed to five different sectors: energy use, transportation, solid waste, water and wastewater, and agriculture. The transportation sector was the most significant contributor of emissions. In summary:

³ U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2021). ICLEI - Local Governments for Sustainability USA.

⁴ Local Government Operations Protocol (2021). The Climate Registry.

- Transportation accounted for 66.6%
- Energy use accounted for 15.3%
- Agriculture accounted for 14.3%
- Emissions from solid waste accounted for 3.3%
- Water and wastewater accounted for 0.6%

Figure ES-1: 2018 Emissions Summary

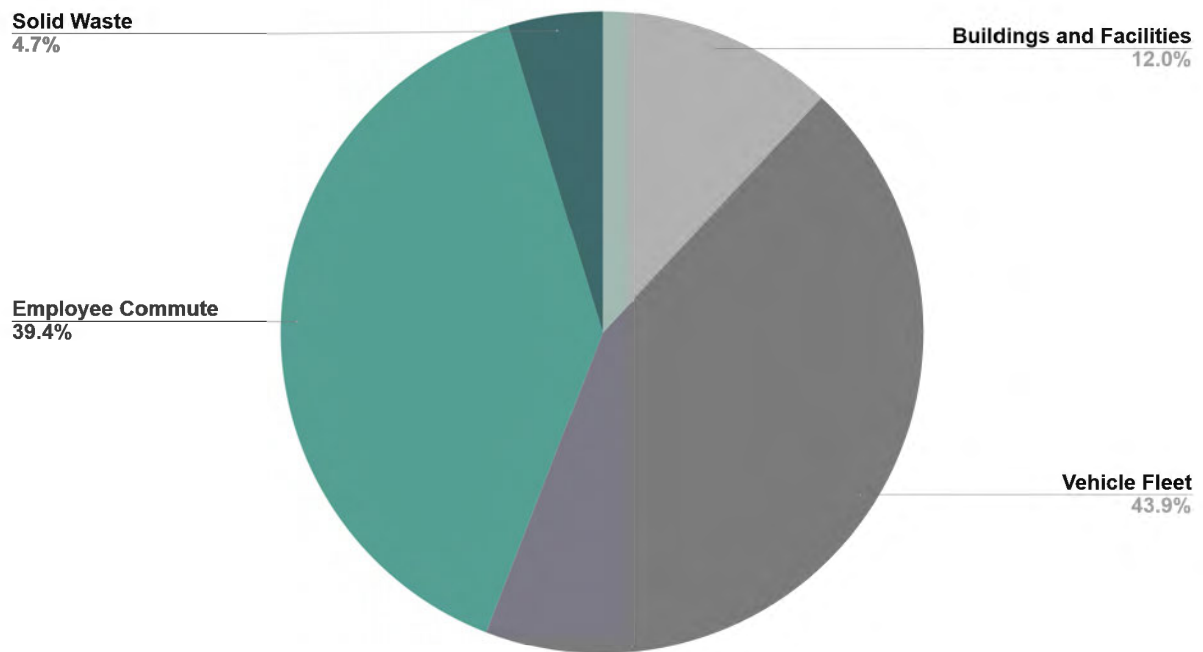


Key Findings of the Government Operations GHG Emissions Inventory

In 2018, County government operations generated 4,493 MT CO₂e for the sectors reported in this inventory. The vehicle fleet sector was the most significant contributor of emissions. In summary:

- Emissions from the County's vehicle fleet accounted for 43.9%
- Employee commutes accounted for 39.4%
- Energy from the County's buildings and facilities accounted for 12.0%
- Emissions from County facility-generated solid waste and County-owned and operated landfills accounted for 4.7%

Figure ES-2: 2018 Emissions Summary



Introduction

California's legislature and regulatory agencies have established policies relating to greenhouse gas (GHG) emissions reductions, including the California Global Warming Solutions Act (AB 32, 2006) and others discussed in more detail in the **California Climate & Policy Goals** section of the report. Due to these drivers and other motivations, many of California's governments, businesses, and the general public are placing increasing focus on quantifying and reducing GHG emissions. Calaveras County (County) has responded to California's climate action planning process by developing goals and policies for GHG emissions reductions in its 2019 General Plan Update and subsequently developing community-wide and government operations inventories for the year 2018 to implement those policies. This report documents the findings and methodologies of those inventories. With support from Calaveras Council of Governments (CCOG) and guidance from County staff, Sierra Business Council (SBC), along with the subconsultant team of Rincon Consultants and Harris & Associates, completed emissions estimates in accordance with the United States Community Protocol (USCP) and the Local Government Operations Protocol (LGOP). These protocols outline widely adopted and accepted methods for performing GHG inventories and are recommended by state agencies for local governments. More information on the inventory boundaries and the protocols used to develop the inventories is provided in the **Inventory Methodologies** section of the report.

GHG emissions are air pollutants as defined by the U.S. Supreme Court and subject to regulation by the U.S. Environmental Protection Agency under the Clean Air Act and the State of California under the Global Warming Solutions Act of 2006 (AB 32). These gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF₃). It is important to note that each of these gases has different potency, or ability to contribute to global warming. For the purposes of this inventory and in accordance with USCP and LGOP, all gases have been converted to their equivalent in carbon dioxide or CO₂e.

GHG emissions trap heat at the earth's surface, causing increases in air and water temperatures, leading to more intense drought, tree mortality, wildfire, flooding, degraded air and water quality, and public health problems. However, these emissions can be managed to reduce risk and improve quality of life in the region. This report is the first step toward measuring emissions reduction progress, planning future climate action, and developing strategies for reducing GHG emissions over time. The purpose of this report is to establish a baseline measurement or foundation to benchmark progress over time and

guide County-wide climate planning and action. The second step of this process includes developing and prioritizing strategies to reduce GHG emissions consistent with state mandates, and involve and communicate progress to the public, stakeholders, and policymakers.

The County's inventory report presents a detailed accounting of GHGs emitted by source. In addition, the inventory projects the County's community-wide GHG emissions from 2018 2030, 2035, and 2045 based on business-as-usual and adjusted scenario forecasts of changes in energy use, transportation, solid waste management, wastewater treatment, and agriculture (note: the forecasts do not include potential wildfire impacts). These factors are influenced over time by changes in climate, population demographics, land-use and transportation patterns, the adoption of new technologies, and measures adopted to reduce greenhouse gas emissions.

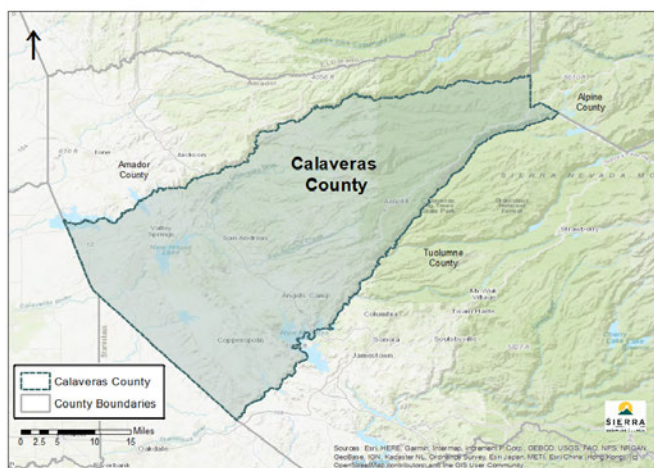
The first phase of the Calaveras County GHG inventory and reduction plan project also included a comprehensive wildfire GHG analysis, designed to be consistent with the California Air Resources Board's "Report on Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities".

Rincon Consultants developed an in-depth analysis of the carbon sequestration value of wildlands and the fire emissions potential from these lands. The report includes an inventory of all the carbon sequestered in both the soils and vegetation of the County to understand areas that have high carbon sequestration value, consistent with California's Natural and Working Lands Inventory. This will provide the County an understanding of the specific regions that would generate more GHG emissions and loss of vegetation carbon storage in a wildfire event. Furthermore, the wildfire assessment included an evaluation of areas that are likely to have a high fire return interval and overlap with these high carbon storage areas, and what the potential reduction in GHG emissions could be from forest management practices. The results of the report can be used to better understand the potential shifts in carbon stocks during wildfire events, and how forest management activities can reduce the loss of valuable carbon sequestration in the County's natural lands. The full report has been attached under **Appendix N**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

Community Profile

Calaveras County is located in the Gold Country and High Sierra regions of the Sierra Nevada mountain range in northern California. The County was incorporated in 1850 and encompasses a total area of 1,037 square miles. Calaveras County sits between Amador County to the north, San Joaquin and Stanislaus Counties to the west, Tuolumne County to the south, and Alpine County to the east. The 2010 United States Census reported that Calaveras County had a population of just over 40,000.

Residents enjoy the County's rural character and many charming small towns, such as Angels Camp, Murphys, San Andreas, Arnold, Copperopolis, Valley Springs, West Point, and Mokelumne Hill. Human populations predated the incorporation of the County and its municipalities - prior to the County's incorporation and the designation of the Stanislaus National Forest, the area was home to the Miwok tribes.



The County's elevation increases from 200 ft in the foothills in the western end up to the crest of the Sierra Nevada Mountains in the eastern end at 8,174 ft, which lends itself to a diversity of ecological resources and recreational opportunities. Calaveras County landscapes include rolling hills, sweeping valleys, forest, grassland, riparian, and meadow habitats, all of which support agricultural resources as well as timber and mineral commodity production. The natural environment predominates, supporting a wide variety of wildlife, and an abundance of year-round recreational activities, including whitewater rafting, boating and fishing, hiking and biking, golfing, and snow sports.

Notable destinations within the County include the Calaveras Big Trees State Park, a preserve of giant sequoia trees, and numerous caverns, such as Mercer Caverns, California Cavern and Moaning Cavern. Other attractions include a thriving wine making industry, including the largest of the Calaveras wineries: Ironstone Vineyards, historic town sites, mountain sports recreation, and the performing arts. The County is also well known for its annual fair and Jumping Frog Jubilee, an iconic frog-jumping contest made famous by Mark Twain in his 1865 short story, "The Celebrated Jumping Frog of Calaveras County."

California & Local Climate Policy & Goals

Since 2005, the State of California has responded to growing concerns over the effects of climate change by addressing emissions in the public and private sectors through legislative action. California mandates and guidance on measuring and reducing GHG emissions include:

- executive order on California global warming impacts and targets (EO S-3-05, 2005)⁵,
- the California Global Warming Solutions Act (AB 32, 2006)⁶ and its successor bill (SB 32, 2016)⁷,
- the Sustainable Communities and Climate Protection Act (SB 375, 2008)⁸,
- the California Clean Energy and Pollution Reduction Act (SB 350, 2015)⁹,
- local government requirements for climate adaptation and resilience strategies (SB 379, 2015)¹⁰,
- the California Air Resources Board (CARB) 2017 Climate Change Scoping Plan¹¹,
- the 100 Percent Clean Energy Act of 2018 (SB 100, 2018)¹², and
- executive order to achieve carbon neutrality (EO B-55-18, 2018)¹³.

All of the above legislation provides guidance and protocols for local governments to participate in the State's GHG reduction efforts.

In response, many communities in the United States are addressing emissions at the local level. Calaveras County established several goals and policies as part of its 2019 General Plan Update that address air quality and GHG emissions, with specific direction to develop and adopt a comprehensive strategy to assist in achieving emission reduction goals for AB 32 and SB 32 (Calaveras County Conservation & Open Space Element, COS-4B and COS 4.4). In addition, the County General Plan established two implementation measures (COS-5B and COS-5C) which direct the County to undertake a GHG emissions inventory and GHG reduction plan.

⁵[http://static1.squarespace.com/static/549885d4e4b0ba0bff5dc695/t/54d7f1e0e4b0f0798cee3010/1423438304744/California+Executive+Order+S-3-05+\(June+2005\).pdf](http://static1.squarespace.com/static/549885d4e4b0ba0bff5dc695/t/54d7f1e0e4b0f0798cee3010/1423438304744/California+Executive+Order+S-3-05+(June+2005).pdf)

⁶ [Global Warming Solutions Act of 2006 \(AB 32\). California Air Resources Board.](#)

⁷ [Global Warming Solutions Act of 2006: Emissions Limit \(SB 32\). \(2016\). California Legislative Information.](#)

⁸ [Transportation Planning: Travel Demand Models: Sustainable Communities Strategy: Environmental Review \(SB 375\). \(2008\). Institute for Local Government.](#)

⁹ [Clean Energy and Pollution Reduction Act \(SB 350\). \(2015\). California Energy Commission.](#)

¹⁰ [SB 379, Jackson. Land use: general plan: safety element \(2015\). California Legislative Information.](#)

¹¹ https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf

¹² https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100

¹³ <https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>

California state climate policies and mandates both encourage and require local governments and public agencies to develop solutions at the local level. As many of the major sources of GHG emissions can be directly or indirectly controlled through local policies and actions, local governments have an opportunity to play a key role in reducing GHG emissions within their boundaries. Through proactive measures related to land use, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can contribute to emissions reductions in their communities. This GHG inventory will build capacity for the County to better understand and address local climate impacts, allowing them to set goals that will increase their resilience and comply with California's greater climate strategy and mandates.

Climate Change in the Sierra Nevada

The California Assembly Bill 32¹⁴ defines climate change impacts under the following language: Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, winter sports, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.

The CARB 2017 Climate Change Scoping Plan¹⁵ provides additional details on the specific threats of climate change, particularly relevant for rural, forested regions like the County. The CARB scoping plan states: In California, as in the rest of the world, climate change is contributing to an escalation of serious problems, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.

- The drought that plagued California for years devastated the state's agricultural and rural communities, leaving some of them with no drinking water. In 2015 alone, the

¹⁴ https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32

¹⁵ https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf

drought cost agriculture in the Central Valley an estimated \$2.7 billion, and more than 20,000 jobs.

- Changes include: A recorded increase in annual average temperatures, as well as increases in daily minimum and maximum temperatures. An increase in the occurrence of extreme events, including heat waves. A decrease in winter chill hours, necessary for the production of high-value fruit and nut crops.
- In recent years, California has experienced the deadliest wildfires in its history.
- Extensive tree mortality is already prevalent in California. The western pine beetle and other bark beetles have killed a majority of the ponderosa pine in the foothills of the central and southern Sierra Nevada Mountains.
- California will experience a reduction in spring runoff volumes, as a result of declining snowpack.
- While more intense dry periods are anticipated under warmer conditions, extremes on the wet end of the spectrum are also expected to increase due to more frequent warm, wet atmospheric river events and a higher proportion of precipitation falling as rain instead of snow.
- In recent years, atmospheric rivers have also been recognized as the cause of the large majority of major floods.
- Climate change is making events, like these listed above, more frequent, more catastrophic and more costly. Climate change impacts all Californians, and the impacts are often disproportionately borne by the state's most vulnerable and disadvantaged populations.

These are the many challenges associated with climate change that face the County, along with communities in the Sierra Nevada. To learn more about how climate change might impact the County, state agencies in California created a new public tool, Cal-Adapt, which provides relevant data, resources, and future projections.¹⁶ A healthy ecosystem provides cultural, social, and economic benefits that local communities rely on for agriculture, tourism, recreation, fishing, and other industries that are important to the County and its economic vitality.^{17,18}

¹⁶ Cal-Adapt. California Energy Commission. (2021).

¹⁷ Core Writing Team, Pachauri, R.K., Meyer, L.A.. (2014). Climate Change 2014: Synthesis Report. Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

¹⁸ Dettinger, M., Alpert, H., Battles, J., Kusel, J., Safford, H., Fougères, D., Knight, C., Miller, L., Sawyer, S. (2018). Sierra Nevada Region Report. California's Fourth Climate Change Assessment.

Inventory Development

Aligning with established methodology and protocols, the inventory development process involved a number of key steps and decision-making points:

- **Identify Emissions Sources and Activities:** In consultation with CCOG and County staff, the team assessed 2018 GHG emissions from five different sectors: energy (energy use in buildings), transportation, solid waste, water and wastewater, and agriculture. Within each sector, activities that occur in the County that release emissions outside of the County, as well as sources that generate emissions directly within the County, were accounted for. Emissions associated with County government operations were also identified and included.
- **Inventory Boundaries:** The geographic scope of the inventory is referred to as “Calaveras County” and is defined by the County’s jurisdictional boundaries.
- **Data Collection and Inventory Years:** This inventory used data collected from the year 2018. This allows the inventory to be comparable to other nationwide inventories which typically include assessments from 2018 data, while also providing the best data available from the County, CCOG, and relevant special districts. The team worked closely with County staff and CCOG to identify and review available data for the baseline inventory and forecast of GHG emissions for the County. Data sets used for the findings in this report are highlighted throughout, as well as detailed in the appendices.
- **Inventory Tools:** For the community-wide and government operations inventories, ClearPath¹⁹ and consultant proprietary spreadsheets were used. ClearPath, available through ICLEI, calculates, monitors, and forecasts GHG emissions based on reported activity data and demographic information. ClearPath was developed to assist in the preparation of USCP and LGOP-compliant GHG inventories.

More details about specific tools and methodologies are highlighted in their respective sections throughout this report.

¹⁹ ClearPath. (2021). ICLEI - Local Governments for Sustainability USA.

GHG Emissions Inventory

Inventory Methodologies

Understanding a GHG Emissions Inventory

Achieving tangible greenhouse gas (GHG) emissions reductions in order to impact climate change requires identifying baseline emissions levels, sources, and activities that generate emissions in the community.

This report presents emissions from the County as a whole, including the incorporated City of Angels Camp. As such the government operations emissions are a subset of community-wide emissions and should not be added to community emissions totals since they are already included in the community-wide data. The inventory uses the latest methodology and modeling to develop a 2018 inventory, looking at GHG emissions generated by energy, transportation, solid waste, water and wastewater, and agriculture. Emissions from carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) are accounted for and calculated as the carbon dioxide equivalent (CO₂e). The government operations inventory only includes emissions from sources and activities over which the County has influence.

As local governments and public agencies have continued to join the greater climate action movement, the need for standardized approaches to quantifying GHG emissions has proven essential. The inventory utilizes the approach and methods provided by the U.S. Community Greenhouse Gas Emissions Protocol, in addition to the Local Government Operations Protocol.

Emissions Protocols

U.S. Community Protocol²⁰

The County's community-wide GHG inventory was conducted in accordance with the U.S. Community Protocol (USCP) released by the organization ICLEI in October 2012 (updated in 2019) and represents the current national standard in guidance for community-wide GHG emissions inventories. The USCP improved on earlier protocols by establishing additional reporting requirements for community-wide inventories and providing improved accounting guidance for quantifying emissions. The improvements include the addition of electricity transmission and distribution losses, the delineation of community wastewater

²⁰ U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (2021). ICLEI - Local Governments for Sustainability USA.

and potable water energy use emissions, improved methods to estimate residential non-utility fuel use emissions, and improved methods to estimate wastewater process emissions. The State of California Governor's Office of Planning and Research recommends that California local governments follow the USCP when undertaking their greenhouse gas emissions inventories.

Local Government Operations Protocol²¹

The Local Government Operations Protocol (LGOP) was released in 2008 (updated in 2010), by ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) to serve as the national standard for quantifying and reporting GHG emissions from local government operations. The purpose of the LGOP is to provide the principles, approach, methodology, and procedures needed to develop a government operations GHG emissions inventory. The LGOP was used to guide the County's government operations inventory.

Greenhouse Gas Global Warming Potential

Greenhouse gas emissions are commonly aggregated and reported in terms of equivalent-carbon-dioxide-units, or CO₂e. This carbon dioxide equivalent combines the three different gaseous emissions types into one single unit based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a GHG may cause over the span of 100 years, measured against the amount of warming caused by carbon dioxide. Converting all emissions to equivalent-carbon-dioxide-units allows for the comparison of different GHGs in similar terms. For example, methane is 28 times more powerful than carbon dioxide in its warming effect over 100 years, so one metric ton (MT) of methane emissions is equal to 28 MT of carbon dioxide equivalents. **Table 1** presents the GWPs of the commonly occurring GHGs according to the Intergovernmental Panel on Climate Change's 5th Assessment Report, reflecting the most recent scientific consensus. Of those seven, this inventory focused on three main greenhouse gases: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).

²¹ Local Government Operations Protocol (2021). The Climate Registry.

Table 1. Greenhouse Gas Global Warming Potentials

Greenhouse Gas	Chemical Formula	IPCC 5th Assessment Global Warming Potential ^{22,23}
Carbon Dioxide	CO ₂	1
Methane	CH ₄	28
Nitrous Oxide	N ₂ O	265
Hydrofluorocarbons	Various	4 - 12,400
Perfluorocarbons	Various	6,630 - 11,100
Sulfur Hexafluoride	SH ₆	23,500
Nitrogen Trifluoride	NF ₃	16,100

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to GHG emissions in a number of ways: 1) GHG emissions that are produced by sources located within the defined boundary, and 2) GHG emissions produced as a consequence of community activities. All of the emissions in this report have been quantified using calculation-based methodologies. Calculation-based methodologies look at GHG-emitting activities and determine how much of each activity occurred in the County. Then an emissions factor is developed or cited from literature for each specific activity and the two figures are multiplied together to arrive at the total emissions produced by each activity within the County:

$$\text{Activity or Source Data} \times \text{Emissions Factor} = \text{Emissions Produced by Activity.}$$

Activity or source data refers to the relevant measurement of energy use or other GHG-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, or annual vehicle miles traveled (VMT). Standard emissions factors are applied to activity or source data to determine the associated emissions. Emissions factors are typically expressed as emissions per unit of activity or source data (e.g. lbs CO₂/kWh of electricity).

²² Global Warming Potential Values. (2014). Greenhouse Gas Protocol. IPCC.

²³ The IPCC 6th Assessment Report, which includes updated GWP values, was released in August 2021 after the completion of the inventory calculations. The 6th Assessment has not yet been incorporated into ICLEI's Clearpath GHG inventory platform as of release of this 2018 Calaveras County GHG inventory report.

The report for community-wide emissions measures GHG emissions in five primary areas: energy use, including electricity, natural gas, propane, and other fuels used to heat and cool buildings; transportation, including emissions from on-road and off-road vehicle operations; solid waste, including materials deposited in landfills that will later decompose and emissions from County landfill gas flaring; water distribution and wastewater treatment; and agriculture, including emissions from enteric fermentation, manure management, fertilizer application, and liming material application²⁴. The report measures both emissions occurring within the County and emissions originating outside the County for use inside the County, in order to create a measure of total emissions.

ICLEI's ClearPath toolkit was used to complete the emissions quantifications for energy use, transportation, solid waste, and water distribution and wastewater treatment. Agricultural emissions were calculated based on the guidance of the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories for agriculture, forestry, and other land use.²⁵

The second part of this report, focused on emissions from government operations, measures emissions in four primary areas: energy use from buildings and facilities, vehicle fleet, employee commutes, and solid waste generation.

The basic process followed for the inventory is to measure sources of emissions (such as natural gas combustion) and activities that create emissions (such as vehicle operations), and convert those sources and activities into equivalent GHG emissions. The observed emissions allow for measurement over time of progress toward meeting climate policy goals. The report also uses assumptions in County-wide growth to create a forecast of changes to occur in GHG emissions, which can aid in decision making.

Information only items are GHG emissions that are not included in the GHG emissions totals, though are reported to provide context. Information items are reported separately from the totals either to avoid overlap with other reported emissions or because they are excluded from GHG inventories by protocol guidance. Information items can include emissions such as:

²⁴ Emissions from cannabis cultivation are not included in the agriculture component of the GHG inventory because cannabis is not included in the Calaveras County 2018 Crop Report. However, if any cultivation occurred, any potential GHG emissions attributed to lighting, off-road vehicles, and water use would be captured within the community-wide totals under the energy, transportation, and water sectors of the inventory.

²⁵ IPCC. 2006. Guidelines for National Greenhouse Gas Inventories. Volume 4 Agriculture, Forestry and Other Land Use. Accessed March 30, 2021.

- Emissions associated with electric vehicles. The emissions are included in residential and non-residential electricity emissions totals, and reported as an information item in the transportation sector.
- Emissions associated with energy used to distribute water and collect wastewater, as they are included in commercial community-wide electricity usage totals.

Forecast Methodology

After the completion of the emissions inventories, forecasts of emissions were developed under business-as-usual (BAU) and adjusted business-as-usual scenarios (ABAU). A BAU scenario does not account for any local, state, or federal policy that would impact future GHG emissions. The BAU forecasts estimate future community-wide GHG emissions in the years 2030, 2035, and 2045. BAU forecasts are based on two inputs — current emissions data and growth rates. Baseline emissions data came from the 2018 inventory. Growth rates were calculated based on projected growth of relevant indicator variables.

BAU projections are intended to demonstrate the expected growth in GHG emissions if no reduction measures are taken. The BAU forecast is beneficial in that it allows for comparison between forecasted and actual observed emissions to determine what emissions reduction progress has been made to date. BAU forecasts also can help assess whether the County can achieve its emissions reduction targets through current efforts.

An adjusted scenario forecast, or adjusted BAU (ABAU), accounts for legislative adjustments and projected emissions reductions resulting from legislative action. This includes future updates to statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs - current emissions data and either BAU projections or adjusted rates of growth or decay.

Community-Wide Inventory Results

The community-wide inventory is an assessment of Calaveras County's (County) greenhouse gas (GHG) emissions resulting from activities by County residents, businesses and visitors for the year 2018. The community-wide inventory includes:

1. Use of electricity
2. Use of fuel in buildings or other stationary use
3. Use of fuel for on-road and off-road transportation by passenger and freight vehicles
4. Generation of solid waste by the community and emissions from in-boundary landfills

5. Use of energy for potable water distribution and emissions from wastewater treatment processes
6. Emissions from agriculture

Community-wide emissions totals were calculated using U.S. Community Protocol (USCP) methodologies and guidance. Data for emissions were collected from specific sources where possible, and when not possible, extrapolated from the current best available sources and standard accepted methodologies. The sections below describe how data was derived for each sector's emissions activities.

In the energy sector, residential and commercial electricity and natural gas were both calculated using specific usage data from Pacific Gas & Electric Company (PG&E) and Calaveras Public Power Agency (CPPA). Residential propane, fuel oil, and wood results were scaled from U.S. Energy Information Administration (EIA) and U.S. Census American Community Survey (ACS) household data, while commercial propane was determined using statewide commercial usage data and square footage data from the EIA (calculated using commercial square footage within the City of Angels Camp and scaled up to the approximate commercial square footage in the County using population data from 2018 ACS population estimates, as there was no County commercial square footage data available).

In the transportation sector, on-road transportation was calculated using Calaveras Council of Governments (CCOG) and Fehr & Peers (F&P) travel demand model (see footnote 31 for more detail) and California Air Resources Board's (CARB) EMFAC model.²⁶ Off-road transportation was calculated using CARB's OFFROAD 2017 model, similar to its EMFAC estimation model. Aviation data was calculated using specific fuel usage data and flight information from the Calaveras County Airport. Recreational boating was calculated using CARB's OFFROAD 2007 model (boating data was not included in CARB's OFFROAD 2017 model). Actual boat fuel use data from the lakes and reservoirs throughout the County was researched but does not exist.

Solid waste emissions were calculated from specific tonnage data from Calaveras County Integrated Waste Management, while transportation of solid waste to landfills was found using the mileage from the County to the respective landfills, and landfill gas flaring was

²⁶ EMFAC, which stands for Emissions Factor, provides emissions inventories of on-road and off-road mobile sources and tools to perform project-level assessment with custom scenario analysis with vehicle activity. EMFAC is a model that estimates the emissions of on-road mobile sources in California

calculated from specific emissions data provided by Geo-Logic Associates and Rock Creek Landfill.

Specific water and wastewater energy and treatment process data was collected from Blue Lake Springs Mutual Water Company, Calaveras County Water District, Calaveras Public Utility District, City of Angels Camp, Mokelumne Hill Sanitary District, Murphys Sanitary District, San Andreas Sanitary District, Union Public Utility District, Utica Water and Power Authority, and Valley Springs Public Utility District.

Generally, emissions for agriculture can be categorized into two sources, crop production and livestock. For crop production, nitrogen and liming material usage reported by the state was used, which provides tonnage used for the County, with no other assumptions for scaling or modeling needed. Livestock was more complex due to the availability of data sources at the local level. Livestock head counts from the USDA NASS were used, which break down head counts of livestock by county. In order to estimate emissions from livestock, assumptions had to be made about livestock herd characteristics and manure management practices. Since this data was not available at the County level, the state average herd characteristics and manure management practices were used, as reported in the State GHG emissions inventory for the year 2019. More Calaveras County-specific information about the actual livestock conditions in the County was requested from the Ag Commissioner, however, data was not able to be obtained that would substantiate any assumptions other than what was available from USDA and the state-wide averages mentioned previously.

Based on the methodologies outlined above, inventory results provide information on the sources of GHG emissions, the relative magnitude of those emissions by source, and emissions trends in the County over time.

Community-Wide GHG Emissions Summary

Key Findings

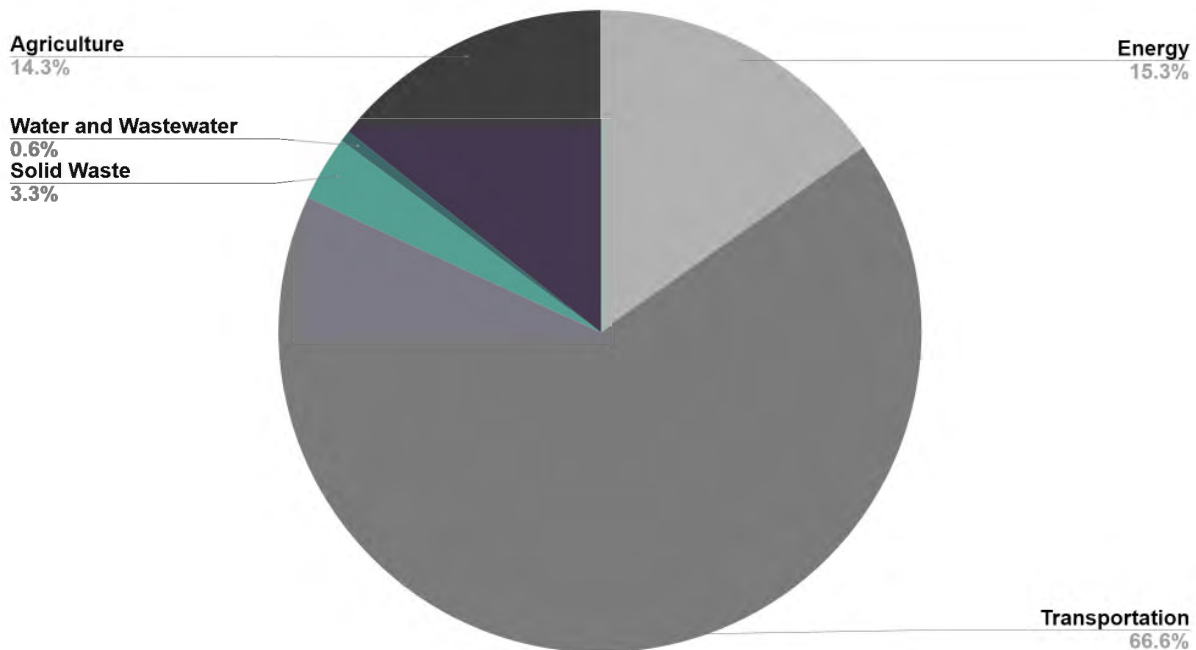
- In 2018, the community, including residents and businesses, of Calaveras County emitted an estimated 368,569 metric tons (MT) CO₂e.
- The largest contributor to community emissions in the inventory is community-wide transportation (67%), which includes on-road vehicle miles traveled (VMT) and off-road vehicle emissions, which includes activity that may relate to agriculture, construction, mining, logging, drilling, and other industrial activities.

- In combination, the transportation, energy, and agriculture sectors produce more than 96% of the community-wide emissions in the County, and therefore have the most potential for emissions reductions.
- By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the County can get an even clearer picture of the GHG emissions in the community, and monitor and evaluate any reduction efforts taken.

Overview of 2018 Community-Wide Inventory

In 2018, the County emitted 368,569 MT CO₂e.²⁷ The transportation sector was the largest source of emissions, followed by energy, agriculture, solid waste, and water and wastewater. On a per capita basis, emissions were 8.27 MT CO₂e per County resident annually. Note that per capita emissions, however, may not be directly comparable to inventories from other jurisdictions, as overall inventory methodologies can differ.

Figure 1. 2018 Emissions Summary



²⁷ Community-Master-Data-Workbook. (2021). Sierra Business Council.

Table 2. 2018 Emissions Summary

Sector	MT CO ₂ e	% of Total Emissions
Energy	56,310	15.28%
Transportation	245,444	66.59%
Solid Waste	12,054	3.27%
Water and Wastewater	2,104	0.57%
Agriculture	52,657	14.29%
Total	368,569	100%

Energy

The energy sector consists of building electricity, natural gas, and other fuel use, as noted below **Table 3**. Aggregated electricity and natural gas use data were provided by PG&E and CPPA²⁸ and is shown in **Figure 2** below. **Figure 2** below shows emissions by energy type, and it is important to note that there are very little emissions coming from electricity provided by CPPA, as CPPA electricity is generated through power from various hydroelectric projects.

Other residential fuels, primarily propane, but also including fuel oil/kerosene and wood, contributed significantly to emissions within the County. Propane, fuel oil/kerosene, and wood usage estimates for 2018 were taken from the EIA data and scaled using household energy use estimates from the U.S. Census American Community Survey.²⁹

The electricity use and emissions metrics include transmission and distribution (T&D) losses for 2018. T&D losses are slight losses in electrical energy as a result of transmission across power lines. T&D losses were measured at 4.8% of end use consumption in 2018 according to the eGRID gross loss rates for the Western Region.³⁰ Natural gas leakage rates were provided by ClearPath and applied to the usage data from PG&E.

Refer to **Appendices A** and **B** for data on 2018 emissions factors.

²⁸ Electricity and natural gas data provided by PG&E and CPPA. Located in the Community-Master-Data-Workbook.

²⁹ Propane, fuel oil/kerosene, and wood data estimated using data from the U.S. Energy Information Administration and U.S. Census Bureau American Community Survey.

³⁰ Transmission and distribution loss rates were provided by the U.S. Environmental Protection Agency eGRID Data Explorer.

Figure 2. Emissions by Energy Type

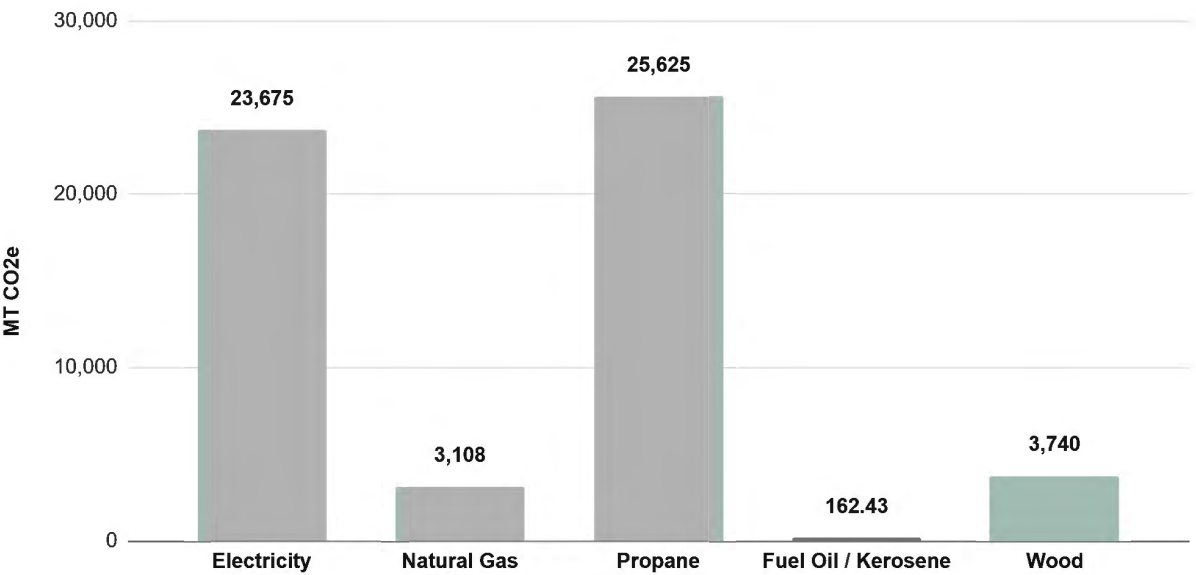


Table 3. Energy Activity Data and Emissions

Energy Type	Amount	Unit	Emissions (MT CO ₂ e)	Data Source
Residential Electricity (PG&E)	169,478,491	kWh	15,991	PG&E
Residential T&D Loss Rate	4.80	%	1,840	eGRID
Residential Natural Gas (PG&E)	410,617	therms	2,184	PG&E
Residential Natural Gas Leakage	0.30	%	71.24	ClearPath
Residential Propane	4,424,633	gallons	24,987	EIA / ACS
Residential Fuel Oil / Kerosene	15,893	gallons	162.43	EIA / ACS
Residential Wood	375,436	MMBtu	3,740	EIA / ACS
Commercial Electricity (PG&E)	47,119,824	kWh	4,446	PG&E
Commercial Electricity T&D Loss Rate	4.80	%	511.47	eGRID
Commercial Electricity (CPPA)	31,092,717	kWh	575.22	CPPA
Commercial Electricity T&D Loss Rate	4.80	%	27.61	eGRID
Commercial Natural Gas (PG&E)	155,271	therms	825.80	PG&E
Commercial Natural Gas Leakage Rate	0.30	%	26.94	ClearPath
Commercial Propane	113,010	gallons	638.21	EIA / ACS
Industrial Electricity (PG&E)	2,692,061	kWh	254	PG&E
Industrial Electricity T&D Loss Rate	4.80	kWh	29.22	eGRID
Total Emissions			56,310	

Transportation

In 2018, on-road VMT data was provided by the CCOG travel demand model.³¹ The breakdown of VMT and emissions by trip type is noted in **Table 4** below. The model allows us to separate out travel into four categories based on the origin and destination of the trips: Internal-Internal (trips beginning and ending in the County), Internal-External (trips beginning in the County and ending elsewhere in the region), External-Internal (trips beginning somewhere else within the region and ending in the County), and External-External (trips beginning and ending outside of the County). 100% of the VMT from Internal-Internal trips were attributed to the County. The VMT from Internal-External and External-Internal trips were attributed 50% to the County, and the VMT from External-External trips or pass through traffic was excluded, per protocol guidance.

Off-road fuel usage data was provided by the California Air Resources Board's OFFROAD2017 model, which included fuel usage data from off-road activity that may relate to agriculture, construction, mining, logging, drilling, and other industrial activities.³² Other off-road activities within the County included aviation and recreational boating. Fuel use data for aviation was provided by the Calaveras County Airport (Maury Rasmussen Field), and recreational boating data was calculated using CARB's OFFROAD 2007 model. On- and off-road activity and emissions data are shown in **Figure 3** and **Table 4** below.

³¹ VMT estimates for Calaveras County were created using the CCOG travel demand model ([original development report](#)) and the SB 375 Regional Targets Advisory Committee (RTAC) methodology. The SB 375 RTAC method was established by RTAC in their September 2009 report to the California Air Resources Board (CARB). This method allocates responsibility for VMT resulting from trips that travel between two different regions (for trips with both origin and destination within one region, all VMT is assigned to that region; for trips with origin in one region and destination in another, half of the VMT is assigned to the originating region and half to the destination region; for trips that pass through a region, if neither the origin nor the destination is within the region, no VMT is assigned to that region). The CCOG travel model was created to forecast vehicle traffic on roads within the County and thus did not originally include travel beyond the County borders. For modeling purposes, trips entering or leaving the County were considered to begin or end at gateways, which are where roads cross County borders. Estimates of VMT using the SB 375 RTAC methodology require modeling the full length of the trip to assign responsibility as described above. (Estimates of VMT for SB 743 purposes also require modeling the full length of the trip.) To add this capability to the model, data from StreetLight was used to estimate the average length of each trip beyond County borders. StreetLight uses data from smartphones to measure vehicle traffic between nationwide origins and destinations. Using this data, the number and lengths of trips through each gateway were estimated. The average trip length beyond each gateway was then added to each trip connecting through that gateway, allowing the model to accurately estimate the end-to-end VMT for trips beyond County borders. With that capability in place, county-wide VMT may then be estimated using the SB 375 RTAC method (and for SB 743 purposes).

³² On-Road data provided by CCOG. Off-Road data provided by CARB OFFROAD2017 Model, EPA Emissions Factors, and 5th Assessment Global Warming Potentials. Aviation data provided by Calaveras County Airport, Maury Rasmussen Field. Boating data provided by CARB OFFROAD2007 Model. Located in Community-Master-Data-Workbook.

Figure 3. On-Road and Off-Road Emissions

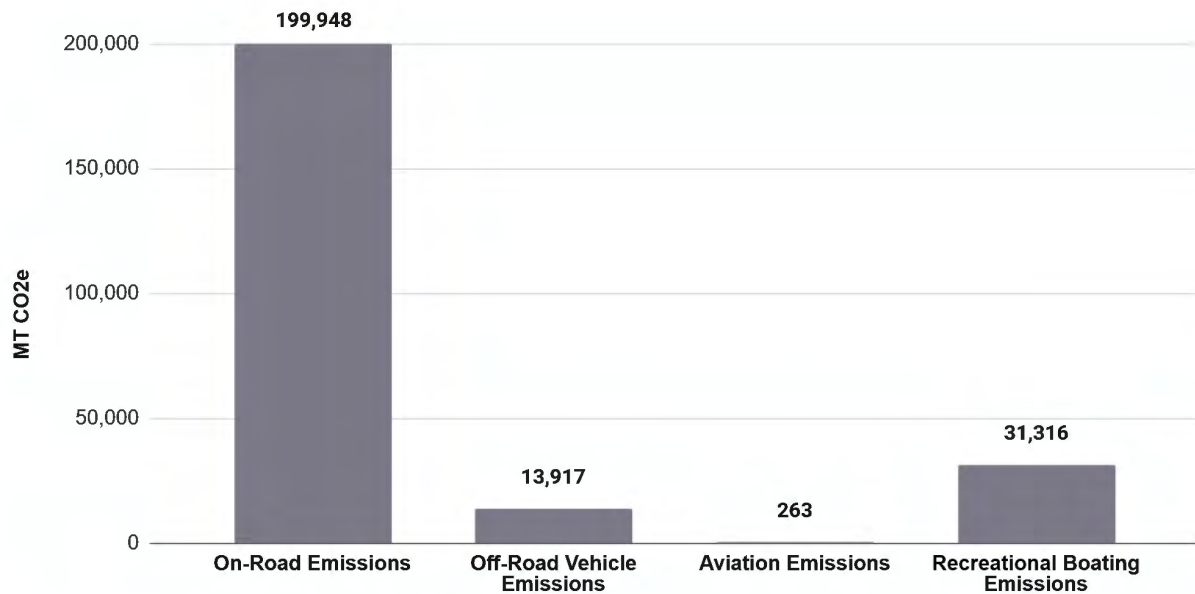


Table 4. Transportation Activity Data and Emissions

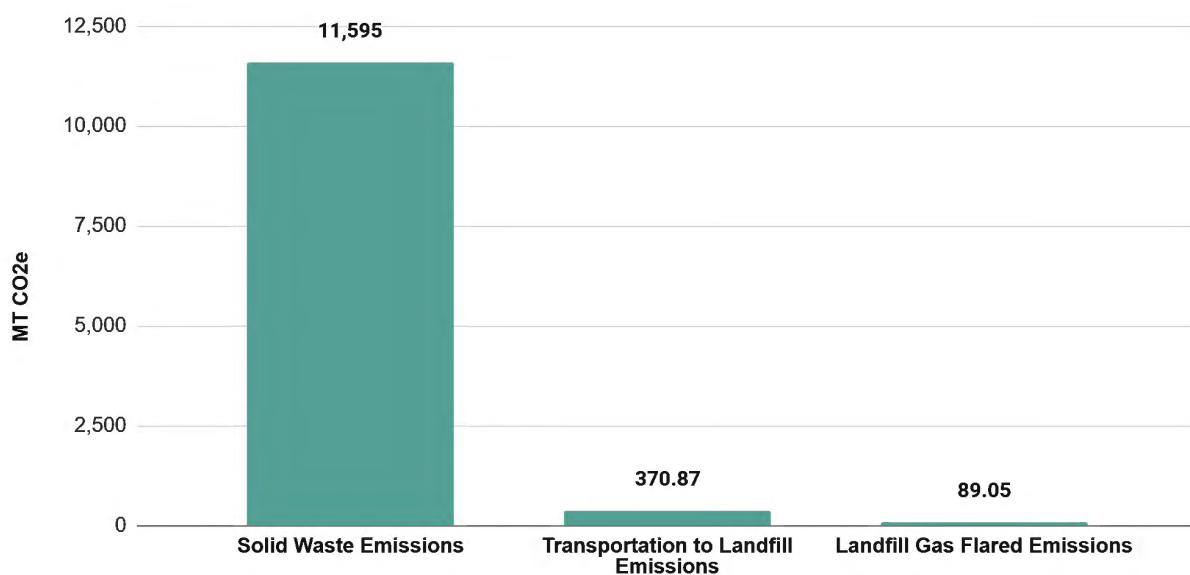
Activity / Source	Miles Traveled (Miles)	Gasoline Use (Gallons)	Diesel Use (Gallons)	Liquid Propane Gas Use (Gallons)	Aviation Fuel (Gallons)	Emissions (MT CO ₂ e)
On-Road Vehicles	405,293,189					199,948
Trip Starts and Ends In Boundary	178,412,934					88,019
Trip Starts In and Ends Out of Boundary	113,313,557					55,902
Trip Starts Out and Ends In Boundary	113,566,698					56,027
Off-Road Vehicles		163,425	1,186,998	34,839		13,917
Aviation					42,947	263
Recreational Boating						31,316
Total Emissions						245,444

Solid Waste

In 2018, total County-wide solid waste sent to the landfill was approximately 40,853 tons.³³ Solid waste generated in the County is sent to several landfills listed in **Table 5** below.

Figure 4 below lists the total solid waste tonnage sent to each landfill. All of the landfills used have methane collection systems in place. Solid waste tonnage data was provided by Calaveras County Integrated Waste Management. Landfill gas flaring emissions from Rock Creek Landfill, which is within the jurisdictional boundary of Calaveras County, were included in **Table 6**, as well. Emissions from transportation of solid waste were calculated using the annual tonnage and the distance to and from each landfill. The waste characterization and emissions factors can be found in **Appendix D**.

Figure 4. Solid Waste Emissions



³³ Solid waste data provided by Calaveras County Integrated Waste Management and Geo-Logic Associates. Located in Community-Master-Data-Workbook.

