Napa County

**** ZOOM MEETING****
https://countyofnapa.zoom.us/s/87995961405

Agenda

Friday, September 23, 2022

9:00 AM

ZOOM ONLY

Climate Action Committee

AMERICAN CANYON Mark Joseph, Pierre Washington
CALISTOGA Chris Canning (Vice Chair), Gary Kraus
NAPA Bernie Narvaez, Liz Alessio
NAPA COUNTY Brad Wagenknecht (Chair), Alfredo Pedroza
ST. HELENA Geoff Ellswoth, Anna Chouteau
YOUNTVILLE John Dunbar, Marita Dorenbecher

Committee Secretary:
Alexandria Quakenbush

IMPORTANT NOTICE REGARDING COVID-19 AND PARTICIPATION IN THE CLIMATE ACTION COMMITTEE MEETING

Climate Action Committee meetings will be conducted via teleconference using the Zoom platform in order to minimize the spread of the COVID-19 Virus, in accordance with AB 361.

To participate in the Climate Action Committee meeting, the public are invited to observe and address the Commission telephonically or electronically only. The meetings are not physically open to the public. Instructions for public participation are below:

The Climate Action Committee will continue to meet the 4th Friday of each month when a meeting is scheduled.

The Climate Action Committee realizes that not all County residents have the same ways to stay engaged, so several alternatives are offered. Please watch or listen to the meetings in one of the following ways:

1. Listen on your cell phone - via Zoom at 1-669-900-6833 Enter Meeting ID 879 9596 1405 once you have joined the meeting.

2. Watch via Live Stream via Zoom by https://www.zoom.us/join, and enter Meeting ID 879 9596 1405

You may submit public comment for any item that appears on the agenda or general public comment for any item or issue that does not appear on the agenda, as follows: Please provide your name and the agenda item on which you are commenting.

Via Email - send your comment to the following email address: cac@countyofnapa.org . Emails received will not be read aloud but will still become part of the public record.

Online -

1. Use the Zoom attendee link: https://countyofnapa.zoom.us/s/87995961405 . Make sure the browser is up to date.
2. Enter an email address and your name. Your name will be visible online while you are speaking.
3. When the Chair calls for the item on which you wish to speak, click “raise hand.” Mute all other audio before speaking to avoid feedback.
4. When called, please limit your remarks to three minutes. After the comment, your microphone will be muted.

By Phone -

1. Call the Zoom phone number and enter the webinar ID: 1-669-900-6833 Enter Meeting ID 879 9596 1405
2. When the Chair calls for the item on which you wish to speak, press *9 to raise a hand. **Please note that phone numbers in their entirety will be visible online while speakers are speaking**
3. Please limit your remarks to three minutes. After the comment has been given, your phone will be muted.

All comments will be heard in the order received.

The above-identified measures exceed all legal requirements for participation and public comment, including those imposed by the Ralph M. Brown Act and AB 361. If you have any questions, contact us via telephone at (707) 253-4417 or send an email to cac@countyofnapa.org.

1. CALL TO ORDER; ROLL CALL

2. PLEDGE OF ALLEGIANCE

3. CONSENT ITEMS

A. The Clerk requests approval of minutes from the regular meeting on July 22, 2022. **22-1780**

Attachments: DRAFT July 22, 2022 Minutes

4. ADMINISTRATIVE ITEMS

A. County staff and Ascent Environmental will provide a presentation on the draft Napa County Regional 2019 Community Greenhouse Gas Inventory Update Summary and the draft Napa County Regional Greenhouse Gas Inventory Forecast (2019-2030). **22-1757**

Attachments: Draft Napa Regional 2019 GHG Inventory Memo
Draft Napa Regional GHG Forecast Memo
Napa CAC Inventory Presentation Sept2022.pdf

5. PUBLIC COMMENT

In this time period, anyone may address the Climate Action Committee regarding any subject over which the Committee has jurisdiction but which is not on today's posted agenda. In order to provide all interested parties an opportunity to speak, time limitations shall be at the discretion of the Chair. As required by Government Code, no action or discussion will be undertaken on any item raised during this Public Comment period.

6. REPORTS AND ANNOUNCEMENTS

7. FUTURE AGENDA ITEMS

8. ADJOURNMENT

I HEREBY CERTIFY THAT THE AGENDA FOR THE ABOVE STATED MEETING WAS POSTED AT A LOCATION FREELY ACCESSIBLE TO MEMBERS OF THE PUBLIC AT THE NAPA COUNTY ADMINISTRATIVE BUILDING, 1195 THIRD STREET, NAPA, CALIFORNIA, ON FRIDAY, 9/16/22 BY 10 AM. A HARDCOPY SIGNED VERSION OF THE CERTIFICATE IS ON FILE WITH THE COMMITTEE CLERK AND AVAILABLE FOR PUBLIC INSPECTION
Jason Hall (by e-signature)
JASON HALL, Clerk of the Commission

Napa County

Board Agenda Letter

Climate Action Committee	**Agenda Date:** 9/23/2022	**File ID #:** 22-1780

TO: Napa County Climate Action Committee

FROM: David Morrison, Director of Planning, Building and Environmental Services

REPORT BY: Deborah Elliott, Planner III - Sustainability

SUBJECT: Approval of Minutes

RECOMMENDATION

The Clerk requests approval of minutes from the regular meeting on July 22, 2022.

EXECUTIVE SUMMARY

The Clerk requests approval of minutes from the regular meeting on July 22, 2022.

ENVIRONMENTAL IMPACT

ENVIRONMENTAL DETERMINATION: The proposed action is not a project as defined by 14 California Code of Regulations 15378 (State CEQA Guidelines) and therefore CEQA is not applicable.

BACKGROUND AND DISCUSSION

The Clerk requests approval of minutes from the regular meeting on July 22, 2022.

Meeting Minutes

Climate Action Committee

American Canyon	Pierre Washington	Mark Joseph	David Morrison, Secretary-Director
Calistoga	Chris Canning (*Vice-Chair)*	Gary Kraus	Chris Apallas, Committee Counsel
Napa	Bernie Narvaez	Liz Alessio	Deborah Elliott, Planner III
Napa County	Brad Wagenknecht (*Chair)*	Alfredo Pedroza	Alexandria Quackenbush, Committee Clerk
St. Helena	Geoff Ellsworth	Anna Chouteau	
Yountville	John Dunbar	Marita Dorenbecher	

Friday, July 22, 2022 **9:00 AM** **Virtual Meeting**

1. CALL TO ORDER; ROLL CALL

Committee Members Present: Mark Joseph, Liz Alessio, Geoff Ellsworth (Joined during Item 4B discussion), John Dunbar, Brad Wagenknecht, Bernie Narvaez (Joined after roll call), Gary Kraus.

Committee Members Excused: Alfredo Pedroza, Marita Dorenbecher, Chris Canning, Anna Chouteau, Pierre Washington

Staff Present: Deborah Elliott, Jason Hall.

2. PLEDGE OF ALLEGIANCE

Chair Wagenknecht led the salute to the flag.

3. CONSENT ITEMS

A. The Clerk of the Committee requests approval of minutes from the following regular meeting held on: June 24, 2022.

Members voted to approve minutes for the June 24, 2022, as presented.

MJ	PW	CC	GK	BN	LA	AP	BW	GE	AC	JD	MD
	X	X			2nd	X			X	1st	X

4. ADMINISTRATIVE ITEMS

A. Receive a presentation from PG&E on electric reliability and the grid of the future. staff.

Tom Huynh gave presentation with discussion, no action taken.

B. The Director of Planning, Building and Environmental Services requests authorization to negotiate and execute an agreement with Community Climate Solutions to fund a website for fiscal year 2022/2023. Staff requests that the Committee discuss the two options to determine whether the Committee would like County staff as the Administering Agency to negotiate and execute an agreement with Community

Climate Solutions to fund the website for one year, through June 30, 2022.
Deborah Elliott provided an update with discussion, and action was voted on.
Members voted to approve the negotiation and execution of the agreement with Community Climate Solutions as presented. Motion passed unanimously.

MJ	PW	CC	GK	BN	LA	AP	BW	GE	AC	JD	MD
2nd	X	X			1st	X			X		X

C. Staff will provide an update to the Climate Action Committee (CAC) on the Countywide Greenhouse (GHG) Inventory and optional tasks.
Deborah Elliott provided the update with discussion, no action taken.

5. PUBLIC COMMENT
(4) Public comments were heard.

6. REPORTS AND ANNOUNCEMENTS
- Member Narvaez shared two items: California Energy Commission (CEC) will host a workshop on vehicle grid integration on July 28, 2022; and, CARB is providing funding ($3,000) for voucher program for clean off-road equipment.
- Member Ellsworth has concerns about efficiency as related to energy and efforts concerning Trucking & Garbage Waste to Upper Napa Valley converting to energy. Member Ellsworth wants to make sure we have proper analysis and know the impact to Climate.
- Member Dunbar announces next meeting on August 26, 2022, and concerns to make sure we do not have a two month gap on anything that might be actionable.
- Member Alessio shared she had a great tour with assembly member, Cecilia Aguilar-Curry, at Napa County Recycling & Waste with discussion. Member Alessio also thanked Emily Bit for her contributions.

7. FUTURE AGENDA ITEMS
- Chair Wagenknecht commented about Grand Jury Response; Director Morrison sent out a draft and reminded that there is no final due date for 90 days.
- Member Dunbar suggested getting a presentation on “Eye on Water” App from Town of Yountville for the August meeting. He will request presentation.
- Member Ellsworth will “take back” information to St. Helena on what they can work on for “Eye on Water” presentation.

8. ADJOURNMENT
Meeting adjourned to August 26, 2022, regular meeting.

JASON HALL, Clerk of the Committee

Key

Vote: MJ = Mark Joseph; PW = Pierre Washington; CC = Chris Canning; GK = Gary Kraus; BN = Bernie Narvaez; LA = Liz Alessio; AP = Alfredo Pedroza; BW = Brad Wagenknecht; GE = Geoff Ellsworth; AC = Anna Chouteau; JD = John Dunbar; MD = Marita Dorenbecher.