Table 5. Emissions from Landfilled Solid Waste and Transportation to Landfill

Landfill	Solid Waste (Tons)	Emissions (MT CO ₂ e)	Distance to Landfill (Miles)	Emissions (MT CO ₂ e)	Data Source
Altamont Landfill	7.80	2.21	151.40	0.17	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Fink Road Landfill	1.90	0.54	173.20	0.046	
Foothill Sanitary Landfill	439.10	124.62	48	2.95	
Forward Landfill	12,197	3,462	100	170.76	
Highway 59 Landfill	0.90	0.26	143	0.018	
L and D Landfill	855.70	243	111.40	13.35	
McKittrick Waste Treatment Site	5.50	1.56	524	0.40	
North County Landfill & Recycling Center	198.60	56.36	66.80	1.86	
Potrero Hills Landfill	81.50	23.13	160.20	1.83	
Recology Hay Road	184.70	52.42	158	4.09	
Rock Creek Landfill	26,874.8	7,627	46.60	175.33	
Sacramento County Landfill, Kiefer	5.1	1.45	89.20	0.064	
Total	40,853	11,594		370.87	

Table 6. Landfill Gas Flaring Activity Data and Emissions

Landfill	Landfill Gas Flared (Cubic Feet / Year)	Emissions (MT CO ₂ e)	Data Source
Rock Creek Landfill	42,978,951	89.05	Geo-Logic Associates
Total Emissions		89.05	

Water and Wastewater

Emissions from water and wastewater for the year 2018 were 2,104 MT CO₂e, summed up in **Table 9** below.³⁴ Data was collected from all water and wastewater agencies in the County. Electricity, natural gas, and other fuel emissions from water distribution and wastewater collection and treatment were accounted for in the County-wide calculations for the energy sector and were considered “information only” items in this section to avoid double counting. Wastewater emissions are primarily associated with the treatment processes at the wastewater treatment plants shown in **Table 9** below. More detailed activity and emissions data is provided in **Appendices E and F**.

Table 7. Water Energy Data - Information Item

Facility	Fuel Type	Energy Use (Gallons)	Emissions (MT CO ₂ e)	
Union Public Utility District	Diesel	409	--	
	Gasoline	4,100	--	
	Propane	600.60	--	
Total Water Energy Emissions			--	
Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Emissions (MT CO ₂ e)	Data Source
Electricity (CPPA)	8,394,457	2,803,560,570	--	CPPA, USCP, Water Agencies

³⁴ Water and wastewater data provided by Blue Lake Springs Mutual Water Company, Calaveras County Water District, Calaveras Public Utility District, City of Angels Camp, Mokelumne Hill Sanitary District, Murphys Sanitary District, San Andreas Sanitary District, Union Public Utility District, Utica Water and Power Authority, and Valley Springs Public Utility District. Located in Community-Master-Data-Workbook.

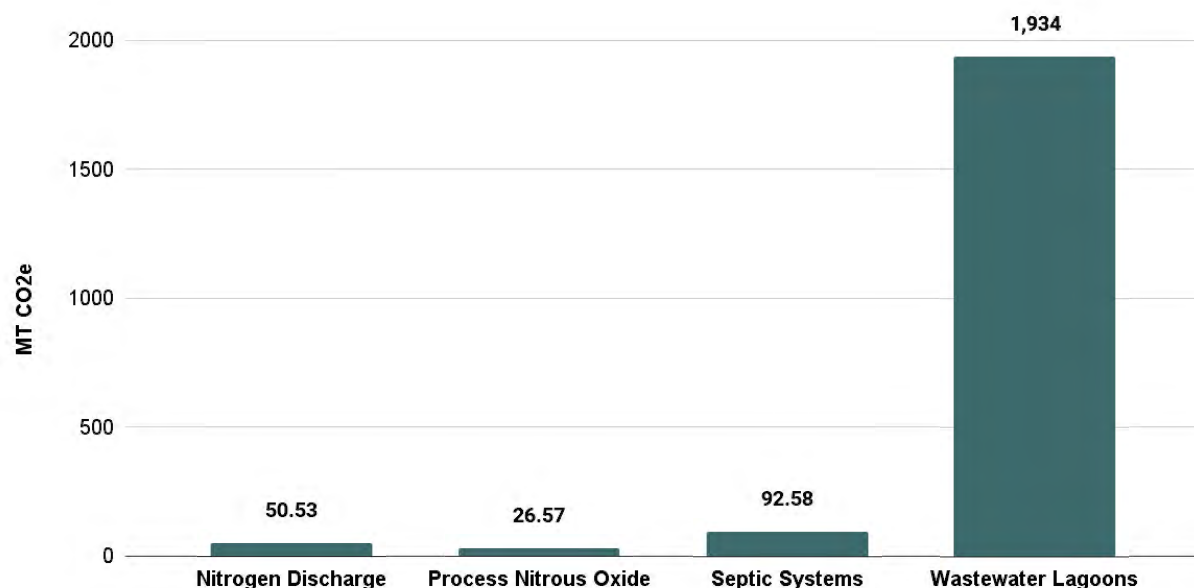
Table 8. Wastewater Energy Data - Information Item

Facility	Fuel Type	Energy Use	Emissions (MT CO ₂ e)	
Murphys Sanitary District	Diesel	75 gallons	--	
Mokelumne Hill Sanitary District	Propane	200 gallons	--	
Total Wastewater Energy Emissions			--	
Facility	Fuel Type	Energy Use	Emissions (MT CO ₂ e)	
San Andreas Sanitary District	Natural Gas	3,865 therms	--	
Energy Type	Electricity Use (kWh)	Water Treated (Gallons)	Emissions (MT CO ₂ e)	Data Source
Electricity (CPPA)	5,548,396	380,947,000	--	CPPA, USCP, Water Agencies

Table 9. Wastewater Treatment Process Data

Treatment Process	Emissions (MT CO ₂ e)
Nitrogen Discharge	50.53
Process N ₂ O	26.57
Septic Systems	92.58
Wastewater Lagoons	1,934
Total Emissions	2,104

Figure 5. Water and Wastewater Emissions



Agriculture

The primary agricultural activities in the County include livestock farming and crop farming (primarily vineyards). There is a wide spectrum of agricultural activities occurring in the County; however only a few sources are of a large enough scale to provide reliable data for GHG emissions calculations.³⁵ This agriculture-focused GHG emissions inventory analysis is limited to relevant GHG emissions sources, which include:

- Crop Production;
- Livestock Enteric Fermentation; and
- Livestock Manure Management.

GHG emissions from crop farming result primarily from the application of liming material and nitrogen fertilizers, while livestock farming-related emissions are dominated by animal enteric fermentation and manure management activity. GHG emissions from off-road agricultural equipment and from electricity use and fuel combustion at agricultural land uses are accounted for under the above **Energy** and **Transportation** sections.

In 2018, the total GHG emissions resulting from agriculture was 52,657 MT CO₂e.³⁶ These emissions were largely dominated by livestock farming, resulting from enteric fermentation

³⁵ GHG emissions sources that have been excluded include: crop residue burning, rice cultivation, diesel agricultural irrigation pumps, and livestock emissions from horses and chickens.

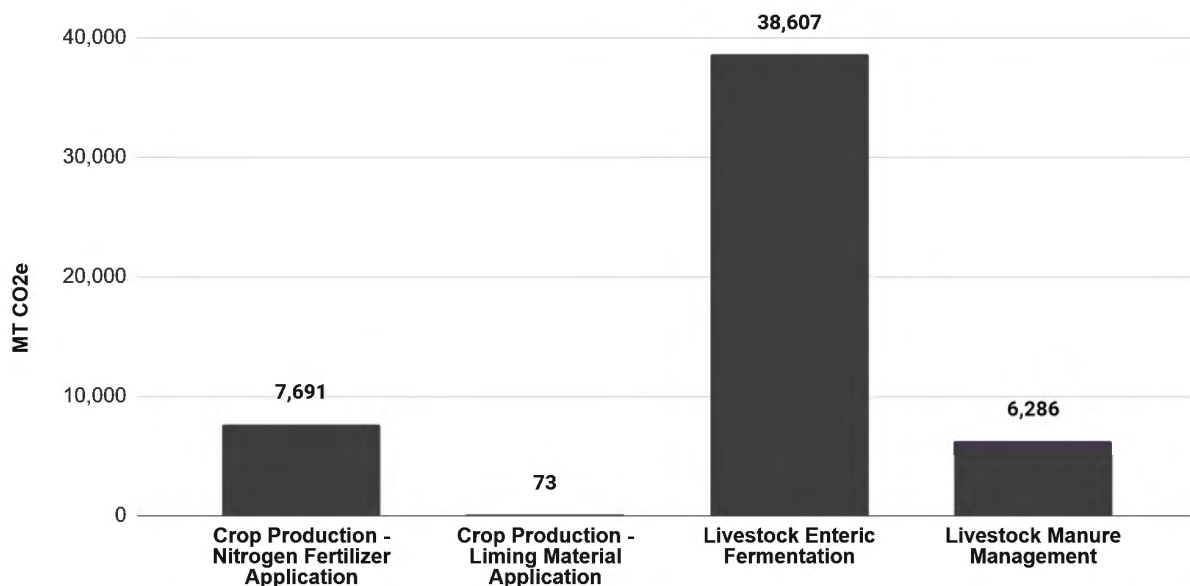
³⁶ Agriculture calculations located in the Agriculture Calculations Rincon spreadsheet.

and manure management, which generate around 85% of County agricultural-related emissions each year. The next largest source of County agricultural emissions is crop farming, with the respective application of nitrogen fertilizers and liming for soil management accounting for 15% of annual agricultural-related emissions. The table and figure below provides the County agricultural emissions results for the 2018 inventory year.

Table 10. Emissions from Agriculture

Activity / Source	Emissions (MT CO ₂ e)
Crop Production - Nitrogen Fertilizer Application	7,691
Crop Production - Liming Material Application	73
Livestock Enteric Fermentation	38,607
Livestock Manure Management	6,286
Total Emissions	52,657

Figure 6. Emissions from Agriculture



Government Operations Inventory Results

This section presents a detailed analysis of greenhouse gas (GHG) emissions resulting from Calaveras County's (County) government operations. The government operations emissions are a subset of community-wide emissions and should not be added to community emissions totals since they are already included in the community-wide data. The

emissions included in this inventory were determined using the operational control framework. Included are emissions from buildings, facilities and lighting energy use, and vehicle fleet fuel use emissions. These are emissions sources and activities for which the County has the full authority to introduce and implement operating policies. The government operations inventory also includes two additional emissions sectors for which the County has limited control: emissions from County facility generated solid waste and emissions from employees' personal commutes to work. Including these optional sources is recommended strongly by the Local Government Operations Protocol (LGOP), even though the County does not have full operational control.

Government operations emissions totals were calculated using LGOP methodologies and guidance. Data for emissions were collected from specific sources where possible, and when not possible, extrapolated from the current best available sources and standard accepted methodologies. In the buildings and facilities sector, electricity and natural gas emissions were calculated using specific usage data from Pacific Gas and Electric Company (PG&E) and Calaveras Public Power Agency (CPPA). For the County's vehicle fleet, vehicle and mileage data was provided by the Calaveras County Public Works Department and scaled to represent the County's entire vehicle fleet. For the employee commute, a survey was sent out to all employees and was scaled up to represent the entire staff from those employees who responded. And for the solid waste sector, specific tonnage and landfill gas flaring data was provided by Calaveras County Integrated Waste Management, Geo-Logic Associates, and Rock Creek Landfill.

Based on the methodologies previously outlined, inventory results provide information on the sources of GHG emissions and the relative magnitude of those emissions by source for the County operations.

Government Operations GHG Emissions Summary

Key Findings

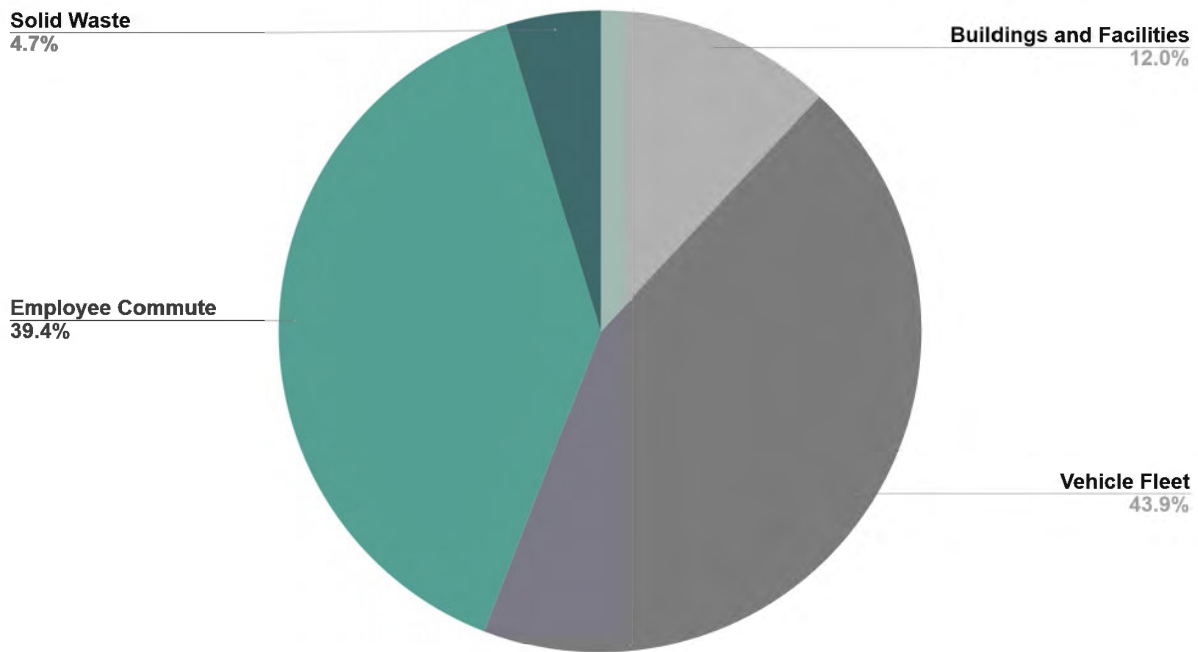
- In 2018, the County's government operations emitted an estimated 4,493 metric tons (MT) CO₂e, which includes emissions sources and activities for which the County has the authority to introduce and implement operational policies.
- The largest contributor to government operations emissions in the inventory is from the County's vehicle fleet (44%).
- In combination, the vehicle fleet, employee commute, and buildings and facilities sectors produce more than 95% of the government operations emissions in the County, and therefore have the most potential for emissions reductions.

- Emissions from government operations account for 1.2% of total community-wide emissions.
- By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the County can get an even clearer picture of the government operations GHG emissions, and monitor and evaluate any reduction efforts taken.

Overview of 2018 Government Operations Inventory

In 2018, County facilities and operations emitted 4,493 MT CO₂e.³⁷ The vehicle fleet sector was the largest source of emissions, followed by employee commute, buildings and facilities, and solid waste.

Figure 7. 2018 Emissions Summary



³⁷ LGO-Master-Data-Workbook. (2021). Sierra Business Council.

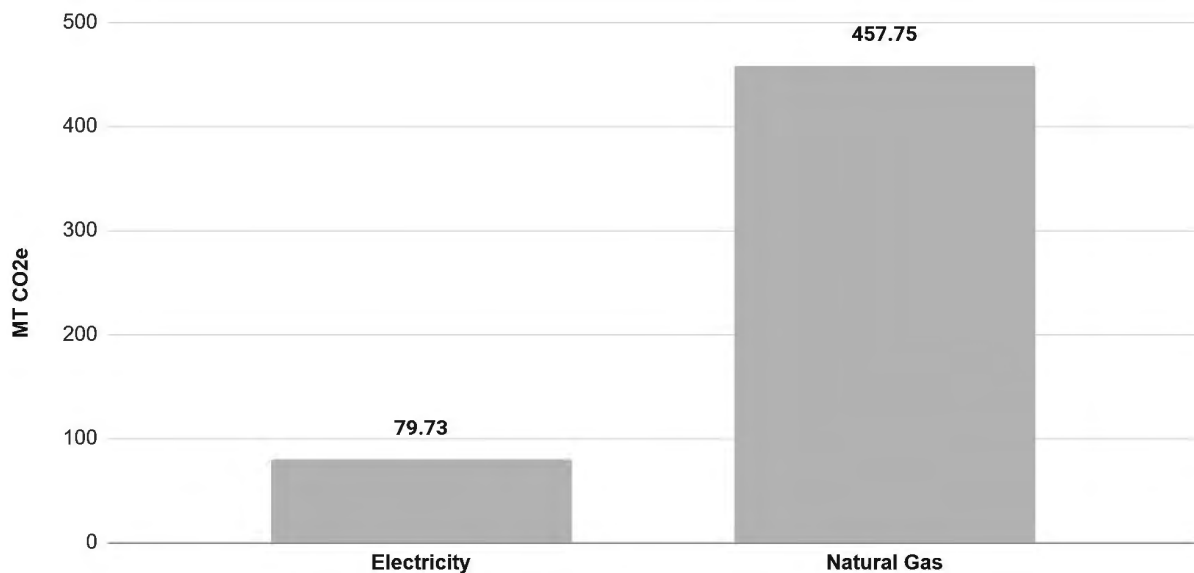
Table 11. 2018 Emissions Summary

Sector	MT CO ₂ e	% of Total Emissions
Buildings and Facilities	537	11.96%
Vehicle Fleet	1,974	43.92%
Employee Commute	1,770	39.39%
Solid Waste	212	4.72%
Total	4,493	100%

Buildings and Facilities

The buildings and facilities sector consists of building electricity, natural gas, and other fuel use in County buildings and facilities, as noted below **Table 12**. Aggregated electricity and natural gas use data was provided by Pacific Gas & Electric Company (PG&E) and Calaveras Public Power Agency (CPPA)³⁸ and is shown in **Figure 8** below. There are very little emissions coming from electricity provided by CPPA, as CPPA electricity is generated through various hydroelectric projects.

Figure 8. Emissions from Buildings and Facilities Energy Use



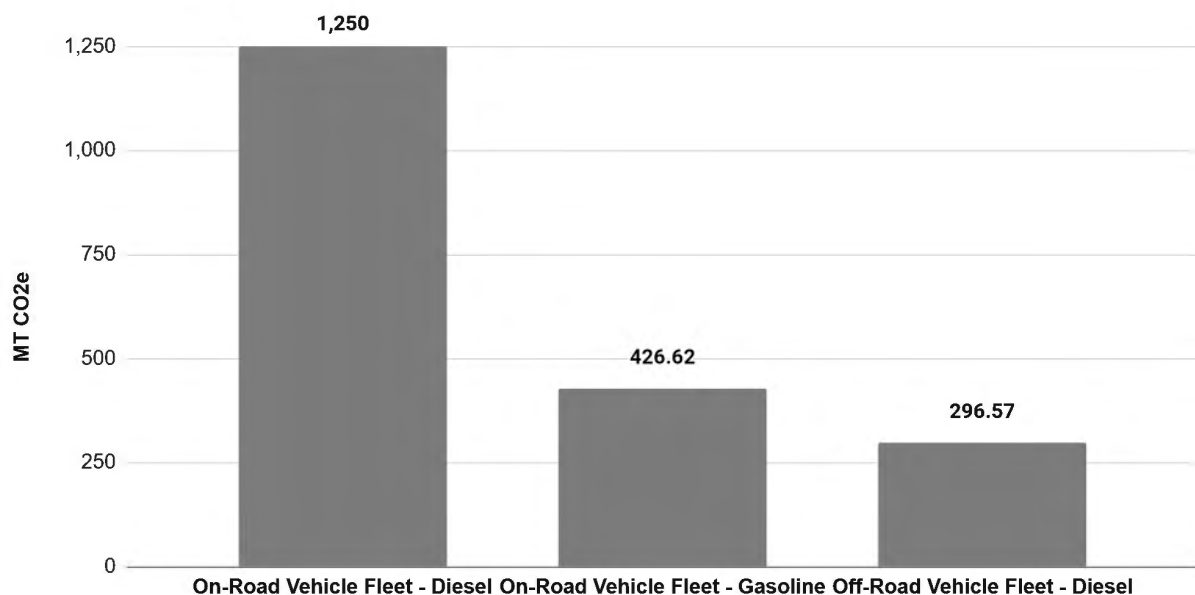
³⁸ Electricity and natural gas data provided by PG&E and CPPA. Located in the LGO-Master-Data-Workbook.

Table 12. Buildings and Facilities Energy Use Activity Data and Emissions

Energy Type	Amount	Unit	Emissions (MT CO ₂ e)	Data Source
Electricity (PG&E)	201,222	kWh	18.97	PG&E
Electricity (CPPA)	3,284,340	kWh	60.76	CPPA
Natural Gas (PG&E)	86,065	therms	457.75	PG&E
Total Emissions			537.48	

Vehicle Fleet

Vehicle fleet data for 2018 was provided by the County's Public Works Department and scaled to represent the entire County vehicle fleet since that data was unavailable.³⁹ This data set included vehicle type, fuel type, total annual miles traveled, and gallons of fuel or hours used. All off-road vehicles were categorized as small utility vehicles in ClearPath. **Table 13** below shows breakdown of passenger, light duty, and heavy duty vehicles, in addition to fuel usage by type.

Figure 9. Vehicle Fleet Emissions

³⁹ Vehicle fleet data provided by the Calaveras County Public Works Department. Located in LGO-Master-Data-Workbook.

Table 13. Vehicle Fleet Breakdown and Emissions

Activity / Source	Annual VMT	Fuel Used (Gallons)	Emissions (MT CO ₂ e)
On-Road Vehicle Fleet - Diesel	1,030,424	122,389	1,250
On-Road Vehicle Fleet - Gasoline	450,159	48,210	426.62
Off-Road Vehicle Fleet - Diesel	N/A	29,047	296.57
Total Emissions			1,974

Employee Commute

In order to compile an employee commute data set, a survey was distributed electronically to all County employees. The survey included questions regarding mileage to and from work, how many days per week were spent driving to work, vehicle type, and fuel type. It was asked that employees fill out this survey for their “pre-COVID-19” commutes. There were 546 employees in 2018. In total, there were 134 responses, and this was scaled up to account for all employees. Total vehicle miles traveled are categorized by gasoline and diesel, as well as by passenger vehicle or light duty truck. The County Employee Commute survey is included in **Appendix I**.

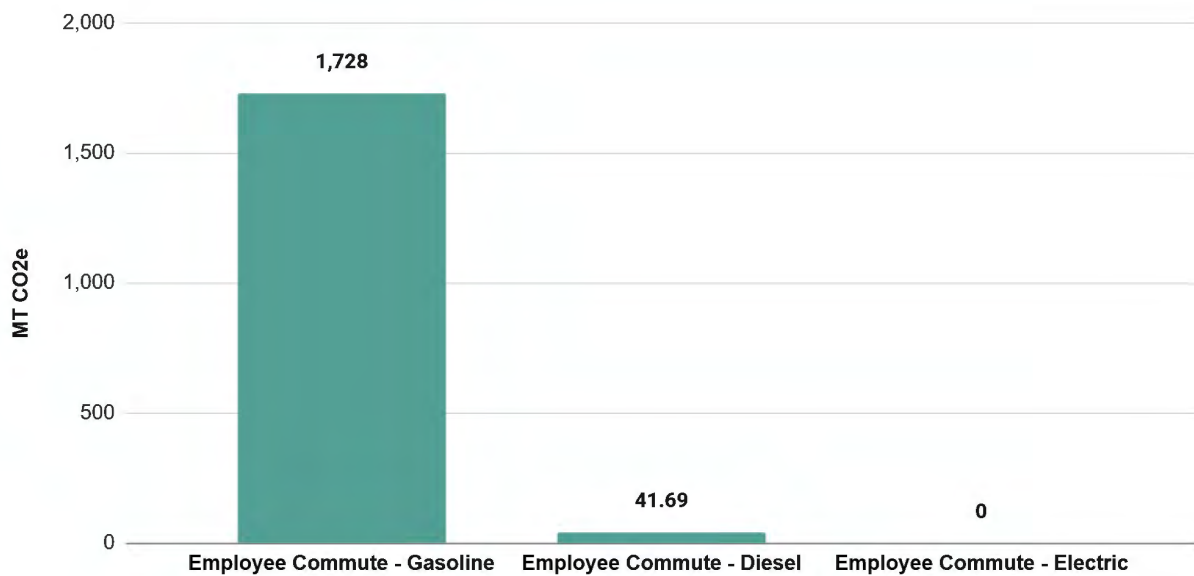
Figure 10. Employee Commute Emissions

Table 14. Employee Commute VMT Breakdown and Emissions

Activity / Source	Annual VMT	Emissions (MT CO ₂ e)
Employee Commute - Gasoline	4,355,747	1,728
Employee Commute - Diesel	81,916	41.69
Employee Commute - Electric	30,350	0
Total Emissions		1,770

Solid Waste

In 2018, solid waste generated by County government operations was approximately 205 tons.⁴⁰ Solid waste generated by County facilities is sent to Forward Landfill in Manteca. In **Figure 11** below, you can see total solid waste tonnage sent to Forward Landfill. Forward Landfill does have a methane collection system in place. Solid waste tonnage data was provided by the County. Landfill gas flaring emissions from Rock Creek Landfill, which is owned and operated by the County, were included, as well. Emissions from transportation of solid waste were also calculated using the annual tonnage and the distance to and from Forward Landfill.

Table 15. County Facility-Generated Solid Waste

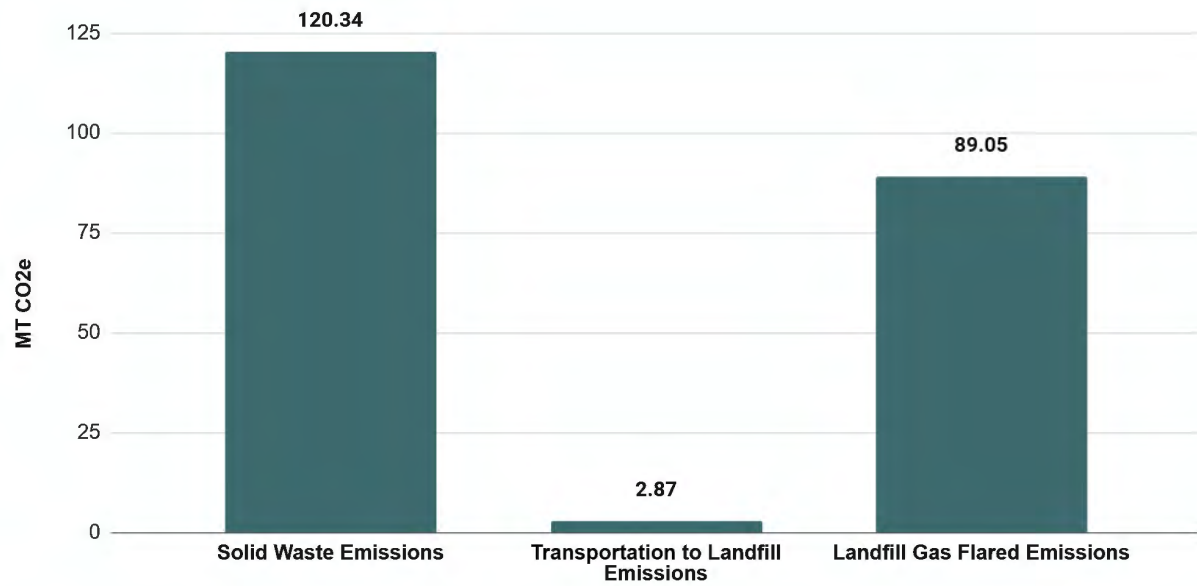
Landfill	Solid Waste (Tons)	Emissions (MT CO ₂ e)	Distance to Landfill (Miles)	Emissions (MT CO ₂ e)	Data Source
Forward Landfill	205	120.34	170.76	2.87	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Total		120.34		2.87	

Table 16. Landfill Gas Flaring Activity Data and Emissions

Landfill	Landfill Gas Flared (Cubic Feet / Year)	Emissions (MT CO ₂ e)	Data Source
Rock Creek Landfill	42,978,951	89.05	Geo-Logic Associates
Total		89.05	

⁴⁰ Solid waste data provided by Calaveras County Integrated Waste Management and Geo-Logic Associates. Located in LGO-Master-Data-Workbook.

Figure 11. Emissions from County Facility-Generated Solid Waste and County-Operated Landfill



Emissions Forecasting

Business-as-Usual Forecasts

Business-as-usual (BAU) forecasts were conducted for Calaveras County (County) after the completion of the emissions inventory to provide an estimate of future emissions in each sector.⁴¹ The BAU scenario takes the emissions from a snapshot in time and projects them out over time, assuming no other changes or variables that might otherwise affect emissions. In general, BAU emissions forecasting does not account for any local, state, or federal policy that would impact future GHG emissions, nor does it account for potential changes in technology or individual consumption behavior. The BAU forecast estimates how annual emissions would change from 2018 to 2030, to 2035, and to 2045. These years align with existing regional, local, and statewide emissions reduction goals.

The BAU forecast is based on two inputs, baseline emissions data and growth rates, both of which are presented in **Appendix K** and **Appendix L**. Growth rates were calculated using projections of population, employment rates, and several other indicator variables. For the County forecasts, two forecast scenarios were calculated due to differences in population growth rates from differing years (one references an increasing population growth rate from 2018 data and the other a declining population growth rate from 2021 data). Both of these forecasts and more detailed information on the reasoning behind including two BAU forecasts are provided in **Appendix L**. Only the forecasts using 2018 DOF data are included in this section of the report.

Calculating the emissions forecast is achieved by isolating an indicator variable for the various sectors and sub-sectors that were evaluated in the inventory and then assessing how that indicator variable is projected to increase or decrease into the future and apply that rate of change to the emissions from that sector or sub-sector.

For example, to forecast residential energy, the team looked at the different projected rates of change for Calaveras County population out to 2045 (from 2018 Department of Finance population projection data), then applied those rates of change to the emissions coming from the County's residential energy sector to arrive at our BAU forecasts. This process was applied to each sector and sub-sector using associated growth indicators.

Table 17 below displays the various indicator variables and their data sources for each sector. Forecasts are based on projections provided by valued sources, however like other predictive modeling, there is inherent uncertainty in these predictions. Likewise, significant

⁴¹ Data located in the City of Angels Camp Forecasts spreadsheet.

events, like the 2020-2021 COVID pandemic, can disrupt a projection in unexpected ways. As this inventory was based on data from before the pandemic, resulting impacts are not accounted for as they are as of yet unknown. Additionally, data that is specific and robust for small rural jurisdictions, like Calaveras County, can be difficult to obtain. Regardless, forecasting can be a useful tool to help understand the actions needed to reach emissions reduction targets.

Table 17. Business-as-Usual Emissions Forecast Variables & Data Sources

Sector	Sub-sector	Indicator Variable	Data Source
Energy	Residential Energy	Population (2018 Projections)	California Department of Finance
	Non-Residential Energy	Employment	California Employment Development Department
Transportation	On-Road Transportation	Population (2018 Projections)	U.S. Census, American Community Survey
	Air Travel	Aircraft Operations	Federal Aviation Administration Forecast
	Boat Travel	VMT Projections	Calaveras Council of Governments
	Off-Road Emissions	Population (2018 Projections)	U.S. Census, American Community Survey
Solid Waste	Solid Waste	Population (2018 Projections)	California Department of Finance
Water and Wastewater	Water and Wastewater	Population (2018 Projections)	California Department of Finance
Agriculture	Agriculture	Acres of Farmland	Calaveras County Agriculture Production Reports

The BAU forecast showed an overall increase in emissions. Under the BAU scenario, emissions are forecast to increase by 5.2% from 2018 to 2030, by 7.3%, from 2018 to 2035, and by 10.8% from 2018 to 2045, for a total increase in emissions from 2018 to 2045 of 10.8%. This equates to 408,491 MT CO₂e projected to be emitted in 2045. **Table 18** and **Figure 12** display the forecast trends.

Table 18. Business-as-Usual Forecasted Emissions by Sector (MT CO₂e) (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Agriculture	Total Emissions and %
2018	48,976	7,334	245,444	12,054	2,104	52,657	368,569
2030	51,418	7,844	260,470	12,655	2,209	53,249	387,845 +5.23%
2035	52,209	8,057	266,522	12,850	2,243	53,509	395,390 +7.28%
2045	52,882	8,483	277,786	13,015	2,272	54,053	408,491 +10.83%
Net % Change	+7.97%	+15.66%	+13.18%	+7.97%	+7.97%	+2.65%	+10.83%

Figure 12. County-Wide Business-as-Usual GHG Emissions Forecast (2018 California Department of Finance Population Projections)



Adjusted Business-as-Usual Forecasts

The adjusted scenario forecast, or adjusted BAU (ABAU), projects emissions out to 2045 and accounts for adjustments and projected emissions reductions resulting from legislative action. This includes projections that include statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs - current emissions data and either BAU projections or adjusted rates of growth or decay. The ABAU

forecast illustrates the difference between and forecasted emissions reductions as a result of state policies' emissions reductions targets. This difference represents the reductions that must be made by the jurisdiction in order to reach reduction targets. These factors are influenced over time by changes in climate, population demographics, land-use and transportation patterns, the adoption of new technologies, and measures adopted to reduce greenhouse gas emissions.

As with the BAU forecasts, two forecast scenarios were calculated due to differences in population growth rates from differing years (one references an increasing population growth rate from 2018 data and the other a declining population growth rate from 2021 data). Both of these forecasts and more detailed information on the reasoning behind including two ABAU forecasts is provided in **Appendix L**. Only the forecasts using 2018 DOF data are included in this section of the report. The below table displays the legislative adjustments that are applied to each emissions sector to calculate the ABAU forecasts.

Table 19. Adjusted Business-as-Usual Emissions Forecast Variables & Data Sources

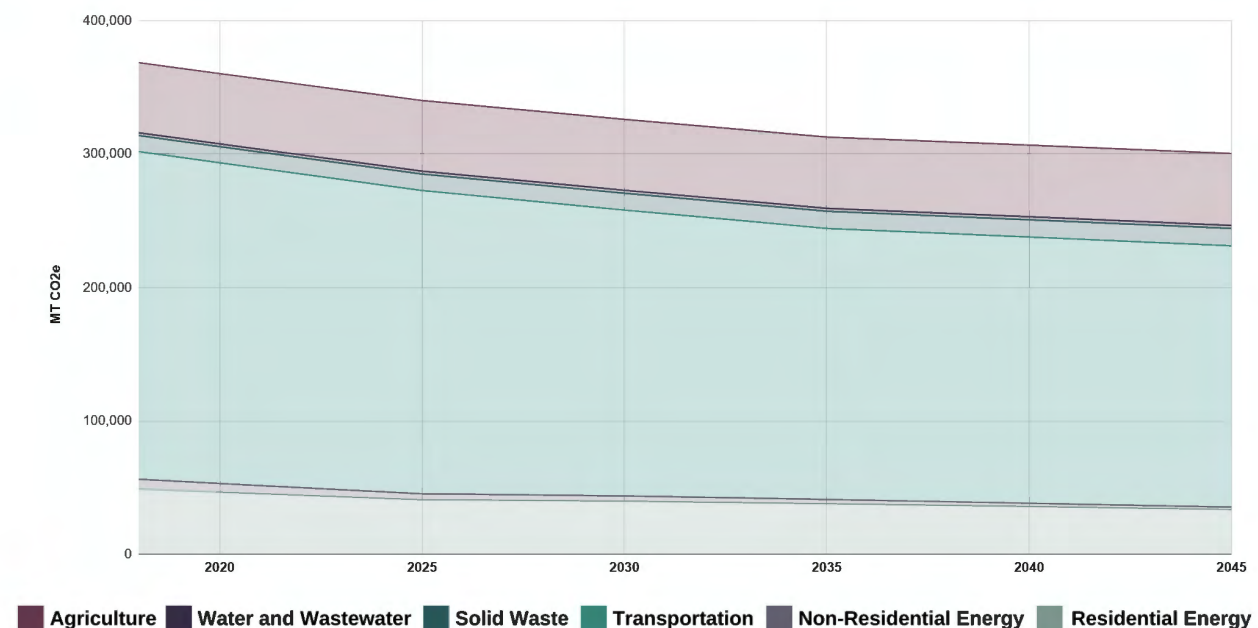
Sector	Sub-sector	Indicator Variable	Data Source
Energy	Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Population (2018 Projections)	SB 100 California Department of Finance
	Non-Residential Energy	Electricity - Renewable Portfolio Standard Other Fuels - Employment	SB 100 California Employment Development Department
Transportation	On-Road Transportation	Emissions Rates (EMFAC 2021)	California Air Resources Board
	Air Travel	Aircraft Operations	Federal Aviation Administration Forecasts
	Boat Travel	Emissions Rates (OFFROAD 2017)	California Air Resources Board
	Off-Road Emissions	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Solid Waste	Solid Waste	Population (2018 Projections)	California Department of Finance
Water and Wastewater	Water and Wastewater	Population (2018 Projections)	California Department of Finance
Agriculture	Agriculture	Acres of Farmland	Calaveras County Agriculture Production Reports

Under the ABAU scenarios, emissions are forecast to decrease by 11.6% from 2018 to 2030, by 15.2% from 2018 to 2035, and by 18.5% from 2018 to 2045, for a total decrease in emissions from 2018 to 2045 of 18.5%. This equates to 300,390 MT CO₂e projected to be emitted in 2045. **Table 20** and **Figure 13** display the forecast trends.

Table 20. Adjusted Business-as-Usual Forecasted Emissions by Sector (MT CO₂e) (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Agriculture	Total Emissions and %
2018	48,976	7,334	245,444	12,054	2,104	52,657	368,569
2030	39,830	3,932	214,075	12,655	2,209	53,249	325,945 -11.56%
2035	37,956	3,196	202,934	12,850	2,243	53,509	312,682 -15.16%
2045	33,629	1,724	195,697	13,015	2,272	54,053	300,385 -18.50%
Net % Change	-31.34%	-76.49%	-20.27%	+7.97%	+7.97%	+2.65%	-18.50%

Figure 13. County-Wide Adjusted Business-as-Usual GHG Emissions Forecast (2018 California Department of Finance Population Projections)



GHG Reduction Targets

An important part of the climate action planning process is setting greenhouse gas (GHG) emissions reduction targets. These targets help guide local governments in developing and adopting appropriate energy action policies and programs. Emissions reduction targets also provide a performance metric by which jurisdictions can evaluate progress.

Targets can be set using different methods. Many cities and counties have chosen to follow California state-wide GHG reduction targets codified in Senate Bill 32, to reduce emissions to 40% below 1990 levels by 2030, or the Executive Order S-3-05, to reduce emissions to 80% below 1990 levels by 2050. More recently, others may choose to adopt Executive Order B-55-18, with the goal of reaching carbon neutrality by 2045. ICLEI recommends adopting an 80% below 1990 levels by 2050 target for both community-wide and government operations, or to consider leading by example and setting a more aggressive goal.⁴²

Another target setting method applied by local governments is to align their reduction targets with those of nearby jurisdictions. This tactic can provide jurisdictions an opportunity to leverage regional influence and achieve economies of scale when pursuing GHG reduction projects that are cross-jurisdictional.⁴³

Calaveras County (County) may also want to take into consideration target setting compliance in regards to the California Environmental Quality Act (CEQA). CEQA section 15183.5 provides guidance on how a GHG plan can be designed to be consistent and comply with criteria for CEQA requirements. Qualified plans that meet CEQA requirements include ones that meet or exceed SB 32, to reduce emissions to 40% below 1990 levels by 2030.

The following table lays out examples of emissions reduction targets adopted by neighboring rural jurisdictions to the County. The County can reference these targets to help guide their decision on selecting appropriate emissions reduction goals for their community.

⁴² ICLEI Guide for Setting a Greenhouse Gas Reduction Target, 2010.

⁴³ ICLEI Guide for Setting a Greenhouse Gas Reduction Target, 2010.

Table 21. GHG Emissions Reduction Targets

Jurisdiction	Reduction Target
City of Merced	GHG reductions to 1990 levels by 2020
Placer County	GHG reductions of 15% below 2005 levels by 2020, 39% below 2005 levels by 2030, and 69% below 2005 levels by 2050
San Joaquin Valley	GHG reductions of 8% of 2005 levels in 2020, 15.7% in 2035, and 21.2% in 2042
City of South Lake Tahoe	GHG reductions of 50% below 2015 levels by 2030 and 80% below 2015 levels by 2040
Town of Truckee	GHG reductions of 80% below 2008 levels by 2040
Tuolumne County	GHG reductions of 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050

Conclusion

This report provides an accounting of Calaveras County's (County) community-wide and government operations greenhouse gas emissions by source and activity.

Business-as-usual (BAU) and adjusted business-as-usual (ABAU) forecasts are also provided to demonstrate the expected growth in GHG emissions, aid in assessing progress, and support GHG emissions reduction target development. These inventories set the stage for ongoing monitoring of the County's progress in achieving national, statewide, regional, and local GHG emissions reduction and other goals. It also provides analysis to inform future planning, policy development, and climate-related actions in the County. And finally, it provides practical information – including key findings, graphs, charts, and maps – that can be used by the County and other agencies to communicate needs and progress to the public, stakeholders, and policymakers.

This analysis found that in 2018, the community as a whole emitted 368,569 metric tons (MT) of CO₂e, which equates to a per capita emissions value of 8.27 MT CO₂e per year. The County's government operations emitted 4,493 MT of CO₂e in 2018. The government operations are emissions sources and activities for which the County has authority to introduce and implement reduction policies. **Figure 14** and **Figure 15** below summarize the County's 2018 GHG emissions.

The County should continue to update these inventories every five years to monitor and assess progress. By conducting periodic GHG emissions inventories as data becomes more robust and methodologies improve, the County can create a clear picture of the GHG emissions in the community, and monitor and evaluate any reduction efforts taken.

Additional key findings from this analysis include:

- The largest contributor to community emissions in the inventory is community-wide transportation, which includes on-road and off-road vehicle emissions. In combination, the transportation (67%), energy (15%), and agriculture (14%) sectors produce more than 96% of the community-wide emissions in the County, and therefore have the most potential for emissions reductions.
- The largest contributor to government operations emissions in the inventory is from the County's vehicle fleet. In combination, the vehicle fleet (44%), employee commute (39%), and buildings and facilities (12%) sectors produce more than 95%

of the government operations emissions in the County, and therefore have the most potential for emissions reductions.

- The 2045 forecasts project an increase for the BAU scenario and a decrease for the ABAU scenario from the 2018 baseline. Under the BAU scenario, from 2018 to 2045 emissions are projected to increase by 10.8%. This equates to 408,491 MT CO₂e projected to be emitted in 2045. Under the ABAU scenario, emissions are projected to decrease by 18.5%, equating to 300,390 MT CO₂e projected to be emitted in 2045.
- Many cities and counties have chosen to follow California state-wide GHG reduction targets codified in Senate Bill 32, to reduce emissions to 40% below 1990 levels by 2030, or the Executive Order S-3-05, to reduce emissions to 80% below 1990 levels by 2050.

Figure 16. 2018 Community-Wide GHG Emissions

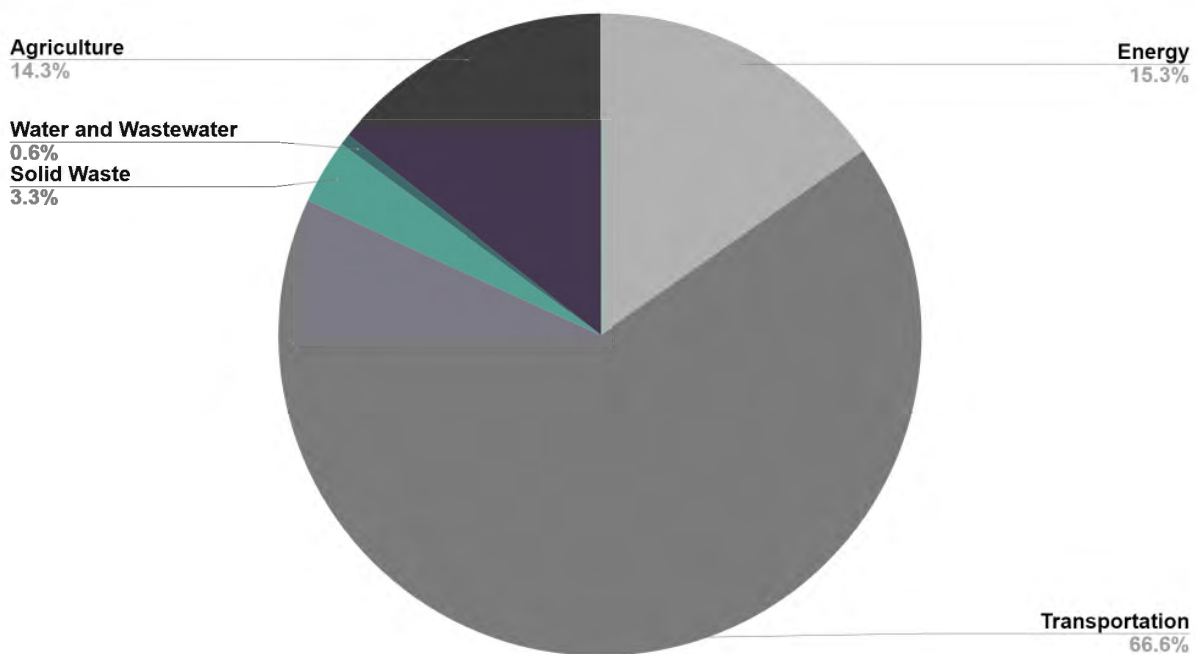
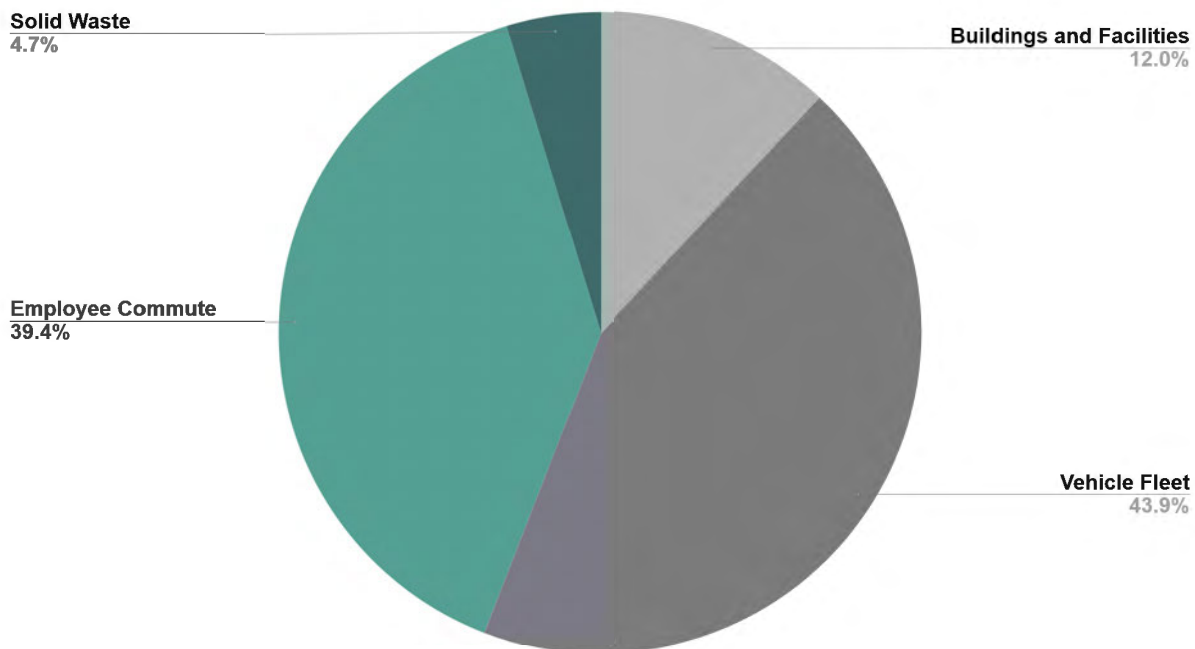


Figure 17. 2018 Government Operations GHG Emissions



Wildfire Assessment Findings

The Calaveras County GHG inventories and reduction plans project also included a separate wildfire assessment report, which has been appended to this GHG inventory report. The wildfire report evaluated the challenges specific to the County, demonstrating how wildfires can impact the carbon cycle and GHG emissions, as well as how the wildland urban interface can both be put at risk by wildfires and increase opportunity for wildfire ignition. To understand the potential GHG emissions impact related to wildfire in the County a Natural and Working Lands Carbon Inventory for the years 2010 and 2020 was developed, which demonstrates the total carbon storage in vegetation and soils. The analysis calculated the current available carbon storage (sequestration) in the County, how carbon storage has changed over time, and highlighted regions and landcover where carbon storage value is high. Additionally, a case study was developed for the 2015 Butte Fire to analyze both the local risks for wildfire and the potential magnitude of GHG emissions and carbon storage loss from a single wildfire event. The wildfire analysis also encompassed an assessment of how forest management practices, such as thinning and prescribed burns, can significantly reduce wildfire GHG emissions and preserve long term carbon stocks that may be destroyed by high-intensity fires caused by overgrown forests.