Notations under vote: Y = Yes; N = No; A = Abstain; X = Excused; 1st = 1st motion; 2nd = 2nd motion

Example

MJ	PW	CC	GK	BN	LA	AP	BW	GE	AC	JD	MD
	A		X			1st				2nd	

Napa County

Board Agenda Letter

Climate Action Committee	**Agenda Date:** 9/23/2022	**File ID #:** 22-1757

TO: Napa County Climate Action Committee

FROM: David Morrison, Director Planning, Building and Environmental Services

REPORT BY: Deborah Elliott, Planner III - Sustainability

SUBJECT: Presentation and Discussion of Draft Greenhouse Gas (GHG) Inventory and GHG Forecast Technical Memorandums

RECOMMENDATION

County staff and Ascent Environmental will provide a presentation on the draft Napa County Regional 2019 Community Greenhouse Gas Inventory Update Summary and the draft Napa County Regional Greenhouse Gas Inventory Forecast (2019-2030).

EXECUTIVE SUMMARY

Honey Walters and Brenda Hom from Ascent Environmental will provide a presentation on the draft Napa County Regional 2019 Community Greenhouse Gas Inventory Update Summary and the draft Napa County Regional Greenhouse Gas Inventory Forecast (2019-2030). Staff requests that the Climate Action Committee discuss the draft GHG inventory and forecast and provide comments.

ENVIRONMENTAL IMPACT

ENVIRONMENTAL DETERMINATION: The proposed action is not a project as defined by 14 California Code of Regulations 15378 (State CEQA Guidelines) and therefore CEQA is not applicable.

BACKGROUND AND DISCUSSION

In June 2021, the County received a grant agreement from the Bay Area Air Quality Management District (BAAQMD) in the amount of $50,000 to prepare a GHG inventory. As directed by the Committee, staff prepared a Request for Proposals (RFP) for consultants to develop an updated regional GHG emissions inventory for the six agencies. The Committee requested that the RFP include optional tasks for consideration of short-lived climate pollutants (SLCP) and an evaluation of the potential for carbon sequestration within Napa

County. The $50,000 grant from the BAAQMD is anticipated to cover the cost of the GHG inventory but will not cover the cost of the optional tasks. Based on the cost-sharing formula agreed to in the existing JPA, each jurisdiction paid an additional cost for the optional tasks.

The County Board of Supervisors awarded the contract to Ascent Environmental Inc. on November 16, 2021 for a maximum of $97,485 to prepare a comprehensive update to the Regional Greenhouse Gas (GHG) Emission Inventory, an optional technical memorandum on short-lived climate pollutants, and an optional technical memorandum on the potential for carbon sequestration in Napa County.

GHG Inventory

The GHG inventory document includes a 2019 communitywide greenhouse gas (GHG) inventory update for the Napa County region (region), including the 2019 GHG inventories for each of the six jurisdictions in the County. GHG emissions are attributed to each jurisdiction based on whether the emissions occur within, or originate from activities in, their jurisdictional boundary. The update year of 2019 was selected because this was the latest year in which data were most complete and excludes data anomalies due to the COVID-19 pandemic starting in 2020, such as reduced transportation emissions from increased telecommuting. The 2019 regional GHG inventory is an update to the 2005 regional inventory that was performed in the 2009 Napa Countywide Community Climate Action Framework (Napa County Transportation & Planning Agency). Quantification of the 2019 regional GHG inventory update is based on the International Council for Local Environmental Initiatives (ICLEI) methodologies, specifically, the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions Version 1.2. To provide locally relevant emissions, additional protocols were used to refine certain sectors (e.g., agriculture, off-road equipment). Consistent with these protocols and past inventories, the community GHG inventories are divided into seven emissions sectors, or sources of emissions.

The regional inventory update relies on the best available and most up-to-date data and calculation methodologies to provide a foundation upon which the jurisdictions and other relevant stakeholders can plan and act to reduce regional GHG emissions.

In summary, total GHG emissions for the region in 2019 were 1,480,602 MTCO2e (metric tons of carbon dioxide equivalent). Direct comparisons between the 2005 and 2019 inventories are not valid due to the changes in GHG emission calculations, data available, and modeling protocols. However, to the extent that portions of each inventory can be compared, it appears that total GHG emissions decreased by 1% between 2005 and 2019. Reductions in GHG emissions by cleaner vehicles and reduced driving, were primarily offset by a small increase in solid waste emissions and a larger increase in building energy use.

The 2019 inventory detailed individual sectors within regional emissions as follows:

- Building Energy 38.1% of total emissions
- On-road transportation 30.2%
- Solid waste 13.4%
- Off-road equipment 7.8%
- Agriculture 7.0%
- Wastewater 3.1%
- Imported Water 0.4%

The 2019 inventory also evaluated GHG emissions for each individual jurisdiction:

- Unincorporated County 40.4% of total emissions
- City of Napa 40.4%
- American Canyon 10.8%
- St. Helena 4.6%
- Calistoga 2.4%
- Yountville 1.5%

GHG Forecast

The forecast technical memorandum presents an estimated forecast of communitywide greenhouse gas (GHG) emissions for the Napa County region (region), including forecasts for each of the six jurisdictions under "business-as-usual" (BAU) and legislative-adjusted BAU scenarios for the year 2030. These forecasts are based on the results of the 2019 communitywide GHG emissions inventory, as well as associated methods, assumptions, emissions factors, and data sources used to develop the updated emissions inventory described in the Napa County Regional 2019 Community Greenhouse Gas Inventory Update Summary memorandum.

This forecast provides an estimate of future GHG levels based on a continuation of current trends in activity, while also accounting for Federal and State legislative actions to reduce emissions in the future. GHG emissions forecasts provide insights to the scale of regional and local reductions needed to achieve GHG emissions reduction targets. Regional activities could incorporate information contained herein into a General Plan, Climate Action Plan, or other planning document.

The forecast GHG inventory, assuming changes in growth and State/Federal legislation, predicts that total regional GHG emissions would increase 5% by 2030, from 1,480,602 to 1,548,761 MTCO2e. Future individual sectors are estimated as follows:

• Building Energy	42.1% of total emissions
• On-road transportation	25.3%
• Solid waste	14.5%
• Off-road equipment	8.4%
• Agriculture	5.9%
• Wastewater	3.4%
• Imported Water	0.3%

The forecast inventory also estimated 2030 GHG emissions for each individual jurisdiction as follows:

• Unincorporated County	43.4% of total emissions
• City of Napa	37.8%
• American Canyon	10.9%
• St. Helena	4.3%
• Calistoga	2.2%
• Yountville	1.4%

Timeline

Staff requests that the Committee discuss the draft GHG inventory and forecast and provide comments. Additional comments may be submitted to County staff until October 3, 2022. Submit comments to CAC@countyofnapa.org. At the October Committee meeting, staff plans to bring back a draft matrix of GHG reduction opportunities. The two optional tasks; SLCP and carbon sequestration will be presented to the Committee at a later date.

All grant related requirements must be completed by December 31, 2022.

Attachments

1) Draft Napa County Regional 2019 Community Greenhouse Gas Inventory Update Summary

2) Draft Napa County Regional Greenhouse Gas Inventory Forecast (2019-2030)

Memo

455 Capitol Mall, Suite 300
Sacramento, CA 95814
916.444.7301

Date: September 13, 2022

To: David Morrison and Deborah Elliott (County of Napa)

From: Honey Walters and Brenda Hom (Ascent Environmental, Inc.)

Subject: Draft Napa County Regional 2019 Community Greenhouse Gas Inventory Update Summary

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INTRODUCTION

This document includes a 2019 communitywide greenhouse gas (GHG) inventory update for the Napa County region (region), including the 2019 GHG inventories for each of the six jurisdictions: American Canyon, Calistoga, the City of Napa, St. Helena, Yountville, and the unincorporated areas of Napa County (Unincorporated County). GHG emissions are attributed to each jurisdiction based on whether the emissions occur within, or originate from activities in, their jurisdictional boundary. The update year of 2019 was selected because this was the latest year in which data were most complete and excludes data anomalies due to the COVID-19 pandemic starting in 2020, such as reduced transportation emissions from increase telecommuting. The 2019 regional GHG inventory is an update to the 2005 regional inventory that was performed in the 2009 *Napa Countywide Community Climate Action Framework* (Napa County Transportation & Planning Agency [NCTPA] 2009). This effort differs from the draft Napa County Climate Action Plan (Napa County CAP) completed in 2018, which focuses on activities and emissions from the Unincorporated County only (County of Napa 2018). Quantification of the 2019 regional GHG inventory update is based on the International Council for Local Environmental Initiatives (ICLEI) methodologies, specifically, the *U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions* Version 1.2 (Community Protocol). In addition, to provide locally relevant emissions, additional protocols were used to refine certain sectors (e.g., agriculture, off-road equipment). Consistent with this protocol and past inventories, the community GHG inventories are divided into seven emissions sectors, or sources of emissions:

- Building Energy – Including electricity and natural gas consumption in residential and non-residential buildings.
- On-road transportation – Including on-road vehicles, such as passenger cars, trucks, and buses.
- Off-road equipment – Including off-road equipment, such as construction equipment, waterborne vessels, and lawn and garden equipment. Excludes agricultural equipment.
- Agriculture – Including livestock emission from enteric fermentation and manure management, off-road agricultural equipment, stationary diesel equipment (e.g., irrigation pumps), fertilizer and pesticide use, and residue burning.
- Solid waste – Including methane emissions from annual generation of solid waste and from waste accumulated in place at landfills inside the Napa region.
- Imported Water – Including water imported from outside of the Napa region.
- Wastewater – Including methane and nitrous oxide emissions from treatment of wastewater generated in the region.

The regional inventory update relies on the best available and most up-to-date data and calculation methodologies to provide a foundation upon which the County of Napa (County) can coordinate with the incorporated cities and town and other relevant stakeholders to plan and act to reduce regional GHG emissions. This approach differs somewhat from the approach used to develop the past inventories in the region. For example, the 2019 regional inventory includes water- and wastewater-related emissions, which were not included in the 2005 regional inventory. A comparison is provided for informational purposes only and uses an adjusted 2019 inventory, matching the basic assumptions and range of emissions sources of the 2005 inventory, to provide a direct comparison.

ORGANIZATION OF THIS MEMORANDUM

This memorandum consists of five parts:

- Section 1: Regional Inventory Boundary summarizes the scope of the inventory evaluated for the region.
- Section 2: Summary of Inventory Results by Sector summarizes the 2019 regional GHG emissions inventory and provides a comparison of 2019 emissions with past inventories from 2005 and 2014 by sector, including any differences in methodology and data.
- Section 3: Summary of Inventory Results by Jurisdiction summarizes the 2019 regional GHG emissions inventory by each jurisdiction, including insights into the reasons for any differences in methodology and data.
- Section 4: Comparison with the 2005 Regional Inventory compares the 2019 regional GHG emissions inventory to the 2005 regional inventory, adjusting for methodological differences.
- Section 5: Data, Methods, and Assumptions presents the methods and data used to develop the 2019 inventory. This includes details on what sources the inventory includes and excludes.

REGIONAL INVENTORY BOUNDARY

The inventory aims to estimate GHG emissions from sources within the six jurisdictions in the region, namely American Canyon, Calistoga, Napa, Saint Helena, Yountville, and Unincorporated. This inventory quantifies three main GHGs: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Other GHGs, such as hydrofluorocarbons and other short-lived climate pollutants, will be addressed in a separate memorandum. The region's inventory only includes emissions generated from sources and activities occurring within the boundaries of each jurisdiction; it does not account for GHG emissions generated from activities occurring outside of the respective jurisdiction, as a given jurisdiction does not have operational control of or authority over those sources.

Additionally, the regional inventory does not account for embedded or lifecycle GHG emissions. The regional inventory evaluates emissions using the production-based approach; therefore, the regional inventory does not consider the upstream emissions generated by the consumption of goods and services within the community.

The GHG emissions sectors and sources included and excluded in the region's 2019 community inventory are presented in Table 1 below. Table 1 identifies the protocol that provided the methodology for estimating GHG emissions from each emissions source. Emissions sources that identify multiple protocols used a combination of data and methods from those protocols. Fertilizer application and off-road vehicles and equipment calculations used methods consistent with Intergovernmental Panel on Climate Change (IPCC) and the Community Protocol but substituted locally specific data obtained from the California Air Resources Board (CARB). A detailed description of how each sector was quantified is discussed in Section 4.

Table 1 Summary of Sectors and Sources for the 2019 Napa County Regional GHG Inventory

Sector	Included	Excluded	Protocol(s)
Building Energy			
Electricity	Emissions associated with all electricity consumed within each jurisdiction		ICLEI
Natural Gas	Emissions from natural gas consumed within each jurisdiction	Emissions from propane and natural gas stationary source engines due to lack of readily variable data.	ICLEI
On-Road Transportation			
On-Road Transportation	Emissions from 100 percent of trips within each jurisdiction (internal-internal) and 50 percent of trips starting or ending outside each jurisdiction (internal-external and external-internal)	Emissions from 100 percent of pass-through trips starting and ending outside each jurisdiction (external-external)	ICLEI/ RTAC
Off-Road Equipment			
Off-Road Equipment	Emissions from off-road equipment within each jurisdiction	Emissions associated with aircraft operations were not included because they are outside of the control of the jurisdictions within the region. Entertainment equipment (e.g., filming equipment) were excluded due to its exclusion in CARB's OFFROAD2021 model, despite being included in the previous OFFROAD2007 model.	ICLEI/ CARB
Agriculture			
Livestock– Enteric Fermentation	Emissions from enteric fermentation from livestock within each jurisdiction		ICLEI
Livestock– Manure Management	Emissions associated with manure management practices within each jurisdiction		ICLEI
Fertilizer Application	Emissions associated with fertilizer use within each jurisdiction	Emissions associated with pesticide use within each jurisdiction.	CARB/ IPCC
Agricultural Off-Road Equipment	Emissions from agricultural off-road vehicles and equipment within each jurisdiction		ICLEI/ CARB
Agricultural Diesel Engines	Emissions from diesel fuel use for stationary engines (e.g., irrigation pumps) within each jurisdiction		CARB
Open Burning		No emissions from open burning of agricultural vegetative matter were reported for this year. Emissions from wildfires and prescribed forest fires are excluded as they occur apart from any jurisdictional control. This sector was not included in the 2005 inventory.[1]	
Carbon storage and sequestration		Emissions reductions or additions associated with changes to carbon sequestration or carbon storage rates in the region. These will be addressed in a separate memorandum.	

Sector	Included	Excluded	Protocol(s)
Solid Waste			
Community-Generated Solid Waste	Emissions from all waste generated by each jurisdiction	Emissions from waste generated outside of each jurisdiction but disposed of within the jurisdiction.	ICLEI
Waste-in-Place	Emissions from waste accumulated at landfills within each jurisdiction.		ICLEI
Wastewater Treatment			
Wastewater Treatment	Emissions associated with wastewater generated by each jurisdiction (including treatment in onsite septic systems and at centralized WWTPs)	Emissions from wastewater generated outside of each jurisdiction but treated within each jurisdiction (including treatment at centralized WWTPs)	ICLEI
Imported Water			
Imported Water	Emissions associated with imported water from outside the region	Disaggregated water usage-related emissions associated with each jurisdiction. These are assumed to be included in the building energy sector.	ICLEI

Notes: GHG = greenhouse gas; CARB = California Air Resources Board; ICLEI = ICLEI – Local Governments for Sustainability; VMT = vehicle miles traveled; RTAC = Regional Targets Advisory Committee; IPCC = Intergovernmental Panel on Climate Change; WWTP = wastewater treatment plant.

[1] Emissions from open burning are typically quantified using permit data obtained from the local air pollution control district (i.e., air quality management district), which specify the number of acres permitted for open burning operations. Bay Area Quality Management District (BAAQMD) only reported data for prescribed forest or open space burning. BAAQMD did not report any agricultural burning in Napa County in 2019.

Source: Ascent Environmental 2022.

SUMMARY OF INVENTORY RESULTS BY SECTOR

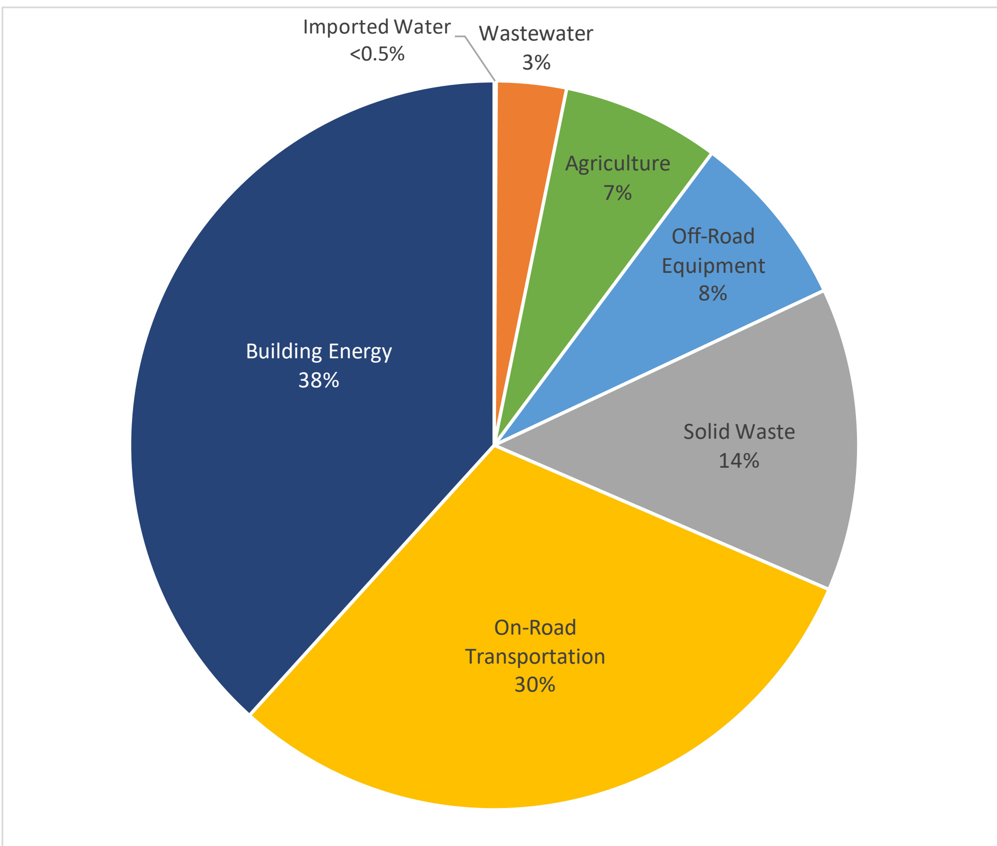
Based on the modeling conducted, the Napa County region generated approximately 1.5 million metric tons of carbon dioxide equivalents ($MTCO_2e$) in 2019. As shown in Figure 1, the top two emissions sectors in 2019 included building energy use (38 percent) and on-road transportation (30 percent), which together accounted for 68 percent of emissions in the region. Other sectors, include solid waste (14 percent), off-road equipment (8 percent), agriculture (7 percent), wastewater (3 percent), and imported water (0.04 percent). Emissions associated with water pumping within the region could not easily be disaggregated from 2019 electricity usage reports and thus, are included in the building energy sector. Table 2 details the emissions results from the 2019 GHG inventory update for the Napa County region. Attachment A presents the activity data used for each emissions sector. Emissions results by jurisdiction are addressed in Section 3. A comparison of emissions to the 2005 regional inventory is provided in Section 4. A detailed analysis of the background data and assumptions behind each individual sector is provided in Section 5.

Table 2 2019 Napa County Regional Greenhouse Gas Inventory by Sector ($MTCO_2e$/year)

Emissions Sector	2019 ($MTCO_2e$/year)	Percent of Total
Building Energy	564,336	38.1%
On-Road Transportation	446,673	30.2%
Solid Waste	198,862	13.4%
Off-Road Equipment	115,548	7.8%
Agriculture	103,381	7.0%
Wastewater	45,858	3.1%
Imported Water	5,943	0.40%
Total	1,480,602	100.0%

Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.