Key findings from the wildfire assessment include:

- The 2020 Calaveras County natural and working lands total carbon stock inventories was calculated to be 74 million MT CO₂e.
- In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land has an emissions potential of over 8 million MT CO₂ from the conversion of carbon stocks to atmospheric carbon.
- Forest management can reduce the intensity and severity of wildfires in Calaveras County, reducing the GHG emissions potential per acre of forested land from 21.7 MT CO₂/acre burned down to 9.3 MT CO₂/acre burned.

The full wildfire report can be viewed in **Appendix N**, Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment.

GHG emissions reduction efforts require the creation of clear, actionable, and feasible implementation plans informed by local context, robust data, and proven solutions. To build upon the findings of these GHG inventories, a secondary project phase will include the development of a comprehensive GHG reduction plan for the County. This plan will develop measures to reduce emissions resulting from energy use, transportation, solid waste disposal, treatment and transport of water and wastewater, and agricultural practices.

As the County moves forward with emissions reduction strategies and uses this data to inform planning efforts, the County should identify the benefits from strategies including: energy efficiency and conservation, renewable energy, vehicle fuel type and efficiency improvements, alternative transportation, vehicle trip reduction, land use and transit planning, waste reduction, and agriculture practices. The County can achieve benefits beyond reducing emissions, including saving money, improving economic vitality, and ultimately increasing the quality of life for its residents, businesses, and visitors.

The consultant team of Sierra Business Council, Rincon Consultants, and Harris & Associates wishes to thank the project staff at Calaveras County and the Calaveras Council of Governments who lent their knowledge to this project.

Appendices

Community-Wide Inventory Appendices

Appendix A. Residential Energy

Table A-1. Residential Activity Data

Activity / Source	2018	Units	Data Source
Electricity (PG&E)	169,478,491	kWh	Pacific Gas & Electric Company (PG&E)
PG&E Transmission & Distribution (T&D) Losses	8,134,968	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
T&D Grid Loss Factor	4.80	%	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
Total Electricity	177,613,46	kWh	Data Source
Natural Gas (PG&E)	410,617	Therms	Pacific Gas & Electric Company
Natural Gas Leakage	0.30%	Leakage Rate	ICLEI ClearPath (1,028 btu/scf Energy Density, 0.8 kg / m ³ , 93.4% CH ₄ , 1% CO ₂)
Propane (LPG)	4,424,633	Gallons	U.S. Environmental Protection Agency, U.S. Energy Information Administration, and U.S. Census Bureau American Community Survey
Fuel Oil / Kerosene	15,893	Gallons	
Wood	375,436	MMBtu	

Methods

Utility-Derived Data

Utility-provided activity data is shown in **Table A-1**. Electricity, natural gas, and other stationary fuel consumption data were collected from Pacific Gas and Electric Company (PG&E), Calaveras Public Power Agency (CPPA), U.S Energy Information Administration (EIA), U.S. Census American Community Survey (ACS), and the U.S. Environmental Protection Agency eGRID (EPA eGRID) for all residences within County limits. Natural gas leakage rates were provided by ClearPath. The data was categorized as residential and entered into ClearPath, where the GHG emissions were calculated using utility-reported and calculated

grid emissions factors for electricity. The calculation methods and emissions factors are shown in **Table A-2**.

Table A-2. Residential GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Source
2018 Electricity – PG&E	BE.2.2	206	34	4	2018 PG&E (CO ₂) & 2018 U.S. EPA eGRID CAMX (CH ₄ and N ₂ O)
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
2018 Electricity – PG&E T&D Losses	BE.4.1	496.54	34	4	2018 U.S. EPA eGRID CAMX (CO ₂ , CH ₄ , and N ₂ O)
2018 Electricity – CPPA T&D Losses	BE.4.1	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG
Fuel Oil/Kerosene	BE.1.2	10.15 kg/Gallon	0.0015 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 Kerosene and Table B.4 Residential Kerosene
Wood	BE.1.2	93.80 kg/MMBtu	0.316 kg/MMBtu	0.0042 kg/MMBtu	USCP Appendix C - Table B.2 Wood and Wood Residuals and Table B.3 Biomass Fuels Solid Residential

Table A-3. 2018 Residential Non-Utility Home Heating Fuel Use Calculations (EIA/ACS)

Fuel Type	Propane	Fuel Oil / Kerosene	Wood	Data Source
California Fuel Use in 2018	263,298,000	55,44,000	21,900,000	Energy Information Administration (EIA) State Energy Data System (SEDS) 2018 California Residential Energy Use Estimates
Units	Gallons	Gallons	MMBtu	
# of 2018 California Households	419,110	31,744	205,621	U.S. Census Bureau, 2018 American Community Survey (ACS) 1-year estimates. California Households using Non-Utility Fuels for Home Heating
Per Household Fuel Use	628.23	174.65	106.51	
Units	Gallons	Gallons	MMBtu	U.S. Census Bureau, 2018 American Community Survey (ACS) 1-year estimates.
# of 2018 Calaveras County Households using Non-Utility Heating Fuels	7,043	91	3,525	

Non-Utility Derived Data

Non-utility activity data is shown in **Table A-1**. Propane, fuel oil/kerosene, and wood used in the County for home heating were estimated using EIA and ACS data. The EIA State Energy Data System California residential energy use estimates and the ACS 2018 1-year estimates of California households using non-utility fuels for home heating were used to calculate California per household fuel use. This per household fuel use factor was applied to the number of households using non-utility fuels for home heating in the County.

Table A-1 shows the activity data for home heating use. **Table A-3** above shows the EIA/ACS propane, fuel oil/kerosene, and wood for 2018. Activity data was then entered into ClearPath using the calculation methods and emissions factors shown in **Table A-2**.

Electricity Transmission and Distribution (T&D) Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in **Table A-1**. T&D losses were calculated for residential electricity following EPA guidance, using EPA

eGRID region grid gross loss (ggl) factors shown in **Table A-2**. EPA recommends multiplying electricity consumption by $\text{ggl}/(1-\text{ggl})$. The calculated T&D losses were entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid-average emissions factors.

Appendix B. Non-Residential (Commercial & Industrial) Energy Use Sector Notes

Table B-1. Non-Residential Activity Data

Activity / Source	2018	Units	Data Source
Electricity (PG&E)	47,119,824	kWh	Pacific Gas & Electric Company (PG&E)
Electricity (CPPA)	31,092,717	kWh	Calaveras Public Power Agency (Hydroelectric Project)
Electricity (Industrial - PG&E)	2,692,061	kWh	Pacific Gas & Electric Company (PG&E)
PG&E T&D Losses (Commercial)	2,261,752	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
PG&E T&D Losses (Industrial)	129,219	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
CPPA T&D Losses	1,492,450	kWh	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
T&D Grid Loss Factor	4.80	%	U.S. Environmental Protection Agency eGRID (Western, CAMX, 2018)
Total Electricity	84,788,023	kWh	Data Source
Natural Gas (PG&E)	155,271	Therms	Pacific Gas & Electric Company
Natural Gas Leakage	0.30%	Leakage Rate	ICLEI ClearPath (1,028 btu/scf Energy Density, 0.8 kg / m ³ , 93.4% CH ₄ , 1% CO ₂)
Propane (LPG)	113,010	Gallons	U.S. Environmental Protection Agency, U.S. Energy Information Administration, and U.S. Census Bureau American Community Survey

Methods

Utility-Derived Data

Utility-provided activity data is shown in **Table B-1**. Electricity, natural gas and other stationary fuel consumption data were collected from Pacific Gas and Electric Company (PG&E), Calaveras Public Power Agency (CPPA), and the U.S. Environmental Protection Agency eGRID (EPA eGRID) for all commercial facilities within County limits. Natural gas leakage rates were provided by ClearPath. The activity data was entered into ClearPath, where the GHG emissions were calculated using utility and EPA reported grid emissions factors. The calculation methods and emissions factors are shown in **Table B-2**.

Table B-2. Non-Residential GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Source
2018 Electricity – PG&E	BE.2.2	206	34	4	2018 PG&E (CO ₂) & 2018 U.S. EPA eGRID CAMX (CH ₄ and N ₂ O)
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
2018 Electricity – PG&E T&D Losses	BE.4.1	496.54	34	4	2018 U.S. EPA eGRID CAMX (CO ₂ , CH ₄ , and N ₂ O)
2018 Electricity – CPPA T&D Losses	BE.4.1	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Table B-3. 2018 Non-Residential Non-Utility Heating Fuel Use Calculations (EIA)

Activity / Source	Propane Data	Data Source
U.S. Propane Use	1,923,497,268	Energy Information Administration (EIA) 2018 U.S. Commercial Energy Use Estimates (SEDS)
Units	Gallons	
2018 U.S. Commercial Square Footage	97,000,000,000	Energy Information Administration (EIA) 2018 Commercial Square Footage Estimates (CBECS)
Per Square Foot Use	0.0198	
Units	Gallons	
2018 County Commercial Square Footage (Scaled from City of Angels Camp Using Population)	5,698,995	City of Angels Camp / ACS

Non-Utility Derived Data

Propane is widely used throughout the County for heating purposes. Commercial propane data was estimated using commercial propane usage data and commercial square footage data from the EIA. This data was scaled using commercial square footage within the City of Angels Camp and scaled up to the approximate commercial square footage in the County using population data from 2018 ACS population estimates, as there was no County commercial square footage data available. This is shown in **Table B-3**.

Electricity Transmission and Distribution (T&D) Losses Data

Electricity transmission and distribution (T&D) losses activity data is shown in **Table B-1**. T&D losses were calculated for commercial electricity following EPA guidance, using EPA eGRID region grid gross loss (ggl) factors shown in **Table B-2**. EPA recommends multiplying electricity consumption by $ggl/(1-ggl)$. The calculated T&D losses were entered into ClearPath, where the GHG emissions were calculated using the EPA eGRID Western CAMX sub-region grid-average emissions factors.

Appendix C. Community Transportation Sector Notes

Table C-1. Community Transportation Activity Data

On-Road Activity / Source (Scaled)	Vehicle Miles Traveled (VMT)	Data Source
Gasoline Vehicles	347,034,462	Calaveras Council of Governments (CCOG) California Air Resources Board (CARB)
Diesel Vehicles	55,973,856	
Electric Vehicles	481,502	
Natural Gas Vehicles	82,275	
Plug-In Hybrid Vehicles	1,721,093	
Total Calaveras County Annual VMT	405,293,189	
EMFAC Calaveras County VMT	1,270,972	
Off-Road Vehicles - Direct ClearPath Input	Unit	Data Source
13,711	CO ₂ (Metric Tons)	CARB OFFROAD 2017, U.S EPA Emissions Factors, and IPCC 5th Assessment Global Warming Potential
1.55	CH ₄ (Metric Tons)	
0.61	N ₂ O (Metric Tons)	
Aviation	Aviation Gasoline (Gallons)	Data Source
Local Aviation (100% Attribution)	20,131	Calaveras County Airport, Maury Rasmussen Field
Itinerant Aviation (50% Attribution)	22,816	
Recreational Boating - Direct ClearPath Input	Unit	Data Source
28,672	CO ₂ (Metric Tons)	CARB OFFROAD 2007
31.46	CH ₄ (Metric Tons)	
6.65	N ₂ O (Metric Tons)	

Table C-2. Community Transportation GHG Calculation Methods & Emissions Factors

Activity / Source (On-Road)	Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Gasoline Vehicles (g/mile)	TR.1.B	420.20	0.0164	0.0184	CARB EMFAC 2017
Diesel Vehicles (g/mile)	TR.1.B	889.75	0.0130	0.14	
Electric Vehicles (g/mile)	TR.1.B	0	0	0	
Natural Gas Vehicles (g/mile)	TR.1.B	990.45	0.5803	0.2019	
Plug-In Hybrid Vehicles (g/mile)	TR.1.B	165.04	0.0006	0.00075	
Activity / Source (Aviation)	Method	CO ₂ (kg/gallon)	CH ₄ (g/gallon)	N ₂ O (g/gallon)	Emissions Factor Source
Emissions Factor	TR.6.B	8.31	0.36	0.07	ClearPath

Methods

On-Road Vehicles

On-road transportation emissions for the County were calculated using vehicle miles traveled (VMT) estimated by Calaveras Council of Governments' Travel Demand Model and EMFAC2017 data for Calaveras County. The CCOG analysis included all miles traveled within the County in 2018, as well as trips that started in boundary and ended out of boundary and trips that started out of boundary and ended in boundary. On-road transportation activity data is shown in **Table C-1**. Activity data was entered into ClearPath, where County-level fuel and vehicle-specific emissions factors, shown in **Table C-2**, were applied to calculate the GHG emissions associated with community on-road transportation. The methodology for collecting and conditioning this data is as follows:

Fuel / Vehicle Type Breakdown and Emissions Calculations

VMT and emissions percentages by fuel type are estimated for Calaveras County using the CARB's EMFAC 2017 model and run for 2018. Data from this model was used to derive county-specific per-mile emissions factors and vehicle fuel efficiencies for gas, diesel,

natural gas, hybrid, and electric fuels for passenger cars, light-duty trucks and heavy-duty trucks. These were applied to the County's VMT estimates to derive emissions by fuel type.

EMFAC 2017 reports CO₂, CH₄, and N₂O emissions factors for different vehicle type and fuel combinations for every county in California, informed by California Department of Motor Vehicles registrations, the Smog Check program and other data sources. Average CO₂, CH₄, and N₂O emissions factors were calculated for passenger vehicles, light trucks, and heavy trucks.

Off-Road Emissions

Off-road emissions for the County were obtained from the California Air Resources Board's (CARB) OFFROAD 2017 model. Included were emissions that may be attributed to off-road, fuel-consuming equipment categories including Agriculture, Construction & Mining, Industrial, Light Commercial, Logging, Oil Drilling, Portable Equipment, and Transportation Refrigeration Units. These are equipment types that are thought to have significant operation within Calaveras County. Emissions from aviation and recreational boating were also included. Aviation fuel usage in the County for 2018 was provided by the Calaveras County Airport, and emissions from recreational boating was calculated using CARB's OFFROAD 2007 model. Emissions data, shown in **Table C-1**, was entered into ClearPath.

Appendix D. Community Solid Waste Sector Notes

Table D-1. Community Solid Waste Activity Data

Landfill	2018 Waste Generation (Tons)	Landfill Gas Capture?	Roundtrip Distance to Facility (Miles)	Data Source
Altamont Landfill	7.80	Yes	151.40	Calaveras County Integrated Waste Management, CalRecycle, and Google Maps
Fink Road Landfill	1.90	Yes	173.20	
Foothill Sanitary Landfill	439.10	Yes	48	
Forward Landfill	12,197	Yes	100	
Highway 59 Landfill	0.90	Yes	143	
L and D Landfill	855.70	Yes	111.40	

McKittrick Waste Treatment Site	5.50	Yes	524
North County Landfill & Recycling Center	198.60	Yes	66.80
Potrero Hills Landfill	81.50	Yes	160.20
Recology Hay Road	184.70	Yes	158
Rock Creek Landfill	26,875	Yes	46.60
Sacramento County Landfill, Kiefer	5.10	Yes	89.20

Table D-2. Community Solid Waste GHG Calculation Methods & Emissions Factors

Activity / Source	Method	Type	Emissions Factor		Emissions Factor Source
Transportation of Solid Waste	SW.6	Solid Waste Transportation	0.00014 Metric Tons CO ₂ e / Wet Short Ton / Mile		USCP Appendix E
Activity / Source	Method	Type	%	Metric Tons CH ₄ / Wet Short Ton	Emissions Factor Source
Community-Generated Solid Waste Characterization	12.2.2	Newspaper	1.20	0.043	CalRecycle Calaveras County Waste Characterization Study for 2018
		Office Paper	1.80	0.20	
		Corrugated Cardboard	5.20	0.12	
		Magazines/Third Class Mail	8.40	0.049	
		Food Scraps	18.20	0.078	USCP Appendix E
		Grass	1.15	0.038	
		Leaves	2.70	0.013	
		Branches	3.05	0.062	

Dimensional Lumber	23.70	0.062
All Other (Non-Organic)	34.60	0

Table D-3. In-Boundary Landfill Gas Flaring

Activity / Source	
Landfill Gas Flared (cubic feet/year)	42,978,951
Fraction of CH ₄ in Landfill Gas (decimal)	0.395
Destruction Efficiency (decimal)	0.99

Methods

Community-Generated Solid Waste

Solid waste generated in Calaveras County and disposed of in landfills emits GHGs. Emissions reported for 2018 occur at the landfills over the entire period that waste decomposes, estimated to be 100 years. The tonnage of landfilled waste generated by County residents, businesses, and visitors was collected from the Calaveras County Integrated Waste Management.

Waste characterization percentages from CalRecycle, shown in **Table D-2**, were applied to the tonnage of community-generated waste that was landfilled. The waste tonnage and characterization data were entered into ClearPath, where GHG emissions were calculated based on standard factors for organic content and methane-generating potential for each waste type. Emissions were adjusted based on the presence of landfill gas capture systems.

Solid Waste Transportation

Solid waste transportation emissions include emissions from the trucks used to transport the waste to the regional landfills. The tonnage of waste collected and the distance to the landfills were entered into ClearPath to calculate GHG emissions using default per-ton-mile CO₂e emissions (the GHGs emitted to transport one ton of waste one mile). Distances to each landfill are noted in **Table D-1**.

It is important to acknowledge the benefits of recycling and composting that lower waste volumes and emissions. When waste volumes are reduced, transportation emissions are

likewise reduced, and when incoming organic waste is diverted, landfill emissions are also reduced. Finally, upstream emissions from materials manufacturing are reduced when recycled materials displace virgin materials.

Landfill Gas Flaring

Rock Creek Landfill is a landfill that is within the boundary of Calaveras County. The landfill gas that is flared annually is accounted for in **Table D-3**. This data was input to ClearPath.

Appendix E. Community Potable Water Use Sector Notes

Table E-1. Community Potable Water Electricity Use Activity Data - Information Item

Year	Energy Use	Unit	Fuel Type	Data Source
2018	409	Gallons	Diesel	Union Public Utility District
2018	4,100	Gallons	Gasoline	Union Public Utility District
2018	600.60	Gallons	Propane	Union Public Utility District
Year	Electricity Use (kWh)	Water Treated (Gallons)	Energy Intensity (kWh / Million Gallons)	Data Source
2018	CPPA 8,394,457	2,803,560,570	2,556	CPPA, USCP, Water Agencies

Table E-2. Community Potable Water GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Emissions Factor Source
2018 Electricity - CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association

Methods

Community Potable Water Electricity Use

The County's potable water use activity data is shown in **Table E-1**. Data was collected from the Calaveras County Water District, City of Angels Camp, Blue Lake Springs Mutual Water Company, Calaveras Public Utility District, Union Public Utility District, Utica Water and Power Authority, Valley Springs Public Utility District, and Calaveras Public Power Agency (CPPA). Because the potable water treatment and delivery infrastructure lies within the County, the electricity use was marked as an "information only" item to prevent double counting. The electricity use was entered into ClearPath, where the GHG emissions were calculated using relevant emissions factors for electricity shown in **Table E-2**. All of this data was marked as "information only" to prevent double counting.

Appendix F. Community Wastewater Treatment Sector Notes

Table F-1. Community Wastewater Treatment Electricity Use Activity Data - Information Item

Year	Energy Use	Unit	Fuel Type	Data Source
2018	75	Gallons	Diesel	Murphys Sanitary District
2018	200	Gallons	Propane	Mokelumne Hill Sanitary District
2018	3,865	Therms	Natural Gas	San Andreas Sanitary District
Year	Electricity Use (kWh)	Water Treated (Gallons)	Energy Intensity (kWh / Million Gallons)	Data Source
2018	5,548,396	380,947,000	14,565	CPPA, USCP, Wastewater Agencies

Table F-2. Community Wastewater Treatment GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Emissions Factor Source
2018 Electricity – CPPA	BE.2.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	Method	CO ₂	CH ₄	N ₂ O	Emissions Factor Source
Central Plants - with Nitrification / Denitrification (Population-Based)	WW.7	N/A	N/A	7 g N ₂ O / person / year	USCP Appendix F
Central Plants - without Nitrification / Denitrification (Population-Based)	WW.8	N/A	N/A	3.2 g N ₂ O / person / year	USCP Appendix F
Effluent (Population-Based)	WW.12	N/A	N/A	0.005 kg N ₂ O-N/kg sewage-N discharged	USCP Appendix F
Lagoons - No Primary Treatment (Population-Based)	WW.6	N/A	0.6 kg CH ₄ / kg BOD ₅	N/A	USCP Appendix F
Septic Systems (Population-Based)	WW.11	N/A	0.6 kg CH ₄ / kg BOD ₅	N/A	USCP Appendix F

Methods

Community Wastewater Treatment Electricity Use

Community-generated wastewater treatment activity data for 2018 is shown in **Table F-1**. Data on electricity use and wastewater treated were collected from Calaveras County Water District, City of Angels Camp, Mokelumne Hill Sanitary District, Murphys Sanitary District, San Andreas Sanitary District, Valley Springs Public Utility District, and CPPA. Because the wastewater treatment infrastructure lies within the County, the electricity use is marked as “information only” to prevent double counting. The electricity use was entered into ClearPath, where the GHG emissions were calculated using utility-reported grid emissions factors for electricity shown in **Table F-2**.

Table F-3. Community Wastewater Treatment Process Activity Data

Facility	Wastewater Treated (MG)	Commercial / Industrial Factor	Nitrification / Denitrification?	Aerobic?	Data Source
CCWD - Arnold	32.50	1.25	No	Yes	CCWD
CCWD - Copper Cove	135.10	1	No	Yes	
CCWD - Country House	0.40	1	No	No	
CCWD - Douglas Flat	12.80	1	Yes	Yes	
CCWD - Forest Meadows	24.20	1	No	Yes	
CCWD - Indian Rock	0.70	1	No	No	
CCWD - La Contenta	58.90	1	No	Yes	
CCWD - Sequoia Woods	1.60	1	No	No	

CCWD - South Worth	3.10	1	No	No	
CCWD - Wallace Lake	5.50	1	No	Yes	
CCWD - West Point	2.90	1	No	No	
CCWD - Wilseyville	2.90	1	No	No	
Mokelumne Hill Sanitary District	0.15	1	Yes	Yes	MHSD
Murphys Sanitary District	43.09	1	No	No	MSD
San Andreas Sanitary District	98.60	1	Yes	Yes	SASD
Valley Springs Public Utility District	27.52	1	No	Yes	VSPUD

Table F-4. Emissions from Nitrogen Discharge

Facility	Daily N Load (kg N/day)	Population Served
City of Angels Camp Wastewater Treatment Plant	60	3,875
San Andreas Sanitary District	5.40	2,800
Valley Springs Public Utility District	1.10	736

Table F-5. Emissions from Septic Systems

Facility	Population Served by Septic Systems
CCWD - Arnold	195
CCWD - Country House	25
CCWD - Douglas Flat	175
CCWD - Indian Rock	21

CCWD - Sequoia Woods	23
CCWD - South Worth	57
CCWD - Wallace Lake	101
CCWD - West Point	165

Table F-6. Emissions from Wastewater Lagoons

Facility	Population Served by Wastewater Lagoons OR BOD5 Load (kg BOD5/day)	% BOD5 Removed in Primary Treatment
CCWD - Copper Cove	4,691 people	32.50
CCWD - Forest Meadows	1,347 people	32.50
CCWD - Wilseyville	218 people	32.50
Mokelumne Hill Sanitary District	35 kg BOD5 / day	60
Murphys Sanitary District	0.00028 kg BOD5 / day	98
Valley Springs Public Utility District	0.000346 kg BOD5 / day	93

Community Wastewater Treatment Facility Process and Fugitive Emissions

There are two emissions associated with wastewater treatment processes: methane (CH₄) and nitrous oxide (N₂O), which together account for a small part of total community-based GHG emissions. Calculating the makeup and amount of emissions depends on the processes involved and the management practices employed.

County wastewater treatment is operated by several treatment facilities. Operational parameters of the wastewater treatment systems are delineated in **Table F-3**. The wastewater treatment activity data were entered into ClearPath, where GHG emissions were calculated using the standard methods and emissions factors from the USCP and Local Government Operations Protocol (LGOP) that are shown in **Table F-2**.

Uncertainties

According to the EPA national inventory of greenhouse gas emissions, considerable uncertainty exists within any of the EPA/IPCC-based methodologies used to estimate

wastewater process and fugitive emissions. EPA states that population-based methane emissions could be underestimated by 37% or overestimated by 47% while nitrous oxide emissions could be underestimated by 76% or overestimated by 93%. Emissions estimates based on direct source measurements can possibly have higher accuracy and less uncertainty. This extreme degree of uncertainty exists because these methodologies were originally developed for international countrywide inventories that were mainly population-based. By necessity, these methodologies were generalized “top-down” approaches that sought to provide emissions estimates for countries where detailed information would be impractical to obtain. Although these methodologies had the advantage of being relatively simple to calculate, the trade-off was a compromised level of accuracy. Nevertheless, the methodologies in this Appendix reflect the evolution of knowledge since the development of the LGOP and rely upon direct measurement where possible.

Methods are evolving but especially where the emissions are based on population and default inputs, communities should exercise caution in drawing conclusions or establishing policies based on these calculations.

Government Operations Inventory Appendices

Appendix G. Buildings and Facilities Sector Notes

Table G-1. Buildings and Facilities Electricity and Natural Gas Activity Data

Building / Facility	Activity / Source	kWh	Therms	Source
Calaveras County Facilities	Electricity (PG&E) / Natural Gas Use	201,222	86,065	Pacific Gas & Electric Company (PG&E)
Calaveras County Facilities	Electricity (CPPA) / Natural Gas Use	3,284,340	--	Calaveras Public Power Agency (CPPA)

Table G-2. Buildings and Facilities GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Source
2018 Electricity – PG&E	6.2	206	34	4	2018 PG&E (CO ₂) & 2018 U.S. EPA eGRID CAMX (CH ₄ and N ₂ O)
2018 Electricity – CPPA	6.2	40.79	0	0	2018 CPPA (Hydroelectric Project), International Hydropower Association
Activity / Source	Method	CO ₂ lbs/MWh	CH ₄ lbs/GWh	N ₂ O lbs/GWh	Source
Natural Gas	BE.1.1	53.02 kg/MMBtu	0.005 kg/MMBtu	0.0001 kg/MMBtu	USCP Appendix C - Table B.1 and Table B.3
Propane (LPG)	BE.1.2	5.79 kg/Gallon	0.001 kg/Gallon	0.0001 kg/Gallon	USCP Appendix C - Table B.1 LPG and Table B.4 Residential LPG

Methods

Buildings, facilities, and public lighting electricity and natural gas data, shown in **Table G-1**, was collected from Pacific Gas & Electric Company and the County's Calaveras Public Power Agency bills. The activity data was entered into ClearPath, where GHG emissions were calculated using the calculation methods and emissions factors shown in **Table G-2**. No County facility propane data was included in the government operations inventory, as a majority of County facilities are located in San Andreas and use natural gas.

Appendix H. Vehicle Fleet Sector Notes

Table H-1. Vehicle Fleet Activity Data

Activity / Source On-Road Unless Noted Off-Road	Total Fuel Use (Gallons)	Annual Miles Traveled (VMT)	VMT % Passenger Vehicles	VMT % Light Trucks	VMT % Heavy Trucks	Data Source
Gasoline Vehicles	48,210	450,159	0	83.97	16.03	Calaveras County (Public Works Department)
Diesel Vehicles	122,389	1,030,424	0	66.59	33.41	
Off Road Gasoline	N/A	N/A	N/A	N/A	N/A	
Off Road Diesel	29,047	N/A	N/A	N/A	N/A	

Table H-2. Vehicle Fleet GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ kg / gallon	CH ₄ grams / mile	N ₂ O grams / mile	Emissions Factor Source
On-Road Passenger Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0186	0.0093	LGOP Appendix G - Table G.11 (CO ₂) and U.S. National Transportation Defaults (CH ₄ and N ₂ O)
On-Road Light Trucks Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.0201	0.0167	
On-Road Heavy Trucks Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.086	0.0664	
On-Road Passenger Diesel	7.1.1.1 and 7.1.3.3	10.21	0.0005	0.001	
On-Road Light Trucks Diesel	7.1.1.1 and 7.1.3.3	10.21	0.001	0.0015	
On-Road Heavy Trucks Diesel	7.1.1.1 and 7.1.3.3	10.21	0.0051	0.0048	
Off-Road Large Utility Diesel	7.1.1.1 and 7.2	10.21	0.58 grams / gallon		LGOP Appendix G - Table G.11 (CO ₂) & G.14 (CH ₄ and N ₂ O)

Methods

The 2018 vehicle fleet information, including vehicles miles traveled (VMT) and fuel use (by type) was collected from County staff. Vehicle fleet data was only provided by the County Public Works Department, so mileage and fuel use were scaled up to account for all County vehicles. Vehicle fleet-specific 2018 miles per gallon (MPG) data was used to calculate annual mileage and fuel use for each vehicle. Vehicle breakdown and fuel use were entered into ClearPath.

Appendix I. Employee Commute Sector Notes

Figure I-1. Employee Commute Survey

County of Calaveras Employee Commute Survey

Please answer every question as completely as possible, as if it were a normal year (not during COVID-19) and you were commuting to the office. If you have any questions please send them to Meredith Anderson at manderson@sierrabusiness.org. Thank you for taking the time to complete this survey. This survey will close on Wednesday, May 12th, 2021.

* Required

Which department do you work for? *

If you split your time between departments, please indicate the time split.

Your answer

What is your primary mode of transportation to work when you are commuting? *

Choose

If other, please explain.

Your answer

How many days a week do you typically drive your vehicle to work (if you were commuting)? *

If you carpool, please include the number of days you are the driver or you drive alone.

Choose

How many days a week do you typically work? *

Choose

What is the average number of vacation days, sick days, holidays and office closures (combined) you observe in a typical YEAR? *

Please enter the number not including weekends.

Your answer

When you drive your own vehicle to work, What is the one-way distance on your commute? *

Please enter a whole number. Enter mileage for one direction only.

Your answer

Which town is your place of primary residence?

Your answer

If you drive to work, what type of vehicle do you drive?

Choose

What is the make and model of your vehicle?

Your answer _____

What is the model year of your vehicle?

Your answer _____

What type of fuel does your vehicle use?

Choose ▼

If other, please specify fuel type and grade.

Your answer _____

What is the average fuel efficiency of your vehicle?

It is ok to guess or estimate. You can also look up your vehicle's fuel efficiency at <http://www.fueleconomy.gov/feg/findacar.shtml>.

Your answer _____

Is the vehicle you drive to work a County-owned vehicle? *

Choose ▼

Table I-1. Employee Commute Activity Data

Fuel	Vehicle Type	2018 Vehicle Miles Traveled	%	Data Source
Number of Employees	N/A	546	N/A	Calaveras County
Gasoline	Passenger Cars		74.78	Calaveras County, 2021 Employee Commute Surveys
	Light Trucks	4,355,747	25.22	
	Heavy Trucks		0	
Diesel	Passenger Cars		41.19	
	Light Trucks	81,916	58.81	
	Heavy Trucks		0	
Total	All Types		N/A	

Table I-2: Employee Commute GHG Calculation Methods & Emissions Factors

Activity / Source	Method	CO ₂ kg / gallon	CH ₄ grams / mile	N ₂ O grams / mile	Emissions Factor Source
Passenger Vehicles - Gasoline		8.78	0.0186	0.0093	LGOP Appendix G - Table G.11 (CO ₂) and U.S. National Transportation Defaults (CH ₄ and N ₂ O)
Light Trucks - Gasoline		8.78	0.0201	0.0167	
Heavy Trucks - Gasoline	7.1.1.1 and 7.1.3.3	8.78	0.086	0.0664	
Passenger Vehicles - Diesel		10.21	0.0005	0.001	
Light Trucks - Diesel		10.21	0.001	0.0015	
Heavy Trucks - Diesel		10.21	0.0051	0.0048	

Methods

Employee commute emissions were calculated using employee surveys conducted in 2021 to use as a proxy for the year 2018. There were 134 respondents out of the 546 total employees. This data was scaled to account for all employees. The survey collected information regarding travel distances, modes, and frequency. Business travel is not delineated in the surveys, but emissions from business travel in County vehicles is captured in the Vehicle Fleet sector. The VMT activity data, shown in **Table I-1**, was then entered into ClearPath, where GHG emissions were calculated using the methods and emissions factors shown in **Table I-2**. The fuel efficiencies were used to convert VMT to fuel use for the emissions calculations.

Appendix J. Solid Waste Sector Notes

Table J-1. Government Operations Solid Waste Activity Data

Landfill Name	2018 Wet Tons	Density (lbs / Cubic Yard)	Data Source
Forward Landfill	205	194.50	Cal-Waste

Table J-2. Solid Waste Calculation Methods & Emissions Factors

Activity / Source	Method	Type	Emissions Factor		Emissions Factor Source
Transportation of Solid Waste	SW.6	Solid Waste Transportation	0.00014 Metric Tons CO ₂ e / wet short ton / mile		USCP Appendix E
Activity / Source	Method	Type	%	Metric Tons CH ₄ / Wet Short Ton	Percentages and Emissions Factor Source
Government Operations Solid Waste Characterization	12.2.2	Newspaper	2.59	0.043	CalRecycle Calaveras County Public Administration 2018 Waste Characterization Study
		Office Paper	27.80	0.20	
		Corrugated Cardboard	4.70	0.12	

Magazines / Third Class Mail	5.47	0.049	LGOP Chapter 12 USCP Appendix E
Food Scraps	14.60	0.078	
Grass	1.35	0.038	
Leaves	1.35	0.013	
Branches	0.04	0.062	
Dimensional Lumber	14.12	0.062	
All Other (Non-Organic)	27.98	0	

Methods

The County facility-generated solid waste data was collected from Cal-Waste in the form of cubic yards. The tonnage of solid waste, shown in **Table J-1**, was calculated using a density of 89 lbs per cubic yard, provided by the California Integrated Waste Management Board (CalRecycle) specifically tailored to public administration waste, and 300 lbs per cubic yard for community-generated waste. The average of these two values was used (194.5 lbs per cubic yard), as some of the waste was generated from community facilities where the County pays for the solid waste disposal. The solid waste was transferred to managed landfills for disposal, which have landfill-gas capture systems in place. The emissions associated with this waste occur at the landfill sites over the entire period of decomposition (estimated to be about 100 years).

The solid waste tonnage activity data was entered into ClearPath, where GHG emissions were calculated using CalRecycle's public administration and County-wide percentages, coupled with standard emissions factors adopted by the California Air Resources Board, the California Climate Action Registry, ICLEI - Local Governments for Sustainability and The Climate Registry and shown in **Table J-2**.

Table J-3. County-Operated Solid Waste Facilities

Rock Creek Landfill Data	2018
Landfill Gas (LFG) Collected (Cubic Feet / Day)	117,751
% Methane in LFG	39.50%
Destruction Efficiency of Methane (0.99 Default)	99%

Methane (CH₄) emissions from Rock Creek Landfill in Farmington were estimated using the activity data and assumptions in **Table J-3** provided by Geo-Logic Associates using the standard formulas in the LGOP and ClearPath.

Forecast Data & Growth Rate Appendices

Appendix K. Forecast

Methods

BAU projections are intended to demonstrate the expected growth in GHG emissions if no reduction measures are taken. The BAU forecast is beneficial in that it allows for comparison between forecasted and actual observed emissions to determine what emissions reduction progress has been made to date, as well as to assess whether or not future reduction goals could be met by the reduction efforts made to date. BAU forecast estimates future community-wide GHG emissions in the years 2030, 2035, and 2045. A BAU forecast is based on two inputs — current emissions data and growth rates. Baseline emissions data came from the 2018 inventory. Growth rates were calculated based on projected growth of relevant indicator variables.

An adjusted scenario forecast, or adjusted BAU (ABAU), accounts for legislative adjustments and projected emissions reductions resulting from legislative action. This includes future updates to statewide vehicle fleet standards and renewable portfolio standards. ABAU forecasts are developed using two inputs — current emissions data and either BAU projections or adjusted rates of growth or decay.

Calculating the emissions forecast is achieved by isolating an indicator variable for the various sectors and sub-sectors that were evaluated in the inventory and then assess how that indicator variable is projected to increase or decrease into the future and apply that rate of change to the emissions from that sector or sub-sector.

For example, agricultural emissions forecasts are based on projecting forward current trends in agricultural activities. This includes the number of livestock and crop production acreage as provided in recent Calaveras County Agriculture Production Reports. The previous ten years of reported data were used to develop growth factors for the emissions forecast. A slight growth in acres of farmland was shown and a growth rate was calculated. Additionally, livestock numbers show no evidence of trend over the 10 year period between 2010 and 2019. Accordingly, livestock population was assumed to remain constant through the emissions forecast period. The forecast was developed out to 2045 using a number of indicator variables for different sectors and subsectors to arrive at our BAU forecast. This process was applied to each sector and sub-sector.

For the County forecasts, two different scenarios were included for both BAU and ABAU forecasts in order to paint a more holistic picture of what might happen in the County in the future. For both BAU and ABAU forecasts, there are two different scenarios: a growth scenario that is aligned with the 2019 Calaveras County General Plan (General Plan)⁴⁴, using 2018 California Department of Finance (DOF) data⁴⁵, and a declining growth scenario that uses current 2021 DOF population projections (as of this report, pulled in June 2021). The 2018 projection data with a population growth resulted in increasing emissions for BAU forecast and decreasing emissions for the ABAU forecast. The 2021 projection data with a population decline resulted in decreasing emissions for BAU forecast and decreasing emissions for the ABAU forecast.

Sierra Business Council (SBC) also investigated the Regional Housing Needs Allocation⁴⁶, through California's Department of Housing and Community Development (HCD). HCD is based off of DOF population projection data, where the values from the 2018 Housing Element were most likely pulled from 2017 DOF population projection data and HCD applied an adjusted DOF population value. SBC also discovered and resolved discrepancies among DOF projections across different data sets, resulting in the DOF instructing us to use P2A population projections.

The project clients (CCOG and Calaveras County) and the consultants determined using the 2018 DOF population projection data may likely yield the most representative forecast scenario. It is the closest data set that aligns to the General Plan.

The rate of change for the Calaveras County VMT projections was applied to the on-road transportation sector. We did not use DOF household data for any of the sectors in the

⁴⁴ Calaveras County General Plan. (2019). Calaveras County.

⁴⁵ Projections. (2021). California Department of Finance.

⁴⁶ Calaveras Final Regional Housing Need Determination. (2018). California Department of Housing and Community Development.

forecast scenarios. As the household projection rate is similar to the population projection rate, we felt comfortable applying the population projection rate in lieu of the household projection rate. The sources for all of the growth rate indicators are located in **Tables L-1** and **L-2**.

Table K-1. Greenhouse Gas Emissions Forecast Data for Business-as-Usual Forecast (2021 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Agriculture	Total Emissions
2018	48,976	7,334	245,444	12,054	2,104	52,657	368,569
2019	48,790	7,377	246,336	12,008	2,096	52,705	369,312
2020	48,662	7,419	247,282	11,977	2,090	52,753	370,183
2021	48,516	7,462	248,211	11,941	2,084	52,801	371,014
2022	48,512	7,504	249,273	11,940	2,084	52,850	372,162
2023	48,591	7,547	250,410	11,959	2,087	52,898	373,493
2024	48,705	7,589	251,579	11,987	2,092	52,948	374,900
2025	48,834	7,632	252,763	12,019	2,098	52,997	376,343
2026	48,953	7,674	253,937	12,048	2,103	53,047	377,762
2027	49,091	7,717	255,129	12,082	2,109	53,097	379,225
2028	49,253	7,759	256,342	12,122	2,116	53,147	380,740
2029	49,311	7,802	257,460	12,136	2,118	53,198	382,026
2030	49,357	7,844	258,567	12,148	2,120	53,249	383,286
2031	49,480	7,887	259,745	12,178	2,126	53,300	384,717
2032	49,540	7,930	260,864	12,193	2,128	53,352	386,006
2033	49,558	7,972	261,946	12,197	2,129	53,404	387,207
2034	49,563	8,015	263,014	12,198	2,129	53,456	388,375
2035	49,542	8,057	264,059	12,193	2,128	53,509	389,489
2036	49,556	8,100	265,137	12,197	2,129	53,562	390,680
2037	49,509	8,142	266,157	12,185	2,127	53,615	391,735
2038	49,458	8,185	267,175	12,173	2,125	53,669	392,784
2039	49,332	8,227	268,122	12,142	2,119	53,723	393,665
2040	49,292	8,270	269,150	12,132	2,118	53,777	394,739
2041	49,129	8,312	270,063	12,092	2,111	53,831	395,538

2042	49,038	8,355	271,043	12,069	2,107	53,886	396,498
2043	48,919	8,397	271,998	12,040	2,102	53,942	397,397
2044	48,849	8,440	272,997	12,023	2,099	53,997	398,404
2045	48,752	8,483	273,972	11,999	2,094	54,053	399,353

**Table K-2. Greenhouse Gas Emissions Forecast Data for Business-as-Usual Forecast
(2018 California Department of Finance Population Projections)**

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Agriculture	Total Emissions
2018	48,976	7,334	245,444	12,054	2,104	52,657	368,569
2019	49,103	7,377	246,625	12,085	2,109	52,705	370,004
2020	49,262	7,419	247,836	12,124	2,116	52,753	371,511
2021	49,452	7,462	249,076	12,171	2,124	52,801	373,085
2022	49,651	7,504	250,324	12,220	2,133	52,850	374,682
2023	49,869	7,547	251,590	12,274	2,142	52,898	376,320
2024	50,104	7,589	252,871	12,332	2,152	52,948	377,995
2025	50,337	7,632	254,151	12,389	2,162	52,997	379,668
2026	50,565	7,674	255,425	12,445	2,172	53,047	381,329
2027	50,792	7,717	256,699	12,501	2,182	53,097	382,988
2028	51,020	7,759	257,974	12,557	2,192	53,147	384,649
2029	51,221	7,802	259,225	12,607	2,200	53,198	386,253
2030	51,418	7,844	260,470	12,655	2,209	53,249	387,845
2031	51,605	7,887	261,707	12,701	2,217	53,300	389,418
2032	51,775	7,930	262,929	12,743	2,224	53,352	390,952
2033	51,936	7,972	264,142	12,782	2,231	53,404	392,467
2034	52,078	8,015	265,337	12,818	2,237	53,456	393,942
2035	52,209	8,057	266,522	12,850	2,243	53,509	395,390
2036	52,300	8,100	267,670	12,872	2,247	53,562	396,751
2037	52,399	8,142	268,827	12,897	2,251	53,615	398,131
2038	52,487	8,185	269,972	12,918	2,255	53,669	399,486
2039	52,567	8,227	271,110	12,938	2,258	53,723	400,823
2040	52,637	8,270	272,239	12,955	2,261	53,777	402,140

2041	52,703	8,312	273,364	12,971	2,264	53,831	403,446
2042	52,749	8,355	274,471	12,983	2,266	53,886	404,710
2043	52,795	8,397	275,578	12,994	2,268	53,942	405,974
2044	52,837	8,440	276,681	13,004	2,270	53,997	407,229
2045	52,882	8,483	277,786	13,015	2,272	54,053	408,491

Table K-3. Greenhouse Gas Emissions Forecast Data for Adjusted Business-as-Usual Forecast (2021 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Agriculture	Total Emissions
2018	48,976	7,334	245,444	12,054	2,104	52,657	368,569
2019	47,584	6,926	242,830	12,008	2,096	52,705	364,149
2020	46,229	6,517	240,215	11,977	2,090	52,753	359,781
2021	44,862	6,108	237,601	11,941	2,084	52,801	355,398
2022	43,587	5,699	234,987	11,940	2,084	52,850	351,147
2023	42,363	5,291	232,373	11,959	2,087	52,898	346,972
2024	41,162	4,882	229,759	11,987	2,092	52,948	342,830
2025	39,970	4,473	227,145	12,019	2,098	52,997	338,703
2026	39,689	4,365	224,531	12,048	2,103	53,047	335,783
2027	39,421	4,257	221,917	12,082	2,109	53,097	332,883
2028	39,167	4,149	219,303	12,122	2,116	53,147	330,004
2029	38,847	4,040	216,689	12,136	2,118	53,198	327,029
2030	38,520	3,932	214,075	12,148	2,120	53,249	324,044
2031	38,123	3,785	211,847	12,178	2,126	53,300	321,358
2032	37,685	3,638	209,619	12,193	2,128	53,352	318,614
2033	37,221	3,491	207,391	12,197	2,129	53,404	315,833
2034	36,749	3,343	205,163	12,198	2,129	53,456	313,038
2035	36,260	3,196	202,934	12,193	2,128	53,509	310,221
2036	35,793	3,049	202,211	12,197	2,129	53,562	308,941
2037	35,288	2,902	201,487	12,185	2,127	53,615	307,604
2038	34,780	2,755	200,763	12,173	2,125	53,669	306,264
2039	34,224	2,608	200,040	12,142	2,119	53,723	304,855

2040	33,724	2,460	199,316	12,132	2,118	53,777	303,526
2041	33,144	2,313	198,592	12,092	2,111	53,831	302,083
2042	32,611	2,166	197,868	12,069	2,107	53,886	300,707
2043	32,060	2,019	197,145	12,040	2,102	53,942	299,306
2044	31,539	1,872	196,421	12,023	2,099	53,997	297,950
2045	31,002	1,724	195,697	11,999	2,094	54,053	296,570

Table K-4. Greenhouse Gas Emissions Forecast Data for Adjusted Business-as-Usual Forecast (2018 California Department of Finance Population Projections)

Year	Residential Energy	Non-Residential Energy	Transportation	Solid Waste	Water and Wastewater	Agriculture	Total Emissions
2018	48,976	7,334	245,444	12,054	2,104	52,657	368,569
2019	47,783	6,926	242,830	12,085	2,109	52,705	364,438
2020	46,611	6,517	240,215	12,124	2,116	52,753	360,336
2021	45,458	6,108	237,601	12,171	2,124	52,801	356,264
2022	44,311	5,699	234,987	12,220	2,133	52,850	352,200
2023	43,176	5,291	232,373	12,274	2,142	52,898	348,154
2024	42,051	4,882	229,759	12,332	2,152	52,948	344,124
2025	40,926	4,473	227,145	12,389	2,162	52,997	340,093
2026	40,714	4,365	224,531	12,445	2,172	53,047	337,275
2027	40,502	4,257	221,917	12,501	2,182	53,097	334,456
2028	40,290	4,149	219,303	12,557	2,192	53,147	331,638
2029	40,062	4,040	216,689	12,607	2,200	53,198	328,796
2030	39,830	3,932	214,075	12,655	2,209	53,249	325,950
2031	39,474	3,785	211,847	12,701	2,217	53,300	323,324
2032	39,106	3,638	209,619	12,743	2,224	53,352	320,682
2033	38,733	3,491	207,391	12,782	2,231	53,404	318,032
2034	38,348	3,343	205,163	12,818	2,237	53,456	315,365
2035	37,956	3,196	202,934	12,850	2,243	53,509	312,688
2036	37,538	3,049	202,211	12,872	2,247	53,562	311,478
2037	37,126	2,902	201,487	12,897	2,251	53,615	310,278
2038	36,706	2,755	200,763	12,918	2,255	53,669	309,066

2039	36,282	2,608	200,040	12,938	2,258	53,723	307,847
2040	35,851	2,460	199,316	12,955	2,261	53,777	306,620
2041	35,417	2,313	198,592	12,971	2,264	53,831	305,389
2042	34,971	2,166	197,868	12,983	2,266	53,886	304,140
2043	34,525	2,019	197,145	12,994	2,268	53,942	302,892
2044	34,076	1,872	196,421	13,004	2,270	53,997	301,639
2045	33,629	1,724	195,697	13,015	2,272	54,053	300,390

Appendix L. Growth Rates

Table L-1. Growth Rate Indicators & Sources for Business-as-Usual Forecast

Sector	Indicator	Source
Residential Energy	Population (2018 & 2021 Projections)	California Department of Finance
Non-Residential Energy	Employment	California Employment Development Department
On-Road Transportation	VMT Projections	Calaveras Council of Governments
Off-Road Transportation	Population (2018 & 2021 Projections)	U.S. Census Bureau, American Community Survey
Air Travel	Aircraft Operations	Federal Aviation Administration Forecasts
Boat Travel	Population (2018 & 2021 Projections)	U.S. Census Bureau, American Community Survey
Solid Waste	Population (2018 & 2021 Projections)	California Department of Finance
Water and Wastewater	Population (2018 & 2021 Projections)	California Department of Finance
Agriculture	Acres of Farmland	Calaveras County Agriculture Production Reports

Table L-2. Growth Rate Indicators & Sources for Adjusted Business-as-Usual Forecast

Sector	Indicator	Source
Residential Energy	Electricity - Renewable Portfolio Standard	SB 100
	Other Fuels - Population (2018 & 2021 Projections)	California Department of Finance
Non-Residential Energy	Electricity - Renewable Portfolio Standard	SB 100
	Other Fuels - Employment	California Employment Development Department
On-Road Transportation	Emissions Rates (EMFAC 2021)	California Air Resources Board

Off-Road Transportation	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Air Travel	Aircraft Operations	Federal Aviation Administration Forecasts
Boat Travel	Emissions Rates (OFFROAD 2017)	California Air Resources Board
Solid Waste	Population (2018 & 2021 Projections)	California Department of Finance
Water and Wastewater	Population (2018 & 2021 Projections)	California Department of Finance
Agriculture	Acres of Farmland	Calaveras County Agriculture Production Reports

Table L-3. Population, Employment, and VMT Projections*

Year	Population (DOF, 2018)	Population (DOF, 2021)	Employment (CEDD)	VMT Projections (CCOG)
2018	44,692	44,572	57,414	316,278,459
2019	44,808	44,403		
2020	44,953	44,286		
2021	45,126	44,153		
2022	45,308	44,150		
2023	45,507	44,222		
2024	45,721	44,325		
2025	45,934	44,443		
2026	46,142	44,551		
2027	46,349	44,677		
2028	46,557	44,824	60,982	
2029	46,741	44,877		
2030	46,920	44,919		
2031	47,091	45,031		
2032	47,246	45,085		
2033	47,393	45,102		
2034	47,523	45,106		
2035	47,642	45,087		608,147,022
2036	47,725	45,100		
2037	47,816	45,057		

2038	47,896	45,011
2039	47,969	44,896
2040	48,033	44,860
2041	48,093	44,711
2042	48,135	44,628
2043	48,177	44,520
2044	48,215	44,456
2045	48,256	44,368

**Other projection data located in Calaveras County Forecast spreadsheet.*

Appendix M. Agriculture Sector Report & Appendix

Attached as a separate document.