Source: Prepared by Ascent Environmental in 2022.



Source: Prepared by Ascent Environmental in 2022.

Figure 1 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Emissions Sector

SUMMARY OF INVENTORY RESULTS BY JURISDICTION

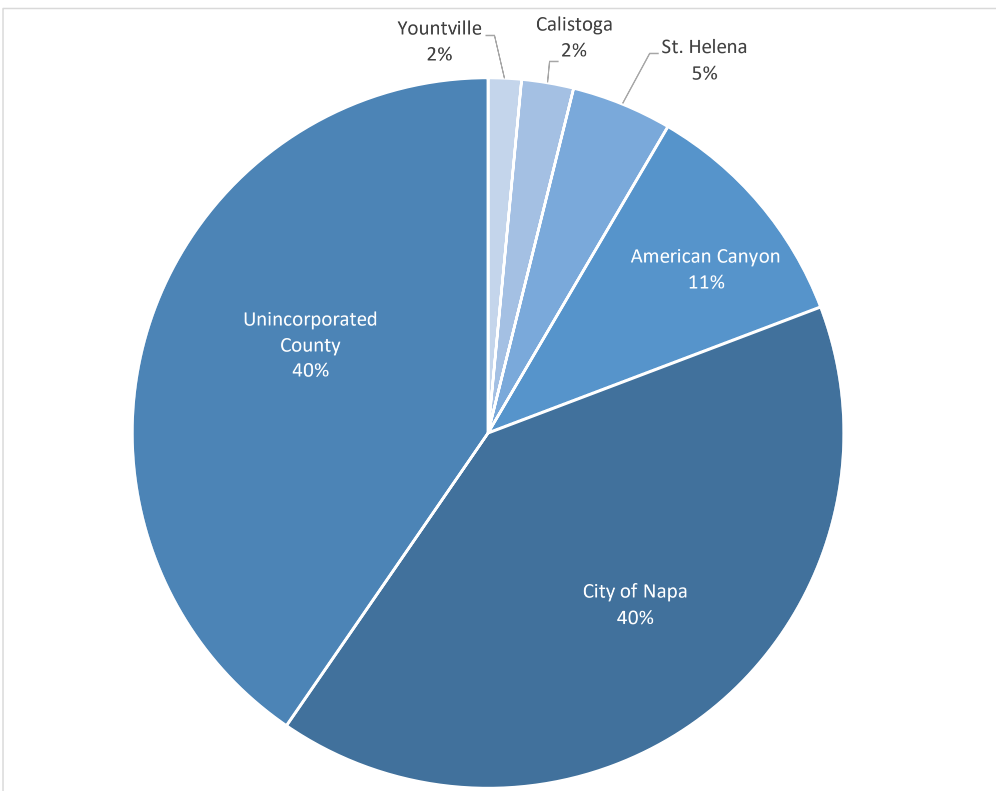
Across the six jurisdictions in the county, the Unincorporated County and City of Napa both accounted for 40 and 40 percent of emissions in the region, respectively, for a total of 80 percent. American Canyon contributed 11 percent of the region's emissions; and St. Helena, Calistoga, and Yountville accounted for the remaining 8 percent. These results are shown in Figure 2 and Table 3.

Table 3 2019 Napa County Regional Greenhouse Gas Inventory by Jurisdiction ($MTCO_2e$/year)

Emissions Sector	2019 ($MTCO_2e$/year)	Percent of Total
Unincorporated County	598,302	40.4%
City of Napa	597,610	40.4%
American Canyon	159,719	10.8%
St. Helena	67,657	4.6%
Calistoga	34,982	2.4%
Yountville	22,332	1.5%
Total	1,480,602	100.0%

Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.

Source: Prepared by Ascent Environmental in 2022.



Source: Prepared by Ascent Environmental in 2022.

Figure 2 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Jurisdiction

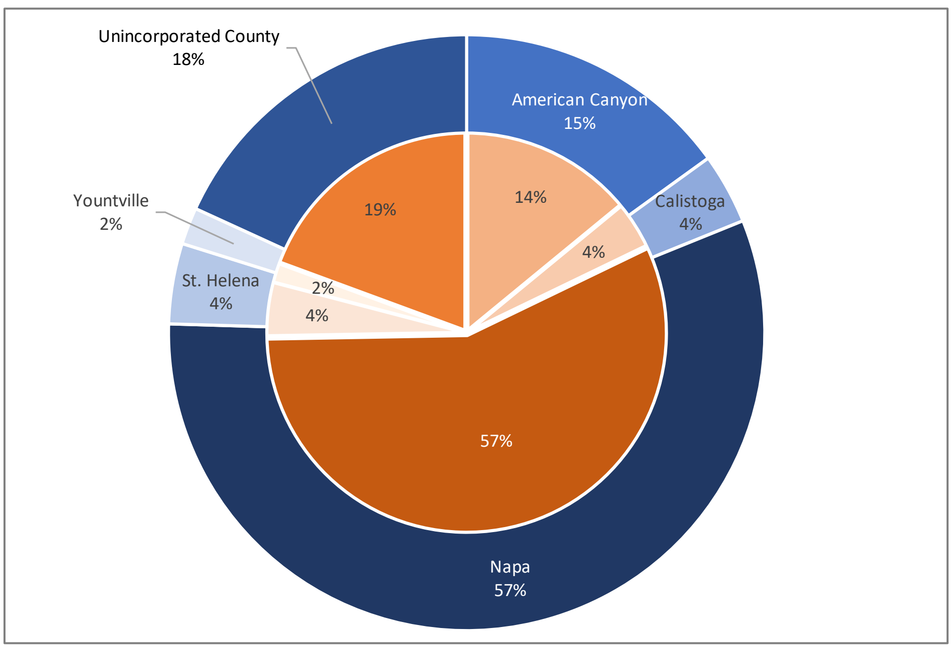
These results are consistent with the level of activity in each jurisdiction. Table 5 and Figures 4 and 6 show the breakdown of emissions by jurisdiction and emissions sector. Table 5 shows emissions normalized by population and employment. Figure 3 provides the population and employment by jurisdiction in 2019 to provide context.

Table 5 2019 Napa County Regional Greenhouse Gas Inventory by Jurisdiction and Sector ($MTCO_2e$/year)

Emissions Sector	American Canyon	Calistoga	Napa	St. Helena	Yountville	Unincorporated County	Total
Building Energy	29,168	8,431	216,505	21,599	5,551	284,313	565,567
On-Road Transportation	86,779	16,239	265,100	28,975	11,722	37,859	446,673
Solid Waste	25,938	4,981	34,236	5,676	2,601	125,429	198,862
Off-Road Equipment	8,998	2,880	47,238	4,502	1,328	50,602	115,548
Agriculture	154	274	1,086	4,415	75	97,378	103,381
Wastewater	7,822	1,994	29,542	2,270	1,040	3,191	45,858
Imported Water	983	229	4,383	285	65	-	5,943
Total	159,842	35,025	598,089	67,721	22,382	598,772	1,481,832
Emissions per capita	7.6	6.5	7.5	11.1	8.0	23.9	10.6
Emissions per SP	5.9	4.3	4.6	5.7	5.7	10.8	6.3
Transportation Emissions per capita	4.1	3.0	3.3	4.8	4.2	1.5	3.2

Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year. SP = service population (population + jobs) (See Table 6).

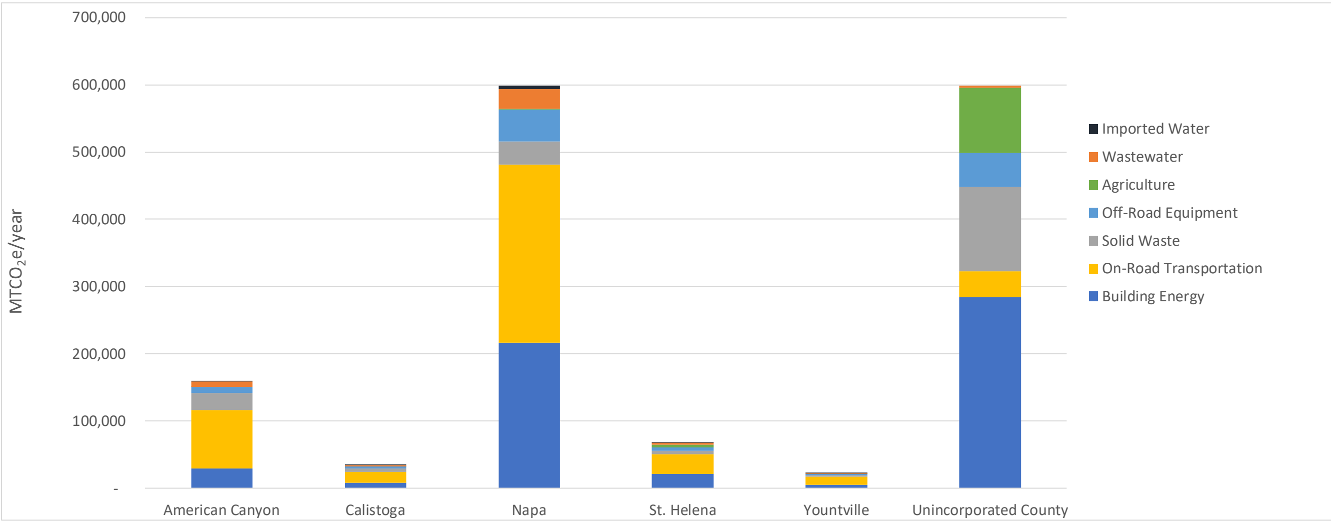
Source: Prepared by Ascent Environmental in 2022.