Appendix N. Wildfire-related Greenhouse Gas Emissions from Natural Lands Carbon Stock Loss and Climate Change Vulnerability Assessment

Attached as a separate document.



Rincon Consultants, Inc.

4825 J Street, Suite 200
Sacramento, California 95819

916 706 1374 OFFICE AND FAX

info@rinconconsultants.com
www.rinconconsultants.com

Calaveras County 2018 Agricultural Sector Greenhouse Gas Emissions Inventory Technical Report November 2021

As part of the Calaveras County (County) Greenhouse Gas (GHG) Reduction Strategy Phase I scope of work, Rincon Consultants, Inc. (Rincon) has conducted an inventory of GHG emissions generated by agricultural sector activities throughout the unincorporated portions of the County for the year 2018. GHG emissions generated by agricultural activities contribute to nearly eight percent of the State of California (State)'s total GHG emissions generated in 2018.¹ As such, inclusion of agricultural emissions sources as part of the County's overall GHG inventory presents a more complete understanding of the emission sources within the County and is consistent with the sectors addressed by the California Air Resources Board (CARB) 2017 Climate Change Scoping Plan. GHG emissions are calculated based on the guidance of the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.² The primary agricultural activities in the County include livestock farming and crop farming (primarily vineyards), with the County's total value of agricultural production ranking 53rd out of 58 counties in the State in 2018.³ There is a wide spectrum of agricultural activities occurring in the County; however only a few sources are of a large enough scale to provide reliable data for GHG emissions calculations.⁴ This agriculture-focused GHG emissions inventory is limited to relevant GHG emissions sources, which include:

- Crop Production;
- Livestock Enteric Fermentation; and
- Livestock Manure Management.

GHG emissions from crop farming result primarily from the application of liming material and nitrogen fertilizers, while livestock farming-related emissions are dominated by animal enteric fermentation and manure management activity. GHG emissions from off-road agricultural equipment and from electricity use and fuel combustion at agricultural land uses is considered separately in the community GHG inventory, consistent with the CARB 2017 Climate Change Scoping Plan. This report provides detail regarding the GHG emissions estimates from these sources in the County, as well as an overview of the methodology and data sources used to estimate these emissions.

Reported Emissions and Data Sources

Agricultural activity in the County is of light intensity compared to the majority of the State. As such, some typical agriculture-specific GHG emission sources have been excluded from this inventory analysis

¹ California Air Resources Board (CARB). 2020. California Greenhouse Gas Emission Inventory: 2000 – 2018.

https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/ghg_inventory_trends_00-18.pdf. Accessed March 30, 2021.

² IPCC. 2006. Guidelines for National Greenhouse Gas Inventories. Volume 4 Agriculture, Forestry and Other Land Use. <https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>. Accessed March 30, 2021.

³ California Department of Food and Agriculture. California Agricultural Statistics Review, 2018-2019. <https://www.cdfa.ca.gov/statistics/PDFs/2018-2019AgReportnass.pdf>. Accessed March 30, 2021.

⁴ GHG emission sources that have been excluded, include: crop residue burning, rice cultivation, diesel agricultural irrigation pumps, and livestock emissions from horses and chickens.

due to lack of activity and, thus, a lack of data. Excluded emission sources include emissions from crop residue burning and diesel agricultural irrigation pumps operation. These emission sources have been excluded from this 2018 GHG inventory based on a conversation with the Calaveras County Air Pollution Control District, during which it was confirmed that there are no permits to operate diesel agricultural irrigation pumps, nor agricultural burn permits on record for these emissions sources.⁵ Table 1 provides an overview of the agricultural GHG emissions sources reported in this 2018 GHG inventory, as well as the sources for County-specific data used to calculate these emissions.

Table 1 Reported GHG Emission Sources and Associated Data Sources

Emission Source	Data Source
Crop Production	
<i>Liming Material Application</i>	California Department of Food and Agriculture. Fertilizing Materials Tonnage Report 2018
<i>Nitrogen Fertilizer Application</i>	
Livestock Enteric Fermentation	United States Department of Agriculture. National Agricultural Statistics Service 2017 Census Volume 1
Livestock Manure Management	

Livestock headcount data is tracked at the county level by both the Calaveras County Department of Agriculture/Weights & Measures and the United States Department of Agriculture (USDA). However, for the purposes of this GHG inventory, data from the USDA National Agriculture Statistics Service (NASS) 2017 Census of Agriculture is used to calculate agriculture-focused GHG emissions related to livestock enteric fermentation and livestock manure management, as the USDA NASS 2017 Census of Agriculture contains further detailed information on County livestock herd population characteristics, while the Calaveras County 2018 Crop Report does not. The GHG emissions factors used to calculate livestock emissions vary depending on population characteristics, including age and species. Without the detailed breakdown of herd population provided by the USDA NASS 2017 Census of Agriculture, a detailed assessment of livestock-related emissions cannot be conducted. While there is a slight discrepancy between the top-level livestock population data provided in the Calaveras County 2018 Crop Report and that in the USDA NASS 2017 Census of Agriculture, further detailed information about the livestock herd populations reported in the Calaveras County 2018 Crop Report is not available.⁶ Therefore, the USDA NASS 2017 Census of Agriculture data has been determined to be the best available source of County livestock population data.

GHG Emissions Methodology and Calculations

The following provides a summary of the methodology used to calculate GHG emission for each agricultural GHG emission source in the County.

Crop Production

GHG emissions associated with crop production in the County predominantly result from liming material and nitrogen fertilizer application used for soil management.

⁵ Doug Carson, Air Pollution Control Specialist II. Personal communication. Phone Call. February 6, 2021.

⁶ Jesse Fowler, Calaveras County Agricultural Commissioner. Personal Communication. Email. December 8, 2020.

Crop Liming Soil Management

Liming is the practice of applying carbonates to agricultural soils to balance soil acidity or basicity (pH) levels. These carbonates generate carbon emissions as they dissolve into the soil. The total liming material applied in the County was obtained from the California Department of Food and Agriculture *Fertilizing Material Tonnage Report* for 2018.⁷ Emissions from liming are calculated based on the methodology used in the California GHG Emission Inventory for each inventory year, as reported in the CARB *Documentation of California's GHG Inventory Index*.⁸ As such, an emission factor of 0.440 grams of carbon dioxide (CO₂) per gram of liming material applied is used to calculate associated GHG emissions. Table 2 provides the total emissions from liming, and activity data used to estimate such emissions. Soil liming in the County generated approximately 73 metric tons of carbon dioxide equivalent (MT CO₂e) in 2018.

Table 2 County Crop Liming Material Application GHG Emissions Factor and Results

Year	Liming Material Applied (MT)	GHG Emission Factor (gram CO ₂ per gram of liming material)	Emissions (MT CO ₂ e)
2018	165	0.440	73

Notes: MT CO₂e = Metric Tons of Carbon Dioxide Equivalent

Crops Nitrogen Fertilizer Soil Management

The production of crops produces GHG emissions through the application of nitrogen fertilizers for soil management. Nitrogen fertilizer produces emissions of nitrous oxide (N₂O) through two pathways: direct emissions associated with natural microbial activity⁹ and indirect emissions that occur when nitrogen in soils is transported away from the site of application atmospherically or through hydrological runoff. The increased nitrogen content of managed soils results in an increase of direct N₂O emissions from nitrification-denitrification processes.¹⁰ This increased nitrogen content can be transported off site after it is volatilized and subsequently deposited where it undergoes nitrification-denitrification, as well as when surface runoff and leaching move the applied nitrogen into groundwater and surface water, where it is then converted to N₂O.¹¹ These direct and indirect nitrogen fertilizer soil management emissions are calculated using the two equations, below, as provided in the CARB *Documentation of California's GHG Inventory Index*.¹²

⁷ California Department of Food and Agriculture (CDFA). 2019. 2018 Fertilizing Material Tonnage Report. https://www.cdfa.ca.gov/is/fldrs/pdfs/2018_Tonnage.pdf. Accessed March 30, 2021.

⁸CARB. 2019. Documentation of California's 2000-2018 GHG Inventory – Index: Agriculture, Forestry, and Other Land Use; Aggregate Sources and Non-CO₂ Emissions Sources on Land; Liming. https://ww3.arb.ca.gov/cc/inventory/doc/doc_index.php. Accessed March 30, 2021.

⁹ Plants depend on soil microorganisms to convert organic nutrients for growth and development.

¹⁰ Nitrification converts ammonia to nitrite and nitrite to nitrate, and denitrification reduces nitrate to nitrogen gas.

¹¹ US EPA. 2018. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016, Annex 3 – part B, Section Methodology for Estimating N₂O Emissions, CH₄ Emissions and Soil Organic C Stock Changes from Agricultural Lands (Cropland and Grassland). https://www.epa.gov/sites/production/files/2018-01/documents/2018_annex_3_-_part_b.pdf. Accessed March 30, 2021.

¹²CARB. 2019. Documentation of California's 2000-2018 GHG Inventory – Index: Agriculture, Forestry, and Other Land Use; Aggregate Sources and Non-CO₂ Emissions Sources on Land; Liming. https://ww3.arb.ca.gov/cc/inventory/doc/doc_index.php. Accessed March 30, 2021.

$$\text{Direct Emissions} = \text{Applied N} \times \text{Direct ER} \times \text{N Conversion}$$

where:

Applied N = mass of nitrogen applied to soil
Direct ER = direct nitrogen emission rate
N Conversion = molecular weight conversion factor of N₂O from N₂

$$\text{Indirect Emissions} =$$

$$\text{Applied N} \times (\text{Leach EF} \times \text{Leach Rate} + \text{V Rate} \times \text{Redep Rate}) \times \text{N Conversion}$$

where:

Applied N = mass of nitrogen applied to soil
Leach EF = leached nitrogen emitted as N₂O
Leach rate = applied nitrogen that is leached
V Rate = applied nitrogen that is volatilized
Redep Rate = volatilized nitrogen redeposited and emitted as N₂O
N Conversion = molecular weight conversion factor of N₂O from N₂

The total nitrogen applied to soils in the County was in 2018 was 1,429 tons, obtained from the California Department of Food and Agriculture *Fertilizing Material Tonnage Report* for 2018.¹³ The activity data, GHG emissions rate, and calculation parameters for the above equation are provided in Table A of the appendix. Nitrogen fertilizer application in the County generated an estimated total of 7,691 MT CO₂e in 2018, as shown in Table 3

Table 3 County Crops Nitrogen Fertilizer Application and GHG Emissions Results

Year	Fertilizer Applied (T N)	Direct N ₂ O Emissions (MT CO ₂ e)	Indirect N ₂ O Emissions (MT CO ₂ e)	Total Emissions (MT CO ₂ e)
2018	1,296	5,397	2,294	7,691

Notes: T N = Tons of Nitrogen; MT CO₂e = Metric Tons of Carbon Dioxide Equivalent

Livestock Enteric Fermentation

GHG emissions from livestock enteric fermentation involve the methane (CH₄) generated by the digestive process of ruminant animals.¹⁴ This is a primary methane emission source from livestock, which is one of the top agricultural commodities of the County. This GHG emissions source varies depending on the type of livestock, its age, and weight class.

Livestock populations used to estimate emissions from enteric fermentation were based on livestock populations reported in USDA NASS Census of Agriculture data. The NASS Census is a complete livestock count of the US farms and ranches taken once every five years, with detailed data available down to the county level. The 2018 inventory year livestock totals were assumed to be equivalent to the 2017 NASS

¹³ California Department of Food and Agriculture (CDFA). 2019. 2018 Fertilizing Material Tonnage Report. https://www.cdfa.ca.gov/is/fldrs/pdfs/2018_Tonnage.pdf. Accessed March 30, 2021.

¹⁴ Ruminant animals are herbivores that acquire nutrients from plant-based food by fermenting it in a specialized stomach prior to digestion.



Census year data, which is the most recent NASS Census year.¹⁵ Livestock populations are not expected to have changed significantly between 2017 and 2018, with the total gross value of livestock production increasing by only 1 percent between these two years.¹⁶

As recommended by the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, livestock population classes that should be reported for enteric fermentation include:

- Dairy cows;
- Beef cows;
- Swine;
- Sheep;
- Goats;
- Horses.¹⁷

To capture the varied enteric fermentation emissions rates from various cattle classes and to maintain consistency with the California GHG Emission Inventory, cattle populations were broken down into estimates of population age and weight based on those derived in the Cattle Enteric Fermentation Model (CEFM), as provided in the United States Environmental Protection Agency (US EPA) *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016 Methodology*.¹⁸ The full cattle population age and weight breakdown used to calculate enteric fermentation emissions in the California GHG Emissions Inventory, as reported in the CARB *Documentation of California's GHG Inventory Index*, was used to estimate the population age and weight percentage for each age and weight class relative to the total cattle population.¹⁹ This breakdown is shown in full detail in Table 4. The cattle population (i.e., herd) breakdown percentages obtained from the CARB *Documentation of California's GHG Inventory Index* were then applied to the total herd reported in, or estimated from, the 2017 NASS Census data to obtain a herd age and weight breakdown for Calaveras County.²⁰ This herd breakdown was used as the activity data for cattle enteric fermentation GHG emissions calculations. Enteric fermentation emission factors from sheep, swine, horses, and goats are not broken down by population, age, and weight class in the CARB California GHG inventory; therefore, this methodological exercise was not required to estimate sheep populations.

¹⁵ United States Department of Agriculture. National Agricultural Statistics Service 2017 Census Volume 1, Chapter 2: County Level Data; California. Table 11 Cattle and Calves -- Inventory and Sales 2017 and 2012.

https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1_Chapter_2_County_Level/California/st06_2_0011_0011.pdf. Accessed March 30, 2021.

¹⁶ Calaveras County Department of Agriculture. 2019. Calaveras County 2018 Crop Report.

https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/ProdReports/2011%20-%202020/2018_Crop_Report.pdf?ver=HzbYUohBlsDDOmWj6j2nAQ%3d%3d. Accessed March 30, 2021.

¹⁷ The 2006 IPCC Guidelines for National Greenhouse Gas Inventories also recommends reporting enteric fermentation for Buffalo, Camels, and Mules and Asses; however, these livestock categories are not considered in the CARB 2017 Scoping Plan and are therefore not considered in this GHG inventory.

¹⁸ The CEFM was developed based on recommendations provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and uses information on population, energy requirements, digestible energy, and CH₄ conversion rates to estimate CH₄ emissions. US EPA. 2018.

Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016, Annex 3 – part B, Section 3.10 Methodology for Estimating CH₄ Emissions from Enteric Fermentation. https://www.epa.gov/sites/production/files/2018-01/documents/2018_annex_3_-_part_b.pdf

¹⁹ CARB. 2020. Documentation of California's 2000-2018 GHG Inventory – Index. Agriculture, Forestry, and Other Land Use; Livestock; Enteric Fermentation. https://ww3.arb.ca.gov/cc/inventory/doc/doc_index.php. Accessed March 30, 2021.

²⁰ The herd breakdown percentages developed here may not represent the actual conditions in Calaveras County; however, these statewide averages are considered the best available estimate due to the availability of more fine-grained data specific to Calaveras County. For example, cattle feedlots may not exist in Calaveras County; however, direct data to support this is not available.

Table 4 Statewide and County Cattle Herd Breakdown

Cattle Population Category	State Inventory Cattle Herd Breakdown		Calaveras County Cattle Herd Breakdown
	2018 Head	Percentage ¹	2017 Head ²
Beef Cows	1,023,231	100%	10,801
<i>Beef Calves</i>	264,965	26%	2,797
<i>Beef Cows</i>	670,000	65%	7,072
<i>Beef Replacement (0-12 months)</i>	26,590	3%	281
<i>Beef Replacement (12-24 months)</i>	61,676	6%	651
Milk Cows	3,364,207	100%	173
<i>Dairy Cow</i>	1,741,577	52%	90
<i>Dairy Calves</i>	891,443	26%	46
<i>Dairy replacement (12-24 months)</i>	513,097	15%	26
<i>Dairy Replacement (0-12 months)</i>	218,090	6%	11
Other Cattle	835,321	100%	11,119
<i>Heifer Feedlot</i>	174,028	21%	2,316
<i>Heifer Stocker</i>	113,678	14%	1,513
<i>Steer Feedlot</i>	287,478	34%	3,827
<i>Steer Stockers</i>	260,137	31%	3,463

Notes: Totals may not add up due to rounding

Data Source: CARB. 2020. Documentation of California's 2000-2018 GHG Inventory – Index. Agriculture, Forestry, and Other Land Use; Livestock; Enteric Fermentation. https://ww3.arb.ca.gov/cc/inventory/doc/doc_index.php. Accessed March 30, 2021.

1. Percentages represent the proportion of the total California cattle population that is made up by each category.

2. The Calaveras County Cattle Herd Breakdown was determined using the totals of Beef Cows, Milk Cows, and Other Cattle as provided by the 2017 NASS Census; however, feedlots and other cattle production practices listed here may not exist in Calaveras County.

Livestock enteric fermentation emissions are calculated using the methodology provided in the CARB *Documentation of California's GHG Inventory Index*, where the number of livestock is multiplied by a per head annual methane emission factor.²¹ Table 5 provides the herd breakdown, emission factors, and emissions results for all livestock types in the County. The total emissions from livestock enteric fermentation in the County were approximately 38,607 MT CO₂e in 2018.

²¹ CARB. 2020. Documentation of California's 2000-2018 GHG Inventory – Index. Agriculture, Forestry, and Other Land Use; Livestock; Enteric Fermentation. https://ww3.arb.ca.gov/cc/inventory/doc/doc_index.php. Accessed March 30, 2021.



Table 5 County Livestock Enteric Fermentation GHG Emissions Factors and Results

Livestock Category	2018 Head	Emission Factor (g CH ₄ / head)	Methane Emissions (g CH ₄)	GHG Emission (MT CO ₂ e) ¹
Beef Cows	10,801		768,150,214	21,508
<i>Beef Calves</i>	2,797	10,734	30,022,998	841
<i>Beef Cows</i>	7,072	95,445	674,987,040	18,900
<i>Beef Replacement (0-12 months)</i>	281	61,223	17,203,663	482
<i>Beef Replacement (12-24 months)</i>	651	70,563	45,936,513	1,286
Milk Cows	173		15,736,773	441
<i>Dairy Cow</i>	90	144,605	13,014,450	364
<i>Dairy Calves</i>	46	11,633	535,118	15
<i>Dairy replacement (12-24 months)</i>	26	65,708	1,708,408	48
<i>Dairy Replacement (0-12 months)</i>	11	43,527	478,797	13
Other Cattle	11,119		543,743,785	15,225
<i>Heifer Feedlot</i>	2,316	41,006	94,969,896	2,659
<i>Heifer Stocker</i>	1,513	61,091	92,430,683	2,588
<i>Steer Feedlot</i>	3,827	39,902	152,704,954	4,276
<i>Steer Stockers</i>	3,463	58,804	203,638,252	5,702
Sheep	1,443	8,000	11,544,000	323
Goats	4,132	5,000	20,660,000	578
Horses	1,046	18,000	18,828,000	527
Swine	110	1,500	165,000	5
All Livestock Total	28,824	-	-	38,607

Notes: g CH₄ = Grams of Methane; MT CO₂e = Metric Tons of Carbon Dioxide Equivalent

1. Emissions in MT CO₂e are obtained by multiplying the total grams of CH₄ emitted by the livestock category, converting to MT CH₄ (1 MT = 1,000,000 grams), and multiplying by the Global Warming Potential for CH₄ of 25.

2. Beef Cows, Milk Cows, Other Cattle, Sheep, Goats, Horses, and Swine populations were obtained from the USDA 2017 NASS Census; however, feedlots and other livestock production practices listed here may not exist in Calaveras County.

United States Department of Agriculture. National Agricultural Statistics Service 2017 Census Volume 1, Chapter 2: County Level Data; California. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/California/. Accessed March 30, 2021.



Livestock Manure Management

GHG emissions from livestock management consider the CH₄ and N₂O generated by different types of manure management systems for livestock. Manure management refers to the capture, storage, treatment, and utilization of animal manures. CH₄ emissions primarily result from direct emissions, while N₂O emissions are both direct and indirect emissions resulting from hydrological runoff and subsequent volatilization. The types of manure management included in this inventory are:

- Anaerobic digester;
- Anaerobic lagoon;
- Daily spreading;
- Dry lot;
- Deep pit;
- Liquid/slurry;
- Pasture;
- Solid storage;
- Poultry without bedding; and
- Poultry with bedding.

Details on the exact manure management systems utilized in Calaveras County are not available; therefore, the overall proportion of the types of manure management used throughout the State were used to estimate GHG emissions.

Livestock manure management emission calculations are based on the population of livestock within a specific manure management system. The proportions of livestock in each manure management system used to calculate emissions from manure management for the *California GHG Emissions Inventory* was applied to Calaveras County estimated livestock population totals. The Calaveras County livestock population estimates used are the same as those derived for the enteric fermentation emissions calculations, described above, with the additional inclusion of poultry. The swine herd is further broken down for manure management emissions, consistent with the values used in the *California GHG Emissions Inventory*, as provided in the *CARB Documentation of California's GHG Inventory Index*. This breakdown is shown in full detail in Table 5. The proportion of livestock in each manure management system, obtained from the *CARB Documentation of California's GHG Inventory Index*, is shown below in Table 7. These proportions are applied to the total County population of each livestock type to determine the number of heads of livestock that would exist in each manure management system.²² Not all manure management systems are used for all livestock categories; therefore, some sections of Table 7 are blank.

²² The herd breakdown and manure management systems developed here may not represent the actual conditions in Calaveras County; however, these statewide averages are considered the best available estimate due to the availability of more fine-grained data specific to Calaveras County.



Table 6 Statewide and County Swine Herd Breakdown

Cattle Population Category	State Inventory Cattle Herd Breakdown		Calaveras County Cattle Herd Breakdown
	2018 Head	Percentage ¹	2017 Head ²
Swine	110,000	100%	110
Market < 50 lbs	31,000	28%	31
Market 50-119 lbs	25,000	23%	25
Market 120-179 lbs	27,000	25%	27
Market 180+ lbs	21,000	19%	21
Breeding	6,000	5%	6

Notes: Totals may not add up due to rounding; lbs = pounds

Data Source: CARB. 2020. Documentation of California's 2000-2018 GHG Inventory – Index. Agriculture, Forestry, and Other Land Use; Livestock; Enteric Fermentation. https://ww3.arb.ca.gov/cc/inventory/doc/doc_index.php. Accessed March 30, 2021.

1. Percentages represent the proportion of the total California cattle population that is made up by each category.

2. The Calaveras County Swine Herd Breakdown was determined using the total inventory of swine provided by the 2017 NASS Census.



Table 7 State 2018 GHG Emissions Livestock Manure Management Inventory Proportions

Livestock Category	Anaerobic Digester	Anaerobic Lagoon	Daily Spread	Dry Lot	Deep Pit	Liquid /Slurry	Pasture	Solid Storage
Cattle								
Dairy Cow	0.012	0.582	0.106	-	0.001	0.202	0.007	0.091
Feedlot Heifers	-	-	-	0.987	-	0.013	-	-
Feedlot Steer	-	-	-	0.987	-	0.013	-	-
Beef Cows	-	-	-	-	-	-	1	-
Calves ¹	-	-	-	-	-	-	1	-
Stocker Heifer	-	-	-	-	-	-	1	-
Stocker Steer	-	-	-	-	-	-	1	-
Swine²	-	0.501	-	-	0.293	0.070	0.101	0.034
Poultry								
Pullets ³	-	0.120	-	-	-	-	-	-
Turkeys ⁴	-	-	-	-	-	-	0.010	-
Layers (Hens) ³	-	0.120	-	-	-	-	-	-
Sheep	-	-	-	0.311	-	-	0.689	-
Goats	-	-	-	0.080	-	-	0.920	-
Horses	-	-	-	0.080	-	-	0.920	-

Notes:

1. Calves includes both beef and dairy calves.
2. All swine herd population categories utilize the same proportion of manure management systems.
3. Pullets and Layers (Hens) utilize an additional manure management system labeled "Poultry without Bedding", which is utilized by a proportion of 0.82 of each these poultry types.
4. Turkeys utilize an additional manure management system labeled "Poultry with Bedding", which is utilized by a proportion of 0.99 of this poultry type.

Data Source: CARB. 2020. Documentation of California's 2000-2018 GHG Inventory. Agriculture, Forestry, and Other Land Use; Livestock; Manure Management. <https://ww2.arb.ca.gov/applications/california-ghg-inventory-documentation>. Accessed March 30, 2021.

Manure management produces direct CH₄ and N₂O emissions and indirect N₂O emissions, which are calculated based on the number of livestock in a specific manure management system. Indirect emissions occur when nitrogen in manure undergoes nitrification-denitrification in a different location than the manure management site, due to transport of nitrogen via hydrological runoff into surface water and groundwater or atmospherically when volatilized and deposited elsewhere. Emissions are



calculated using the equations below, with parameters obtained from the CARB *Documentation of California's GHG Inventory Index*.²³

$$CH_4 \text{ Emissions} = \text{Livestock Pop} \times \text{Volatile Solids Prod} \times CF \times \text{Prod Cap} \times D$$

where:

Livestock Pop	= livestock population within manure management system
Volatile Solids Prod	= volatile solids production rate (kg/year)
CF	= methane conversion factor
Prod Cap	= maximum methane production capacity (m ³ /kg)
D	= methane density (g/m ³)

$$N_2O \text{ Emissions} = \text{Livestock Pop} \times ER \times (\text{Direct ER} + (\text{Runoff EF} \times \text{Runoff Rate} + \text{V Rate} \times \text{Redep Rate})) \times N \text{ Conversion}$$

where:

Livestock Pop	= livestock population within manure management system
ER	= nitrogen excretion rate (g/year)
Direct ER	= direct nitrogen emission rate as N ₂ O (g N ₂ O/g N)
Runoff EF	= runoff nitrogen emitted as N ₂ O
Runoff rate	= nitrogen in manure that leaves site as runoff
V Rate	= nitrogen in manure that is volatilized
Redep Rate	= volatilized nitrogen redeposited and emitted as N ₂ O
N Conversion	= molecular weight conversion factor of N ₂ O from N ₂

The above equations utilize calculation parameters that vary for different livestock types and manure management systems. The calculation parameters were obtained from the CARB *Documentation of California's GHG Inventory Index*, and are provided in the appendix to this report, broken down by livestock type. Calculation parameters that vary by manure management system can be found in the appendix, with cattle calculation factors provided in Table B; swine calculation factors provided in Table C; poultry calculation factors provided in Table D; and goat, horse and sheep calculation factors provided in Table E. The estimated maximum methane production capacity, volatile solids production rates and nitrogen excretion rates vary only by livestock type, and are the same for each manure management system, which are provided in Table F of the appendix. The remaining calculation parameters, which are constants for all livestock and manure management systems, are provided in Table G of the appendix. Not all manure management systems are used for all livestock categories; therefore, some sections of the calculation parameter tables in the appendix are left blank, or the manure management system is excluded from the table when applicable.

Based on the calculations performed in the State GHG Inventory, manure management emissions are calculated for: Dairy Cows, Feedlot Heifers, Feedlot Steer, Beef Cows, Calves, Stocker Heifer, Stocker Steer, Swine, Pullets, Turkeys, Hens, Goats, Horses, and Sheep. The total livestock populations in the County use the same data as the livestock counts shown in Table 5 for enteric fermentation emission

²³ CARB. 2020. Documentation of California's 2000-2018 GHG Inventory. Agriculture, Forestry, and Other Land Use; Livestock; Manure Management. <https://ww2.arb.ca.gov/applications/california-ghg-inventory-documentation>. Accessed March 30, 2021.



calculations, with the Calves livestock population being the sum of both beef and dairy calves from Table 5, and poultry totals (pullets, turkeys and hens), obtained from the 2017 NASS Census.²⁴

As shown in Table 8, livestock manure management in the County generated approximately 6,286 MT CO₂e in 2018.

Table 8 2018 Livestock Manure Management GHG Emissions Results

Year	Cattle Emissions (MT CO ₂ e)	Sheep Emissions (MT CO ₂ e)	Swine Emissions (MT CO ₂ e)	Poultry Emissions (MT CO ₂ e)	Goat Emissions (MT CO ₂ e)	Horse Emissions (MT CO ₂ e)	Total Emissions (MT CO ₂ e)
2018	5,564	66	52	399	78	126	6,286

Notes: MT CO₂e = Metric Tons of Carbon Dioxide Equivalent

Agricultural GHG Emissions Inventory Results Summary

GHG emissions resulting from agricultural activities in Calaveras County are largely dominated by emissions generated by livestock farming, resulting from enteric fermentation and manure management. These emission sources generate around 85 percent of County agricultural-related GHG emissions each year. The next largest source of County agricultural GHG emissions is crop farming, with the respective application of nitrogen fertilizers and liming for soil management accounting for 15 percent of annual agricultural-related GHG emissions. Table 9 provides the County agricultural emissions results for each reported source for the 2018 inventory year, and Figure 1 provides a visual breakdown of these sources.

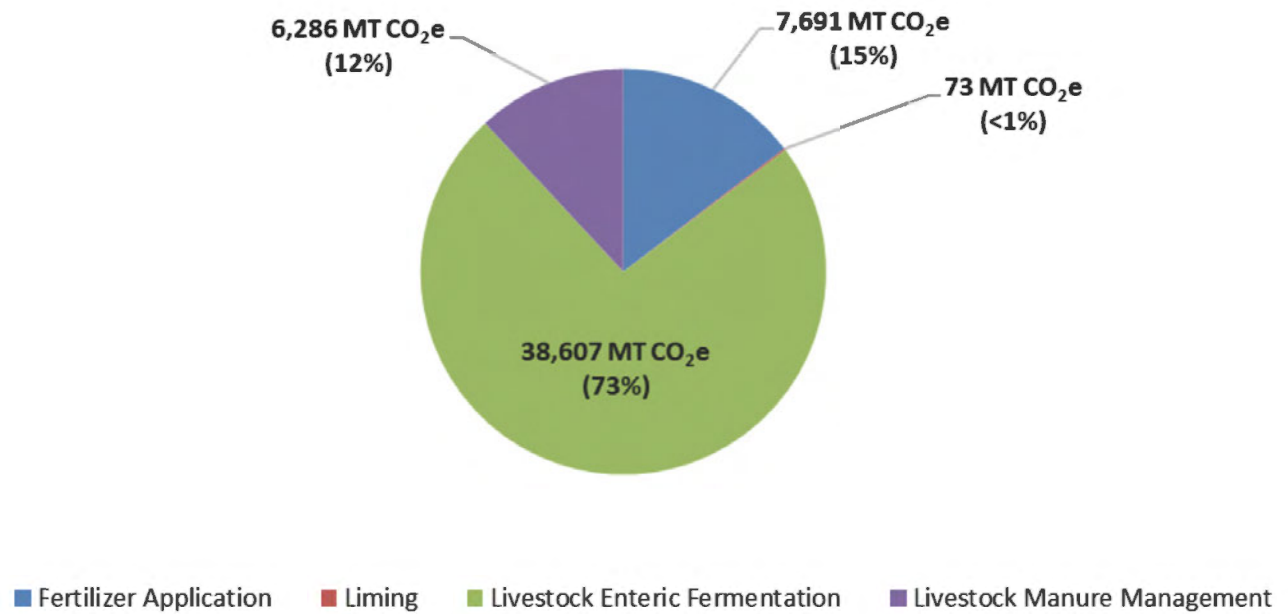
Table 9 2018 Agricultural Sector GHG Emissions Inventory Results Summary

Emission Source	Emissions (MT CO ₂ e)	Percent of County Total
Crop Production		
<i>Liming Material Application</i>	73	<1%
<i>Nitrogen Fertilizer Application</i>	7,691	15%
Livestock Enteric Fermentation	38,607	73%
Livestock Manure Management	6,286	12%
Total	52,657	100%

Notes: MT CO₂e = Metric Tons of Carbon Dioxide Equivalent;
Totals may not add up to 100% due to rounding

²⁴ United States Department of Agriculture. National Agricultural Statistics Service 2017 Census Volume 1, Chapter 2: County Level Data; California; Table 19. Poultry -- Inventory and Number Sold: 2017 and 2012.
https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/California/st06_2_0019_0019.pdf. Accessed March 30, 2021.

Figure 1 2018 Agricultural Sector GHG Emissions Inventory Results Summary



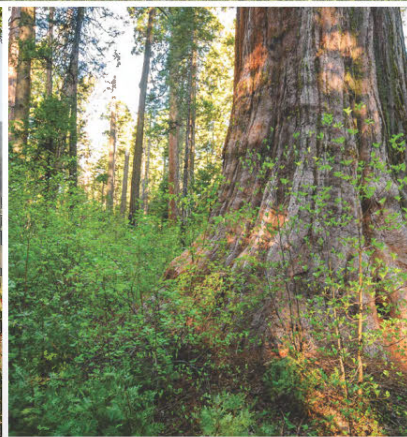
Report Preparers

Erik Feldman, Sustainability Principal
Kelsey Bennett, Environmental/Sustainability Senior Program Manager
Andrew Beecher, Sustainability Planner

Calaveras County

Greenhouse Gas Emissions Inventory Report

Wildfire-related Greenhouse Gas Emissions
from Natural Lands Carbon Stock Loss and
Climate Change Vulnerability Assessment



Prepared by:



RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

Prepared for:

Calaveras
County



November 2021

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1 Introduction

California has experienced record-breaking wildfires in recent years, with 2020 setting the all-time record for acres burned of over 4 million acres in the State, more than double the previous state record set in 2018.¹ This significant increase in the severity and extent of wildfires, highlights the importance of understanding the full extent of these impacts in order to guide policy development. In 2018 pursuant to Executive Order (EO) B-52-18, the State established the California Fuel Management Task Force, which was in charge of developing a holistic integrated approach toward forest management. In January 2021, this effort culminated in the development and adoption of California's Wildfire and Forest Resilience Action Plan, which integrates key findings and recommendations from various plans, studies, and assessments into a single coordinated and comprehensive strategy for forest management and wildfire resilience.² In parallel with this effort, the California Air Resources Board (CARB) has developed methodology regarding quantification of the carbon cycle and greenhouse gas (GHG) emission impacts of wildfire and forest management strategies in order to better understand wildfire implications in terms of the State's contribution to climate change.³ This report intends to provide detail relative to these State level efforts in the context of Calaveras County, including the City of Angels Camp, by assessing the changes in carbon stocks from land use and fire related activities, the GHG emissions impact of wildfire in the County, and the wildfire-related climate change vulnerabilities, while presenting relevant best practices in wildfire impact reduction related to Calaveras County specific to climate change vulnerabilities.

A combination of a changing climate and hundreds of years of unnatural fire suppression has led to increases in fuels that contribute to catastrophic fires. Wildfires are not only an effect of a changing climate that influences drought and the disease that turns living vegetation into dry fuel, but they are also a major contributor to GHG emissions by converting natural land carbon stocks into atmospheric carbon.⁴ This feedback cycle is a symptom of unhealthy forests and wildlands that result from fire suppression, insufficient investment in wildland fire risk management and misguided land use planning.⁵ Regular wildfires are part of the natural cycle of forests, grasslands, and shrublands, in which old decaying vegetation is cleared out by low-intensity fires so that mature trees can continue to thrive and provide valuable habitat and ecosystem services. Such regular wildfires are typically lower-intensity, preserving the primary carbon stocks that are already in place, allowing for continued carbon sequestration associated with living vegetation and minimal release of these carbon stocks as GHG emissions during wildfires.⁶ However, land use planning has included

¹ Roman et al. 2020. Greetings from the 2020 Wildfire Season. National Fire Protection Association Journal. Available: <<https://www.nfpa.org/News-and-Research/Publications-and-media/NFPA-Journal/2020/November-December-2020/Features/Wildfire>>. Accessed June 7, 2021.

² California Governor's Forest Management Task Force (CGFMTF). 2021. California Wildfire & Forest Resilience Action Plan. Available: <<https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>>. Accessed May 27, 2021.

³ CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

⁴ California Natural Resources Agency (CNRA). 2018. California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate. Available: <<https://resources.ca.gov/CNRALegacyFiles/wp-content/uploads/2018/05/Forest-Carbon-Plan-One-Page-May-2018.pdf>>. Accessed June 7, 2021.

⁵ Bustin, et. al. 2015. Land Use and Wildfire: A Review of Local Interactions and Teleconnections. Land volume 4. Available: <https://www.researchgate.net/publication/272790284_Land_Use_and_Wildfire_A_Review_of_Local_Interactions_and_Teleconnections>. Accessed June 7, 2021.

⁶ CGFMTF. 2021. California Wildfire & Forest Resilience Action Plan. Available: <<https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>>. Accessed May 27, 2021.

development in areas that would naturally have recurring fires, leading to an increased population in the wildland urban interface (WUI), and an increased need to suppress fire in these areas.⁷ Now California faces the challenge of managing natural lands and land use patterns to reduce potential for high-intensity fires that generate GHG emissions and put lives and properties at risk.

This report evaluates these challenges specific to Calaveras County, demonstrating how wildfires can impact the carbon cycle and GHG emissions, as well as how the WUI can both be put at risk by wildfires and increase opportunity for wildfire ignition. To understand the potential GHG emissions impact related to wildfire in Calaveras County a Natural and Working Lands (NWL) Carbon Inventory for the years 2010 and 2020 was developed, which demonstrates the total carbon storage in vegetation and soils. This analysis calculates the current available carbon storage (sequestration) in the County, how carbon storage has changed over time, and highlight regions and landcover where carbon storage value is high. Additionally, a case study has been developed for the 2015 Butte Fire to analyze both the local risks for wildfire and the potential magnitude of GHG emissions and carbon storage loss from a single wildfire event. The GHG emission analysis also includes an assessment of how forest management practices, such as thinning and prescribed burns, can significantly reduce wildfire GHG emissions and preserve long term carbon stocks that may be destroyed by high-intensity fires caused by overgrown forests.

Wildfires also present a significant threat to communities, assets, and resources (i.e., people, homes, businesses, public infrastructure/services, and the natural surroundings) in the County, which are expected to be exacerbated by the effects of climate change. This is addressed in the Wildfire Vulnerability Assessment included in this report, which was developed based on the most recent guidance from the California Governor's Office of Planning and Research (OPR). The assessment includes discussion of the County's vulnerabilities to wildfire specifically focused on the impacts associated with the WUI and the increased risk associated with higher temperatures and severe weather events resulting from climate change. This information is presented to inform decision makers and help implement action under the Greenhouse Gas Reduction Strategy.

A concerted effort will be required to mitigate the risks associated with wildfire, which is further exacerbated by climate change. This report intends to provide a basis for understanding the wildfire interactions with the carbon cycle and WUI, and to provide meaningful information that can be used to help secure grant funding for natural land management and climate change and resilience. The State has greatly increased the availability of funding for climate change, forest management and wildfire resilience projects, with an emphasis on GHG reduction, improved forest health, home hardening against fires, improvements in defensible space, and fire prevention workforce training. A portion of this funding will be obtained through the California Greenhouse Gas Reduction Fund, with grants available through the California Climate Investments Program.⁸ The Climate Investment Program is intended to fund GHG reduction projects, therefore the connection between wildfire and GHG emissions in this report may improve the ability of the County to pursue funding. Projects that are initiated by the County would provide the dual benefit of both reducing the County's contribution to climate change through wildfire related GHG emissions reduction and increasing resilience to climate change through improved forest health.

⁷ Bustic, et. al. 2015. Land Use and Wildfire: A Review of Local Interactions and Teleconnections. Land volume 4. Available: <https://www.researchgate.net/publication/272790284_Land_Use_and_Wildfire_A_Review_of_Local_Interactions_and_Teleconnections>. Accessed June 7, 2021.

⁸ California Office of Governor Gavin Newsom. 2021. Governor Newsom, Legislative Leaders Announce Early Budget Action for Wildfire Prevention. Available: <<https://www.gov.ca.gov/2021/04/08/governor-newsom-legislative-leaders-announce-early-budget-action-for-wildfire-prevention/>>. Accessed June 7, 2021.

2 Natural and Working Lands Carbon Inventories (2010 and 2020)

This section explains the inventory methodology used to quantify the major natural and working lands GHG emissions sinks and sources for Calaveras County (County). The 2010 and 2020 NWL carbon inventories were developed based on the methodology outlined in Resilient Merced, California's 2017 Climate Change Scoping Plan, and the State's Natural and Working Lands Inventory.^{9,10,11} The inventory of carbon stocks for natural and working lands (NWL carbon inventory) in Calaveras County covers the County's 662,838 acres.¹² Calaveras County includes large areas of natural and working lands and a diversity of land-cover types ranging from developed land to mixed forest. The development of NWL carbon inventories allows jurisdictions to evaluate land management activities that are designed to increase or protect carbon stocks and/or reduce GHG emissions. A NWL carbon inventory also plays an important role in prioritizing policy initiatives aimed at reducing GHG emissions or increasing carbon sequestration and can be a tool to examine how natural and human influences have impacted carbon storage in the past and monitor the progress of policy initiatives over time.

NWL carbon inventory (i.e., stock) is the total amount of carbon sequestered in woody and herbaceous material and in the soil (i.e., the biosphere). Some land management and natural activities can increase carbon stocks, for example through riparian restoration, while others can contribute to the emission of carbon dioxide (CO₂) into the atmosphere, such as wildfire. Live vegetation also provides continued sequestration of carbon via respiration while landcover consumed by wildfire would lose that sequestration ability for an extended period while the landcover recovered. The analyses below follow the Resilient Merced methodology and includes the development of land-based emissions. Land-based emissions exist in the form of methane and nitrous oxide, which are associated with wetlands and agricultural practices such as fertilizer application. However, these land-based emissions are not included in the 2010 and 2020 NWL carbon inventories due to the small contribution of wetlands in Calaveras County and because fertilizer emissions are already included in the County's 2018 Community GHG Emissions Inventory. Including these emissions in the NWL carbon inventories would result in double counting emissions.

The NWL carbon inventories estimate carbon stocks, by land-cover class (i.e., mixed forest, grassland, shrub, etc.) at two points in time (2010 and 2020), to determine historical changes in carbon stocks. This section includes the following:

- NWL Carbon Inventory Data Sources – a complete description of the data sources used to complete the carbon inventories
- NWL Carbon Inventory Methods and Findings

⁹ California Department of Conservation. 2021. TerraCount Materials. The Nature Conservancy, Tukman Geospatial, Climate Action Reserve, and Merced County. 2018. Resilient Merced. Available: <<https://maps.conservation.ca.gov/TerraCount/downloads/>>. Accessed May 26, 2021.

¹⁰ CARB. 2017. California's 2017 Climate Change Scoping Plan. Available: <https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/scoping_plan_2017.pdf>. Accessed May 26, 2021.

¹¹ CARB. 2018. An Inventory of Ecosystem Carbon in California's Natural and Working Lands. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf>. Accessed May 26, 2021.