	American Canyon	Calistoga	Napa	St. Helena	Yountville	Unincorporated County	Total County
Jobs	10,000	2,700	40,500	3,100	1,100	13,800	71,200
Population	20,996	5,352	79,016	6,094	2,793	25,357	139,608

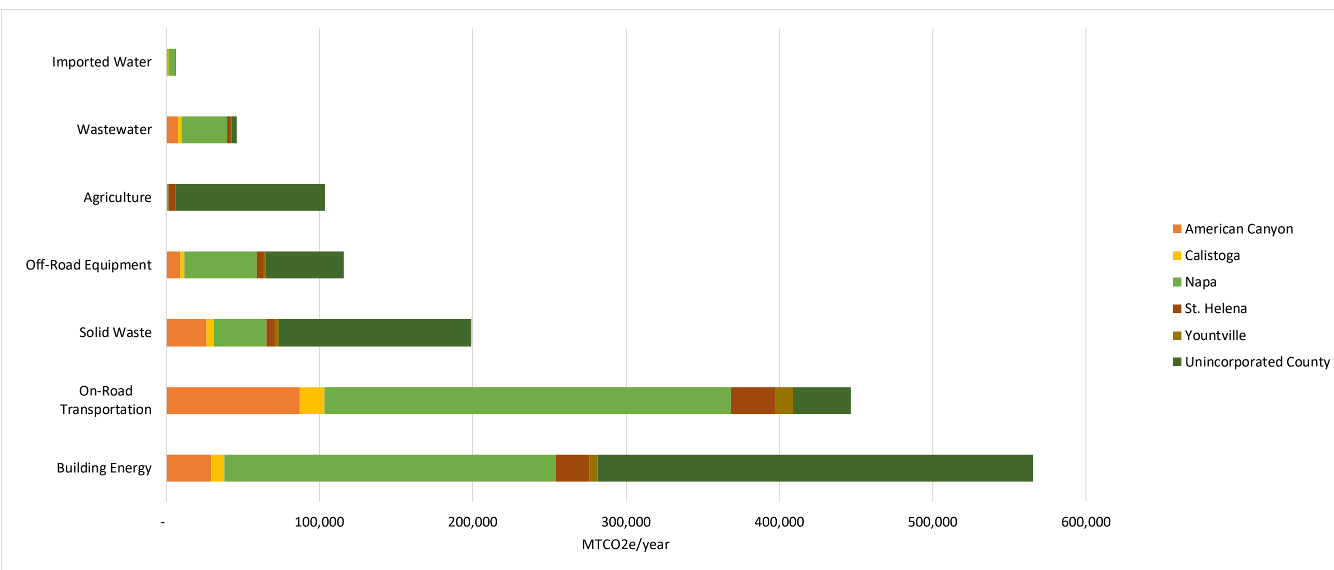
Source: Department of Finance (DOF) 2022, Employment Development Department (EDD) 2022.

Figure 3 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Jurisdiction



Source: Prepared by Ascent Environmental in 2022.

Figure 4 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Jurisdiction and Sector ($MTCO_2e$/year)



Source: Prepared by Ascent Environmental in 2022.

Figure 5 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Sector and Jurisdiction ($MTCO_2e$/year)

As shown in Table 5 and Figure 4, emissions tend to be proportional to the level of economic activity in a jurisdiction (e.g., agricultural activity in the Unincorporated County, job and population centers in the City of Napa). For this reason, normalized emissions per capita and emissions per service population are also provided in Table 5, based on data available from Department of Finance (DOF) and the Employment Development Departments (EDD) and shown in Table 6. The region emitted 10.6 $MTCO_2e$ per capita per year in 2019. This is on-par with the state average emissions of 10.5 $MTCO_2e$ per capita in 2019 and may be slightly higher than estimated as the state's inventory includes additional smaller emission sectors (e.g., high-global warming potential gases, which account for 5 percent of the state's emissions) (CARB 2021a, 2021b). These normalized factors also show that Calistoga has the lowest GHG emissions per capita and per service population in the region (6.5 $MTCO_2e$ per capita); and St. Helena has the highest GHG emissions per capita and service population (11.1 $MTCO_2e$ per capita) out of the incorporated jurisdictions. The Unincorporated County has the highest emissions per capita in the region (23.9 $MTCO_2e$ per capita), due mostly to the greater proportion of agricultural and industrial activity in that area against population.

HIGHLIGHTS BY JURISDICTION

Unincorporated County

The Unincorporated County emitted 598,802 $MTCO_2e$ in 2019 and has the highest emissions per capita (23.9 $MTCO_2e$/person/year) in the region. This is likely due two major reasons. First, winemaking and vineyard activities are prevalent throughout the Unincorporated County, as evidenced by the large proportion of building energy-related emissions attributable to the area (50 percent) despite having a smaller population (shown in Figure 5). Second, the agricultural and solid waste sectors are understandably high in the Unincorporated County due to the proportion of agricultural lands and location of landfills in the area. Building energy, agriculture, and solid waste accounted for 85 percent of the Unincorporated County's emissions in 2019. Emissions from building energy and agriculture overshadow emissions from on-road transportation, which only accounted for 6 percent of the area's emissions. Thus, the presence of solid waste landfills and high levels of agricultural activity contribute to the Unincorporated County's high emissions.

City of Napa

The City of Napa emitted nearly the same level of emissions as the Unincorporated County in 2019 (598,302 $MTCO_2e$/year) and has lower emissions-per-capita (7.5 $MTCO_2e$/person/year). As the largest city in the region, the City of Napa is a major job and population center in the region, accounting for 57 percent of the jobs and population in the region in 2019, as shown in Figure 3. The City of Napa, thus, understandably accounts for the majority of the building energy and on-road transportation emissions in the region as jobs and population both generate vehicle trips through commuting and commerce. The city is also a major tourist destination with a prominent hospitality industry, further contributing to higher transportation and building emissions. The City of Napa accounted for 38 percent of regional building energy emissions and 59 percent of regional on-road transportation emissions. These two emissions sectors are also the largest sectors with the city's own inventory; building energy and on-road transportation accounted for 39 and 42 percent of the city's total emissions, respectively, for a total of 81 percent of the city's emissions in 2019, when rounded. As the population center, the City of Napa is also the largest emitter of wastewater emissions, accounting for 64 percent of total wastewater emissions.

American Canyon

American Canyon was the next largest emitter in the region, emitting 159,719 $MTCO_2e$/year in 2019 and with a slightly higher emissions-per-capita (7.6 $MTCO_2e$/person/year). American Canyon is the second largest city in the region but is about a quarter of the size of the City of Napa. Even so, American Canyon makes up about 19 percent of total on-road transportation emissions in the region. On-road transportation is also the largest sector in the city, accounting for 54 percent of the city's emissions. This is possibly due to its location at the southern end of the county and subsequent proximity to other major job centers in the Bay Area, resulting in higher VMT associated with commuting.

St. Helena

St. Helena emitted 67,657 $MTCO_2e$/year in 2019, less than half of American Canyon's emissions in the same year. St. Helena accounted for 5 percent of the region's emissions. Despite this lower total emissions, St. Helena had the highest emissions-per-capita at 11.1 $MTCO_2e$/person/year. This could possibly be due to St. Helena's status as a major tourist destination. On-road transportation accounted for 43 percent of emissions generated by the city. As shown in

Table 5, St. Helena has the highest transportation-related emissions per capita in the region, over 40 percent higher than the City of Napa. St. Helena is also the third smallest city in the region, with a population of 3,100.

Calistoga

Calistoga emitted 34,982 $MTCO_2e$/year in 2019, nearly half of St. Helena's emission in the same year. Calistoga only accounted for 2 percent of the region's emissions. Calistoga also had relatively low emissions per capita at 6.5 $MTCO_2e$/person/year despite it being the second smallest city in the region with a population of 2,700. Its largest sectors were on-road transportation (46 percent) and building energy (24 percent), together accounting for 70 percent of the city's emissions.

Yountville

Yountville emitted 22,332 $MTCO_2e$/year in 2019 and only accounted for 2 percent of the region's emissions. Despite these low emissions, Yountville had the second highest emissions per capita at 7.5 $MTCO_2e$/person/year despite it being the smallest city in the region with a population of 1,100. Like St. Helena, Yountville is also a major tourist destination, and a high proportion of its emissions are from on-road transportation (52 percent), which are nearly double that of emissions from building energy (25 percent). Together, on-road transportation and building energy accounted for 77 percent of the city's emissions.

COMPARISON WITH THE 2005 REGIONAL INVENTORY

The 2019 regional inventory updates a previous regional inventory conducted for the year 2005. However, due to differences in methodology and data sources, the following assumptions and data were adjusted to allow for a proper comparison between the two inventories. These adjustments are only to be considered for purposes of comparison with the 2005 inventory only. The formal results for the updated 2019 GHG inventory are presented in the previous three sections.

- The 2019 values were adjusted to the global warming potential (GWP) factors from IPCC's Second Assessment Report (SAR), consistent with the methodology used in the 2005 inventory (NCTPA 2009). This approach was necessary because the 2005 inventory did not make CH_4 and nitrous oxide (N_2O) emissions available for adjustment with newer GWP factors from IPCC's Sixth Assessment Report (AR6) (IPCC 2021).
- 2019 on-road transportation activity was modified to use vehicle miles travelled (VMT) from the California Department of Transportation's (Caltrans) Highway Performance Monitoring System (HPMS), the same source used in the 2005 inventory (Caltrans 2020). In contrast, the main 2019 inventory update is based on the Regional Targets Advisory Committee (RTAC) method, which accounts for VMT generated by the jurisdiction and excludes pass-through trips. Caltrans roadway VMT estimates are generally much higher than the RTAC method. Regional VMT data by origin and destination were not readily available for 2005. (See Section 4).
- Only sectors that were present and verifiable in the 2005 inventory were included in the comparison.
    - The comparison excludes water and wastewater emissions sectors evaluated in the 2019 inventory, but which were not included in the 2005 inventory.
    - Additionally, agricultural emissions are excluded. Although both the 2005 and 2019 inventories include an agricultural sector, the 2005 inventory did not specify how the agricultural emissions were derived. Without knowing the specific sub-sectors that were incorporated in the 2005 agricultural sector, a proper comparison could not be made between the two years.
    - Off-road equipment were modeled in 2005 using a much less sophisticated model (OFFROAD2007) compared to the one used for the 2019 inventory (OFFROAD2021). The 2005 offroad inventory consisted of lawn and garden equipment, industrial, and commercial equipment. 2019 includes all offroad

equipment types in CARB's OFFROAD2021 model, except agriculture. It is possible that the 2005 inventory included fewer vehicle types and lower activity overall than the 2019 inventory, but that is uncertain. Thus, off-road equipment emissions were excluded from this comparison.