¹² Includes unincorporated County areas as well as the City of Angels Camp.

- Land-cover Classification – methods and findings related to the land-cover classification process and derived carbon stock estimates for 2010 and 2020
 - Carbon Stock Estimates – methods and findings related to the calculation of carbon stock estimates for 2010 and 2020
- County NWL Carbon Inventory Summary – a summary of the results and utility of the NWL carbon inventories

2.1 NWL Carbon Inventories Data Sources

Jurisdictional NWL carbon inventories require the use of large-scale spatial data sets and carbon or biomass data. Geographic information system (GIS) is used to capture, store, manipulate, analyze, manage, and present spatial, or geographic, data across the county. The Calaveras NWL carbon inventories use publicly available data sources that are expected to be updated in the future. Table 1 includes the data sources used to complete the Calaveras 2010 and 2020 NWL carbon inventories.

Table 1 Data Sources Used

Land Type	Data	Publication Frequency	Year
Natural Lands (Forest, Shrubland, Grassland, etc.), and Cropland ³	LANDFIRE ¹	2 years	2010, 2020
Soil	National Cooperative Soil Survey (NCSS) Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets ²	Annual	2019

Sources:

¹ LANDFIRE. 2021. LANDFIRE: Existing Vegetation Cover, Height, and Type, United States Department of Agriculture and United States Department of the Interior. Available: <<https://www.landfire.gov/>>. Accessed May 26, 2021

² Nauman, et al. 2017. Soil Properties and Class 100m Grids United States. Available: <<https://scholarsphere.psu.edu/resources/ea4b6c45-9eba-4b89-aba6-ff7246880fb1>>. Accessed May 26, 2021.

³ Croplands are considered as "Working Lands".

LANDFIRE spatial land-cover data provides the foundation of the Calaveras NWL carbon inventories, similar to the Resilient Merced project completed for Merced County and the State's Natural and Working Lands Carbon Inventory developed for CARB.¹³ The data sources used to develop the NWL carbon inventories are described below:

- The LANDFIRE data covers the county at a 30-meter resolution. The LANDFIRE layers used include Existing Vegetation Type, Cover, and Height.
- The soil data used includes three national United States soil point datasets: NCSS Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets. These datasets include remote sensing images, predictions of soil properties (e.g., percent organic carbon, total nitrogen, bulk density, PH, etc.) and classes, conventional soil polygon maps from the Soil Survey Geographic database (SSURGO), and machine learning. Predictions were generated at 100-meter spatial resolution.

¹³ California Department of Conservation. 2021. The Nature Conservancy, Tukman Geospatial, Climate Action Reserve, Merced County. 2018. Resilient Merced. Available: <<https://maps.conservation.ca.gov/TerraCount/downloads/>>. Accessed May 26, 2021.

2.2 NWL Carbon Inventories Methods and Findings

The Calaveras County NWL carbon inventory methodology is based on the Resilient Merced pilot project. The first step includes estimating carbon stocks by land-cover class (i.e., forest, grassland, shrub, etc.) using LANDFIRE. This step details changes in land-cover between the two years. The second step involves calculating carbon stored in different carbon pools (i.e., above- and below-ground live biomass, litter, soil, etc.) based on existing vegetation type, cover, and height. This step illustrates changes in carbon stock as a result of land-cover changes between 2010 and 2020. The sections below describe the methods and findings of the NWL carbon inventories for Calaveras County.

2.2.1 Land-cover Classification

The NWL carbon inventories are derived from the assignment of all land in the county to discrete land-cover classes, representing all land-use types in the County. The Existing Vegetation Type LANDFIRE dataset was used to determine the land-cover class. The land-cover classes assigned in the 2010 and 2020 NWL carbon inventories are:

- Barren
- Cultivated Crops
- Development
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Grassland/Herbaceous
- Open Water
- Shrub/Scrub
- Wetland

Examples of some of the land-cover classes common to Calaveras County are shown in Figure 1.

Figure 1 Land-cover Class Example Photos

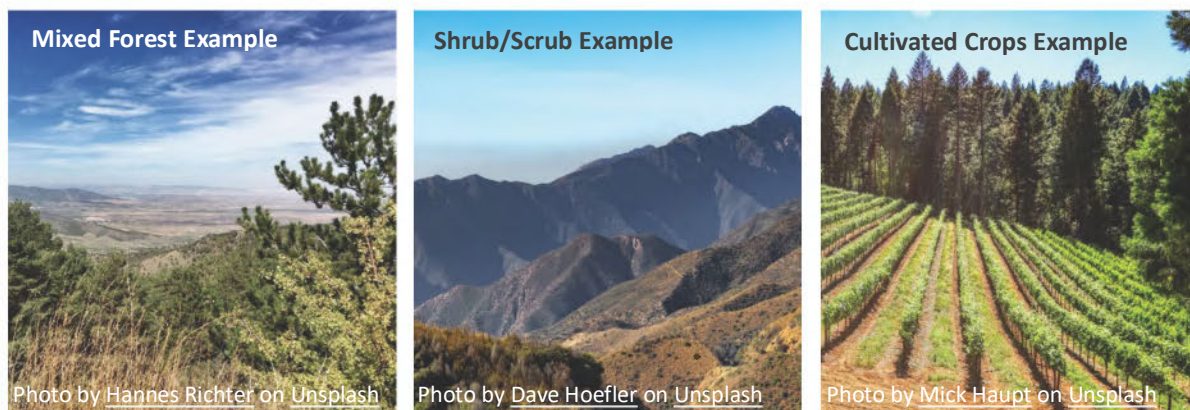
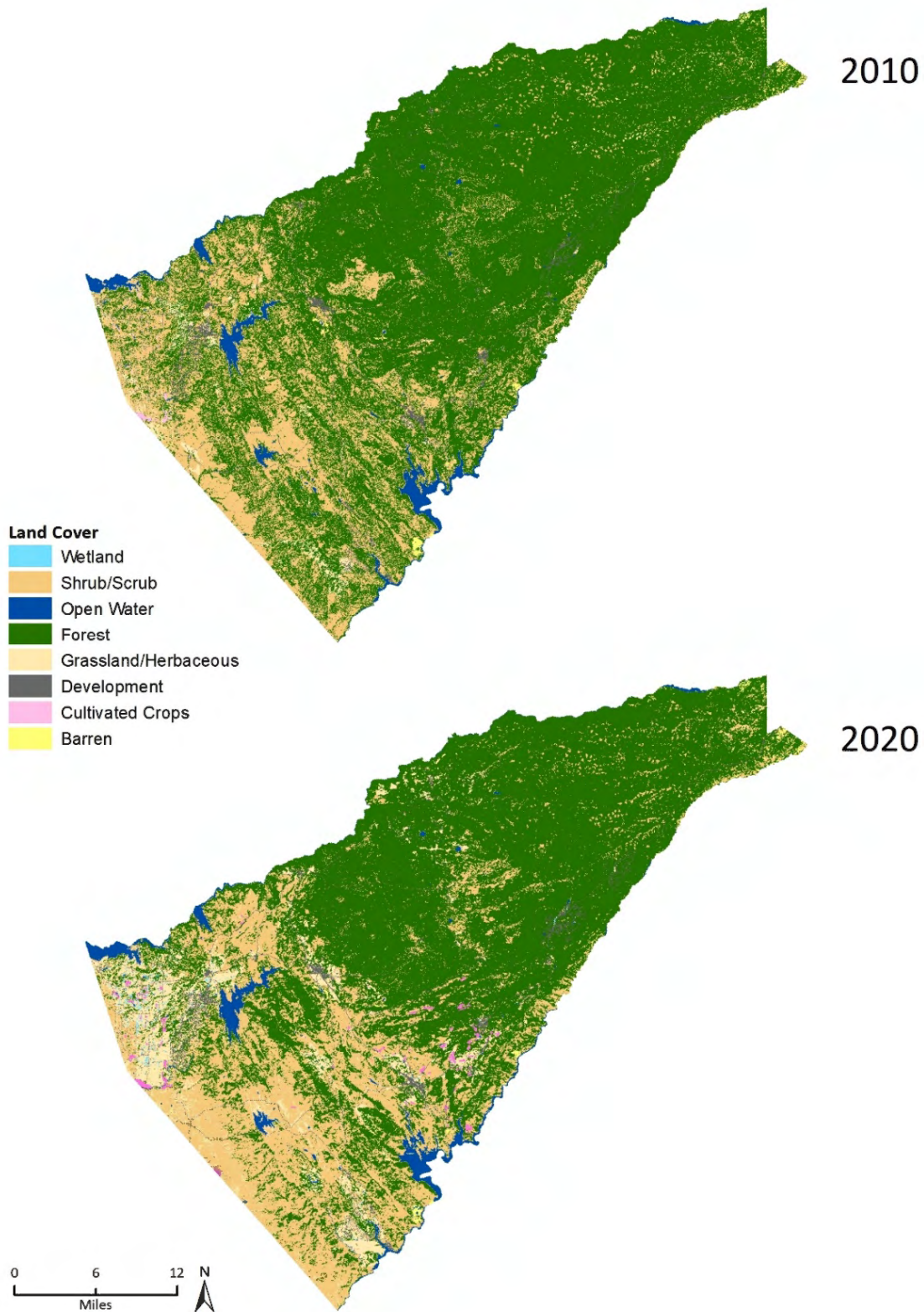


Figure 2 and Table 2 detail the results of the land-cover classification in Calaveras for 2010 and 2020. The data between the two years show decreases in mixed forest and deciduous forest and an increase in evergreen forest. The loss in forested land is primarily being replaced by shrub/scrub and grassland/herbaceous landcover.

Figure 2 Calaveras County Land-cover Classes (2010 and 2020)



General Land Cover 2010-2020

Source: LANDFIRE. 2021

Table 2 Calaveras County Land-cover Classes (2010 and 2020)

Land-cover Class	2010 Acres	2020 Acres	Percent Change
Barren	3,996	3,658	-8
Cultivated Crops	842	2,912	246
Deciduous Forest	43,748	37,636	-14
Development	11,717	12,259	5
Evergreen Forest	1,835	11,243	513
Grassland/Herbaceous	13,058	44,797	243
Mixed Forest	420,723	354,620	-16
Open Water	14,288	15,960	12
Shrub/Scrub	152,632	178,190	17
Wetland ¹	0	1,563	N/A
Total	662,838	662,838	-

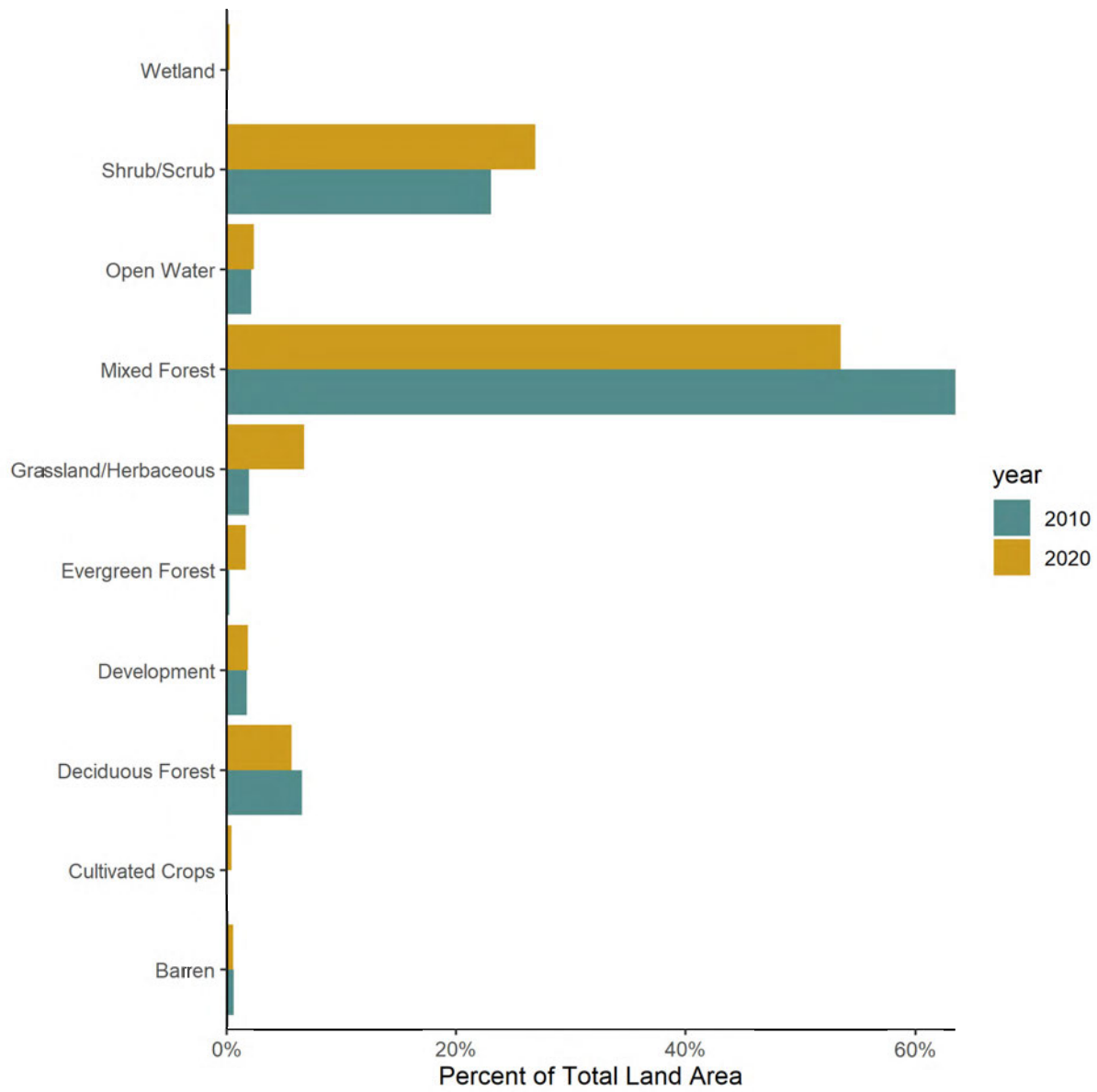
Notes:

¹ Though wetlands show a change from 0 to 1,563, this is likely due to inconsistencies in classification. For example, the same vegetation type could have been classified as grassland in one year and wetland the next year, without an actual change in land-cover.

Source: LANDFIRE. 2021

Table 2 above shows the number of acres in each land-cover class for 2010 and 2020 and the percent change between the two years. As previously described, mixed and deciduous forests decreased, and shrubland and grassland increased from 2010 to 2020. Other categories, such as evergreen forest, cultivated crops, and wetlands, show increases over time; however, these categories represent a very small portion of the total land area. These increases could be observed changes or may be attributed to a difference in classification between the two years, for example a forest classified by LANDFIRE as mixed forest 2010 could be classified as evergreen in 2020 with no actual change in landcover. Figure 3 illustrates the proportional land-cover changes between 2010 and 2020.

Figure 3 Calaveras County Proportional Land-cover by Vegetation Class (2010 and 2020)



Source: LANDFIRE. 2021

2.2.2 Carbon Stock Estimates

Carbon stock estimates are based on the sum of carbon stored in different carbon pools. This analysis includes carbon stored in the following carbon pools:

- above- and below-ground live biomass
- above- and below-ground dead standing trees
- lying dead wood (e.g., branches, logs, etc. lying on the ground surface)
- litter
- soil.

Carbon stored in all above- and below-ground biomass (including live, dead, and litter), was calculated using volumetric estimates of carbon mass (metric tons per hectare) provided by CARB. These estimates were provided for every combination of Existing Vegetation Type, Height, and Cover and assigned to each 30 by 30-meter cell in Calaveras.

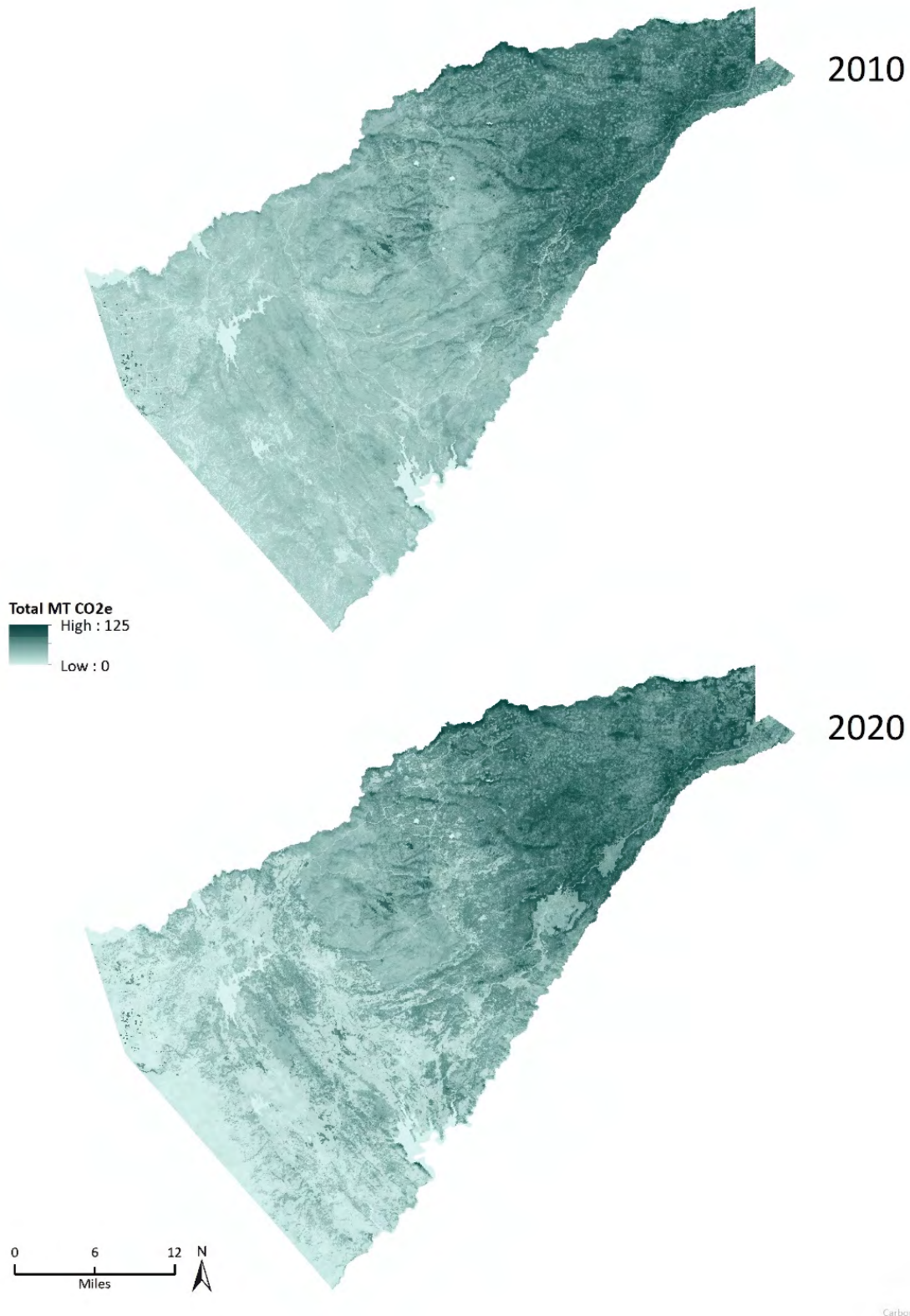
Soil carbon values were obtained using the combined NCSS Characterization Database, the National Soil Information System (NASIS), and the Rapid Carbon Assessment (RaCA) datasets described in the NWL Carbon Inventory Data Sources section of this report. The soil carbon inventory estimates were determined by using the values provided for soil organic carbon and soil bulk density at a depth of 0-30cm. Soil carbon was then estimated using Quantification Guidance for Forest Project Protocol Version 4.0¹⁴ as shown in the following equation (the Conversion of Organic Matter to Carbon was skipped as the input data we had was already converted to Soil Organic Carbon):

Soil CO ₂ e	=	Organic Matter Value (Steps 2 or 4) x 0.58 (Conversion of Organic Matter to Carbon) x Bulk Density Value (Steps 3 or 5) x Soil Depth Sampled (30 cm) x 40,468,564.224 (Conversion of 1 cm ² to 1 acre) x 10 ⁻⁶ (Conversion of 1 gram to 1 metric ton) x 3.67 (Conversion of Carbon to CO ₂)
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The NWL carbon inventories, which includes the sum of all above- and below-ground biomass and soil carbon for 2010 and 2020, are mapped in Figure 4 and provided in Table 3. The average carbon stock per acre for each vegetation class is provided in Table 4. All carbon stock values are presented in metric tons of carbon dioxide equivalent (MT CO₂e).

¹⁴ Climate Action Reserve. 2017. Quantification Guidance for Use with Forest Carbon Projects. Available: <https://www.climateactionreserve.org/wp-content/uploads/2017/07/FPP_Quantification_Guidance_062817.pdf>. Accessed May 26, 2021.

Figure 4 Calaveras County Total Carbon Stock (2010 and 2020)



Sources: LANDFIRE. 2021; Nauman, et al, 2017; CARB. 2020. Volumetric estimates of carbon mass from Klaus I. Scott at the CARB Emission Inventory Analysis Section of the GHG & Toxics Emission Inventory Branch, AQPS Division. November 17, 2020.

Table 3 Calaveras County NWL Carbon Inventories (2010 and 2020)

Land-cover Class	2010 Total Carbon Stock (MT CO ₂ e)	2020 Total Carbon Stock (MT CO ₂ e)	Percent Change
Barren	304,138	283,840	-7
Cultivated Crops	47,803	161,695	238
Deciduous Forest	5,307,362	4,717,271	-11
Development	657,179	702,240	7
Evergreen Forest	265,045	1,181,379	346
Grassland/Herbaceous	746,009	2,190,346	194
Mixed Forest	57,446,504	53,696,781	-7
Open Water	137,051	231,711	69
Shrub/Scrub	11,828,226	11,115,216	-6
Wetland	10	71,293	745,417
Total	76,739,325	74,351,771	-3

Sources: LANDFIRE, 2021; CARB, 2020

Table 4 Calaveras County Average Carbon Stock per Acre (2010 and 2020)

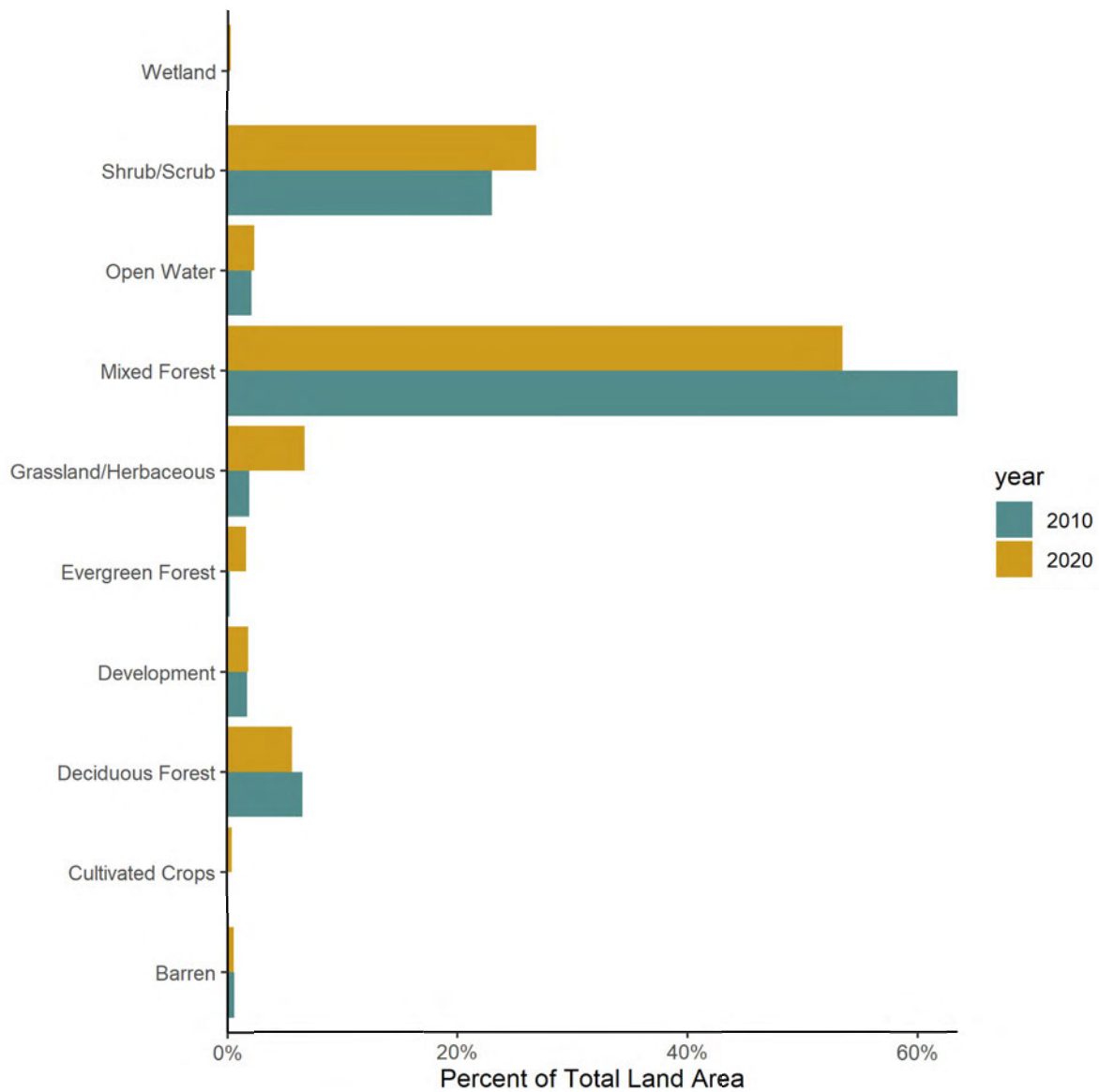
Land-cover Class	2010 Average Carbon Stock per Acre (MT CO ₂ e)	2020 Average Carbon Stock per Acre (MT CO ₂ e)
Barren	76	78
Cultivated Crops	57	56
Deciduous Forest	121	125
Development	56	57
Evergreen Forest	144	105
Grassland/Herbaceous	57	49
Mixed Forest	137	151
Open Water	10	15
Shrub/Scrub	77	62
Wetland	43	46

Sources: LANDFIRE, 2021; CARB, 2020

Table 3 includes the total carbon stock for 2010 and 2020 and the percent change between the two years. As described and illustrated in the Land-cover Classification section above, mixed and deciduous forest acreage decreased and shrubland and grassland cover increased. The mixed forest vegetation class encompassed approximately 63 percent of the total landcover area in 2010 and dropped to 54 percent in 2020. This vegetation class contains over 70 percent of the total carbon stocks in the County (75 percent in 2010 and 72 percent in 2020). Deciduous forests dropped from 7 percent to 6 percent from 2010 to 2020 in both landcover area and carbon stock. Shrubland is the second largest vegetation class in both landcover and carbon stock. From 2010 to 2020, shrubland increased from 23 percent to 27 percent and carbon stock hovered around approximately 15 percent, only increasing slightly in 2020 compared to 2010.

Categories, such as wetland, open water, and cultivated crops show large increases over time; however, such categories represent a very small portion of the total land areas. Although there was a slight decrease in carbon stocks in the County between 2010 and 2020, the magnitude of available carbon storage in the County is nearly 2,500 times the total GHG emissions generated by the County from transportation, energy use and waste disposal. Figure 5 shows the proportional carbon stock changes between 2010 and 2020. The total carbon stock in the County decreased 3 percent from 2010 to 2020. Table 4 provides the average amount of carbon sequestered per acre in each of the vegetation classes. The forest categories hold the largest amount of carbon, ranging from 100 to 150 MT CO₂e per acre.

Figure 5 Calaveras County Proportional Carbon Stock by Vegetation Class (2010 and 2020)



Sources: LANDFIRE, 2021; CARB, 2020

2.3 County NWL Carbon Inventory Summary

The NWL carbon inventory provides a quantitative estimate of historical and existing carbon stored in the County as well as estimates of carbon stock, carbon stock changes, and resulting GHG flux in the landscape. These carbon stock changes result from disturbances, including conversion of natural lands to development and wildfire, among others. NWL carbon inventories are important for tracking how disturbances affect carbon stocks and GHG emissions, thereby informing how the County's land base contributes to local and State GHG emissions goals. Although the 2010 and 2020 NWL carbon inventories do not show a clear link between forest carbon stock decreases due to wildfire, CARBs Natural and Working Land Inventory Report attributed the Statewide decrease in forest and shrubland carbon stocks from 2001 to 2010 to large wildfires.¹⁵ Between 2010 and 2020, Calaveras County experienced one large fire, the Butte Fire (in 2015), which burned approximately 70,868 acres, mostly in Calaveras County. The Butte Fire is ranked 18th on the California Department of Forestry and Fire Protection (Cal FIRE) list of the Top 20 Most Destructive California Wildfires.¹⁶ The Butte Fire did not result in a permanent large loss of carbon stock, as indicated in the carbon inventory results between 2010 and 2020. However, studies indicate that large, intense fires brought on by fire suppression, drought, and other factors, may result in historically forested areas changing to shrubland in the future.¹⁷ Section 3 discusses potential future emissions from carbon stock loss due to wildfire.

¹⁵ CARB. 2018. An Inventory of Ecosystem Carbon in California's Natural & Working Lands. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf>. Accessed June 2, 2021.

¹⁶ California Department of Forestry and Fire Protection (Cal FIRE). 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed June 10, 2021.

¹⁷ Carroll. 2016. Severe fires turning forest to shrubland in California. Available: <<https://phys.org/news/2016-04-severe-forest-shrubland-california.html#:~:text=A%20new%20study%20found%20that,the%20state%20changing%20to%20shrubland.&text=%22Basically%20we%20are%20switching%20forest,happen%20at%20very%20large%20scales>>. Accessed May 26, 2021.

3 Potential GHG Emissions from Carbon Stock Loss Due to Wildfire

The GHG emissions from wildfires are inherently linked to the loss of carbon stocks in vegetated areas. As wildfires burn through forests, grasslands, and shrublands the carbon stored in the biomass is released to the atmosphere from the direct combustion of material, and from the resulting decay of biomass after a fire has killed vegetation.¹⁸ In the past century, fire suppression has increased the accumulation of wildfire fuel, as natural, smaller, low-intensity fires that were at one-time natural have been prevented to protect lives and property.¹⁹ As a result of this disruption of the natural carbon cycle and the influences of climate change, wildfires have become more severe, resulting in massive losses of carbon stocks and high levels of GHG emissions. The potential for carbon losses and subsequent GHG emissions resulting from wildfire can be diminished through land use planning and forest management practices, such as forest thinning and prescribed burns. This section provides an overview of the carbon/fire cycle, and an analysis of the potential GHG emissions from carbon stock loss due to wildfire in Calaveras County. In addition to an assessment of the overall emission potential, a case study for an estimate of the GHG emissions associated with 2015 Butte Fire is provided.

3.1 Carbon and Fire Cycle

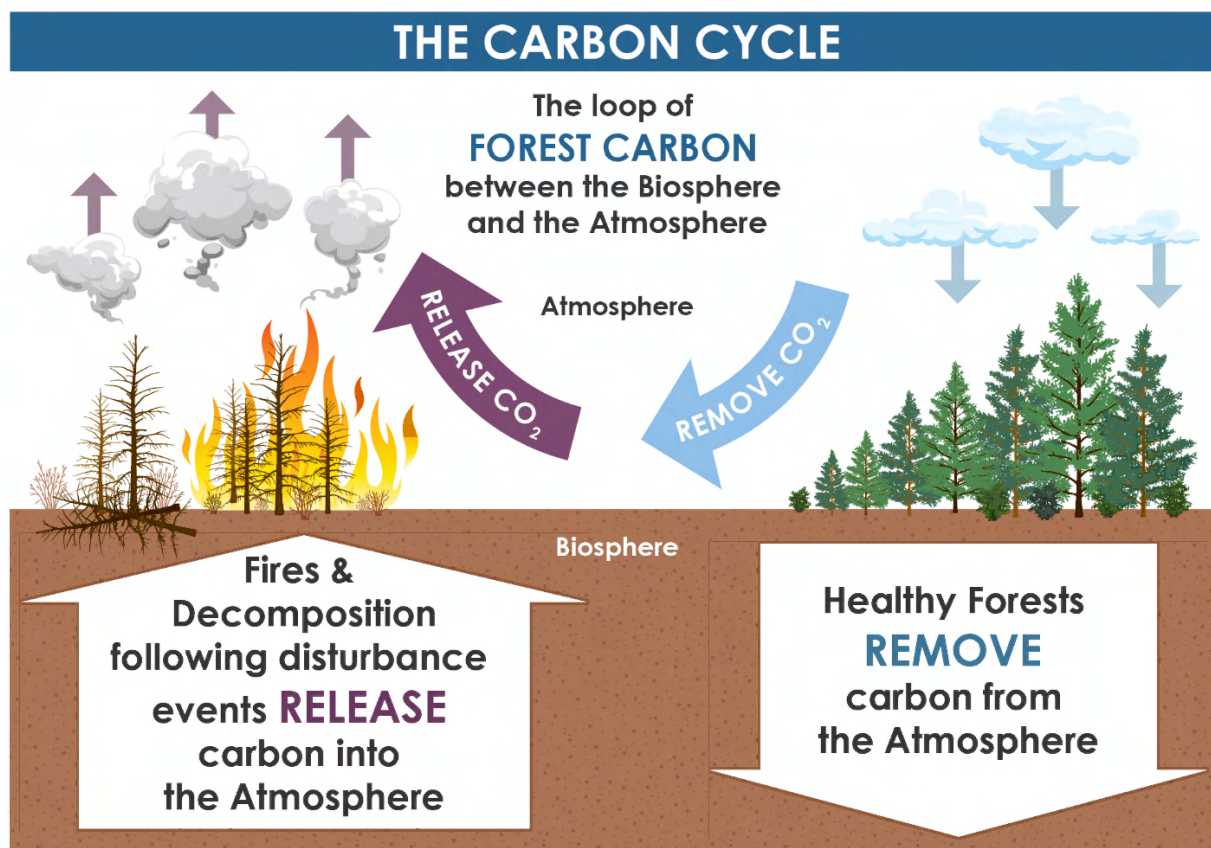
The carbon cycle is an essential aspect for Earth to maintain the carbon balance required to sustain life. The cycle primarily consists of flows of carbon between the atmosphere, biosphere, oceans, and Earth's crust, through various natural processes. While the largest contributor to climate change is the human-influenced release of carbon that has long been sequestered in Earth's crust as fossil fuels (long-term carbon cycle), maintaining the carbon exchanges between the biosphere (i.e. plants, animals, insects) and atmosphere (short-term carbon cycle) is essential for reducing the impacts of climate change and preserving valuable ecosystem services.²⁰ Figure 6 graphically details the carbon cycle exchange between the biosphere and atmosphere, including when 1) carbon stock loss occurs within the biosphere releasing GHG emissions into the atmosphere as a result of wildfire as well as 2) how carbon dioxide from the atmosphere is sequestered by vegetation in the biosphere.

¹⁸ Bonnicksen. 2008. Greenhouse Gas Emissions from Four California Wildfires: Opportunities to Prevent and Reverse Environmental and Climate Impacts. Available: <http://www.orww.org/Wildfires/References/Climate_&_Atmosphere/Bonnicksen_2008.pdf>. Accessed June 2, 2021

¹⁹ CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

²⁰ CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

Figure 6 Forest Carbon and Fire Cycle



Source: Rincon Consultants, Inc., 2021

The health of the majority California's ecosystems is dependent on wildfire, which can reduce buildup of organic debris that can fuel high-severity wildfires, release nutrients into the soil, and trigger changes in vegetation community composition.²¹ Historically, indigenous people of California understood the interactions of wildfire and the natural lands, even using controlled burns to promote the health of natural lands. However, in the 20th century fire suppression became the guiding force for U.S. fire policy that was intended to protect communities and resources.²² This has created a disruption in the natural carbon cycle of forests that arises from a lack of naturally occurring fires that serve to regularly clear undergrowth, enhance available nutrients, and promote the long-term health of mature trees.

Climate change has also contributed to this imbalance in the carbon cycle, where forests have become increasingly affected by drought and invasive species. This can turn forests into a carbon source, with decaying biomass emitting carbon to the atmosphere and becoming fuel for

²¹ CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

²² Bruno. 2020. Indigenous tribes in California and other parts of the U.S. have been rekindling the ancient art of controlled burning. The Nature Conservancy. Available: <<https://www.nature.org/en-us/magazine/magazine-articles/indigenous-controlled-burns-california/>>. Accessed June 7, 2021.

wildfires.²³ The current state of many California forests is that of a carbon cycle imbalance, where more severe wildfires occur that burn hotter and more intense resulting in a higher loss of carbon storage in biomass and, in turn, generate a greater release of GHG emissions into the atmosphere from both the initial burning and later decay of burned trees. This loss of biomass also reduces the ability for forests to continue to absorb carbon generated by human activities, furthering the carbon imbalance seen in the atmosphere.

Carbon cycle imbalances between the atmosphere and biosphere create a feedback loop that exacerbates the impacts of wildfire. The increased carbon dioxide levels in the atmosphere contribute to climate change, which impacts forests by increasing tree mortality due to extreme heat events, droughts, and increased levels of invasive species.²⁴ The combination of climate change and the unhealthy forests that result from human policy and land use development are both contributing to high-severity wildfires (high present long term perturbations to ecosystems, biodiversity, and carbon storage potential) and increased GHG emissions from the direct loss of carbon stock during wildfire events.

3.2 Land Carbon Stock by Vegetation Type

GHG emissions from wildfire is dependent on the vegetation type, as vegetation types with higher carbon densities have a higher potential for GHG emissions (i.e. forests) and vegetation types with lower carbon densities have a lower potential for GHG emissions (i.e. grass and shrublands). The NWL carbon inventory performed in the previous section provides a basis for assessing the carbon emissions associated with different vegetation types based on their carbon storage potential. While there are many factors that can attribute to the degree which carbon storage is lost from a wildfire (i.e. fuel loading and fuel moisture), generally, areas with higher carbon storage values will see higher carbon emissions and higher losses of carbon storage in many wildfire scenarios.

Each land cover class discussed in the NWL carbon inventory provides a unique carbon storage value and accordingly a unique potential for carbon loss during wildfire. Biomass carbon densities were derived from the NWL inventory, using volumetric estimates of carbon mass provided by the CARB and the Calaveras specific Existing Vegetation Types, Heights, and Covers. As shown in Table 5, mixed forests have the largest biomass carbon densities and cover the largest land area in Calaveras County. Deciduous forests also have a relatively large biomass carbon density and contribute the second most to the overall biomass carbon stock in the County, even though land area covered is relatively small compared to shrub/scrub land cover and mixed forest. The deciduous forest and mixed forest land covers contribute the largest to the total biomass carbon stocks, and as such have the highest potential for carbon losses in the case of wildfire.

²³ Natural Resources Canada. 2020. Climate Change Impacts on Forests. Available: <<https://www.nrcan.gc.ca/climate-change/impacts-adaptations/climate-change-impacts-forests/forest-carbon/13085>>. Accessed June 7, 2021.

²⁴ CARB. 2021. Frequently Asked Questions: Wildfire Emissions. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/wildfire_emissions_faq.pdf>. Accessed June 7, 2021.

Table 5 Calaveras County NWL Biomass Carbon Density (2010 and 2020)

Land-cover Class	2010			2020		
	2010 Biomass Carbon Stock (MT CO ₂)	2010 Acres	2010 Biomass Carbon Density (MT CO ₂ /acre)	2020 Biomass Carbon Stock (MT CO ₂)	2020 Acres	2020 Biomass Carbon Density (MT CO ₂ /acre)
Barren	4,941	3,996	1.2	4,526	3,658	1.2
Cultivated Crops	3,773	842	4.5	10,373	2,912	3.6
Deciduous Forest	2,339,939	43,748	53.5	2,264,892	37,636	60.2
Development	0.0	11,717	0.0	0.0	12,259	0.0
Evergreen Forest	97,079	1,835	52.9	228,808	11,243	20.4
Grassland/Herbaceous	29,751	13,058	2.3	118,491	44,797	2.6
Mixed Forest	26,028,502	420,723	61.9	25,851,098	354,620	72.9
Open Water	0.0	14,288	0.0	0.0	15,960	0.0
Shrub/Scrub	3,932,040	152,632	25.8	1,566,025	178,190	8.8
Wetland	0.0	0.0	0.0	4,259	1,563	2.7
Total	32,436,025	662,838	49	30,048,472	662,838	45

Sources: LANDFIRE, 2021; CARB, 2020

3.3 Potential Emissions from Carbon Stock Loss

Wildfires contribute significantly to carbon stock losses which result in GHG emissions as the carbon stocks are transferred from the biosphere to the atmosphere. While many factors contribute to the degree in which carbon is lost during a wildfire event, the analysis here is intended to provide a general estimate from theoretical fire scenarios and a review of the carbon stock loss and emissions potential from the 2015 Butte Fire. The primary focus of the GHG emissions analysis is on forested areas with larger potential for carbon storage losses.

It is difficult to accurately estimate GHG emission and carbon stock losses from wildfire, as each wildfire event has different characteristics that influence the degree to which carbon stocks are lost. The intensity of fires can vary greatly, even within areas of the same wildfire event. Some events can result in a nearly complete loss of all living biomass, whereas some may only burn undergrowth and leave longstanding trees relatively unharmed. These variables may greatly impact the degree to which carbon stocks are lost and GHG emissions are generated. Additionally, the decomposing deadfall that remains after live vegetation has been burned by wildfire also serves as an emissions

source for decades after the initial emissions impact of fuel burning, which further complicates the full understanding of GHG emissions and carbon stock loss impact.²⁵

3.3.1 Cause, Vegetation Type, and Area of Emissions Impacts

Estimates for wildfire emissions potential for forested areas of Calaveras County are based on the 2010 study *High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest*.²⁶ This study surveyed the carbon stock loss and emissions impact of several fires throughout California in both treated areas, where forest management has occurred, and untreated areas. The American River Complex fire surveyed in the study occurred in a region of the western Sierra Nevada Mountains in Placer County, which is estimated to be the most characteristic of Calaveras County forests. While the live tree and surface fuel carbon stocks estimated from the study do not exactly match that those derived in from the NWL inventory in this study, different survey methods were used to estimate biomass carbon which is the likely source of this discrepancy.²⁷ The emission estimates reported from wildfire in the study area show that approximately 28.9 to 30.7 percent of the biomass carbon is converted to emissions in areas of the wildfire that were untreated, which decreased to a range of 12.7 to 12.9 percent for treated forests.

The emissions estimates based on the aforementioned 2010 study estimates the wildfire emissions that would occur in deciduous and mixed forests and can be used as a reference for similar land cover in Calaveras County, which represent 8 and 86 percent of above- and below-ground carbon stocks in Calaveras County in 2020, respectively. For untreated forests, an average of 29.8 percent of biomass carbon could be converted to carbon emissions from wildfire. Using 2020 biomass carbon densities for deciduous and mixed forest of 60.2 and 72.9 MT CO₂/acre, respectively, in Table 4, burning of this land during a wildfire has the potential to release emissions of 17.9 and 21.7 MT CO₂/acre burned. This value generally aligns with the CARB estimates for overall California annual wildfire emission per acre, which averages to about 20.6 MT CO₂e/acre between the years 2000 and 2019.^{28,29} Given that the California wildfire emissions also include the burning of grasslands and shrublands, it is likely that the values derived here for Calaveras County is an underestimate. In the unlikely scenario that the majority of the deciduous and mixed forests in Calaveras County were to burn over multiple future wildfire events, the forested land of Calaveras County has an emissions potential of over 8 million MT CO₂ from the conversion of carbon stocks to atmospheric carbon.

The emissions estimates for wildfire in forested areas provided here are intended to provide a general estimate based on published relevant research. Fire emission modeling performed in other practices can take many additional considerations into account, including weather conditions, fuel moisture content, fire intensity, and smoldering time. However, this is beyond the scope of the analysis completed here-in.

²⁵ North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

²⁶ North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

²⁷ North and Hurteau. 2011. provides a biomass carbon density of 84.7 and 82.3 MT CO₂/acre for the two survey areas, while the NWL inventory provides an estimate of 72.9 MT CO₂/acre for mixed forest.

²⁸ The average wildfire emissions per acre account for the burning of shrublands and grasslands, which have lower carbon storage values, as well as forests. Therefore, it is expected that the average value for all fires in California would be expected to be lower than the value for forests specifically.

²⁹ CARB. 2020. Public Comment Draft: Greenhouse Gas Emissions of Contemporary Wildfire, Prescribed Fire, and Forest Management Activities. Available: <https://ww3.arb.ca.gov/cc/inventory/pubs/ca_ghg_wildfire_forestmanagement.pdf>. Accessed June 7, 2021.

3.3.2 Wildfire-related GHG Emissions Case Study – Butte Fire

The Butte Fire that occurred in September 2015 is one of the top 20 most destructive California wildfires and was the most significant wildfire to occur in Calaveras County in the past century with 70,868 acres burned.³⁰ The fire was ignited by tree branches coming in contact with powerlines in Amador County in September of 2015, with high winds quickly spreading the fire into Calaveras County. Not only did this fire ignite in the WUI, nearly 30 percent of acreage burned was considered WUI land.³¹ The Butte Fire occurred in the midst of California’s historic drought, from 2012 to 2016. Increased potential for extended dry periods that fuel wildfires is expected with climate change.³²

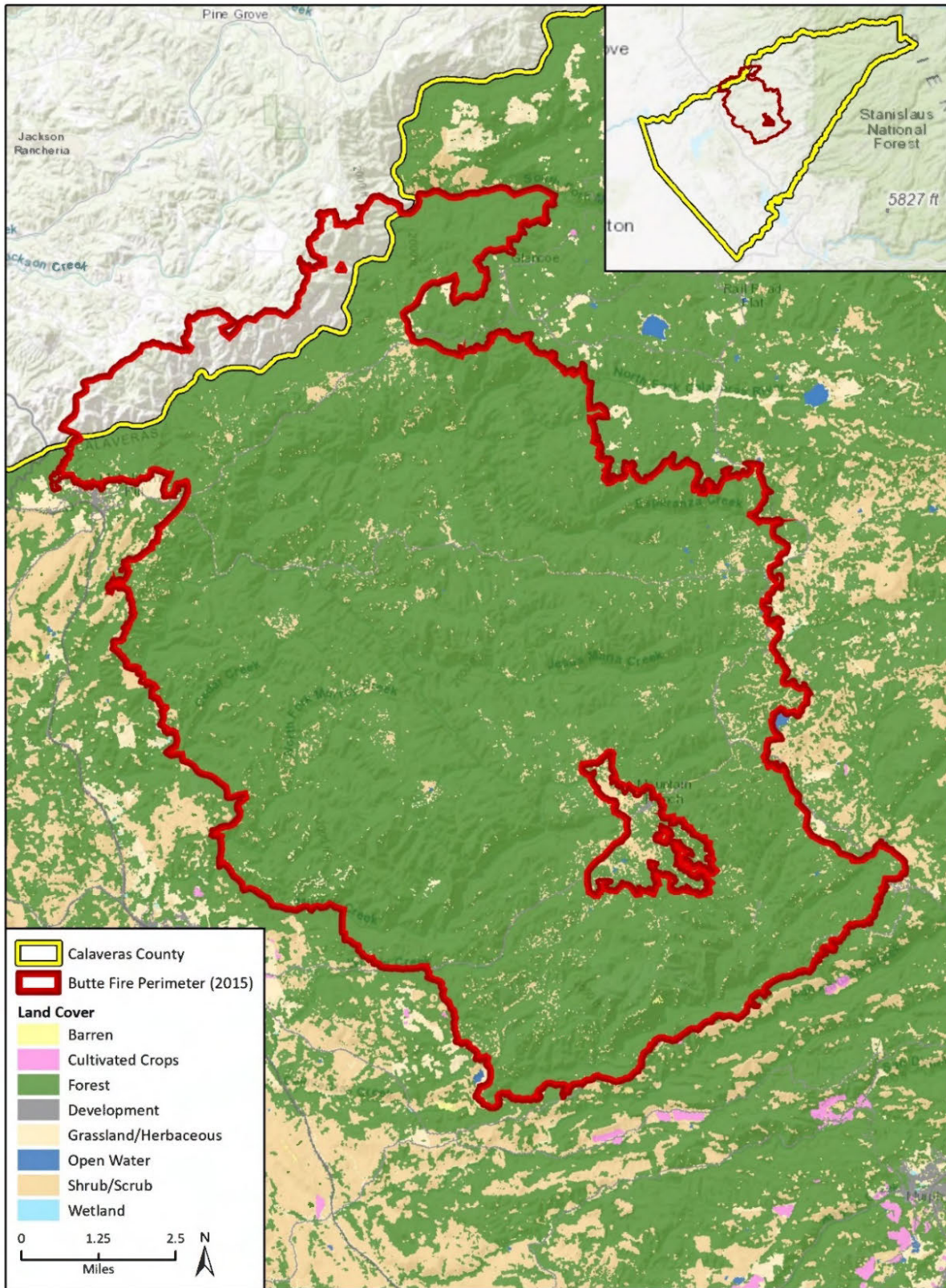
The Butte Fire burned through regions of the County with high carbon sequestration values, resulting in high GHG emissions and high carbon stock losses. As shown in Figure 7 and Table 6, the wildfire burned through primarily deciduous forest and mixed forest land-cover vegetation types in Calaveras County, as provided by the 2010 NWL inventory.

³⁰ CalFIRE. 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed May 26, 2021.

³¹ Bay City News. 2018. Wildland Development Escalates California Fire Costs. Available: <<https://www.kqed.org/news/11713393/wildland-development-escalates-california-fire-costs>>. Accessed June 7, 2021.

³² Diffenbaugh et al. 2015. Anthropogenic warming has increased drought risk in California. Available: <<https://www.pnas.org/content/112/13/3931.short>>. Accessed June 7, 2021.

Figure 7 2010 NWL Inventory and Butte Fire Perimeter



Sources: CalFIRE, 2020; ESRI, 2021; LANDFIRE 2021

Table 6 Butte Fire Footprint Land-cover Class from 2010 NWL Inventory

Land-cover Class	Butte Fire Footprint Area (acres)	Percentage of Footprint Area
Barren	61	<1%
Deciduous Forest	14,281	21%
Development	429	1%
Evergreen Forest	232	<1%
Grassland/Herbaceous	172	<1%
Mixed Forest	49,473	74%
Open Water	89	<1%
Shrub/Scrub	2,566	4%
Grand Total	67,303	100%

Sources: LANDFIRE, 2021; CARB, 2020

A general estimate of GHG emissions associated with the Butte Fire can be calculated using the deciduous forest and mixed forest emission factors of 17.9 and 21.7 MT CO₂/acre burned, derived above. As shown in Table 7, it has been estimated that the Butte Fire generated approximately 1.3 million MT CO₂ from direct fire emissions from the primary affected vegetation types, which only includes the direct emissions from combustion and does not account for the additional future emission that occur as burned biomass decays and emits GHGs for decades after the event. This conversion of carbon, sequestered in biomass, to atmospheric carbon contributing to climate change impacts is nearly four times the GHG emission generated by the County from energy consumption, waste generation and transportation in one year.

Table 7 Butte Fire GHG Emission Estimates from Primary Land-cover Types

Land-cover Class	Butte Fire Footprint Area (acres)	Percentage of Footprint Area	GHG Emission Factor (MT CO ₂ /acre)	GHG Emissions (MT CO ₂)
Deciduous Forest	14,281	21%	17.9	255,632
Mixed Forest	49,473	74%	21.7	1,073,557
Grand Total	63,754	95%		1,329,188

Sources: LANDFIRE, 2021; CARB, 2020; CalFIRE, 2020; MP North and MD Hureau. 2011

3.4 County Land Carbon Management Scenarios

The degree to which carbon is lost during a wildfire event is dependent on many variables, one of which is whether fire management practices have occurred in the affected area. It has been shown that fire management practices such as deadfall clearing, thinning, and prescribed burning have a significant influence on reducing the intensity and severity of wildfires resulting in more living trees remaining after a wildfire event.³³ While most forest management practices result in a net removal of carbon stocks from either the managed burning or removal of biomass material, the long-term benefits of protecting large trees with higher carbon storage values and preserving natural ecosystems may outweigh the short-term loss of carbon storage.

While wildfires are a natural process that will inevitably continue, management of forests in the County can significantly reduce the impacts of wildfires in both severity and GHG emission potential. Based on the results of the 2010 study *High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest*, forested areas that have been treated with mechanical and prescribed fire forest management show significantly less GHG emissions and tree mortality rates than areas that were untreated.³⁴ In the western Sierra Nevada wildfire scenario discussed in Section 3.3, *Potential Emissions from Carbon Stock Loss*, wildfire in untreated forest areas converted approximately 29.8 percent of biomass carbon to GHG emissions, while treated forest areas had approximately 12.8 percent of biomass carbon converted to GHG emissions. Similarly, treated forests experienced far less tree mortality rates, with 58 to 63 percent tree mortality compared to 93 to 100 percent tree mortality in untreated forests. Based on these results, forest management to reduce the intensity and severity of wildfires can reduce GHG emissions from wildfire by approximately 57 percent. In the context of Calaveras County, this could reduce the GHG emissions potential per acre of forested land from 21.7 MT CO₂/acre burned down to 9.3 MT CO₂/acre burned.

While forest management practices result in a net loss of carbon in the County, the potential to preserve longstanding carbon reserves in larger trees reduces the potential for uncontrolled fires in the County.

3.5 County Emissions from Carbon Stock Loss Summary

The potential impact of GHG emissions from wildfire in forested areas of Calaveras County is significant and would result in a net loss of valuable carbon stocks that sequester GHG emissions that contribute to the impacts of climate change. Forest management practices such as thinning and prescribed burns can reduce both the GHG emission from wildfire and reduce the severity and intensity of wildfires, resulting in reduced tree mortality rates. While forest management practices result in a net loss of carbon in the County, the potential to preserve longstanding carbon reserves in larger trees reduces the potential for uncontrolled fires in the County. This connection between carbon stock loss and wildfire-related GHG emissions is essential for understanding the impact related to the County's potential contribution of GHG emissions related to wildfire occurrence. Section 4 discusses climate change vulnerability specific to wildfire.

³³ Halofsky et al. 2020. Changing wildfire, changing forests: the effects of climate change on fire regimes and vegetation in the Pacific Northwest, USA. Available: <<https://fireecology.springeropen.com/articles/10.1186/s42408-019-0062-8#Sec27>>. Accessed June 3, 2021.

³⁴ North and Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. Available: <https://www.fs.fed.us/psw/publications/north/psw_2011_north002.pdf>. Accessed June 3, 2021.

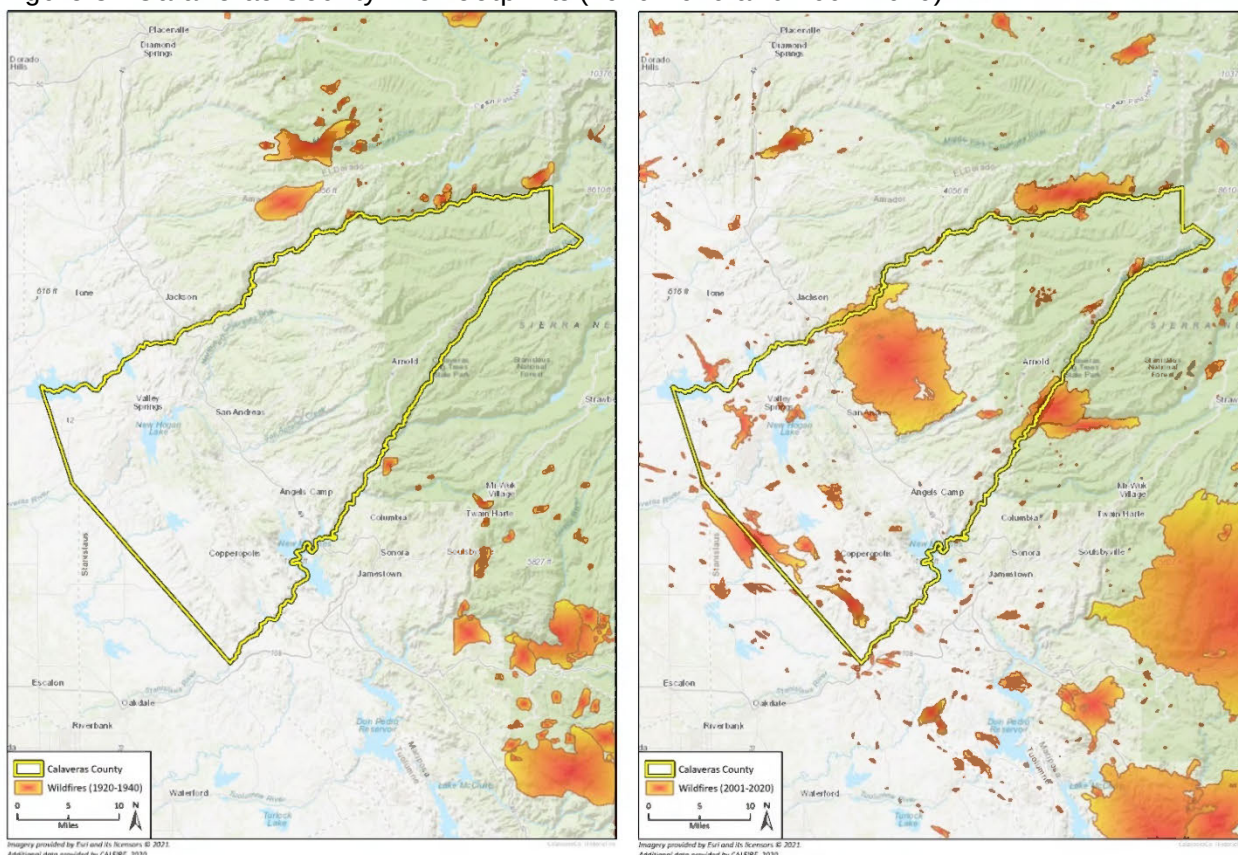
4 Climate Change Vulnerability Assessment Specific to Wildfire

The Calaveras County potential wildfire-related GHG emissions from carbon stock loss leads to a critical opportunity to assist in furthering thought leadership, especially when facing a challenge as daunting as adapting to changing fire frequency, intensity, and consequences that have been driven by climate change, development patterns, and land management practices. Thus, provided below is a Calaveras County climate change vulnerability assessment specific to the climate change hazard of wildfire. The increasing devastation and loss of life from wildfires in California's WUI must be mitigated to reverse this destructive trend and make California safer while improving the health of California's forests, shrublands, and grasslands.

4.1 Historical Wildfire

Calaveras County has experienced wildfire over the past century, as shown by the historical wildfire maps below in Figure 8. The most recent period from 2001 to 2020 shows a greater amount of County acreage affected by wildfire compared to the period from 1920-1940.

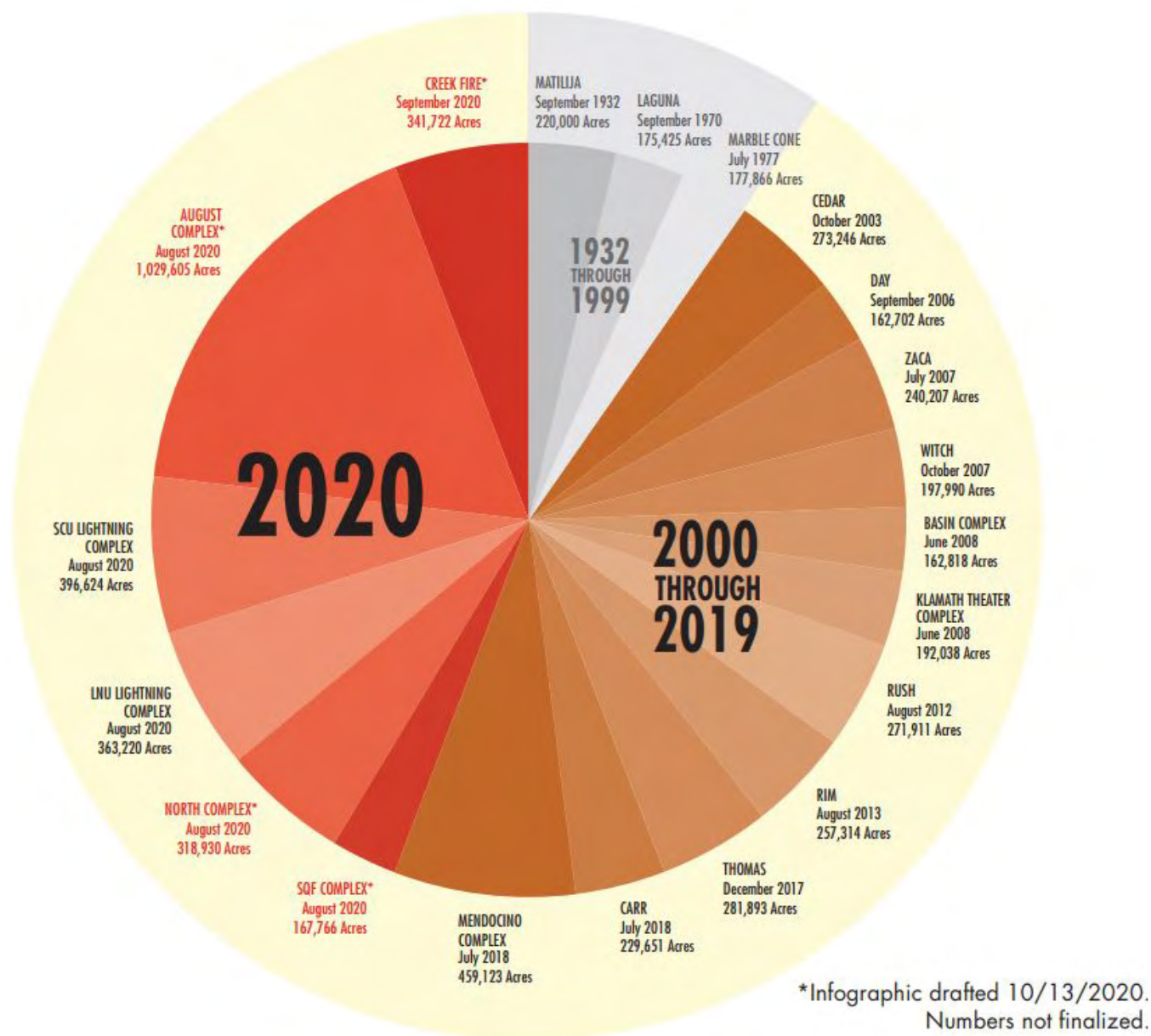
Figure 8 Calaveras County Fire Footprints (1920-1940 and 2001-2020)



Source: CalFIRE Fire and Resource Assessment Program (CalFIRE FRAP). 2021. California Fire Perimeters GIS dataset. Available: <<https://frap.fire.ca.gov/mapping/gis-data/>>. Accessed May 26, 2021.

However, as shown in Figure 9, over the approximate last century the majority of the top 20 largest California wildfires occurred since 2000. Specifically, five of the State's six largest fires burned more than four million acres during the same timeframe (double the previous record) in 2020, destroying thousands of buildings, forcing hundreds of thousands of people to flee their homes, and exposing millions of people across the State to dangerously unhealthy air.

Figure 9 Top 20 Largest California Wildfires



Source: CGFMTF. 2021. California Wildfire & Forest Resilience Action Plan. Available: <https://www.fire.ca.gov/media/ps4p2vck/californiawildfireandforestresilienceactionplan.pdf>. Accessed May 27, 2021.

Therefore, the expanse of acreage affected by wildfire has increased over time, and the frequency and intensity of wildfire has also increased over the past century throughout California.

4.2 Wildfire Exposure Potential

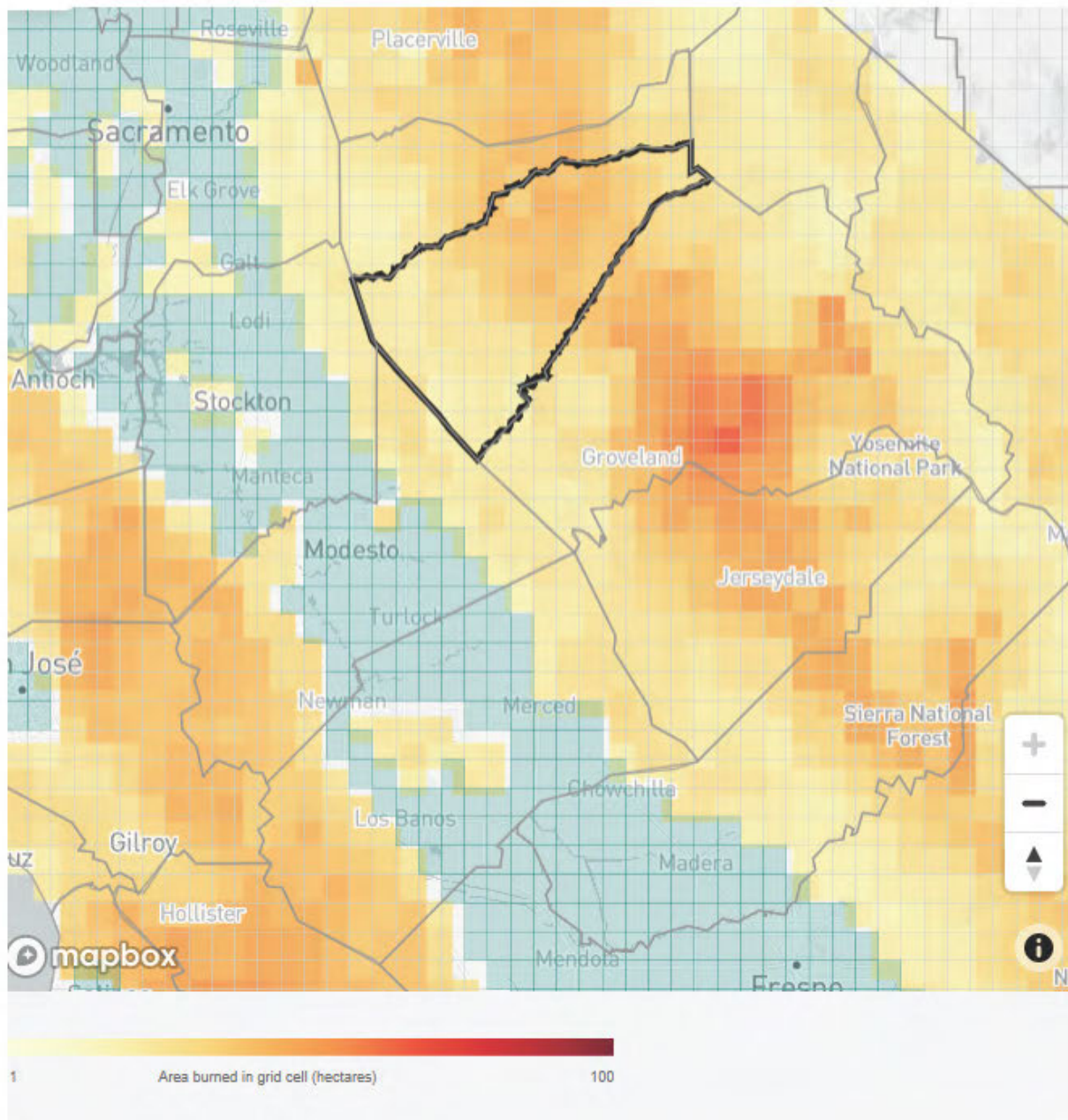
Wildfire exposure potential can be determined by looking at the existing and projected likelihood of certain areas to wildfire. The existing likelihood is discussed below in terms of existing mapped fire hazard severity zones for Calaveras County. The projected likelihood is discussed below in terms of projected wildfire exposure areas for Calaveras County.

4.2.1 Existing Fire Hazard Severity Zones

The California Department of Forestry and Fire Protection (CalFIRE) serves and safeguards the people and protects the property and resources over 31 million acres of California's privately owned wildlands. Preventing wildfires within the State Responsibility Area (SRA) is a pivotal part of the CalFIRE mission. Public Resources Code 4201-4204 direct CalFIRE to map fire hazard within SRA based on relevant factors such as fuels, terrain, and weather. Additionally, CalFIRE provides recommendations for Local Responsibility Area (LRA) lands for cities and unincorporated areas of counties. These statutes were passed after significant WUI fires occurred and, consequently, fire hazards are described according to their potential for causing ignition to buildings. The Fire Hazard Severity Zones (FHSZs) provide the basis for application of various strategies to reduce risks to buildings associated with wildland fires and also relate to the requirements for building codes designed to reduce ignition potential to buildings in WUI zones.³⁵ As shown in Figure 10, the majority of Calaveras County is mapped as a FHSZ. The eastern portion of the County is dominated by a category of Very High FHSZ, while the western portion of the County is mapped as a combination of Very High, High, and Moderate FHSZs. Figure 11 also shows the Very High FHSZs within the City of Angels Camp, as recommended by CalFIRE. These show Very High FHSZs in the northwestern, southern, and eastern regions of the City.

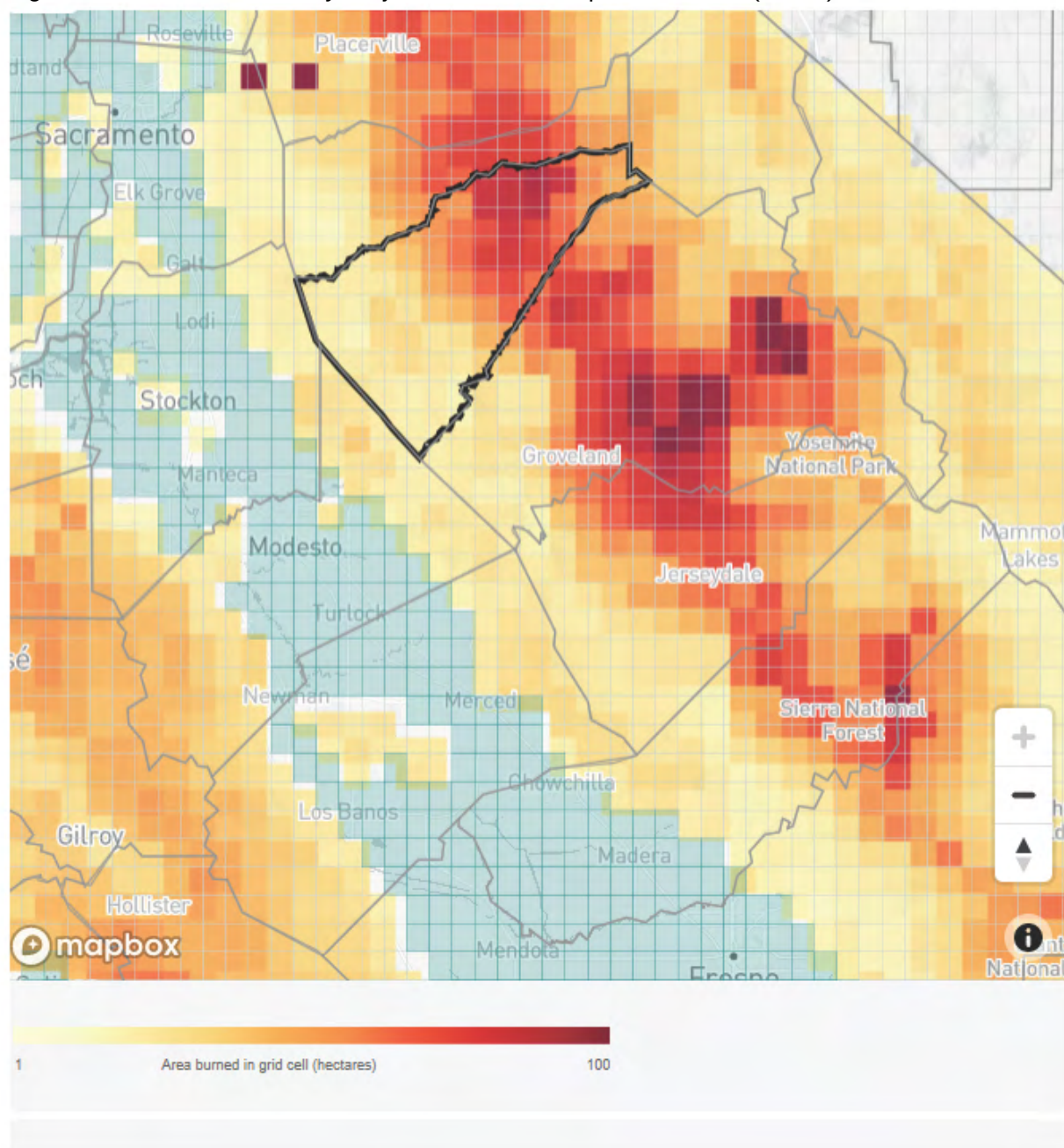
³⁵ California Office of the State Fire Marshal (COSFM). 2021. State Fire Hazard Severity Zones Maps. Available: <<https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/>>. Accessed May 25, 2021.

Figure 12 Calaveras County Projected Wildfire Exposure Areas (2020s)



Source: Cal-Adapt, 2021.

Figure 13 Calaveras County Projected Wildfire Exposure Areas (2090s)



Source: Cal-Adapt, 2021.

These resulting projected wildfire exposure area maps are intended to support a regional priority plan to reduce wildfire risk and improve forest health.

4.3 Wildfire Community Sensitivities

Communities will be affected by climate change to varying degrees depending on how sensitive the communities are to impacts and the severity of the impacts. Virtually all people and assets in a community will be affected by climate change in some way. However, it is not usually feasible to assess the vulnerability of every population group or every asset in the community. The sensitivity of a community depends on the aspects of the community (i.e., specific populations and assets) most affected by anticipated climate impacts, and how prevalent they are in the community. The most likely impact of climate change that Calaveras County may experience is an increase in wildfire risk. This section of the vulnerability assessment identifies sensitive areas of the Calaveras community.

4.3.1 Populations

Population demographics are determined using the California Healthy Places Index (HPI) and United States Census Bureau unless otherwise noted. County level data are among the more comprehensive statistics available for understanding climate impacts on Sierra Nevada communities and show that 12 of the 20 counties in the Sierra Nevada qualify as disadvantaged or economically distressed; Calaveras County hovers at the threshold, though it is not considered distressed despite the community and landscape devastation caused by the 2015 Butte Fire.³⁸ However, of the 45,578 persons residing in Calaveras County, the following population groups may be disproportionately harmed by the climate change hazard of wildfire.

Older adults: Persons 65 years or older are more at risk for climate change impacts related to wildfire, especially those living alone, because aging can impair muscle strength, coordination, cognitive ability, immune system, and the regulation of body temperature. These conditions can be exacerbated by poor air quality resulting from wildfires and present challenges in evacuating older adult populations. Approximately 28 percent of County residents are over 65 years, which is more than the Statewide average of 15 percent of residents over 65 years.

Persons with chronic health conditions or disabilities: These are people who have a long-term or permanent health condition that can create regular challenges in their day-to-day lives. These health problems include cancer, heart disease, obesity, and arthritis. In addition, these are people with any kind of disability, including mobility challenges, hearing or vision impairments, behavioral disabilities, and challenges living independently or taking care of themselves. Chronic illnesses are exacerbated by climate change, with wildfire presenting additional risk through increased air pollution and difficulty in evacuating persons with mobility challenges and essential medical equipment. Approximately 15 percent of County residents have a disability.

Renters: These are people who live in homes that they (or the head of their household) do not own. Renters have less control over home improvements than homeowners and may not be able to adequately protect themselves from climate hazards such as wildfire by retrofitting their homes and adjusting their property's surroundings. Approximately 12 percent of housing units in the County are renter-occupied.

³⁸ OPR, CNRA, and California Energy Commission (CEC). 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

Uninsured individuals: People without health insurance have difficulty accessing quality health care and are more likely to have unmet health needs. Climate impacts such as wildfire and related elevated levels of air pollution are expected to cause direct and indirect health impacts, particularly for vulnerable populations with limited or no access to health services. Approximately 7 percent of County residents aged 18 to 64 are uninsured.

4.3.2 Buildings

Residential Structures: Residential structures in Calaveras County consist of single-family dwellings and multi-family units, totaling 27,995 housing units.

Public Safety Facilities: Public safety facilities include fire buildings and police stations. Calaveras County has 39 fire departments and fire stations owned and operated by nine local fire districts, including CalFIRE. The County is also served by the Calaveras County Sheriff's Office with a headquarters and four substations located within the County.³⁹

Community Facilities and Government Buildings: Community and government facilities are public properties and are important to the residents as well as the operation of the County. The County seat is located in San Andreas. In addition, there are eight public libraries within the County, the San Andreas Central Library and seven additional branch libraries.⁴⁰

Schools: Calaveras County has four school districts and a County Office of Education. There are ten elementary schools (one is K-8), two middle schools, two high schools, and several alternative schools. The total K-12 student population is approximately 5,300.⁴¹ The schools are located primarily along access road corridors such as California Highway 49, California Highway 4, and California Highway 26, and the County Office of Education is located proximate to the intersection of California Highways 49 and 4 in Angels Camp.

4.3.3 Infrastructure

Access Roads: Access roads provide entry to and exit from communities and neighborhoods. A limited number of entry and exit points does not make a road itself more vulnerable than other roads, but disruption to access roads can effectively cut off large numbers of people from other areas of the County. California State Routes 49, 4, and 26 are the primary access roads into and out of the County.

Water Systems: There are seven agencies that provide water services and maintain water systems within Calaveras County, including: Calaveras County Water District, City of Angels Camp, Blue Lake Springs Mutual Water Company, Calaveras Public Utility District, Union Public Utility District, Utica Water and Power Authority, and Valley Springs Public Utility District. The Calaveras County Water District supplies water to the County, including to about 13,080 municipal and residential/commercial customers in six service areas throughout the County.⁴² Within the City of Angels Camp, the City provides water and sewer services to businesses and residents.

³⁹ Calaveras County. 2021. County Sheriff's Office. <<https://sheriff.calaverasgov.us/Outreach/Substations>>. Accessed June 2, 2021.

⁴⁰ Calaveras County. 2021. County Library and All Branch Locations. Available: <<https://library.calaverasgov.us/Locations-Hours>>. Accessed June 2, 2021.

⁴¹ Calaveras County Office of Education (CCOE). 2021. Calaveras County School Location and District Information. Available: <https://www.ccoe.k12.ca.us/apps/pages/index.jsp?uREC_ID=1175520&type=d&pREC_ID=1423925#:~:text=Calaveras%20Unified%20School%20District%20is,Road%20Flat%20and%20West%20Point.>. Accessed June 2, 2021.

⁴² Calaveras County Water District (CCWD). 2021. Our History. Available: <<https://ccwd.org/about/>>. Accessed June 9, 2021.

Electrical Utility Lines and Natural Gas Pipelines: These lines transmit and deliver electricity and natural gas from Pacific Gas & Electric to the County. The County has both underground and overhead electric utility lines as well as underground natural gas pipelines.

Electrical Substations: Electrical substations are facilities that convert electricity from one voltage to another, making it suitable for long-distance transmission or for use by homes, businesses, and other electrical customers. There is one electrical substation, the PG&E Valley Springs Substation, located within the County limits and owned and operated by Pacific Gas & Electric.

4.3.4 Natural and Managed Resources

Forest Resources: Forests in Calaveras County represent a natural and economic resource. Forest lands provide natural habitats as well as opportunities for recreation. Calaveras County spans 663,290 acres (1,036 square miles). As shown in Table 2, a total of 403,499 acres of evergreen, deciduous, and mixed forest lands exist within the County. As such, forested areas represent approximately 61 percent of County land area. The forest supports a wide variety of wildlife and plant species due to its range in climate, elevation, and geology. The Stanislaus National Forest contains approximately 325,000 acres of commercial forest land, part of which is in Calaveras County, and is also home to the Emigrant Wilderness, Mokelumne Wilderness, and the Carson-Iceberg Wilderness.

With approximately 159,000 acres of hardwood habitat (24 percent of land area in the County), including 2,000 acres of Blue Oak-Foothill Pine, 55,000 acres of Blue Oak Woodland, 102,000 acres of Montane Hardwood, and a small amount of Montane Riparian habitat, Calaveras County contains approximately 1.6 percent of California's nearly 10 million acres of hardwood rangeland and forests. It leads all other counties in the percentage of County land area in oak woodland within the State. In Calaveras County, approximately 89 percent of the County's hardwood rangelands are privately held, and 75,901 acres are located within the Stanislaus National Forest.^{43, 44}

Timber Resources: As of 2018, the County contained approximately 77,500 acres of land zoned as Timberland Production. Timber is the largest commodity industry in the County at \$8,948,100 of revenue in 2018. Quality timber harvesting returned to the County with a good market. Crews also worked on fire breaks, and those sellable logs were utilized. The California Forest Practice Act was enacted to ensure that logging is done in a sustainable manner that will preserve and protect wildlife, forests, and streams. The CFPA is applicable to all commercial harvesting activities conducted by landowners of small parcels and large timber companies alike in the County. CalFire is responsible for enforcing the laws that regulate logging on privately-owned lands in California.⁴⁵

Livestock Resources: As of 2018, the County contained approximately 198,000 acres of rangeland with 17,700 head of cattle/calves. Cattle/calves and poultry are the second and fourth largest commodity industries in the County at \$7,852,537 and \$3,338,100 of revenue, respectively, in 2018. Cattle grazing provides an additional benefit of reducing vegetated fuel load and maintaining open space to reduce fire hazard in the County.⁴⁶

⁴³ Calaveras County. 2018. Calaveras county General Plan Draft EIR Agricultural, Forest, and Mineral Resources Chapter. Available: <https://planning.calaverasgov.us/Portals/Planning/Documents/Draft%20General%20Plan%20Update/CEQA/4_2_Agricultural%20Forest%20and%20Mineral%20Resources.pdf>. Accessed June 3, 2021.

⁴⁴ Calaveras County. 2007. Voluntary Oak Woodland Management Plan. Available: <https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/Oak_Woodland_Management_Plan.pdf>. Accessed June 3, 2021.

⁴⁵ Calaveras County. 2018. Calaveras County Crop Report.

⁴⁶ Calaveras County. 2018. Calaveras County Crop Report.

Crop Resources: As of 2018, the County contained approximately 711 acres of wine grape crops and 794 acres of walnuts crops as well as a growing acreage of cannabis cultivation. Wine grapes and walnuts are the third and fifth largest commodity industries in the County at \$3,389,750 and \$1,346,624 of revenue, respectively, in 2018. In addition to gross production value, wineries and tasting rooms provide added value to the wine grape yields and walnut sales to rangeland visitors provides added value to the walnut yields in the County.⁴⁷

4.4 Wildfire Impacts Due to Climate Change

Climate change hazards and impacts vary depending on location. Understanding local climate hazards and impacts allows communities to prepare for the future and increase their resilience. Climate change is projected to continue affecting Calaveras County in many ways, including increased wildfires and associated air pollution. Projected wildfire impacts for Calaveras County are described below based on information presented by Cal-Adapt and the Sierra Nevada Summary Report of California's Fourth Climate Change Assessment.

The combination of warmer temperatures and greater precipitation variability are expected to increase the prevalence of droughts in the State and Calaveras County and, thus, need for forest fuel management practices. These changes in climate pose daunting challenges to the region's landscapes, resources and communities, including wildfire risk. Fire is a major driver of the ecosystems of the Sierra Nevada region. The warming and drying trends are projected to increase the frequency and severity of wildfire. A progressively altered fire regime is a primary and acute risk to the flora, fauna, and persons of the Sierra Nevada region. High-severity wildfires have the potential to transform urban and natural landscapes, perhaps irreversibly, thereby threatening population communities with death, injury, and/or displacement, residential and other key buildings damage, and critical infrastructure in terms of access to access roads, water service, and power service. The smoke and air pollution produced by wildfire is also a serious threat to human health.⁴⁸ Furthermore, wildfires have the potential to damage the County's forest, timber, livestock, and crop resources, which could in turn adversely affect the County's valuable habitat and ecosystem services as well as timber, livestock (cattle and poultry), wine grape, and walnut industries.

Therefore, location of funding in terms of wildfire and specifically WUI fire risk will be important for the County to identify and obtain for ongoing forest fuel management practices and increased wildfire prevention.

4.5 Wildland Urban Interface Vulnerability

The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Communities adjacent to and surrounded by wildland are at varying degrees of risk from wildfires.

⁴⁷ Calaveras County. 2018. Calaveras County Crop Report.

⁴⁸ OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

4.5.1 Wildfire Cause and Times of Year

Wildland fires are classified as either naturally occurring or human-caused. Common causes of wildfire, which are mostly due to humans, include:

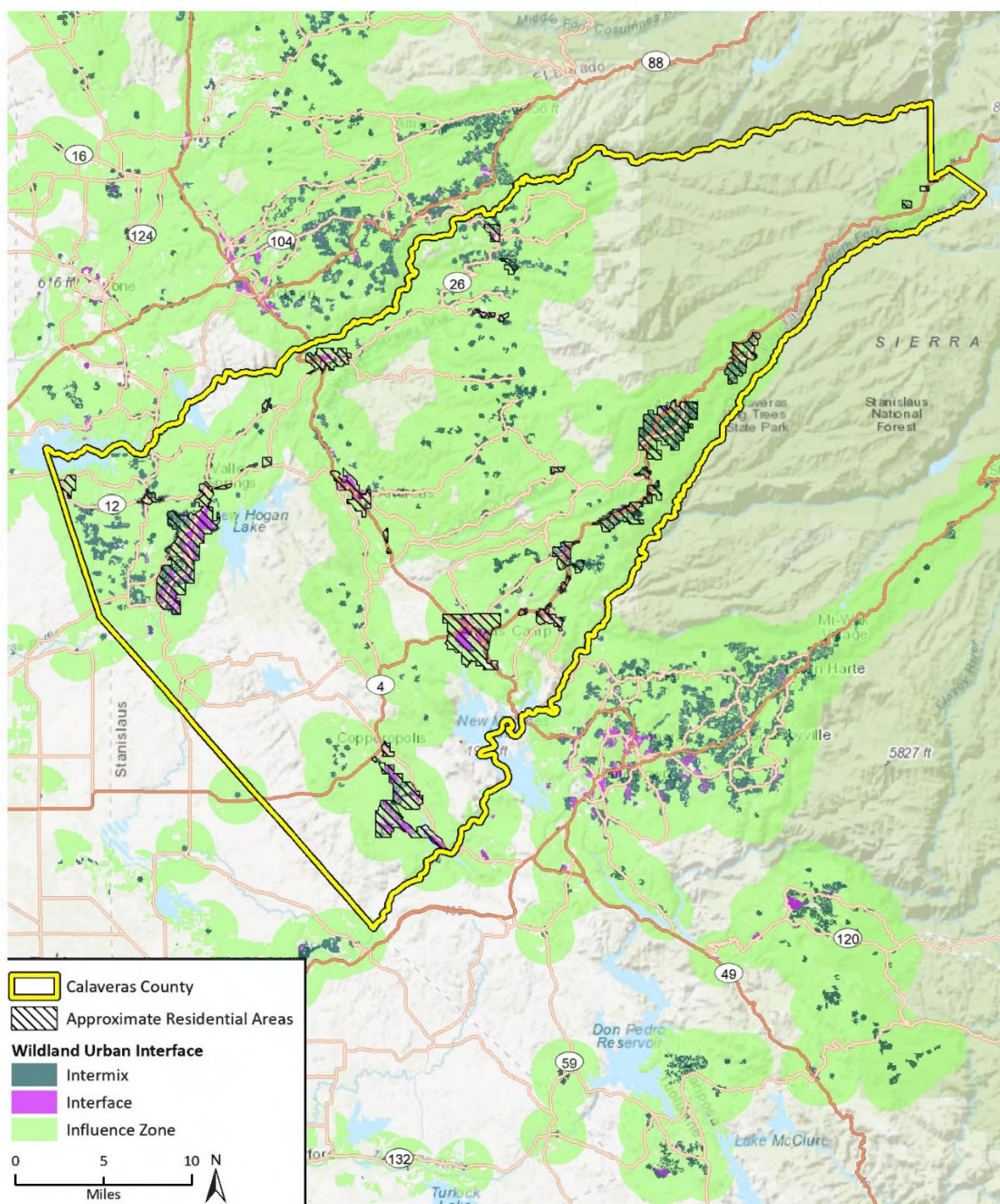
- Equipment use and malfunctions
- Vehicle crashes and engine sparks
- Negligently discarded cigarettes
- Unattended campfires
- Burning of debris
- Intentional acts of arson
- Lightning strikes

Peak wildfire season within California usually occurs between July and November, a time when hot, dry winds are most frequent and vegetated areas are dry, constituting a higher fuel load.

4.5.2 Developed Areas Impacted by Wildfire

As demonstrated in Figure 14, the majority of residents within the County live in intermix WUI areas or interface WUI areas. Intermix WUI refers to areas where housing and wildland vegetation intermingle, while interface WUI refers to areas where housing is in the vicinity of a large area of dense wildland vegetation. The WUI areas also primarily coincide with the major transportation corridors within the County (California State Routes 49, 4, and 26).

Figure 14 Calaveras County WUI Areas



Sources: CalFIRE, 2020; ESRI, 2021

4.5.3 Wildfire Climate Change Vulnerability Case Study – Butte Fire

The Butte Fire that occurred in September 2015 is one of the top 20 most destructive California wildfires. The fire was ignited by tree branches coming in contact with powerlines in Amador County in September of 2015, with high winds quickly spreading the fire into Calaveras County. As shown in Figure 7 in Section 3, the wildfire burned through primarily mixed forest land-cover vegetation types, per the 2010 NWL inventory. The Butte Fire resulted in:

- 2 deaths (in the Mokelumne Hill and Mountain Ranch areas);
- 921 structures (including 549 homes) lost; and
- 70,868 acres burned.⁴⁹

In addition, resources assigned to combat the fire included 4,865 personnel, 519 fire engines, 92 hand crews, 10 helicopters, and 94 dozers. And California Governor Jerry Brown declared a state of emergency in Calaveras County when the fire expanded to 65,000 acres in size.⁵⁰ The Butte Fire alone represented 8 percent of total area burned by wildfire in California in 2015, which was 893,362 acres in total.

Figure 15 shows WUI areas within the County in relation to the largest fire that has occurred in Calaveras County in recent history, the Butte Fire. It appears that the wildfire suppression effort was able to prevent the Butte Fire from spreading into all of the interface WUI areas and a majority of the intermix WUI areas. This prevented even greater human and structural loss, given that the wildfire perimeter was held from extending into a majority of the WUI areas for much of the County. However, major devastation still occurred within some WUI areas due to the Butte Fire.

Climate change resulted in the grape harvest starting two weeks earlier than normal and also exacerbated the Butte Fire given that California was in the midst of a five-year drought that lasted from 2012 to 2016.⁵¹ Daniel Berlant with CalFIRE said that the State's historic multi-year drought was a factor in the Butte Fire, because such drought conditions allow for a simple spark, an ember, and any type of open flame to quickly ignite into a wildfire and spread very rapidly. CalFire called the growth of the Butte Fire "unprecedented."⁵²

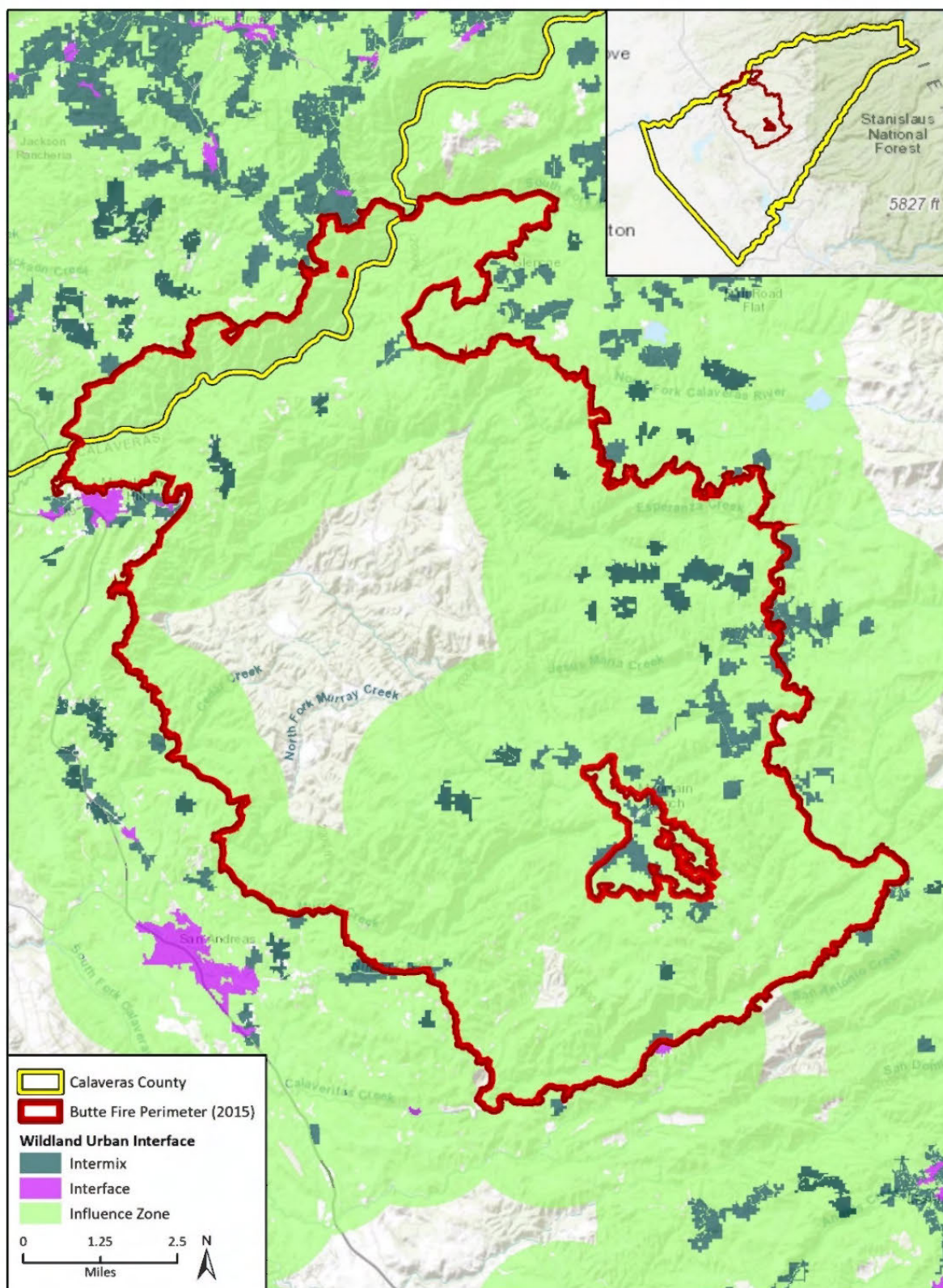
⁴⁹ CalFIRE. 2021. Top 20 Most Destructive California Wildfires. Available: <https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf>. Accessed May 26, 2021.