After accounting for these adjustments, Table 6 and Figure 6 show the 2005 baseline inventory alongside the 2019 inventory, for comparison purposes only. Between 2005 and 2019, countywide emissions decreased by 1 percent. This decrease in emissions between 2005 and 2014 is due to a combination of factors including, but not limited to:

- Increased population, jobs, and visitors affecting increased activity levels (e.g., building energy use, vehicle travel).
- Greater reductions in energy emission factors and building energy efficiency (e.g., less polluting vehicles, building renovations, more renewables in the electricity portfolio).
- Adjustments in calculation methodologies (e.g., models, equations, and emission factors).
- Differences in data sources between the two inventories.

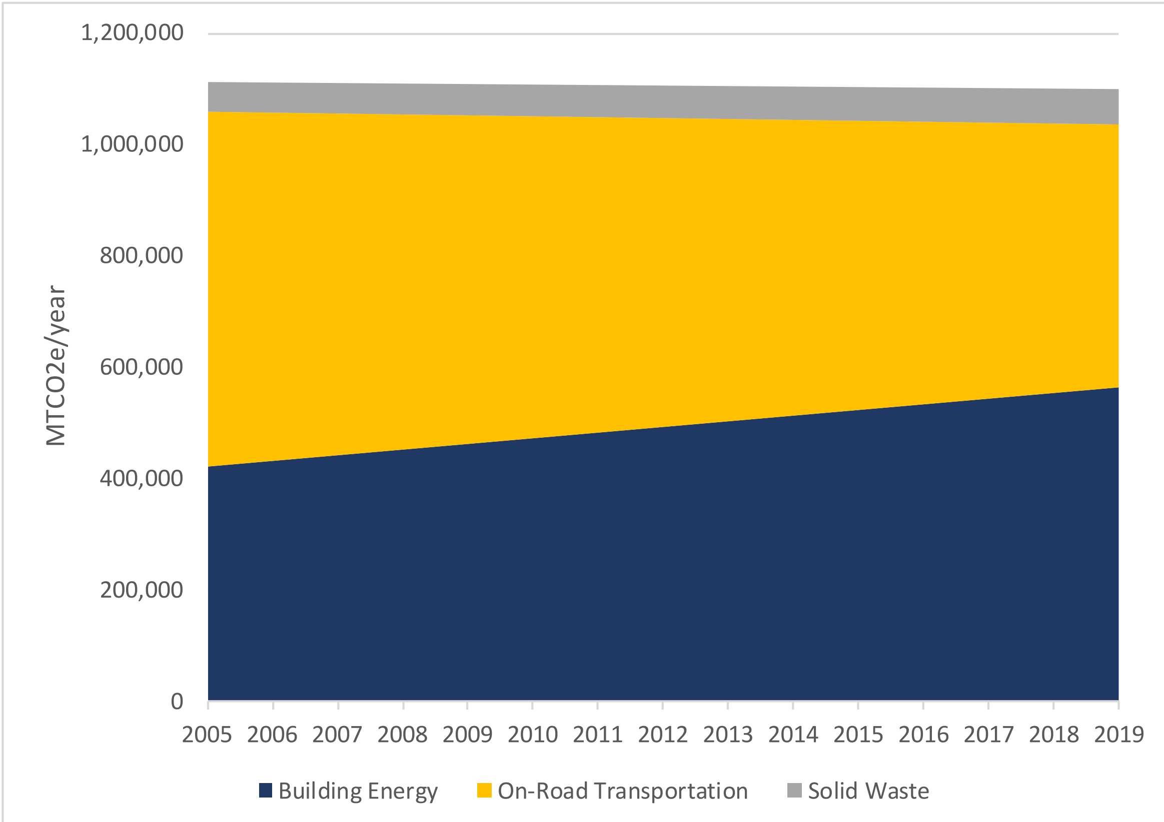
Table 6 Comparison of Napa County 2005 and 2019 Regional Greenhouse Gas Inventories by Sector (for comparison only) (MTCO$_2$e/year)

Emissions Sector	2005	2019	Percent Change	Primary Differences[1]
Building Energy	423,011	564,033	33%	Increased usage of both electric and natural gas. Decreased emission factors.
On-Road Transportation	636,724	471,256	-26%	Increases in regional VMT reported in Caltrans's HPMS data.
Solid Waste	54,209	63,409	17%	Increased accumulation of waste in landfills.
Total	1,113,944	1,098,698	-1%	

Notes: The 2005 inventory did not include water and wastewater sectors. Therefore, for comparison purposes, those sectors are excluded from this comparison table. CARB = California Air Resources Board, VMT = vehicle miles travelled, HPMS = Highway Performance Monitoring System, RTAC = Regional Targets Advisory Committee.

[1] After adjusting the 2019 inventory to use GWP factors from IPCC's Second Assessment Report and other calculation methods.

Source: Prepared by Ascent Environmental in 2022. NCTPA 2009.



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Note: Graph based on 2005 and 2019 emissions inventories. Emissions based on GWP factors using IPCC's Second Assessment Report. Emissions between 2005 and 2019 are interpolated. Excludes offroad, agriculture, water, and wastewater emissions. GWP = global warming potential, IPCC = Intergovernmental Panel on Climate Change.

Source: Prepared by Ascent Environmental in 2022.

Figure 6 Napa County Regional Greenhouse Gas Emissions Inventory from 2005 to 2019 (for comparison only)

As shown in Table 6 and Figure 6, the decreases in emission in on-road transportation emissions outweigh the increase in emissions from building energy and solid waste . The building energy sector has surpassed on-road transportation as the largest emissions sector in the region. This could be attributed, in part to population and job growth in the county. To provide context, between 2005 and 2019, the region's population increased by 7 percent and jobs increased by 4 percent, according to the DOF and EDD (DOF 2012, 2021; EDD 2022). Although both population and emissions increased in the region, the average GHG emissions per capita and per service population also decreased by 8 percent with the contribution of the state's renewable portfolio goals and expanded clean vehicle standards.

DATA, METHODS, AND ASSUMPTIONS

The basic calculation for estimating GHG emissions involves two primary inputs: activity data and emissions factors. Activity data refers to the relevant measurement of a community's activity resulting in emissions, and emissions factors represent the amount of a GHG emitted on a per unit of activity basis. Emissions factors are applied to activity data (i.e., the two values are multiplied together) to estimate GHG emissions. For example, in the residential energy sector, activity data of annual community electricity consumption in megawatt-hours (MWh) is multiplied by an emissions factor in pounds of GHG per MWh, which results in a pounds of GHG emissions value. This calculation-based methodology is used for estimating emissions from most sources in the region's inventory.

In addition to including new GHG emissions sectors and sources, the 2019 inventory update includes several changes to the data sources and emission factors used, along with changes in methods. These differences were necessary in cases where the original data sources used in the 2005 inventory were no longer available or have been updated. New methods that provide more accurate emissions estimates are available for sectors such as the on-road vehicles and solid waste sectors. The general approach used to estimate the region's 2019 GHG inventory is consistent with the latest guidance from the Community Protocol (ICLEI 2019). The calculations relied on activity data provided by each jurisdiction, sector-specific sources of information, and GWP factors from AR6 (IPCC 2021).

An overview of activity data and emissions factors for each emissions source, along with data sources, is shown in Table 8. Detailed methods are described in the following sections.

Table 8 2019 Napa County Regional GHG Inventory Summary of Activity Data and Emissions Factors

Sector/Source	Input Type	Description and Data Sources
Agriculture		
Livestock Management	Activity data	Livestock population data from the County of Napa Agricultural Commissioner's Office's 2019 Crop Report
	Emissions factor	Livestock-specific emissions factors from CARB, IPCC, and EPA
Fertilizer Application	Activity data	Fertilizer application data from CDFA's Fertilizer Tonnage Report 2019
	Emissions factor	Fertilizer emissions factors from IPCC 2006
Agricultural Equipment - Off-Road Equipment	Activity data	Off-road vehicles and equipment activity data and emissions factors from CARB's OFFROAD2021 model
	Emissions factor	
Agricultural Equipment – Diesel Engines	Activity data	Diesel-powered agricultural stationary engines (e.g., irrigation pumps) from BAAQMD permit data.
	Emissions factor	Napa County region-specific average emissions factor from CARB
On-Road Transportation		
On-Road Transportation	Activity data	VMT data from MTC's Regional Travel Demand Model via the VMT Data Portal.
	Emissions factor	Napa County-specific emissions factors from CARB's EMFAC2021 model.
Building Energy		
Electricity	Activity data	Electricity consumption data from PG&E and MCE
	Emissions factor	Utility-specific emissions factors from TCR, EPA's eGRID, CEC's Power Content Label.
Natural Gas	Activity data	Natural gas consumption data from PG&E
	Emissions factor	Average emissions factors from TCR
Solid Waste		
Community-Generated Solid Waste	Activity data	Waste and ADC disposal data from the California Department of Resources Recycling and Recovery
	Emissions factor	Mixed municipal solid waste emissions factor from EPA
Waste-in-Place	Emissions Data	Direct methane and nitrous oxide fugitive emissions reports from in-boundary landfills from EPA.

Sector/Source	Input Type	Description and Data Sources
Off-Road Vehicles and Equipment		
Off-Road Vehicles and Equipment	Emissions Data	County-level off-road vehicles and equipment emissions data from CARB's OFFROAD2021 model
Wastewater Treatment		
Wastewater Treatment	Activity data	Population data in the region and population served by septic tanks
	Emissions factor	Emissions factors based on population-based factors for centralized wastewater treatment and septic systems from ICLEI
Water Supply		
Water Supply	Activity data	Water consumption data by source from each jurisdiction
	Emissions factor	Energy intensity factors from 2015 CPUC Water/Energy Cost-Effectiveness Analysis.

Notes: MTC = Metropolitan Transportation Commission; CARB = California Air Resources Board; CEC = California Energy Commission; CPUC = California Public Utilities Commission; EPA = U.S. Environmental Protection Agency; ICLEI = ICLEI – Local Governments for Sustainability; IPCC = Intergovernmental Panel on Climate Change; District; PG&E = Pacific Gas and Electric Company; MCE = Marin Clean Energy; TCR = The Climate Registry; VMT = vehicle miles traveled; ADC = alternative daily cover; BAAQMD = Bay Area Air Quality Management District.

Source: Ascent Environmental 2022.

Additionally, demographic data related to population, jobs, and housing in the unincorporated County were obtained from DOF and EDD (DOF 2021, EDD 2022).

Global Warming Potentials

GHG emissions other than CO_2 generally have a stronger insulating effect and thus, a greater ability to warm the Earth's atmosphere through the greenhouse effect. This effect is measured in terms of a pollutant's GWP factor. CO_2 has a GWP factor of one while all other GHGs have GWP factors measured in multiples of one relative to the GWP of CO_2. This conversion of non-CO_2 gases to one unit enables the reporting of all emissions in terms of carbon dioxide equivalent (CO_2e), which allows for the consideration of all gases in comparable terms and makes it easier to communicate how various sources and types of GHG emissions contribute to climate change. The standard unit for reporting emissions is $MTCO_2e$.

Consistent with the best available science, these inventories use GWP factors published in the Sixth Assessment Report from IPCC, where CH_4 and nitrous oxide (N_2O) have GWP factors of 27.9 and 273, respectively (IPCC 2021). These values represent the GWP of GHG on a 100-year time horizon. This means that CH_4 is approximately 28 times stronger than CO_2 and N_2O is 273 times stronger than CO_2 in their potential to warm Earth's atmosphere over the course of 100 years. In comparison, the SAR, used in the development of the 2005 inventory, reported GWP's of 21 and 310 for CH_4 and N_2O, respectively. The use of 100-year GWP values is consistent with CARB methods and reflects the long-term planning horizon of the CAP.

BUILDING ENERGY SECTOR

Based on GHG emissions modeling conducted, residential and non-residential building energy use in 2019 resulted in 564,336 $MTCO_2e$ in 2019. This sector comprised approximately 38 percent of the region's emissions, resulting in the largest emissions sector in the inventory. These emissions were a result of electricity and natural gas energy use at buildings and facilities. The building energy sector consumed 927 megawatt-hours (MWh) of electricity and 103 million therms of natural gas. This estimate includes a negative credit for electricity consumption from electric vehicle charging to avoid double-counting with the on-road vehicle sector.

Marin Clean Energy (MCE), a community choice aggregation (CCA) program that offers additional renewable electricity options to northern Bay Area counties, began enrollment of customers in the region in 2015. Through automatic enrollment, customers are allowed to either increase their renewable mix for an additional fee or opt out of the program. Those opting out would have, by default, PG&E's resource mix (MCE 2015). In 2019, 85 percent of electricity use in the region was purchased from MCE, with 5 percent purchased from MCE's Deep Green option (Herrick, pers. comm., 2022). In this year, MCE customers had a 60 percent renewable mix and 90 percent GHG-free mix offered through their Light Green option and a 100 percent renewable mix through their Deep Green and Local Sol options (MCE 2022, MCE 2020). A GHG-free mix is the percent of electricity generated from sources that do not emit GHG emissions, including those that are not renewable (e.g., large hydroelectric, nuclear). The GHG-emitting portion of MCE's energy portfolio (e.g., the 39 percent of Light Green power that is not GHG-free) is assumed to be sourced from "unspecified sources of power," consistent with MCE's current Power Content Label (MCE 2020). The emission factors for the "unspecified sources of power" are assumed to be equal to the average emission factors for the state via eGRID for the CAMX region (455 lb CO_2e/MWh). This resulted in an average MCE emissions factor of 58 lb CO_2e/MWh for 2019.

In 2019, 15 percent of electricity use in the region was purchased from PG&E. PG&E supplied its customers electricity with a renewable mix of 28.5 percent, with 1.5 percent from geothermal sources (which generate some GHGs) (CEC 2020). 2019 was an anomalous year for PG&E in that the utility reported that the remaining 71.5 percent of electricity supplied in that year were from GHG-free sources, consisting of large hydroelectric and nuclear sources, for a total of 99 percent GHG-free sources for PG&E in 2019 (CEC 2020). For context, in 2018 and 2020, 15 to 16 percent of PG&E's electricity was generated from natural gas (CEC 2019, 2021). Based on the distribution of participation in MCE in the region in 2019, 99.5 percent of the region's electricity use was generated with GHG-free sources, resulting in a regional average emission factor of 21 lb CO_2e/MWh. This analysis is detailed in Table 9.

PG&E supplied all the natural gas used in the region in 2019. Due to the lower emissions from electricity consumption, GHG emissions from the use of natural gas accounted for approximately 99 percent of total emissions from the building energy sector. Approximately 30 percent of building natural gas emissions were from non-residential customers, contributing a total of 165,949 $MTCO_2e$ in 2019. Residential buildings generated 382,148 $MTCO_2e$, or approximately 70 percent of total building natural gas emissions.

Table 10 presents emission factors used to quantify emissions from electricity and natural gas use. Tables 11 and 12 presents building electricity and natural gas use and associated emissions by jurisdiction, respectively.

Table 9 2019 Napa County Regional Utility Participation (Percent of Electricity Use per Jurisdiction)

Jurisdiction	PG&E		MCE Light Green		MCE Deep Green	
	Electricity Use (MWh)	Percent of Electricity Use	Electricity Use (MWh)	Percent of Electricity Use	Electricity Use (MWh)	Percent of Electricity Use
American Canyon	26,616	25.6%	74,747	71.9%	2,582	2.5%
Calistoga	1,939	6.9%	25,980	92.7%	112	0.4%
Napa	64,494	17.4%	290,725	78.4%	15,462	4.2%
St. Helena	6,457	10.7%	39,121	65.1%	14,516	24.2%
Yountville	1,137	2.7%	30,644	74.0%	9,625	23.2%
Unincorporated County	37,411	11.6%	284,955	88.4%	138	0.0%
Total	138,054	14.9%	746,172	80.5%	42,435	4.6%

Notes: PG&E = Pacific Gas and Electric, MCE = Marin Clean Energy.

Source: Data provided by Ascent Environmental in 2022.

Table 10 2019 Napa County Regional GHG Inventory: Building Energy Emission Factors

Emission Factor	Unit	Source
Electricity – PG&E (99% GHG-Free)		
18.7	lb CO_2/MWh	TCR 2020
3.1	lb CH_4/GWh	eGrid 2019 (EPA 2021)
0.4	lb N_2O/GWh	eGrid 2019 (EPA 2021)
20.7	lb CO_2e/MWh	Calculated
Electricity – MCE Light Green (90% GHG-Free[1])		
44.0	lb CO_2/MWh	MCE 2022, TCR 2020
3.2	lb CH_4/GWh	MCE 2022, eGrid 2019 (EPA 2021), TCR 2020
0.4	lb N_2O/GWh	MCE 2022, eGrid 2019 (EPA 2021), TCR 2020
57.8	lb CO_2e/MWh	Calculated
Electricity – MCE Deep Green (100% GHG- Free)		
0.0	lb CO_2/MWh	MCE 2022
0.0	lb CH_4/GWh	MCE 2022
0.0	lb N_2O/GWh	MCE 2022
0.0	lb CO_2e/MWh	Calculated
Natural Gas		
5.31	kg CO_2/therm	TCR 2020
0.47	g CH_4/therm	TCR 2020
0.01	g N_2O/therm	TCR 2020
5.32	g CO_2e/therm	Calculated

Notes: CH_4 = CH_4; CO_2 = carbon dioxide; eGrid = Emissions & Generation Resource Integrated Database; EPA = U.S. Environmental Protection Agency; GHG = greenhouse gas; GWh = gigawatt-hours; kg = kilograms; lb = pounds; MT = metric tons; MWh = megawatt-hours; N_2O = nitrous oxide; PG&E = Pacific Gas and Electric; MCE= Marin Clean Energy; TCR = The Climate Registry.

Source: CEC 2020, MCE 2022, EPA 2021, TCR 2020; data compiled by Ascent Environmental 2022.

Table 11 2019 Napa County Regional GHG Inventory: Building Electricity Use and GHG Emissions by Jurisdiction

Jurisdiction	Electricity Use (MWh/yr)			GHG Emissions ($MTCO_2e$/yr)		
	Residential	Non-Residential	Total	Residential	Non-Residential	Total
American Canyon	35,398	68,547	103,945	661	1,085	1,747
Calistoga	12,053	15,979	28,032	225	314	539
Napa	159,409	211,272	370,681	2,974	3,454	6,428
St. Helena	18,667	41,427	60,094	332	512	844
Yountville	6,472	34,934	41,406	117	507	624
Unincorporated County	98,777	223,726	322,503	1,850	4,208	6,058
Total	330,776	595,885	926,661	6,160	10,079	16,240

Notes: Totals in columns may not add due to rounding. PG&E provided electricity use for 2019 by zip codes. These data were apportioned to each jurisdiction by the relative population in each zip code. MCE provided electricity use directly by jurisdiction.

MWh = megawatt-hours; MT = metric tons; CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent; PG&E=Pacific Gas and Electric; MCE= Marin Clean Energy.

Source: Data provided by Ascent Environmental in 2022 based on data provided by MCE and PG&E.