⁵⁰ Wildfire Today. 2021. Butte Fire Archives. Available: <<https://wildfiretoday.com/tag/butte-fire/>>. Accessed June 8, 2021.

⁵¹ California Department of Water Resources (CDWR). 2021. Drought. Accessible: <<https://water.ca.gov/water-basics/drought>>. Accessed June 10, 2021.

⁵² Capradio. 2021. Available: <<https://www.capradio.org/articles/2015/09/14/california-drought-factor-in-rapid-growth-of-wildfires/>>. Accessed June 9, 2021.

Figure 15 Calaveras County WUI Areas and Butte Fire Perimeter



Sources: CalFIRE, 2020; ESRI, 2021

Steps that could possibly have prevented or at least minimized the spread of the Butte County Fire include:

- better management and maintenance of powerlines, including but not limited to undergrounding of powerlines;
- Better management and clearing of defensible space around powerlines that traverse forested areas as well as the buildings throughout the County that were lost and damaged from the wildfire; and
- Quicker notification and response of downed or malfunctioning powerlines by the electric provider to the local fire departments and stations.

In addition, in order to disrupt the feedback cycle of wildfires that threatens communities at the WUI, it is necessary to identify and assess both GHG emissions and climate change impacts posed by wildfire and to subsequently develop mitigation and adaptation strategies. In order to do so, planning, fire, and forest managers require information regarding where fires are likely to occur, the intensity at which they might occur, and with what impacts to communities, assets, and resources.

4.6 County Climate Change Vulnerability Summary

Climate change resulting in increased temperatures, drought, and dry fuel load throughout the State is anticipated to exacerbate the potential for wildfire hazard and impact within the County. Forest management practices such as thinning and prescribed burns can reduce the severity and intensity of wildfires, in turn reducing the potential for uncontrolled fires in the WUI where the majority of residences exist and providing net benefits to the County. This connection between climate change and related impacts in the WUI is essential for understanding the climate hazards specific to wildfire in terms of the potential impact to residents, businesses, the local economy, and ecosystem services. Section 5 discusses best practices for reducing wildfire impact.

5 Wildfire Impact Reduction Best Practices

Given Calaveras County vulnerability to wildfire and per best practices identified by State agencies in the State Wildfire and Resilience Action Plan and OPR Fire Hazard Planning Technical Advisory, in order to protect public health and minimize risks to existing and new land uses, there should be an acceleration of efforts within the County to:

- Restore the health and resilience of forests, grasslands, and natural places;
- Improve the fire safety of communities and land uses; and
- Sustain the economic vitality of rural forested areas.⁵³

Since the scale of the potential wildfire problem is great, multiple routes of action need to be taken to accomplish wildfire resiliency.

5.1.1 Restored Forest/Shrub/Grassland Health and Resilience

5.1.1.1 Forest Health and Resilience Management

Activities to restore forest health and resilience should focus on thinning overgrown forests and dry fuel load within the Stanislaus National Forest and privately held forested areas of Calaveras County, with particular attention to areas along highways and roadways where wildfires are most likely to ignite at the WUI interface. Meadow restoration to improve water quantity and quality could also be part of shrubland and grassland resilience-building activities.⁵⁴ Thinning of overgrown forests and forests with large amounts of forest debris and decay can also be accomplished through prescribed burns that are carefully planned and closely watched by the local fire departments and CalFIRE.

Work to improve resilience to wildfire is currently being performed in Calaveras County through the efforts of multiple agencies. The Upper Mokelumne River Watershed Authority has been treating overgrown forests in the Stanislaus and El Dorado National Forests since 2006, under contract with the U.S. Forest Service, with activities focusing on areas along roadways. As of 2021, over 4,000 acres of overgrown forests in the Upper Mokelumne River Watershed have been treated through this effort, with plans to expand to efforts to include an additional 50,000 acres of permitted projects.⁵⁵ One such project was the Lily Gap Project, which included thinning of trees and brush on 157 acres near the town of West Point.⁵⁶ Additionally, prescribed burns are regularly performed within the Stanislaus National Forest and Calaveras Big Tree State Park, with 218 and 248 acres of prescribed burns planned for 2021 in each part, respectively.^{57,58}

⁵³ OPR. 2020. Fire Hazard Planning Technical Advisory.

⁵⁴ Calaveras County. 2007. Voluntary Oak Woodland Management Plan. Available: <https://ema.calaverasgov.us/Portals/EMA/Documents/Ag/Oak_Woodland_Management_Plan.pdf>. Accessed June 3, 2021.

⁵⁵ Upper Mokelumne River Watershed Authority (UMRWA). 2021. Forest Health Projects Reducing Risk of Catastrophic Wildfire. Available: <http://www.umrwa.org/uploads/UMRWA_BFF%20Press%20Release%20-%20final.pdf>. Accessed June 3, 2021.

⁵⁶ United States Department of the Interior, Bureau of Land Management (USDI BLM). ND. California Stewardship Contracting. Available: <<https://www.blm.gov/programs/natural-resources/forests-and-woodlands/stewardship-contracting/california>>. Accessed June 3, 2021.

⁵⁷ McCarty. 2021. Custodians of Stanislaus National Forest plan prescribed burns mid-May into June. The Union Democrat. Available: <https://www.uniondemocrat.com/news/article_fd01b854-b1c3-11eb-b138-cf0480ee59ee.html>. Accessed June 3, 2021.

⁵⁸ Pine Tree, The. 2021. California State Parks and CalFIRE Plan Prescribed Burns at Calaveras Big Trees State Park. Available: <<http://thepinetree.net/new/?p=119052>>. Accessed June 3, 2021.

5.1.1.2 Collaborative Forestry

Regional stakeholder collaborations and community-based organizations could improve capacity and options for County- and regional-scale forest management and restoration. Collaboration at the community and regional levels promote ecosystem restoration in a manner that improves the resilience of forests and capacity of such communities to respond to climate change. Collaboratives within the Sierra Nevada region are working to address pivotal barriers to forest restoration through development of tools and approaches aimed at maintaining healthy resilient forests and managing response and realignment in the face of climate change. And community organizations are also providing the local and social capital to enable forest restoration and health initiatives to move forward. Calaveras County can continue and expand upon the following collaborative forestry actions within the Sierra Nevada region:

- Collaborative groups engaged in environmental planning for forest restoration helping the U.S. Forest Service as extension of staff in order to carry out forest management activities,
- State and federal agencies partnered as part of the Tahoe-Central Sierra Initiative to conduct fuel treatments along highway corridors, restoring ecosystem resilience and protecting communities; and
- A Master Stewardship Agreement established to collaboratively pursue projects that promote forest resilience within the Stanislaus National Forest.⁵⁹

5.1.2 Improved Community and Land Use Fire Safety

5.1.2.1 Creation and Maintenance of Defensible Space

For people living in a wildfire-prone zone such as the Sierra Nevada region (including Calaveras County), CalFIRE and FEMA suggest creating at least a 100-foot defensible space around such homes. Defensible space is an area around a building or structure within which vegetation and other debris are managed, so that a wildfire burning under average weather conditions would be unlikely to ignite structures; this reduces the spread of fire and can save homes and other buildings from igniting. Specifically, as shown in Figure 16, defensible space is a multi-zone protection that homeowners can create around their homes to limit or slow the spread of fire, and it involves clearing dead brush and vegetation as well as keeping a distance between tree limbs and ground plants. In addition, maintaining a 100-foot defensible space buffer around buildings and structures in fire prone areas is required by California Public Resources Code, Division 4, Part 2, Section 4291.⁶⁰

⁵⁹ OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

⁶⁰ California Legislative Information (CLI). 2021. California Public Resources Code, Division 4, Part 2. Available: <https://leginfo.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=4.&title=&part=2.&chapter=1.&article=2.>>. Accessed May 27, 2021.

Figure 16 Defensible Space Zones



Source: CalFire. 2021. Wildfire Defensible Space Guidance.

5.1.2.2 Emergency Response and Evacuation Planning

The majority of County residents live in WUI areas proximate to the major transportation corridors traversing the County (California State Routes 49, 4, and 26). As such, these transportation corridors are key to emergency response (for firefighters needing to access and protect residential areas during wildfire events) and emergency evacuation operations (residents fleeing their homes during wildfire events). Thus, regular maintenance and improvement of these transportation corridors is one of the primary wildfire defense actions that the County can take.

Per California Assembly Bill 747, county and city general plan safety elements are required to address evacuation routes related to identified fire hazards. The Calaveras County Office of Emergency Services (OES) strives to build a disaster-prepared and resilient County through emergency management and coordination with response partners and the community. County OES is responsible for wildfire preparedness, mitigation, and response and recovery and aims to create partnerships, plans, and systems to build capabilities and coordinate the preparedness, response, and recovery efforts of all County and regional stakeholders.⁶¹ In conjunction with CalFire, Calaveras County OES and the Calaveras County Sheriff's Office has created an Emergency Evacuation System, which is divided into 60 grid pages and further divided into 307 2-mile by 2-mile evacuation zones.⁶²

⁶¹ Calaveras County Office of Emergency Services (CCOES). 2021. Available: <<https://nextdoor.com/agency-post/ca/calaveras-county/calaveras-county-office-of-emergency-services/evacuation-map-113652600/>>. Accessed June 9, 2021

⁶² Calaveras County Public Evacuation Application (CCPEA). 2021. Available: <<https://www.arcgis.com/apps/webappviewer/index.html?id=4792467f1b154c9da6ba04a2f8bc6ca3>>. Accessed June 9, 2021

5.1.3 Sustained Rural Forested Area Economic Vitality

Stewardship Authority contracts allow the U.S. Forest Service to blend needed restoration work with commercially viable timber extraction work (objectives traditionally achieved through separate contracts) to achieve land management goals for the national forests and the public lands that also meet local and rural community economic needs. Small-scale bioenergy facilities and co-located businesses (e.g., post, pole, etc.), are logical complements to such Stewardship Authority contracts, providing local employment by making use of low-value end-products (i.e., small-diameter wood) and by-products (i.e., slash). In addition, pairing biomass energy production with community-scale manufacturing can increase the volume of fuel load removed from densely stocked forest stands and also create more jobs for local County residents. Such an approach would reduce likely exposure to high-severity wildfire as well as rebuild community capacity, creating a positive feedback loop between the environment and the economy that helps empower the County to address future climate impacts.⁶³

⁶³ OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28., 2021.

6 Conclusion

Projected changes in climate change imperil the forest carbon balance. During the 21st century, increases in wildfire hazard, drought frequency, and forest vulnerability will represent threats to the survival and growth of trees as well as the safety and health of persons. Projected wildfire disturbances and land-use changes (i.e., development), indicate that, by the middle of the 21st century, the Sierra Nevada region will lose more than 25 percent of the carbon stored in living biomass.⁶⁴

Fire managers, analysts, and resource specialists value wildfire vulnerability assessment and its role in terms of informing decision makers and helping implement action under the framework processes. It is the hope that this report discussing Calaveras County natural and working lands inventories, potential for future wildfire-related GHG emissions, climate change vulnerability assessment specific to wildfire, Butte Fire-specific case studies, and State-agency-supported wildfire impact reduction best practices will assist Calaveras County with both GHG emissions reduction planning as well as climate change wildfire hazard and forest resilience planning.

⁶⁴ OPR, CNRA, and CEC. 2021. California's Fourth Climate Change Assessment Report – Sierra Nevada Region Report. Available: <https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-004_SierraNevada_ADA.pdf>. Accessed May 28, 2021.

7 Report Preparers

Erik Feldman, Sustainability Principal
Kelsey Bennett, Environmental/Sustainability Senior Program Manager
Andrew Beecher, Sustainability Planner
Camila Bobroff, Sustainability Analyst
Jon Montgomery, GIS Specialist
Adam Grace, Graphics Specialist

Appendix C. GHGRP Measure Quantifications & Substantial Evidence

DOCUMENTS ATTACHED BELOW

Strategy	Measure Number	Measure	Description	Annual Reductions from Electricity in 2030 (MTCO2e)	Annual Reductions from NG / Propane / Wood in 2030 (MTCO2e)	Total Annual Reductions in 2030 (MTCO2e)	Annual Reductions from Electricity in 2045 (MTCO2e)	Annual Reductions from NG / Propane / Wood in 2045 (MTCO2e)	Total Annual Reductions in 2045 (MTCO2e)
Increase Renewable Energy	RE-1	Increase Community Renewable Energy	Convert 14% of existing residential grid electricity and 18% of existing commercial grid electricity to renewable electricity by 2030. Increase the use of renewable energy in the community and support efforts to increase renewable and carbon-free energy generation, including wind, solar, hydro, and biomass, and to ensure customer access to this renewable energy. Encourage on-site renewable energy generation and storage systems for residents and businesses. Develop a robust renewable energy program that provides outreach, financing opportunities, and technical assistance to residents and businesses. Pursue community renewable energy projects. Work with large energy users to transition towards renewable and zero net energy projects. Pursue distributed energy resources (DERs), microgrids, energy storage opportunities, and grid optimization projects. Pursue funding to support the above efforts.	1,418		1,418	-		-
	RE-2	Promote On-Site Renewable Energy Generation (Government Operations)	Support efforts on available government-owned land or buildings to increase renewable and carbon-free energy generation, including wind, solar, hydro, biomass, and others. Promote on-site renewable energy generation and energy storage. Evaluate the renewable energy potential and assess barriers to increased renewable energy generation.			Not quantified - reductions accounted for under RE-1.			Not quantified - reductions accounted for under RE-1.
	RE-3	Incentives for Alternative Energy	Consistent with Implementation Measures COS-5F and PF-3F of the County's General Plan, provide incentives to facilitate alternative energy projects. Pursue funding to support the incentive program. Modify the County's development standards and zoning ordinance to provide incentives for providing alternative energy-producing facilities compatible with surrounding uses, such as solar arrays in parking lots that serve to provide shade and energy production. Cooperate with and support state and federal programs that assist landowners in energy conservation and production. Support programs that provide incentives for property owners to install alternative energy facilities such as solar arrays, small windmills, and other energy systems.			Not quantified - reductions accounted for under RE-1.			Not quantified - reductions accounted for under RE-1.
	RE-4	Codes and Standards for Alternative Energy	Consistent with Implementation Measures PF-3A, RP-5A, and RP-2A of the County's General Plan, amend codes to facilitate alternative energy projects. Amend the zoning code to encourage the incorporation of solar, wind, and other alternative energy infrastructure in project design to establish standards for locating and permitting solar farms, wind farms, and other alternative energy facilities to ensure land use compatibility, addressing the potential visual impacts of alternative energy infrastructure to the extent permitted by law. Amend the Calaveras County Code to recognize the development of geothermal resources and their related land uses and other proposals involving or affecting geothermal resources to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources. Amend the County Code to incorporate required findings and procedures for implementing state legislation and Department of Conservation requirements relative to solar-use easements and institutions affecting Williamson Act Contracts.			Not quantified - reductions accounted for under RE-1.			Not quantified - reductions accounted for under RE-1.
Perform Energy Education and Outreach	EO-1	Conduct Energy Conservation Outreach and Education	Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education. Conduct energy conservation and efficiency education and outreach to residents and businesses. Pursue funding and staff to support these initiatives. Support and promote programs for lower income and disadvantaged populations. Increase awareness of resources and financing opportunities for homes and businesses to (1) replace old appliances with energy-efficient models, (2) conduct retrofits to HVAC systems and building envelope, (3) upgrade to efficient lighting, (4) replace old inefficient wood- and propane-burning stoves, and (5) add smart controls and sensors. This includes property owners (primary, vacation, and second homeowners), property management groups, and landlords. Through education and outreach, increase participation in voluntary residential and commercial energy efficiency programs. Educate citizens about low-income home weatherization programs (DOE Weatherization Assistance Program, California's Low-Income Weatherization Program, utility-offered Energy Savings Assistance Program, local program). Educate about existing housing rehabilitation loan programs. Partner with the local utilities (PG&E and Calaveras Public Power Agency) to promote existing energy programs for residents and businesses.	1,431	2,716	4,147		911	911
	EB-1	Establish a Green Business Program	Achieve participation of 5% of businesses in 2030 and 2045 within a Green Business Program. Reduce existing and new commercial energy use (all sources) by 10% in 2030 and 2045. Establish a green business program that certifies businesses based on criteria such as energy efficiency, employee wellness, water and waste reduction, etc. Benefits to employee wellness could include active transportation, cleaner air, etc.	12	11	23	-	7	7
	EB-2	Improve Building Energy Efficiency of Government Operations	Pursue grants to improve the energy efficiency of existing county buildings and infrastructure whenever a project is undertaken to improve or maintain them. This includes replacement, maintenance, or improvement of both interior and exterior lighting systems (streetlights, parking lot lighting, traffic signals, other outdoor area lighting, and controls), HVAC and water heating systems (equipment, controls, sensors, etc.), building envelope components (insulation, roofing, glazing, etc.), and other energy improvements, lighting, controls, sensors, building envelope, and any other energy loads. In accordance with General Plan Implementation Measure COS-5M, new and renovated County facilities shall be designed to exceed the requirements of the currently adopted California State Energy and Green Building Codes at the time of project approval. Buildings shall be a minimum of 5% more efficient than required and shall eliminate the use of fossil fuels to the extent feasible.			Not quantified - reductions accounted for under EB-3 and EB-4.			Not quantified - reductions accounted for under EB-3 and EB-4.
	EB-3	Facilitate Energy Efficiency Retrofits	Reduce existing residential and commercial energy use (all sources) by 10% and 15%, respectively, in 2030 and 20% and 30% in 2045, respectively, through energy efficiency retrofits. The County will pursue funding to help facilitate (i.e., incentivize) energy-efficient upgrades for homes and businesses. Energy efficiency retrofits can include upgrades to lighting, heating, ventilation and air conditioning, appliances, water efficiency, and building envelope (insulation, windows). Consistent with COS-5G of the County's General Plan, cooperate with the Calaveras County Air Pollution Control District (CCAPCD) to implement emissions reduction programs such as the Carl Meyer Program, and to find methods of incentivizing the replacement or retrofit of small emissions sources throughout the County, such as the replacement of existing wood stoves.	1,399	2,469	3,868	-	1,727	1,727
Retrofit Existing Buildings	EB-4	Implement an Equipment Time-of-Replacement Ordinance	At equipment end of life, replace 40% of existing residential and commercial natural gas and propane water heaters with electric alternatives by 2030 and 80% by 2045 (based on 10-year life and 10% non-compliance). At equipment end of life, replace 23% of natural gas, propane, and wood space heating equipment with electric alternatives by 2030 and 30% by 2045 (based on 20-year life and 10% non-compliance). By 2025, adopt an ordinance that requires residential and commercial fossil fuel-powered space and water heating appliances to be replaced with electric alternatives at time of replacement, with exceptions where electrical service is not available. Review and update ordinance every three years (at time of building code updates) as improved equipment becomes available.	(967)	10,715	9,748	-	27,531	27,531
	NC-1	Incentivize Highly Efficient New Development	Achieve participation from 10% of new residential buildings in high energy efficient building measures starting from 2025 through 2045. Reduce new residential energy use (all sources) by 53%. Achieve participation from 10% of new commercial buildings in high energy efficient building measures between 2025 and 2045. Reduce new commercial energy use (all sources) by 30%. Provide incentives (e.g., easing permitting requirements) to new residential and nonresidential development projects for going beyond Title 24 compliance. Pursue funding to support the incentive program.	15	43	58	-	98	98
	NC-2	Incentivize ZNE New Construction	Achieve participation in developing zero net energy buildings by 10% of new residential and commercial buildings from 2025 through 2045. Incentivize new residential and nonresidential buildings to be built all-electric and highly energy efficient and install renewable energy generation and energy storage systems that can fully offset energy needs. Pursue funding to support the incentive program.	-	81	81	-	192	192
	NC-3	Reduce Criteria Air Pollutants and Emissions from New Development	Consistent with Implementation Measures COS-5F and COS-5H of the County's General Plan, reduce criteria air pollutants, including GHG emissions, from new developments. Evaluate proposed discretionary development projects subject to CEQA evaluation to determine whether they will emit criteria air pollutants, including greenhouse gases, exceeding CCAPCD's standards. Should proposed developments within the County be anticipated to result in significant impacts related to the emission of criteria air pollutants, the County shall require the applicable mitigation measures provided in the CCAPCD's Guidelines for Assessing and Mitigating Air Quality Impacts of Land Use Projects.			Not quantified - reductions accounted for under NC-1 and NC-2.			Not quantified - reductions accounted for under NC-1 and NC-2.
Efficient New Construction	NC-4	Increase Clean Wood-Burning Appliances	By 2025, adopt an ordinance in alignment with Implementation Measure COS-5N of the County's General Plan that requires all newly installed wood-burning appliances, including stoves and factory-built fireplaces, installed in residential projects be EPA certified to the most current EPA standards, with an exception for projects permitted under the Limited Density Owner Built Rural Dwelling permit program, listed historic structures or as may otherwise be stated in the most currently adopted Housing Element. EPA-rated woodstoves assumed to generate 30% less emissions than non-EPA-rated woodstoves (EPA Phase 2 certified stoves currently produce no more than 4.5 grams per hour).	-	28	28	-	62	62
	Total Annual Energy GHG Reductions (MTCO2e)			3,308	16,064	19,372	-	30,528	30,528

Emissions Reductions by Sector		
Sector	2030	2045
Residential	17,020	28,044
Nonresidential	2,352	2,483
Total	19,372	30,528

RE-1: Increase Community Renewable Energy**Convert 14% of existing residential grid electricity and 18% of existing commercial grid electricity to renewable electricity by 2030.**

	2018	2030	2045
Existing energy use in residential buildings			
Existing residential grid electricity usage (MWh) (after EB-4, EB-3, and EO-1)	177,613	154,999	152,285
Assumed percent increase in residential renewable energy [1]		14%	54%
Reduced grid electricity usage (MWh)		20,925	82,234
Electricity (PG&E) emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
GHG reductions from existing residential renewable energy (MTCO ₂ e)		1,082	0
Existing energy use in commercial buildings			
Existing commercial PG&E electricity usage (MWh) (after EB-4, EB-3, EO-1, and EB-1)	49,382	37,180	31,259
Existing commercial CPPA electricity usage (MWh) (after EB-4, EB-3, EO-1, and EB-1)	32,585	24,533	20,627
Assumed percent increase in commercial renewable energy [1]		18%	70%
Reduced PG&E grid electricity usage (MWh)		6,506	21,881
Reduced CPPA grid electricity usage (MWh)		4,293	14,439
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
CPPA electricity emissions factor (MTCO ₂ e/MWh)		0.00000	0.00000
GHG emissions reductions from PG&E electricity (MTCO ₂ e)		336	0
GHG emissions reductions from CPPA electricity (MTCO ₂ e)		0	0
GHG reductions from existing commercial renewable energy (MTCO ₂ e)		336	0
GHG Reductions from RE-1: Increase Community Renewable Energy (MTCO₂e)		1,418	-

Sources:

[1] County communications - assumes a residential solar install rate of 2.7% per year through 2045, and a commercial solar install rate of 3.5% per year through 2045, based on County permit data.

*This measure does not impact industrial electricity usage

EO-1: Conduct Energy Conservation Outreach and Education			
Reduce existing and new residential and commercial energy use (all sources) by 12% in 2030 and 2045 through robust energy conservation outreach and education.			
	2018	2030	2045
Existing energy use in residential buildings			
Existing residential electricity usage (MWh) (after EB-4 and EB-3)	177,613	176,135	173,052
Existing residential natural gas usage (therms) (after EB-4 and EB-3)	411,849	245,565	55,908
Existing residential propane usage (gallons) (after EB-4 and EB-3)	4,424,633	2,638,187	600,644
Existing residential kerosene usage (gallons) (after EB-3)	15,893	14,304	11,920
Existing residential wood usage (MMBtu) (after EB-4 and EB-3)	375,436	261,867	28,158
Target percent energy conservation in existing residential buildings [1 2 3]		12%	12%
Reduced electricity usage (MWh)		21,136	20,766
Reduced natural gas usage (therms)		29,468	6,709
Reduced propane usage (gallons)		316,582	72,077
Reduced kerosene usage (gallons)		1,716	1,430
Reduced wood usage (MMBtu)		31,424	3,379
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
Kerosene emissions factor (MTCO ₂ e/gal)		0.01022	0.01022
Wood emissions factor (MTCO ₂ e/MMBtu)		0.00996	0.00996
GHG emissions reductions from electricity (MTCO ₂ e)		1,093	0
GHG emissions reductions from natural gas (MTCO ₂ e)		157	36
GHG emissions reductions from propane (MTCO ₂ e)		1,788	407
GHG emissions reductions from kerosene (MTCO ₂ e)		18	15
GHG emissions reductions from wood (MTCO ₂ e)		313	34
GHG reductions from energy conservation in existing residential buildings (MTCO ₂ e)		3,368	491
Existing energy use in commercial buildings			
Existing commercial PG&E electricity usage (MWh) (after EB-4 and EB-3)	49,382	42,491	35,724
Existing commercial CPPA electricity usage (MWh) (after EB-4 and EB-3)	32,585	38,038	23,573
Existing commercial natural gas usage (therms) (after EB-4 and EB-3)	465,844	306,875	126,523
Existing commercial propane usage (gallons) (after EB-4 and EB-3)	113,010	74,446	30,694
Target percent energy conservation in existing commercial buildings [1 2 3]		12%	12%
Reduced PG&E electricity usage (MWh)		5,099	4,287
Reduced CPPA electricity usage (MWh)		3,365	2,829
Reduced natural gas usage (therms)		36,825	15,183
Reduced propane usage (gallons)		8,933	3,683
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
CPPA electricity emissions factor (MTCO ₂ e/MWh)		0.00000	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO ₂ e)		264	0
GHG emissions reductions from CPPA electricity (MTCO ₂ e)		0	0
GHG emissions reductions from natural gas (MTCO ₂ e)		196	81
GHG emissions reductions from propane (MTCO ₂ e)		50	21
GHG reductions from energy conservation in existing commercial buildings (MTCO ₂ e)		510	102
New energy use in residential buildings			
Forecast residential electricity usage (MWh) (after NC-1)	177,613	186,233	191,261
Forecast residential natural gas usage (therms) (after NC-1 and NC-2)	411,849	430,864	443,357
Forecast residential propane usage (gallons) (after NC-1 and NC-2)	4,424,633	4,628,922	4,741,653
Forecast residential kerosene usage (gallons) (after NC-1 and NC-2)	15,893	16,627	17,032
Forecast residential wood usage (MMBtu) (after NC-1, NC-4, and NC-2)	375,436	390,377	397,073
New residential electricity usage (MWh)		8,620	13,648
New residential natural gas usage (therms)		19,015	29,509
New residential propane usage (gallons)		204,289	317,020
New residential kerosene usage (gallons)		734	1,139
New residential wood usage (MMBtu)		14,941	21,637
Target percent energy conservation in new residential buildings [1 2 3]		12%	12%
Reduced electricity usage (MWh)		1,034	1,638
Reduced natural gas usage (therms)		2,282	3,541
Reduced propane usage (gallons)		24,515	38,042
Reduced kerosene usage (gallons)		88	137
Reduced wood usage (MMBtu)		1,793	2,596
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
Kerosene emissions factor (MTCO ₂ e/gal)		0.01022	0.01022
Wood emissions factor (MTCO ₂ e/MMBtu)		0.00996	0.00996
GHG emissions reductions from electricity (MTCO ₂ e)		53	0
GHG emissions reductions from natural gas (MTCO ₂ e)		12	19
GHG emissions reductions from propane (MTCO ₂ e)		138	215
GHG emissions reductions from kerosene (MTCO ₂ e)		1	1
GHG emissions reductions from wood (MTCO ₂ e)		18	26
GHG reductions from energy conservation in new residential buildings (MTCO ₂ e)		223	261
New energy use in commercial buildings			
Forecast commercial PG&E electricity usage (MWh) (after NC-1)	49,382	52,767	56,934
Forecast commercial CPPA electricity usage (MWh) (after NC-1)	32,585	34,819	37,569
Forecast commercial natural gas usage (therms) (after NC-1 and NC-2)	465,844	497,772	537,064
Forecast commercial propane usage (gallons) (after NC-1 and NC-2)	113,010	120,756	130,287
New commercial PG&E electricity usage (MWh)		3,385	7,553
New commercial CPPA electricity usage (MWh)		2,234	4,984
New commercial natural gas usage (therms)		31,928	71,220
New commercial propane usage (gallons)		7,745	17,277
Target percent energy conservation in new commercial buildings [1 2 3]		12%	12%
Reduced PG&E electricity usage (MWh)		406	906
Reduced CPPA electricity usage (MWh)		268	598
Reduced natural gas usage (therms)		3,831	8,546
Reduced propane usage (gallons)		929	2,073
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
CPPA electricity emissions factor (MTCO ₂ e/MWh)		0.00000	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO ₂ e)		21	0
GHG emissions reductions from CPPA electricity (MTCO ₂ e)		0	0
GHG emissions reductions from natural gas (MTCO ₂ e)		20	45
GHG emissions reductions from propane (MTCO ₂ e)		5	12
GHG reductions from energy conservation in new commercial buildings (MTCO ₂ e)		47	57
GHG Reductions from EO-1: Conduct Energy Conservation Outreach and Education (MTCO₂e)		4,147	911

Sources:

[1] https://www.aceee.org/files/proceedings/2000/data/papers/SS00_Panel8_Paper10.pdf

[2] <https://19january2017snapshot.epa.gov/sites/production/files/2015->

[3] <https://www.aceee.org/sites/default/files/publications/researchreports/e063.pdf>

*Suggested target percent energy conservation from education for County's consideration

EB-1: Establish a Green Business Program

Establish a green business program that certifies businesses based on criteria such as energy efficiency, employee wellness, water and waste reduction, etc.

2018**2030****2045****Existing energy use in commercial buildings**

Existing commercial PG&E electricity usage (MWh) (after EB-4 and EB-3)	49,382	42,491	35,724
Existing commercial CPPA electricity usage (MWh) (after EB-4 and EB-3)	32,585	28,038	23,573
Existing commercial natural gas usage (therms) (after EB-4 and EB-3)	465,844	306,875	126,523
Existing commercial propane usage (gallons) (after EB-4 and EB-3)	113,010	74,446	30,694

Target participation rate*

5%

5%

Target percent energy reduction for existing commercial buildings*

10%

10%

Reduced PG&E electricity usage (MWh)

212

179

Reduced CPPA electricity usage (MWh)

140

118

Reduced natural gas usage (therms)

1,534

633

Reduced propane usage (gallons)

372

153

PG&E electricity emissions factor (MTCO₂e/MWh)

0.05170

0.00000

CPPA electricity emissions factor (MTCO₂e/MWh)

0.00000

0.00000

Natural gas emissions factor (MTCO₂e/therm)

0.00532

0.00532

Propane emissions factor (MTCO₂e/gal)

0.00565

0.00565

GHG emissions reductions from PG&E electricity (MTCO₂e)

11

0

GHG emissions reductions from CPPA electricity (MTCO₂e)

0

0

GHG emissions reductions from natural gas (MTCO₂e)

8

3

GHG emissions reductions from propane (MTCO₂e)

2

1

GHG reductions from existing green businesses (MTCO₂e)

21

4

New energy use in commercial buildings**2018****2030****2045**

New commercial PG&E electricity usage (MWh) (after NC-1)	49,382	52,767	56,934
New commercial CPPA electricity usage (MWh) (after NC-1)	32,585	34,819	37,569
New commercial natural gas usage (therms) (after NC-1 and NC-2)	465,844	497,772	537,064
New commercial propane usage (gallons) (after NC-1 and NC-2)	113,010	120,756	130,287

New commercial PG&E electricity usage (MWh)

3,385

7,553

New commercial CPPA electricity usage (MWh)

2,234

4,984

New commercial natural gas usage (therms)

31,928

71,220

New commercial propane usage (gallons)

7,745

17,277

Target participation rate*

5%

5%

Target percent energy reduction for new commercial buildings*

10%

10%

Reduced PG&E electricity usage (MWh)

17

38

Reduced CPPA electricity usage (MWh)

11

25

Reduced natural gas usage (therms)

160

356

Reduced propane usage (gallons)

39

86

PG&E electricity emissions factor (MTCO₂e/MWh)

0.05170

0.00000

CPPA electricity emissions factor (MTCO₂e/MWh)

0.00000

0.00000

Natural gas emissions factor (MTCO₂e/therm)

0.00532

0.00532

Propane emissions factor (MTCO₂e/gal)

0.00565

0.00565

GHG emissions reductions from PG&E electricity (MTCO₂e)

0.9

0.0

GHG emissions reductions from CPPA electricity (MTCO₂e)

0.0

0.0

GHG emissions reductions from natural gas (MTCO₂e)

0.8

1.9

GHG emissions reductions from propane (MTCO₂e)

0.2

0.5

GHG reductions from new green businesses (MTCO₂e)

2

2

Sources:

**Suggested target participation rate and percent energy reduction from green businesses for City's consideration*

EB-3: Facilitate Energy Efficiency Retrofits

Reduce existing residential and commercial energy use (all sources) by 10% and 15%, respectively, in 2030 and 25% and 30% in 2045, respectively, through energy efficiency retrofits.

	2018	2030	2045
Existing energy use in residential buildings			
Existing residential electricity usage (MWh) (after EB-4)	177,613	195,705	230,735
Existing residential natural gas usage (therms) (after EB-4)	411,849	272,850	74,545
Existing residential propane usage (gallons) (after EB-4)	4,424,633	2,931,319	800,859
Existing residential kerosene usage (gallons)	15,893	15,893	15,893
Existing residential wood usage (MMBtu) (after EB-4)	375,436	290,963	37,544
Target percent energy reduction for existing residential buildings [1]*		10%	25%
Reduced electricity usage (MWh)		19,571	57,684
Reduced natural gas usage (therms)		27,285	18,636
Reduced propane usage (gallons)		293,132	200,215
Reduced kerosene usage (gallons)		1,589	3,973
Reduced wood usage (MMBtu)		29,096	9,386
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
Kerosene emissions factor (MTCO ₂ e/gal)		0.01022	0.01022
Wood emissions factor (MTCO ₂ e/MMBtu)		0.00996	0.00996
GHG emissions reductions from electricity (MTCO ₂ e)		1,012	0
GHG emissions reductions from natural gas (MTCO ₂ e)		145	99
GHG emissions reductions from propane (MTCO ₂ e)		1,655	1,131
GHG emissions reductions from kerosene (MTCO ₂ e)		16	41
GHG emissions reductions from wood (MTCO ₂ e)		290	93
GHG reductions from existing residential energy efficiency retrofits (MTCO ₂ e)		3,118	1,364
Existing energy use in commercial buildings			
Existing commercial PG&E electricity usage (MWh) (after EB-4)	49,382	49,989	51,035
Existing commercial CPPA electricity usage (MWh) (after EB-4)	32,585	32,986	33,676
Existing commercial natural gas usage (therms) (after EB-4)	465,844	361,029	180,748
Existing commercial propane usage (gallons) (after EB-4)	113,010	87,583	43,848
Target percent energy reduction for existing commercial buildings [2 3]*		15%	30%
Reduced PG&E electricity usage (MWh)		7,498	15,310
Reduced CPPA electricity usage (MWh)		4,948	10,103
Reduced natural gas usage (therms)		54,154	54,224
Reduced propane usage (gallons)		13,137	13,154
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0.00000
CPPA electricity emissions factor (MTCO ₂ e/MWh)		0.00000	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO ₂ e)		388	0
GHG emissions reductions from CPPA electricity (MTCO ₂ e)		0	0
GHG emissions reductions from natural gas (MTCO ₂ e)		288	288
GHG emissions reductions from propane (MTCO ₂ e)		74	74
GHG reductions from existing commercial energy efficiency retrofits (MTCO ₂ e)		750	363
GHG Reductions from EB-3: Facilitate Energy Efficiency Retrofits (MTCO₂e)		3,868	1,727

Sources:

[1] California Energy Commission. 2014. *Impact Evaluation of the California Comprehensive Residential Retrofit Programs*.

[2] https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.

[3] https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20814.pdf

*Suggested target percent energy reduction from retrofits for County's consideration

EB-4: Implement an Equipment Time-of-Replacement Ordinance

At equipment end of life, replace 45% of existing residential and commercial natural gas and propane water heaters with electric alternatives by 2030 and 90% by 2045 (based on 10-year life and 10% non-compliance).
At equipment end of life, replace 23% of natural gas, propane, and wood space heating equipment with electric alternatives by 2030 and 90% by 2045 (based on 20-year life and 10% non-compliance).

	2018	2030	2045
Existing non-electricity energy use in residential buildings			
Existing residential natural gas usage (therms)	411,849	411,849	411,849
Existing residential propane usage (gallons)	4,424,633	4,424,633	4,424,633
Existing residential wood usage (MMBtu)	375,436	375,436	375,436
Percentage of homes with replaced natural gas and propane water heating [1]*		45%	90%
Percentage of residential natural gas and propane usage used for water heating [2]		59%	59%
Reduced natural gas usage from water heating (therms)		109,346	218,692
Reduced propane usage from water heating (gallons)		1,174,740	2,349,480
Percentage of homes with replaced natural gas, propane, and wood space heating [3 4 5]*		23%	90%
Percentage of residential natural gas and propane usage used for space heating [2]		32%	32%
Percentage of residential wood usage used for space heating**		100%	100%
Reduced natural gas usage from space heating (therms)		29,653	118,612
Reduced propane usage from space heating (gallons)		318,574	1,274,294
Reduced wood usage from space heating (MMBtu)		84,473	337,892
Natural gas emissions factor (MTCO ₂ e/therm)		0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)		0.00565	0.00565
Wood emissions factor (MTCO ₂ e/MMBtu)		0.00996	0.00996
GHG emissions reductions from natural gas (MTCO ₂ e)		739	1,794
GHG emissions reductions from propane (MTCO ₂ e)		8,433	20,465
GHG emissions reductions from wood (MTCO ₂ e)		841	3,366
GHG reductions from residential time-of-replacement electrification retrofits (MTCO ₂ e)		10,014	25,625
Additional residential electricity use and emissions			
Assumed average efficiency of natural gas and propane heating [6 7]		80%	80%
Assumed average efficiency of wood heating [8]		71%	71%
Assumed average efficiency of electric heating [9]		300%	300%
MWh per therm natural gas conversion		0.0293	0.0293
MWh per gallon propane conversion		0.0280	0.0280
MWh per MMBtu wood conversion		0.2931	0.2931
Total natural gas use reduced from electrification (therms)		138,999	337,304
Total PG&E electricity needed to offset natural gas (MWh)		1,086	2,635
Total propane use reduced from electrification (gallons)		1,493,314	3,623,774
Total PG&E electricity needed to offset propane (MWh)		11,146	27,048
Total wood use reduced from electrification (MMBtu)		84,473	337,892
Total PG&E electricity needed to offset wood (MWh)		5,860	23,439
Total additional PG&E electricity needed (MWh)		18,092	53,122
PG&E electricity emissions factor (MTCO ₂ e/MWh)		0.05170	0
Additional GHG emissions from residential electricity use (MTCO ₂ e)		935	0
Existing non-electricity energy use in commercial buildings			
Existing commercial natural gas usage (therms)	465,844	465,844	465,844
Existing commercial propane usage (gallons)	113,010	113,010	113,010
Percentage of businesses with replaced natural gas and propane water heating [1]*		45%	90%
Percentage of commercial natural gas and propane usage used for water heating [10]		32%	32%
Reduced natural gas usage from water heating (therms)		67,082	134,163
Reduced propane usage from water heating (gallons)		16,273	32,547
Percentage of businesses with replaced natural gas and propane space heating [3 4 5]*		23%	90%

Percentage of commercial natural gas and propane usage used for space heating [10]	36%	36%
Reduced natural gas usage from space heating (therms)	37,733	150,934
Reduced propane usage from space heating (gallons)	9,154	36,615
Natural gas emissions factor (MTCO ₂ e/therm)	0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)	0.00565	0.00565
GHG emissions reductions from natural gas (MTCO ₂ e)	557	1,516
GHG emissions reductions from propane (MTCO ₂ e)	144	391
GHG reductions from commercial time-of-replacement electrification retrofits (MTCO₂e)	701	1,907
Additional commercial electricity use and emissions		
Assumed average efficiency of natural gas and propane heating [6 7]	80%	80%
Assumed average efficiency of electric heating [9]	300%	300%
MWh per therm natural gas conversion	0.0293	0.0293
MWh per gallon propane conversion	0.0280	0.0280
Total natural gas use reduced from electrification (therms)	104,815	285,097
Total PG&E electricity needed to offset natural gas (MWh)***	493	1,342
Total CPPA electricity needed to offset natural gas (MWh)***	326	886
Total propane use reduced from electrification (gallons)	25,427	69,162
Total PG&E electricity needed to offset propane (MWh)***	114	311
Total CPPA electricity needed to offset propane (MWh)***	75	205
Total additional PG&E electricity needed (MWh)	608	1,653
Total additional CPPA electricity needed (MWh)	401	1,091
PG&E electricity emissions factor (MTCO ₂ e/MWh)	0.05170	0
CPPA electricity emissions factor (MTCO ₂ e/MWh)	0.00000	0
Additional GHG emissions from commercial electricity use (MTCO₂e)	31	0
GHG Reductions from EB-4: Implement an Equipment Time-of-Replacement Ordinance (MTCO₂e)	9,748	27,531

Sources:

- [1] <https://www.lowes.com/n/how-to/when-to-replace-a-water-heater>
- [2] <https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-PO.pdf>
- [3] https://www.hud.gov/sites/documents/EUL_FOR_CNA_E_TOOL.PDF
- [4] https://docs.cpuc.ca.gov/published/Final_decision/11474-13.htm
- [5] CA Energy Efficiency Measure Data - Technical Resource Manual. <https://www.caetrm.com/measure/SWHC031/03/#life-cycle>
- [6] https://www.energy.gov/sites/prod/files/2014/05/f15/fupwg_may2014_new_gas_technologies.pdf
- [7] <https://www.aceee.org/sites/default/files/publications/researchreports/a1803.pdf>
- [8] https://19january2021snapshot.epa.gov/burnwise/frequent-questions-about-wood-burning-appliances_.html
- [9] U.S. DOE. 2023. Air Source Heat Pumps. Available: <https://www.energy.gov/energysaver/air-source-heat-pumps>
- [10] California Commercial End-Use Survey. 2006. <https://planning.lacity.org/eir/CrossroadsHwd/deir/files/references/C19.pdf>

*Accounts for an assumed non-compliance rate of 10%

**Assumes that residential wood is used solely for space heating

***Commercial electricity apportioned between utilities using forecasted electricity consumption

NC-1: Incentivize Highly Efficient New Development

Through incentives, achieve participation from 10% of new residential buildings starting from 2025 through 2045. Reduce new residential energy use (all sources) by 53%.
 Achieve participation from 10% of new commercial buildings between 2025 and 2045.
 Reduce new commercial energy use (all sources) by 30%.

	2018	2024	2030	2045
New energy use in residential buildings				
Forecast residential electricity usage (MWh)	177,613	182,041	186,468	191,777
Forecast residential natural gas usage (therms)	411,849	422,115	432,380	444,692
Forecast residential propane usage (gallons)	4,424,633	4,534,922	4,645,211	4,777,479
Forecast residential kerosene usage (gallons)	15,893	16,289	16,685	17,160
Forecast residential wood usage (MMBtu) (after NC-4)	375,436	384,794	391,345	399,201
New residential electricity usage starting in 2025 (MWh)			4,427	9,737
New residential natural gas usage starting in 2025 (therms)			10,266	22,577
New residential propane usage starting in 2025 (gallons)			110,289	242,557
New residential kerosene usage starting in 2025 (gallons)			396	871
New residential wood usage starting in 2025 (MMBtu)			6,551	14,407
Percent efficiency improvement for new residential construction [1]			53%	53%
Target participation rate*			10%	10%
Reduced electricity usage (MWh)			235	516
Reduced natural gas usage (therms)			544	1,197
Reduced propane usage (gallons)			5,845	12,856
Reduced kerosene usage (gallons)			21	46
Reduced wood usage (MMBtu)			347	764
PG&E electricity emissions factor (MTCO ₂ e/MWh)			0.05170	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)			0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)			0.00565	0.00565
Kerosene emissions factor (MTCO ₂ e/gal)			0.01022	0.01022
Wood emissions factor (MTCO ₂ e/MMBtu)			0.00996	0.00996
GHG emissions reductions from electricity (MTCO ₂ e)			12	0
GHG emissions reductions from natural gas (MTCO ₂ e)			3	6
GHG emissions reductions from propane (MTCO ₂ e)			33	73
GHG emissions reductions from kerosene (MTCO ₂ e)			0	0
GHG emissions reductions from wood (MTCO ₂ e)			3	8
GHG reductions from efficient new residential construction (MTCO ₂ e)			52	87
New energy use in commercial buildings				
Forecast commercial PG&E electricity usage (MWh)	49,382	51,100	52,819	57,115
Forecast commercial CPPA electricity usage (MWh)	32,585	33,719	34,853	37,688
Forecast commercial natural gas usage (therms)	465,844	482,056	498,267	538,796
Forecast commercial propane usage (gallons)	113,010	116,943	120,876	130,708
New commercial PG&E electricity usage starting in 2025 (MWh)			1,718	6,015
New commercial CPPA electricity usage starting in 2025 (MWh)			1,134	3,969
New commercial natural gas usage starting in 2025 (therms)			16,211	56,740
New commercial propane usage starting in 2025 (gallons)			3,933	13,765
Target percent emissions reductions from new commercial construction [2]			30%	30%
Target participation rate*			10%	10%
Reduced PG&E electricity usage (MWh)			52	180
Reduced CPPA electricity usage (MWh)			34	119
Reduced natural gas usage (therms)			486	1,702
Reduced propane usage (gallons)			118	413
PG&E electricity emissions factor (MTCO ₂ e/MWh)			0.05170	0.00000
CPPA electricity emissions factor (MTCO ₂ e/MWh)			0.00000	0.00000
Natural gas emissions factor (MTCO ₂ e/therm)			0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)			0.00565	0.00565
GHG emissions reductions from PG&E electricity (MTCO ₂ e)			3	0
GHG emissions reductions from CPPA electricity (MTCO ₂ e)			0	0
GHG emissions reductions from natural gas (MTCO ₂ e)			3	9

GHG emissions reductions from propane (MTCO2e)	1	2
GHG reductions from efficient new commercial construction (MTCO2e)	6	11
GHG Reductions from NC-1: Incentivize Highly Efficient New Development (MTCO2e)	58	98

Sources:

[1] https://energycodeace.com/download/35132/file_path/fieldList/Whats%20New.2019%20Residential%20Code.pdf

[2] https://energycodeace.com/download/35133/file_path/fieldList/Whats%20New.2019%20Nonresidential%20Code

**Suggested target participation rate for County's consideration*

NC-2: Incentivize ZNE New Construction

Achieve participation by 10% of new residential and commercial buildings from 2025 through 2045.	2018	2024	2030	2045
New non-electricity energy use in residential buildings				
Forecast residential natural gas usage (therms) (after NC-1)	411,849	422,115	431,836	443,495
Forecast residential propane usage (gallons) (after NC-1)	4,424,633	4,534,922	4,639,366	4,764,623
Forecast residential kerosene usage (gallons) (after NC-1)	15,893	16,289	16,664	17,114
Forecast residential wood usage (MMBtu) (after NC-1 and NC-4)	375,436	384,794	390,998	398,438
New residential natural gas usage starting in 2025 (therms)			9,722	21,381
New residential propane usage starting in 2025 (gallons)			104,444	229,701
New residential kerosene usage starting in 2025 (gallons)			375	825
New residential wood usage starting in 2025 (MMBtu)			6,204	13,643
Target percent new residential construction that is all-electric, ZNE*			10%	10%
Reduced natural gas usage (therms)			972	2,138
Reduced propane usage (gallons)			10,444	22,970
Reduced kerosene usage (gallons)			38	83
Reduced wood usage (MMBtu)			620	1,364
Natural gas emissions factor (MTCO ₂ e/therm)			0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)			0.00565	0.00565
Kerosene emissions factor (MTCO ₂ e/gal)			0.01022	0.01022
Wood emissions factor (MTCO ₂ e/MMBtu)			0.00996	0.00996
GHG emissions reductions from natural gas (MTCO ₂ e)			5	11
GHG emissions reductions from propane (MTCO ₂ e)			59	130
GHG emissions reductions from kerosene (MTCO ₂ e)			0	1
GHG emissions reductions from wood (MTCO ₂ e)			6	14
GHG reductions from all-electric, ZNE new residential construction (MTCO ₂ e)			71	156
New non-electricity energy use in commercial buildings				
Forecast commercial natural gas usage (therms) (after NC-1)	465,844	482,056	497,781	537,093
Forecast commercial propane usage (gallons) (after NC-1)	113,010	116,943	120,758	130,295
New commercial natural gas usage starting in 2025 (therms)			15,725	55,038
New commercial propane usage starting in 2025 (gallons)			3,815	13,352
Target percent new commercial construction that is all-electric, ZNE*			10%	10%
Reduced natural gas usage (therms)			1,573	5,504
Reduced propane usage (gallons)			381	1,335
Natural gas emissions factor (MTCO ₂ e/therm)			0.00532	0.00532
Propane emissions factor (MTCO ₂ e/gal)			0.00565	0.00565
GHG emissions reductions from natural gas (MTCO ₂ e)			8	29
GHG emissions reductions from propane (MTCO ₂ e)			2	8
GHG reductions from new all-electric, ZNE new commercial construction (MTCO ₂ e)			11	37
GHG Reductions from NC-2: Incentivize ZNE New Construction (MTCO₂e)			81	192

Sources:

*Suggested target participation rate for County's consideration

NC-4: Increase Clean Wood-Burning Appliances**Require all wood burning appliances, including fireplaces, in new residential construction to be EPA-rated appliances, except as may be provided in the Housing Element or for off-grid construction.**

	2018	2024	2030	2045
New wood use in residential buildings				
Forecast residential wood usage (MMBtu)	375,436	384,794	394,152	405,375
New residential wood usage starting in 2025 (MMBtu)			9,358	20,581
Percent reduction in emissions for EPA-rated compared to non-EPA-rated stove [1]			30%	30%
Assumed percent new residential wood heaters exempted			10%	10%
Reduced wood usage (MMBtu)			2,807	6,174
Wood emissions factor (MTCO ₂ e/MMBtu)			0.00996	0.00996
GHG reductions from new residential construction (MTCO ₂ e)			28	62
GHG Reductions from NC-4: Increase Clean Wood-Burning Appliances (MTCO₂e)			28	62

Sources:

[1] <https://www3.epa.gov/ttnchie1/op42/ch01/final/c01s10.pdf>

Measure TR-1: Increase EV/ZEV Adoption

Inputs and Assumptions		Source				
Total registered vehicles in Calaveras County (2018)	60,587	https://www.dmv.ca.gov/portal/file/california-motor-vehicle-fuel-types-by-county-01012019-pdf/				
Registered ZEVs in Calaveras County (2018)	1,267	https://www.dmv.ca.gov/portal/file/california-motor-vehicle-fuel-types-by-county-01012019-pdf/				
Calaveras County 2018 population	44,692	DOF 2018 population estimate for 2018, consistent with estimates used in forecast				
Cars per capita	1.36					
EV cars per public EV charger	20	In line with leading EV cities in California (Cupertino, San Francisco, LA)				
EV chargers in Calaveras County	4	https://www.libertyplugs.com/public-ev-charging-stations/california/calaveras-county				
Inputs	2025	2030	2035	2040	2045	
Percentage of passenger vehicles that are electric (%)	15%	30%	50%	60%	65%	
Percentage of commercial vehicles that are electric (%)	10%	35%	45%	55%	70%	
Baseline EV adoption from EMFAC	2025	2030	2035	2040	2045	
Passenger EV (%)	3.56%	5.99%	7.77%	8.78%	9.31%	** From EMFAC2021 Analysis, used in adjusted forecast
Commercial EV (%)	0.34%	3.96%	12.40%	21.77%	29.12%	** From EMFAC2021 Analysis

Calculations						
Passenger EV						
Year	2025	2030	2035	2040	2045	
Passenger VMT after mode shift to active transit (miles)	340,321,520	347,213,825	320,837,510	316,882,792	317,487,246	** Assume reductions from public transit and active transportation programs happen first (Measures TR-3 and TR-4)
Passenger EF (MT CO ₂ e/VMT)	0.00034	0.00030	0.00028	0.00027	0.00026	** From EMFAC2021 Analysis
EV adoption beyond baseline	11.4%	24.0%	42.2%	51.2%	55.7%	
Total Reductions (MT CO₂e)	13,270	25,403	37,879	43,699	45,546	
Commercial EV (Commercial + Bus)						
Year	2025	2030	2035	2040	2045	
Commercial VMT Share (%)	13%	11%	10%	9%	9%	** From EMFAC2021 Analysis, commercial + bus VMT share
Commercial VMT (miles)	52,911,146	46,019,974	42,182,669	40,530,057	40,476,776	*Commercial + bus VMT
Commercial EF (MT CO ₂ e/VMT)	0.00100	0.00099	0.00092	0.00086	0.00079	** From EMFAC2021 Analysis, commercial + bus weighted EF
EV adoption beyond baseline	9.7%	31.0%	32.6%	33.2%	40.9%	
Total Reductions (MT CO₂e)	5,123	14,097	12,595	11,518	13,058	
EV Charger Count Calculations						
Year	2025	2030	2035	2040	2045	
Population	45,934	46,142	46,349	46,557	46,741	**DOF 2018 population estimates
Total estimated registered vehicles	62,271	62,553	62,833	63,115	63,365	
Additional registered EVs	7,125	15,019	26,536	32,325	35,287	
Additional public EV chargers needed to support EV goal	356	751	1,327	1,616	1,764	

Measure TR-2: Decarbonize the County Municipal Fleet and Employee Commute

Inputs and Assumptions		2025	2030	2035	2040	2045	
Percentage of municipal fleet vehicles that are electric (%)		20%	40%	60%	80%	100%	
Baseline EV adoption	2025	2030	2035	2040	2045		
Municipal Fleet EV (%)		0%	0%	0%	0%	0%	**Based on County's 2018 GHG Inventory Report, municipal fleet had zero EVs

Calculations						
Year	2025	2030	2035	2040	2045	
Municipal VMT (miles)	1,480,583	1,480,583	1,480,583	1,480,583	1,480,583	**Total municipal fleet VMT from County's 2018 GHG Inventory Report and assumed constant through 2045
Municipal fleet emissions (MT CO ₂ e)	1,974	1,974	1,974	1,974	1,974	**Emissions from County's 2018 GHG Inventory Report and assumed constant through 2045
Municipal EF (MT CO ₂ e/VMT)	0.00133	0.00133	0.00133	0.00133	0.00133	**Weighted EF between gasoline and diesel vehicles
EV adoption beyond baseline (%)	20.0%	40.0%	60.0%	80.0%	100.0%	
Total Reductions (MT CO₂e)	395	790	1,184	1,579	1,974	**To be applied to municipal inventory only to avoid double counting (the municipal VMT is already accounted for in the community inventory and Measure TR-1)

Inputs and Assumptions		2025	2030	2035	2040	2045	
Percentage of County commuter vehicles that are electric (%)		20%	40%	60%	80%	100%	
Baseline EV adoption	2025	2030	2035	2040	2045		
Employee Commute EV (%)		0.68%	0.68%	0.68%	0.68%	0.68%	**Calculated from County's 2018 GHG Inventory Report as EVMT divided by total employee commute VMT; assumed constant thru

Calculations						
Year	2025	2030	2035	2040	2045	
Employee Commute VMT (miles)	4,468,013	4,468,013	4,468,013	4,468,013	4,468,013	**Total employee commute VMT from County's 2018 GHG Inventory Report and assumed constant through 2045

Employee commute emissions (MT CO2e)	1,770	1,770	1,770	1,770	1,770	**Emissions from County's 2018 GHG Inventory Report and assumed constant through 2045
Employee Commute EF (MT CO2e/VMT)	0.00040	0.00040	0.00040	0.00040	0.00040	**Weighted EF between gasoline, diesel, and electric vehicles
EV adoption beyond baseline (%)	19.3%	39.3%	59.3%	79.3%	100.0%	
Total Reductions (MT CO2e)	342	696	1,050	1,404	1,770	**To be applied to municipal inventory only to avoid double counting (the municipal VMT is already accounted for in the community inventory and Measure TR-1)

Measure TR-3: Increase Public Transit Mode Share

Inputs and Assumptions		Source				
Assumptions						
Existing public transit mode share (2018)	0.3%	https://planning.calaverasgov.us/Portals/Planning/Documents/Draft%20General%20Plan%20Update/CEQA/4_13_Transportation%20and%20Circulation.pdf				
Average transit trip length (miles)	14.5	Used average of commuter bus length (25.1 miles) and regular bus length (3.8 miles): https://www.apta.com/wp-content/uploads/Resources/resources/statistics/Documents/FactBook/2018-APTA-Fact-Book.pdf				
Pitkin County, CO 2021 Public Transit Mode Share (%)	19%					
Inputs		2025	2030	2035	2040	2045
Public Transit Mode Share Goal	4%	6%	12%	14%	15%	
Passenger trips per mile	0.1382	0.1177	0.1152	0.1148	0.1156	** From EMFAC2021 Analysis
Calculations						
Year	2025	2030	2035	2040	2045	
Public transit mode share increase from baseline (%)	4%	6%	12%	14%	15%	
Total VMT (miles)	420,394,306	431,180,818	441,967,330	452,753,842	463,540,354	
Passenger VMT Share (%)	87%	89%	90%	91%	91%	** From EMFAC2021 Analysis
Passenger VMT (miles)	367,483,160	385,160,844	399,784,661	412,223,785	423,063,578	**Total Passenger VMT, including VMT from EVs
Passenger trips (trips)	50,802,656	45,326,323	46,038,445	47,329,209	48,921,036	
New public transit trips substituted for vehicle trips (trips)	1,879,698.26	2,583,600.38	5,386,498.09	6,484,101.65	7,191,392.34	
Passenger VMT reduced with public transit trips (miles)	27,161,640	37,333,026	77,834,897	93,695,269	103,915,619	
Passenger EF (MT CO2e/VMT)	0.000341	0.000305	0.000280	0.000269	0.000258	** From EMFAC2021 Analysis
Total Reductions (MT CO2e)	9,256	11,376	21,760	25,229	26,769	
% reduction in passenger VMT from Measure	6.5%	8.7%	17.6%	20.7%	22.4%	

Measure TR-4: Increase Active Transportation Mode Share

Inputs and Assumptions		Source				
Assumptions						
Existing active transportation mode share (2018)	3.0%	https://planning.calaverasgov.us/Portals/Planning/Documents/Draft%20General%20Plan%20Update/CEQA/4_13_Transportation%20and%20Circulation.pdf				
Average bike trip length (miles)	1.5	Caltrans California Household Travel Survey (2013) CARB Bike Path Reductions Technical Documentation (2019)				
Yolo County 2019 Active Transportation Mode Share (%)	9.9%	https://data.census.gov/cedsci/table?q=Commute&a=050000US06113&tid=ACST01V2019.S0801				
Inputs		2025	2030	2035	2040	2045
Active Mode Share Goal	3%	4%	5%	6%	6%	
Passenger trips per mile	0.1382	0.1177	0.1152	0.1148	0.1156	** From EMFAC2021 Analysis
Calculations						
Year	2025	2030	2035	2040	2045	
Bike mode share increase from baseline (%)	0%	1%	2%	3%	3%	
Passenger VMT (miles)	340,321,520	347,827,818	321,949,763	318,528,516	319,147,969	**Total Passenger VMT, including VMT from EVs after VMT reduction from public transit
Passenger trips (trips)	47,047,699	40,932,914	37,075,126	36,571,647	36,904,734	
New bike trips substituted for vehicle trips (trips)	-	409,329.14	741,502.51	1,097,149.41	1,107,142.02	
Passenger VMT reduced with bike trips (miles)	-	613,994	1,112,254	1,645,724	1,660,713	
Passenger EF (MT CO2e/VMT)	0.000341	0.000305	0.000280	0.000269	0.000258	** From EMFAC2021 Analysis
Total Reductions (MT CO2e)	-	187	311	443	428	
% reduction in passenger VMT from Measure	0.0%	0.2%	0.3%	0.5%	0.5%	

Measure TR-5: Decarbonize Off-road Equipment and Vehicles

Inputs and Assumptions		Source				
Inputs		2025	2030	2035	2040	2045
Percent decarbonized (%)	15%	30%	40%	50%	60%	
Calculations						
Year	2025	2030	2035	2040	2045	
BAU/ABAU Off-road emissions	-	25,957	-	-	28,936	**OFFROAD2021
Total Reductions (MT CO2e)	-	7,787	-	-	17,362	

Measure TR-6: Create a Tourism Economy

Not quantifiable (supportive of TR-1 to TR-5)

Measure TR-7: Establish Calaveras County as a Pilot Program

Not quantifiable (supportive of TR-1 to TR-5)

Measure TR-8: Develop a Biofuel Industry

Not quantifiable (supportive of TR-1 to TR-5)

Measure TR-9: Pursue State Funding

Not quantifiable (supportive of TR-1 to TR-5)

Measure TR-10: Pursue Federal Funding

Not quantifiable (supportive of TR-1 to TR-5)

TR Measures Summary

Year	2025	2030	2035	2040	2045
ABAU Transporation Emissions (MT CO2e)		188,994			
Total Reductions (MT CO2e)	27,649	58,850	72,545	80,889	103,162
% Reductions (of sector)		31.14%			

**Includes Air Travel emissions which are not being reduced*
**2025, 2035, and 2040 are excluding reductions from off-road emissions because forecast did not provide for these years*

Growth Rates

Inventory Year:

2018

Unit	2018	2030	2035	2045
Population (County)	44692	46920	47642	48256
Housing	19,264	20,224	20,535	20,800
Employment (County)	57414	61695	63479	67047

Inventory Source: County of Calaveras. Community-Master-Data-Workbook. 2018.

Housing based on average 2.32 people/household, per Housing Element (2019)

Data Sources:

Calaveras County General Plan. 2019.

Residential Energy California Department of Finance; SB 1000

Non-Residential Energy California Employment Development Department; SB 1000

On-Road Transportation Calaveras Council of Governments

Off-Road Transportation U.S. Census Bureau, American Community Survey

Solid Waste California Department of Finance

Water/Wastewater California Department of Finance

Unit	% Change		
	2018-2030	2018-2035	2018-2045
Population	4.99%	6.60%	7.97%
Housing	4.99%	6.60%	7.97%
Employment	6.96%	9.86%	15.66%

Number of Periods		
2018-2030	2018-2035	2018-2045
12	17	27

Wastewater Inventory Inputs

2018 Inventory Results

Inventory Record	CO2e MT	Percent of Total
Process N2O emissions from wastewater treatment	26.57	1%
Process N2O emissions from effluent discharge	50.53	2%
Process N2O emissions from septic systems	92.58	4%
Process N2O emission from lagoons	1934	92%
Total Emissions	2104	100%

Inventory Source: County of Calaveras. Community-Master-Data-Workbook. 2018.

Input/Assumptions Summary

Applicable Growth Rate:	Population
Assumes effluent load increases proportional to population	

Wastewater Treatment

Industrial/Commercial multiplier	1.25 (Protocol WW.12)	7 g N2O/person (Protocol WW.7)
EF:		
Effluent Discharge		
EF:	0.005 kg N2O/kg N in effluent (Protocol WW.12)	
Molecular weight ratio	1.57 (Protocol WW.12)	
Effluent	0.001* Molecular weight ratio) * GWP	
Emissions	(Protocol WW.12)	

Electricity use for Potable Water and Waste Water

2018 Inventory Results

	Input	Data	Unit
Potable Water Energy Use	Electricity use for potable water	8,394,457	kWh
	Potable water provided to community	2,803,560,570	Gallons
	Energy intensity for potable water	2,994	kWh/Million Gallons
	Population Served	44,692	People
	Energy Intensity per person	188	kWh/Person
Wastewater Energy Use	Electricity use for wastewater treatment	5,548,396	kWh
	Water Treated	380,947,000	Gallons
	Energy intensity for potable water	14,565	kWh/Million Gallons
	Population Served	44,692	People
	Energy Intensity per person	124	kWh/Person

Inventory Source: County of Calaveras. Community-Master-Data-Workbook. 2018.

Forecasted Energy Use From Potable Water and Wastewater

Year	County Population	% Change from 2018	Potable Water Energy Use (kWh)	Potable Water Use (Gallons)	Potable Water % Total Water Energy Use	Wastewater Energy Use (kWh)	Wastewater % Total Water Energy Use
2018	44,692		8,394,457	2,803,560,570	60%	5,548,396	40%
2030	46,920	4.99%	8,812,940	2,943,324,576	60%	5,824,996	40%
2035	47,642	6.60%	8,948,553	3,137,605,599	60%	5,914,631	40%
2045	48,256	7.97%	9,063,880	3,387,816,517	60%	5,990,857	40%

*Assumes energy use increases proportional to population; Consistent with wastewater emissions assumptions

Solid Waste

2018 Inventory Results

Inventory Record	CO2e MT	Activity Data	Units	Distance to Facility (miles)
Altamont Landfill	2.21	7.80	Tons of waste	151.40
Fink Road Landfill	0.54	1.90	Tons of waste	173.20
Foothill Sanitary Landfill	124.62	439.10	Tons of waste	48.00
Forward Landfill	3,462	12,197	Tons of waste	100.00
Highway 59 Landfill	0.26	0.90	Tons of waste	143.00
L and D Landfill	243	855.7	Tons of waste	111.40
McKittrick Waste Treatment Site	1.56	5.50	Tons of waste	524.00
North County Landfill & Recycling Center	56.36	198.60	Tons of waste	66.80
Portrero Hills Landfill	23.13	81.50	Tons of waste	160.20
Recology Hay Road	52.42	184.70	Tons of waste	158.00
Rock Creek Landfill	7,627	26,874.80	Tons of waste	46.6
Sacramento County Landfill, Kiefer	1.45	5.10	Tons of waste	89.20

Inventory Source: Calaveras County Integrated Waste Management. Community-Master-Data-Workbook. 2018.

BAU Emissions				
2018 Emissions	Disposal	Transport	Disposal % Total	Transport % Total
Altamont Landfill	2.21	0.17	0.02%	0.00%
Fink Road Landfill	0.54	0.046	0.005%	0.0004%
Foothill Sanitary Landfill	124.62	2.95	1.04%	0.02%
Forward Landfill	3,462.00	170.76	28.93%	1.43%
Highway 59 Landfill	0.26	0.018	0.00%	0%
L and D Landfill	243.00	13.35	2.03%	0.11%
McKittrick Waste Treatment Site	1.56	0.40	0.01%	0.00%
North County Landfill & Recycling Center	56.36	1.86	0.47%	0.02%
Portrero Hills Landfill	23.13	1.83	0.19%	0.02%
Recology Hay Road	52.42	4.09	0.44%	0.03%
Rock Creek Landfill	7,627.00	175.33	63.74%	1.47%
Sacramento County Landfill, Kiefer	1.45	0.064	0.01%	0.00%
Total Per Type	11,594.55	370.87	96.9%	3.1%
Total	11,965.42			

Landfill Gas Flaring

2018 Inventory Results

Inventory Record	CO2e MT	Activity Data	Units
Rock Creek Landfill	89.05	42,978,951	Cubic feet per year
Total	89.05		

Solid Waste Emissions (MT CO2e)

Sector	2030		2035		2045	
	Disposal	Transport	Disposal	Transport	Disposal	Transport
Altamont Landfill	2.32	0.18	2.36	0.18	2.39	0.18
Fink Road Landfill	0.57	0.05	0.58	0.05	0.58	0.05
Foothill Sanitary Landfill	130.83	3.10	132.84	3.14	134.55	3.19
Forward Landfill	3,634.45	179.27	3,690.37	182.02	3,737.93	184.37
Highway 59 Landfill	0.27	0.02	0.28	0.02	0.28	0.02
L and D Landfill	255.10	14.01	259.03	14.23	262.37	14.41
McKittrick Waste Treatment Site	1.64	0.42	1.66	0.43	1.68	0.43
North County Landfill & Recycling Center	59.17	1.95	60.08	1.98	60.85	2.01
Portrero Hills Landfill	24.28	1.92	24.66	1.95	24.97	1.98
Recology Hay Road	55.03	4.29	55.88	4.36	56.60	4.42
Rock Creek Landfill	8,006.91	184.06	8,130.12	186.90	8,234.90	189.30
Sacramento County Landfill, Kiefer	1.52	0.07	1.55	0.07	1.57	0.07
Total Per Type	12,172.09	389.34	12,359.39	395.33	12,518.68	400.43
Gas Flaring		93.49		94.93		96.15
Total (MT CO2e)	12,654.92		12,849.65		13,015.26	

Forecasted Solid Waste Disposal

Year	County Population	% Change from 2018	Altamont Landfill	Fink Road Landfill	Foothill Sanitary Landfill	Forward Landfill Waste (tons)	Highway 59 Landfill	L and D Landfill	McKittrick Waste Treatment Site	North County Landfill & Recycling Center	Portrero Hills Landfill	Recology Hay Road	Rock Creek Landfill (tons)	Sacramento County Landfill, Kiefer	Total Solid Waste (tons)
2018	44,692		7.8	1.9	439.1	12,197	0.9	855.7	5.5	198.6	81.5	184.7	26,875	5.1	40,853
2030	46,920	4.99%	8	2	461	12,805	1	898	6	209	86	194	28,215	5	42,413
2035	47,642	6.60%	8	2	468	13,002	1	912	6	212	87	197	28,649	5	43,065
2045	48,256	7.97%	8	2	474	13,170	1	924	6	214	88	199	29,018	6	43,620

*Assumes disposal increases proportional to population; Consistent with solid waste emissions assumptions

Forecasted Landfill Gas Flaring

2018 Inventory Results

Year	Baseline Emissions	% Change from 2018	Future Emissions
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Input/Assumptions Summary

Applicable Growth Rate:	Population				
Methane Recovery Factor:	62% Source: Calaveras County Integrated Waste Management. Community-Master-Data-Workbook. 2018.				
Oxidation Rate	10% Source: SBC, Personal Communication, January 6, 2022				
US Protocol Equation SW4.1	CH4 emissions = GWP*(1-Recovery Factor)*(1-Oxidation Rate)*Total Mass*Sum(Mass fraction of waste type*EF for waste type)				
Methane Emissions:					
Transportation EF	0.00014 MT CO2/Wet short ton/mile				
Assume no change in waste composition in future years					
Waste Composition	EF (MT CH4/	Weighted EF	LFG Capture Rate	Weighted % Capture Rate	Source
Percent Newspaper	2.59	0.042862	0.0011	65%	1.6835
Percent Office Paper	27.8	0.20286	0.0564	64%	17.792
Percent Corrugated Cardboard	4.7	0.12	0.0056	61%	2.867
Percent Coated Paper	5.47	0.048562	0.0027	62%	3.3914
Percent Food Waste	14.6	0.0776	0.0113	60%	8.76
Percent Grass	1.35	0.038095	0.0005	50%	0.675
Percent Leaves	1.35	0.012861	0.0002	58%	0.783
Percent Branches	0.04	0.061913	0.0000	59%	0.0236
Percent Lumber	14.12	0.06049	0.0085	65%	9.178
Remainder (Mixed MSW)	34.6	0	0.0000	62%	21.452
Average		0.0864		67%	US Protocol Equation SW4.1

2018	89		
2030		4.99%	93.48934932
2035		6.60%	94.92795355
2045		7.97%	96.1513649

SW1. Organic Waste Diversion

Reduction Measure SW1:	The County will coordinate with government-funded and privately sponsored recycling and composting programs to divert 75 percent of food and green yard waste from landfills and reduce short-lived climate pollutants in accordance with Senate Bill (SB) 1383.
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Default Assumptions

Methane Recovery Factor:	62%
Oxidation Rate	10%

Data Inputs

US Protocol Equation SW4.1 Methane Emissions:	$CH_4 \text{ emissions} = GWP * (1 - \text{Recovery Factor}) * (1 - \text{Oxidation Rate}) * \text{Total Mass} * \text{Sum}(\text{Mass})$
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Applicable Measure	Data Needed	Input				Source of Data	Capture Rate
		2030	2035	2045	EF		
	BAU Tons of Waste (Total tons)	42,413	43,065	43,620			
	BAU Emissions (Total disposal)	12,172	12,359	12,519			
	BAU Methane Recovery Rate	0.62	0.62	0.62			
	BAU Oxidation Rate	0.10	0.10	0.10		Conservatively Revised to Clear Path Efs	
BAU Waste Composition	% of Waste Attributable to Food waste	15%	15%	15%	0.06	(MT CH4/wet short ton)	0.60
	% of Waste Attributable to Grass	1%	1%	1%	0.02	(MT CH4/wet short ton)	0.50
	% of Waste Attributable to Leaves	1%	1%	1%	0.03	(MT CH4/wet short ton)	0.58
	% of Waste Attributable to Branches	0%	0%	0%	0.06	(MT CH4/wet short ton)	0.59
	Food Waste Emissions	3,745	3,803	3,852			
	Grass Emissions	144	147	148			
	Leaves Emissions	9	9	9			
	Branches Emissions	1	1	1			
	Total Organics CO2 Emissions	3,899	3,958	4,009			
	% Diverted	75%	75%	75%			

Measure Impact

	2030	2035	2045
Solid Waste Reduction (Tons)	5,515.77	5,600.64	5,672.82
% Waste Reduction	13%	13%	13%
Total Emissions Reduction (MT CO2e)	(2,923.92)	(2,968.83)	(3,007.03)

SW2. Divert from Forward to Rock Creek Landfill

Reduction Measure SW2:	The County will divert an additional 5 percent of total County solid waste disposal from Forward Landfill to Rock Creek Landfill.
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Default Assumptions

Distance to Forward Landfill (Miles)	100
Distance to Rock Creek Landfill (Miles)	47

Data Inputs

Applicable Measure	Data Needed	Input			EF	Source of Data
		2030	2035	2045		
	Forward Landfill Disposal (tons)	9,691	9,840	9,967		Assumes reduction from SW1
	Rock Creek Landfill Disposal (tons)	21,353	21,682	21,961		Assumes reduction from SW2
	Transport EF	0.00014	0.00014	0.00014	MT CO2e/ton/mile	
	Reduction in Miles for Rock Creek	53.40	53.40	53.40		
Waste Diversion	% Diverted	5%	5%	5%		
	Waste Diverted	485	492	498		
	Miles for Diverted Waste	51,750	52,546	53,224		Assume 2-way trip

Measure Impact

	2030	2035	2045
Diverted Miles	51,750	52,546	53,224
Total Emissions Reduction (MT CO2e)	(7.25)	(7.36)	(7.45)

Reduction Measure SW3:	The County will increase methane capture by an average of 1 percent for all waste types at Rock Creek Landfill by 2035.
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Methane Recovery Factor:	62%
Oxidation Rate	10%
US Protocol Equation SW4.1 Methane Emissions:	$CH_4 \text{ emissions} = GWP * (1 - \text{Recovery Factor}) * (1 - \text{Oxidation Rate}) * \text{Total Mass} * \sum (\text{Mass fraction of waste type} * EF \text{ for waste type})$

Data Needed	Input				Source of Data
	2030	2035	2045	EF	
BAU Rock Creek Tons of Waste (Total tons)	21,838	22,174	22,460		Adjusted by SW2
BAU Emissions (Total disposal)	8.010	8.133	8.238		Adjusted by SW2
BAU Methane Recovery Rate	0.62	0.62	0.62		Adjusted by SW1
BAU Oxidation Rate	0.10	0.10	0.10		
BAU Adjusted SW4.1 Emissions	1,937	1,967	1,992		
Adjusted Methane Recovery Rate	0.63	0.63	0.63		
SW4.1 Emissions with Adjusted Recovery	1,886	1,915	1,939		

	2030	2035	2045
Total Emissions Reduction (MT CO2e)	51.01	51.79	52.46

Waste Composition	%	With SW1	EF (MT CH4)	Weighted EF	LFG Captu	Weighted % Capture Rate
Percent Newspaper	1.2	1.2	0.042862	0.0005	65%	0.78
Percent Office Paper	1.8	1.8	0.1556	0.0028	64%	1.152
Percent Corrugated Cardboard	5.2	5.2	0.1048	0.0054	61%	3.172
Percent Coated Paper	8.4	8.4	0.0476	0.0040	62%	5.208
Percent Food Waste	18.2	13.65	0.0648	0.0088	60%	10.92
Percent Grass	1.15	0.8625	0.0228	0.0002	50%	0.575
Percent Leaves	2.7	2.025	0.026	0.0005	58%	1.56
Percent Branches	3.05	2.2875	0.058	0.0013	59%	1.86
Percent Lumber	23.7	23.7	0.0068	0.0016	65%	15.41
Remainder (Mixed MSW)	34.6	40.875	0	0.0000	62%	21.45
Average				0.0253		62%

Conservatively Revised to Clear Path Efs

WW3. Use of Reclaimed (Non-Potable) Water	W1. Use of Grey Water
Reduciton Measure WW-3	The County will work with local/regional agencies to create incentives and rebates for greywater systems to achieve retrofits for 25 percent of existing homes, and grey water systems in 50 percent of new homes. This quantifiable portion used to calculate County-wide goal, which may also be achieve with use of recycled water on public or agricultural lands.

Data Inputs

Applicable Measure	Data Needed	Input			Source of Data	Notes
		2030	2035	2045		
	BAU Emissions	879.00	892.53	904.03		
	Emissions Attributable to Households	703.2016441	714.0223838	723.2259021	Assumes Default ClearPath Commercial/Industrial Multiplier	
	Housing	20224	20535	20800		
	New Housing	960	1,272	1,536		
	% of New population using grey water	50%	50%	50%		
	% of old population served by greywater	25%	25%	25%		
W-1	Proportion of household water used for gray water	50%	50%	50%	US DOE	60% is maximum

Measure Impact

	Reduction in wastewater treatment		
	2030	2035	2045
W-1 (new)	1%	2%	2%
W-1 (retrofit)	12%	12%	12%
Total Wastewater Treatment Reduct	13%	13%	13%
Total Emissions Reduction	(92)	(95)	(97)
Total % Reduction From all Water	-10%	-11%	-11%

W2. Low Water Use Fixtures

W-2: Require Low-Flow Water Fixtures

The County will adopt a reach code to exceed state-level requirements by 5 percent for the installation of water-conserving appliances in all new residential and non-residential buildings, and the County will require design plans of new development projects to include water-saving features.

Default Assumptions

No change in water efficiency requirements between 2019 and 2022 CalGreen. Assumes 2019 is BAU.

Data Inputs

Applicable Measure	Data Needed	Input			Source of	Notes
		2030	2035	2045		
	BAU Emissions	1329.89	1350.35	1367.76		
W-2	% Reduction in Water Demand	5%	5%	5%		

Measure Impact

Reduction in wastewater treatment			
	2030	2035	2045
Total Emissions Reduction	(66.49)	(67.52)	(68.39)

GHG Reduction

Measure	Summary	2030	2035	2045
Solid Waste				
SW1	Waste Diversion	(2,923.92)	(2,968.83)	(3,007.03)
SW2	Waste Transport	(7.25)	(7.36)	(7.45)
SW3	Methane Capture	(51.01)	(51.79)	(52.46)
Sector Total:		(2,982.18)	(3,027.98)	(3,066.95)
Wastewater				
W1	Grey Water	(92.07)	(94.78)	(97.08)
Sector Total:		(92.07)	(94.78)	(97.08)
Potable Water				
W2	Building Water Efficiency	(66.49)	(67.52)	(68.39)
Sector Total:		(66.49)	(67.52)	(68.39)

Sector	Emissions (MT CO2e)					
	2030		2035		2045	
	BAU Total	Reduced Total	BAU Total	Reduced Total	BAU Total	Reduced Total
Potable Water	1,329.89	1,263.39	1,350.35	1,282.83	1,367.76	1,299.37
Wastewater	879.00	786.93	892.53	797.75	904.03	806.95
Solid Waste	12,654.92	9,672.74	12,849.65	9,821.67	13,015.26	9,948.31
Total	14,863.81	11,723.06	15,092.53	11,902.26	15,287.05	12,054.63

Measure AG-1: Increase Crop Efficiency and Soil Health

Inputs and Assumptions					
Assumptions	N2O Emission Reductions (%)				
Implementing best practices in fertilizer efficiency: fertilizer placement practices	60-70%	https://ucanr.edu/sites/Nutrient_Management_Solutions/Nitrous_Oxide_and_California_Agriculture/			
Implementing best practices in fertilizer efficiency: fertilizer type practices	30%	https://ucanr.edu/sites/Nutrient_Management_Solutions/Nitrous_Oxide_and_California_Agriculture/			
Inputs	2025	2030	2035	2040	2045
Percentage reduction in fertilizer emissions (%)	20%	30%	40%	50%	60%
Calculations					
Year	2025	2030	2035	2040	2045
Nitrogen application emissions (MT CO2e)	8,028	8,277	8,535	8,800	9,074
Total Reductions (MT CO2e)	1,606	2,483	3,414	4,400	5,444

Measure AG-2: Implement Livestock Manure Management Strategies

Inputs and Assumptions					
Assumptions	Emission Reductions (%)				
Methane reductions from manure best practices (e.g., anaerobic digestion, compost beds, etc.)	40%-100%	https://www.epa.gov/agstar/practices-reduce-methane-emissions-livestock-manure-management			
Percent of manure GHG emissions from methane (%)	75%	**Calculated from 2017 Ag. Inventory as component of GHG emissions from methane divided by total GHG emissions			
GHG emission reductions from manure best practices (e.g., anaerobic digestion, compost beds, etc.)	30%-75%	**Feasible reductions in GHG emissions from practices that reduce methane emissions; calculated by multiplying methane reduction percentages by component of GHG emissions from methane			
Inputs	2025	2030	2035	2040	2045
Percentage reduction in manure management GHG emissions (%)	5%	10%	20%	30%	40%
Calculations					
Year	2025	2030	2035	2040	2045
Manure emissions (MT CO2e)	6,286	6,286	6,286	6,286	6,286
Total Reductions (MT CO2e)	314	629	1,257	1,886	2,514

Measure AG-3: Reduce Methane Emissions from Livestock

Inputs and Assumptions					
Assumptions	Methane Reductions (%)				
Use of feed additives	11.7%	https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0234289 and https://ww2.arb.ca.gov/sites/default/files/2020-12/17RD018.pdf			
Inputs	2025	2030	2035	2040	2045
Percentage reduction in enteric fermentation emissions (%)	10%	20%	25%	30%	35%
Calculations					
Year	2025	2030	2035	2040	2045
Enteric fermentation emissions (MT CO2e)	38,607	38,607	38,607	38,607	38,607
Total Reductions (MT CO2e)	3,861	7,721	9,652	11,582	13,512

AG Measures Summary

Year	2025	2030	2035	2040	2045
Total Reductions (MT CO2e)	5,781	10,833	14,323	17,868	21,471

Measure CS-1:	Conserve and Preserve Natural and Working Lands
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Not quantifiable (supportive)

Measure CS-2:	Apply Compost
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Inputs and Assumptions		Source				
County procurement requirement in 2022 (tons)	3,603	Angels City's procurement target + Unincorporated County's procurement target: https://calrecycle.ca.gov/organics/sicp/procurement/recoveredorganicwasteproducts/				
County population procurement requirement is based on	45,036	Angels City's population + Unincorporated County's population: https://calrecycle.ca.gov/organics/sicp/procurement/recoveredorganicwasteproducts/				
Procurement requirement per capita	0.0800					
Emissions avoided from mixed organics compost application (MT CO2e/ton)	0.23	https://ww2.arb.ca.gov/sites/default/files/classic/cc/waste/cerffinal.pdf				
Inputs	2025	2030	2035	2040	2045	
Target Achievement (%)	80%	100%	100%	100%	100%	

Calculations					
Year	2025	2030	2035	2040	2045
Population	45,934	46,920	47,642	48,033	48,256
Estimated procurement requirement (tons)	3,675	3,754	3,811	3,843	3,861
Total Sequestration (MT CO₂e)	676	863	877	884	888

CS Measures Summary

Year	2025	2030	2035	2040	2045
Total Reductions (MT CO ₂ e)	676	863	877	884	888

Attachment 9

Sample Implementation Timeline for Open Space

Proposed changes are in red and underlined.

Open Space Plan Implementation

Table COS-2 provides an implementation schedule the County will endeavor to implement. The table is intended to be flexible, allowing the County to reprioritize as appropriate to take advantage of funding opportunities or later to recognize staff and funding limitations without formal general plan amendments.

Sample Calendar for Open Space Plan Implementation

Topic	IM	2026 Status Report
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From 2027 to 2028: Biological Resources & Open Space Ordinance

<u>Future Specific Plan</u>	<u>LU-2F</u>	<u>Once</u>
<u>Open Space Zoning Ordinance</u>	<u>COS-1A</u>	<u>Once/Ongoing</u>
<u>Mitigation Options for Biological Resources</u>	<u>COS-4B</u>	<u>Once Initially/Ongoing</u>
<u>Wildlife Corridors</u>	<u>COS-4E</u>	<u>Ongoing (Once/Ongoing)</u>
<u>Riparian Corridors (Ordinance)</u>	<u>COS-4N</u>	<u>Ongoing (Once/Ongoing)</u>
<u>Begin HCP Process</u>	<u>COS-4C</u>	<u>Once</u>

From 2029 to 2030: Agricultural Resource Production

<u>Innovative Techniques (Clustering Standards)</u>	<u>LU-2E</u>	<u>Once/Ongoing</u>
<u>Min. Parcel Sizes Adjacent to RP Lands</u>	<u>RP-1A</u>	<u>Once/Ongoing</u>
<u>Solar Use Easements on Ag Land</u>	<u>RP-2A</u>	<u>Once</u>
<u>Right to Farm Ordinance</u>	<u>RP-2B</u>	<u>Once</u>
<u>Williamson Act Implementation</u>	<u>RP-2C</u>	<u>Once – In Process</u>
<u>Farmland Mapping</u>	<u>RP-2G</u>	<u>Once</u>

From 2031 to 2032: Fire Safety

<u>Post Fire Assessment and Rehabilitation</u>	<u>S-3J</u>	<u>Once</u>
<u>Visitor High Occupancy Uses (Fire Safety)</u>	<u>S-3R</u>	<u>Once</u>

<u>Evacuation Routes, Sites, and Centers</u>	<u>S-3V</u>	<u>Once</u>
<u>Level of Service Thresholds</u>	<u>PF-1A</u>	<u>Once</u>
<u>Woody Biomass</u>	<u>COS-5L</u>	<u>Ongoing</u>
<u>Green Waste Collection</u>	<u>COS-5D</u>	<u>Ongoing</u>

From 2033 to 2034: Mining Resources

<u>Amend County Code (Mining)</u>	<u>RP-1A, -1B</u>	<u>Once</u>
<u>Mineral Resource Information</u>	<u>RP-4C</u>	<u>Once Initially/Ongoing</u>
<u>Mining Advisory Committee</u>	<u>RP-4D</u>	<u>Once (or Ongoing)</u>

From 2035 to 2036: Recreation and Scenic Resources

<u>Bicycle and Pedestrian Plan</u>	<u>C-5A</u>	<u>Once</u>
<u>Flexible Development Standards</u>	<u>COS-6A</u>	<u>Once/Ongoing</u>
<u>Hillside and Hilltop Construction Standards</u>	<u>COS-6B</u>	<u>Once</u>
<u>Recreation Facilities</u>	<u>COS-7A</u>	<u>Once</u>
<u>Bicycle and Pedestrian Facilities</u>	<u>COS-7B</u>	<u>Once</u>
<u>Develop a Program to Identify and Provide Access to Public Waterways</u>	<u>COS 7-C</u>	<u>Once</u>
<u>Local and Regional Trail System</u>	<u>COS-7E</u>	<u>Ongoing</u>
<u>Parks and Recreation Funding</u>	<u>COS-7I</u>	<u>Ongoing</u>

From 2037-2038: Native American Cultural Resources

<u>Identify Native American Resource Sensitive Areas</u>	<u>COS-8A</u>	<u>Once Initially/ Ongoing</u>
<u>Professional Qualifications/Cultural Resources</u>	<u>COS-8C</u>	<u>Once Initially/ Ongoing</u>
<u>Subsurface/Unanticipated Cultural Resources</u>	<u>COS-8D</u>	<u>Once Initially/ Ongoing</u>
<u>Treatment of Archaeological Resources</u>	<u>COS-8F</u>	<u>Once Initially/ Ongoing</u>

From 2039-2040

Complete implementation for any measure listed above that remain incomplete.

Proposed changes are in red and underlined.

Table LU-2: Relationship of General Plan Land Use Designations and the Current (~~2014~~2026) Zoning Districts (Basic Guidance)

Base Zone	Land Use Designation	RM – Resource Management	RP – Resource Production	WL – Working Lands	RTA – Rural Transition A	RTB – Rural Transition B	RR – Rural Residential	RLD – Residential Low Density	RMD – Residential Medium Density	RHD – Residential High Density	CH – Historic Center	CC – Community Center	C – Commercial	CR – Commercial Recreation	I – Industrial	PI – Public and Institutional	PR – Park and Recreation	ROW – Right-of-way
GF – General Forestry		●	●	●														
TP – Timber Production		●	●	●														
A1 – General Agriculture		●	●	●														
AP – Agricultural Preserve		●	●	●	●	●	●											
RA – Residential Agricultural				●	●	●												
RR – Rural Residential				●	●	●	●											
R1 – <u>Single-Family Low Density</u> Residential								●	●		●	●						
R2 – <u>Two-Family Medium Density</u> Residential									●	●	●	●						
R3 – <u>Multi-Family High Density</u> Residential									●	●	●	●						
~~RC – Rural Commercial~~													●					
~~RM – Rural Home Industry~~			●	●	●	●	●											
<u>HC – Historic Center</u>											●	●	●					
C1 – Local Commercial											●	●	●					
C2 – General Commercial												●	●					
CP – Professional Office											●	●	●					
M1 – Light Industry															●			
M2 – General Industry															●			
M4 – Business Park												●			●			
REC – Recreation		●	●	●	●	●	●	●	●	●	●	●		●			●	
PS – Public Service		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	

~~OS – Open Space~~																	
~~U-Unclassified~~																	
~~HS-Highway Service~~																	

Note: Lower density or intensity zoning shall be considered a compatible zone. See **Policy LU-1.4**.

Attachment

Comments Received to Notice of Public Hearing

Katherine Stefani

From: Slim Crawford <slimcrawford@hotmail.com>
Sent: Monday, October 5, 2026 1:07 PM
To: Katherine Stefani
Cc: Kelly Wooster
Subject: October 8, 2026 Planning Commission Meeting - Project 2025-043
Attachments: COMMENTS_000265.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

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Ms. Stefani:

Attached please find comments from Kelly C. Wooster regarding the above referenced matter prior to today's 4:00 p.m. deadline. The contact information for Mr. Wooster is as follows:

KELLY C. WOOSTER
P.O. Box 62
Copperopolis, CA 95228
Telephone: (209) 785-2437
Facsimile: (209) 785-8455
Email: kcw@caltel.com

If you have any questions or require any further information, please contact us.

Thank you,

Kamy J Crawford

Legal Secretary

Telephone: (209) 736-0569

October 5, 2026

Re: October 8, 2026 Planning Commission Meeting – Project 2025-043

I request a continuance of this meeting. This is a substantial undertaking and people need more time to read and comment on it.

There are issues.

The draft amendments to the General Plan rely in part on the draft GHG Reduction Plan. For example, Attachment 4, Page 5, Attachment 6, Page 4. That Plan may not be adopted, and if it isn't, litigation may result alleging noncompliance with Senate Bill 1425. These references and Attachment 8 should be deleted.

The County should not adopt the draft GHG Reduction Plan anyway. It is fundamentally flawed, and the General Plan provisions that call for it should be deleted or amended. That draft Plan deals with gross emissions, with no allowance for carbon sequestration. It does not fit this rural county where people must drive gas or diesel powered vehicles, because EVs don't work well with hills and cold. The open space that sequesters carbon also means people have to drive a lot.

In addition, the draft GHG Reduction Plan is based on a 2018 greenhouse gas inventory which itself is flawed. For example, it includes emissions from dairies and feed lots in this county in 1990 and forward, of which there were and are none.

None of this is required by the State.

In addition, Attachment 5, p.1, would amend LU 1.3 to identify lands and green spaces "that can be revitalized into publicly accessible open spaces..." How would that be done as to private land?

Attachment 6,p.1 would require specific plans to include 10% of the project area as open space. Why any particular percentage given that parcels vary, and why 10%?

There may be more issues I haven't had time to identify them.

From: [Tom Infusino](#)
To: [Timothy Laddish](#); [Michelle Plotnik](#); [Hector Lozano](#); [Don Parker](#); [Michael Robie](#)
Cc: [Annette Huse](#); [Julie Moss-Lewis](#); [Katherine Stefani](#)
Subject: RE: Comments on the Open Space Element Update on the Planning Commission Agenda for 10/8/26
Date: Tuesday, October 6, 2026 1:30:39 PM

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Dear Commissioners,

The Calaveras Planning Coalition supports the recommendations in the staff report supporting adoption of the Open Space Element Update on your October 8, 2026 agenda.

The update plans to achieve equitable access to open space by leaning heavily on the existing Parks and Recreation Master Plan, while adding a preference for new park and recreation facilities in underserved areas.

The update plans to achieve climate change resilience primarily through adoption and implementation of the 2023 draft greenhouse gas reduction measures already approved by this Commission.

The implementation schedule puts our plan on par with other counties our landowners must compete with for state open space funding (Plumas, Placer, El Dorado, Amador, Tuolumne and Mariposa) that complete their open space plans with some form of implementation timeline.

We thank Planning Department staff for their work on this open space element update. We look forward to working with staff as we continue to implement the open space plan in Calaveras County.

With Gratitude,

Tom Infusino, Facilitator
Calaveras Planning Coalition
(209) 295-5302 (Land Line)
www.calaverascap.com