Table 12 2019 Napa County Regional GHG Inventory: Building Natural Gas Use and GHG Emissions by Jurisdiction

Jurisdiction	Natural Gas Use (therms/yr)			GHG Emissions ($MTCO_2e$/yr)		
	Residential	Non-Residential	Total	Residential	Non-Residential	Total
American Canyon	5,040,518	89,005	5,129,523	26,825	474	27,299
Calistoga	1,443,578	31,352	1,474,929	7,682	167	7,849
Napa	24,511,805	14,872,674	39,384,478	130,448	79,150	209,598
St. Helena	2,156,533	1,731,322	3,887,855	11,477	9,214	20,691
Yountville	858,030	58,152	916,182	4,566	309	4,876
Unincorporated County	37,797,011	14,400,058	52,197,069	201,150	76,635	277,785
Total	71,807,474	31,182,562	102,990,036	382,148	165,949	548,097

Notes: Totals in columns may not add due to rounding. PG&E provided natural gas use for 2019 by zip code. These data were apportioned to each jurisdiction by the relative population in each zip code.

MT = metric tons; CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent; PG&E=Pacific Gas and Electric.

Source: Data provided by Ascent Environmental in 2022 based on data provided by PG&E and TCR.

WASTEWATER GENERATION

Based on modeling conducted, wastewater generation in 2019 resulted in emissions of approximately 45,858 $MTCO_2e$, or 3 percent of total emissions, primarily from fugitive CH_4. All wastewater generated within each jurisdiction is treated in a number of methods: (1) conveyed to other wastewater treatment facilities in the region through sewer systems or (2) treated on-site via a septic tank system.

This sector accounts for the CH_4 and N_2O emissions from wastewater treatment processes. Wastewater treatment facilities are located wholly within the region and not exported outside of the area. Thus, the electricity use at those facilities is captured in the building energy sector and is excluded from the wastewater sector. These emissions are summarized in Table 13.

Table 13 2019 Napa County Regional Wastewater Methane Emissions by Source

Wastewater Treatment Process Emissions					
Wastewater Source	Population Served	$MTCO_2$/yr	$MTCH_4$/yr	MTN_2O/yr	$MTCO_2e$/yr
Septic	24,459	0	106	0	2,961
WWTP	230,299	0	1,533	0.461	42,897
Total	*254,757*	0	*1,639*	*0.461*	*45,858*

Notes: Totals may not add due to rounding. MG = million gallons; MT = metric tons; CH_4 = methane; CO_2e = carbon dioxide equivalent, MGD = million gallons per day.

Source: Data provided by Ascent Environmental in 2022.

Domestic Wastewater

Domestic wastewater CH_4 emissions were based on average population-generated wastewater rates from:

- equations WW.11 (alt) for septic systems and WW.6 (alt) and WW.8 for sewer systems from the Community Protocol;
- the County's estimate of the percent of the population that are serviced by sewer connections and septic connections; and
- the 2019 population estimates for each jurisdiction, available from the California Department of Finance.

Across all jurisdictions, it is estimated that approximately 90 percent of the region's population is served by centralized wastewater treatment facilities and while the other 10 is served by on-site septic tanks for wastewater treatment. Table WW.15.1 from the Community Protocol shows that California's average wastewater generation factor is 100 gallons per day per capita (ICLEI 2019). Using this factor, the region is estimated to have generated 9.3 billion gallons of wastewater in 2019.

IMPORTED WATER

Based on modeling conducted, water imports into the region accounted for 5,943 $MTCO_2e$ in 2019, less than one percent of the region's 2019 GHG inventory. These resulted from GHG emissions from electricity generation required to deliver and treat water outside the region. Water conveyance within the region is assumed to be accounted for under the electricity usage reports from MCE and PG&E. Each of the six jurisdictions in the region provided total water volume deliveries to their jurisdiction in 2019 broken out by water source and type of water (e.g., recycled, potable). Water conveyance and treatment energy rates per gallon vary by water source and type. These factors were available from a 2015 Water-Energy Cost Effectiveness Analysis released by the California Public Utilities Commission (CPUC) (CPUC 2015). Water conveyed from the State Water Project (SWP) in the San Francisco Bay water region requires 926 kWh per acre feet, which is between 2 and 90 times more energy than water sourced from local surface water, depending on the local source (e.g., groundwater, local deliveries) (CPUC 2015). Based on data collected, all the water imported to the region was sourced from the SWP and resulted in the usage of approximately 28.8 GWh outside of the region in 2019. Average eGRID CAMX emission factors were applied to this usage to get total emissions from imported water use. Results are shown below in Table 14 and 15 below.

Table 14 2019 Napa County Regional Imported Water and Energy Use by Jurisdiction

Jurisdiction	State Water Project (MG/year)	MWh/Year
American Canyon	661	4,759
Calistoga	154	1,109
Napa	2,948	21,224
St. Helena	191	1,378
Yountville	43	313
Unincorporated County	0	0
Total	3,998	28,783

Notes: MG = million gallons, MWh = megawatt hours

Source: Data compiled by Ascent Environmental in 2022.

SOLID WASTE

Based on modeling conducted, the solid waste sector was responsible for approximately 198,862 $MTCO_2e$, or 14 percent of the region's 2019 GHG inventory. The Community Protocol recommends that community GHG inventories include emissions from both solid waste facilities located in the community (i.e., "waste-in-place") and waste generated by the community. Waste-in-place CH_4 emissions from landfill gas (LFG) generated at solid waste facilities located within the region accounted for 114,619 $MTCO_2e$, or 57 percent of emissions from the solid waste sector. CH_4 emissions from decay of waste generated annually by residences and businesses in the region accounted for 84,243 $MTCO_2e$, or 42 percent of emissions from the solid waste sector. Table 15 summarizes emissions from the solid waste sector.

LFG is a mix of gases, primarily composed of CH_4, generated from decomposing organic waste and waste chemical reactions and evaporation in landfills. If a landfill has an impermeable membrane that covers a portion or all of the landfill (i.e., cover-and-capture), it can harvest the LFG and prevent CH_4 emissions from being released into the atmosphere. Once captured, a landfill can either convert the CH_4 to CO_2 through flaring or use it as a fuel for other energy-related applications. For the two landfills in the region, LFG generation and flaring rates for 2019 were available from EPA's Facility-Level Information on Greenhouse Gases (FLIGHT) database (EPA 2022). Any CO_2 emissions from flaring were not counted toward the region's inventory because the IPCC considers any CO_2 emissions from flaring or fugitive emissions to be of biogenic origin and not significant to overall solid waste emissions (IPCC 2006).

Table 15 2019 Napa County Regional GHG Inventory: Solid Waste Generation Emissions by Jurisdiction

Jurisdiction	Waste Generation			Waste-in-Place		$MTCO_2e$
	Annual Waste Tonnage	Annual ADC Tonnage	$MTCH_4$	$MTCH_4$	MTN_2O	
American Canyon	68,529	657	930	0	0	25,938
Calistoga	12,519	1,092	179	0	0	4,984
Napa	50,755	41,501	1,227	0	0	34,236
St. Helena	14,254	1,243	203	0	0	5,675
Yountville	6,533	570	93	0	0	2,601
Unincorporated County	28,105	761	4,495	4,108	<1	125,429
Total	180,695	45,824	7,127	4,108	<1	198,862

Notes: ADC = Alternative Daily Cover, $MTCH_4$ = metric tons of methane, MTN_2O = metric tons of nitrous oxide, $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Data provided by Ascent Environmental 2022 based on data from EPA 2022.

Waste in Place

The only landfills located within the region are the American Canyon Sanitary Landfill (ACSL) and the Clover Flat Landfill near Calistoga, both located in the Unincorporated County. While Clover Flat is open and currently accepting waste, ASCL closed in 1995 and currently has an active LFG collection system. According to FLIGHT, in 2019, the American Canyon landfill generated 2,574 $MTCH_4$ in fugitive CH_4 emissions from accumulated waste at the landfill in 2019 (EPA 2022). Clover Flat also has an active LFG collection system but does not anticipate closure of the landfill until 2053. In 2019, Clover Flat generated 1,534 $MTCH_4$ in fugitive CH_4 emissions (EPA 2022). CH_4 emissions from closed landfills generally decrease overtime due to the gradual reduction in organic decomposition.

Waste Generation

For emissions related to annual solid-waste generation from the community in the region, CH_4 emissions are also generated from organic decomposition. The release of CH_4 emissions from community-generated waste depends on which landfill the waste is disposed at as the LFG management systems differ.

ON-ROAD VEHICLES

Based on modeling conducted, on-road vehicle usage in the region resulted in 446,673 $MTCO_2e$ in 2019, or 30 percent of the County's inventory. On-road vehicle emissions are primarily the result of exhaust from the combustion of gasoline, diesel, and natural gas fuels, based on average 2019 fleet-wide emission factors for Napa County available from EMFAC2021. On-road passenger vehicle activity was based on the annual VMT associated with trips that begin or end in the region. Origin and destination-based daily VMT data by jurisdiction was obtained from average weekday VMT from MTC's VMT Data Portal and (MTC 2015, Brazil pers. comm., 2022). It was assumed that vehicle trips included 100 percent of vehicle trips that both originate from and end in the unincorporated area (i.e., fully internal trips), 50 percent of trips that either end in or depart from the unincorporated area (i.e., internal-external or external-internal trips), and zero percent of vehicle trips that are simply passing through the area (i.e., external-external, or "pass-through," trips). This passenger vehicle trip accounting method is consistent with the method recommended to CARB in 2010 by the RTAC (established through the Sustainable Communities and Climate Protection Act of 2008 [Senate Bill 375]).

MTC provided passenger vehicle VMT only. To estimate VMT from commercial vehicles (e.g., medium and heavy duty trucks), EMFAC2021 was used to calculate a ratio between passenger VMT and non-passenger VMT. Direct VMT and emissions from EMFAC are not typically used in GHG inventories as they are based on odometer data rather than the RTAC method. The calculated passenger-non-passenger ratio was then applied to the VMT from MTC to estimate non-passenger VMT.

Table 16 shows total annual VMT by vehicle fuel type and associated emissions estimates for the region.

Table 16 2019 Napa County Regional GHG Inventory: On-Road Vehicle Fleet Activity and Emissions by Jurisdiction

Jurisdiction	VMT/yr	$MTCO_2$/yr	$MTCH_4$/yr	MTN_2O/yr	$MTCO_2e$/yr
American Canyon	191,054,828	85,061	5	6	86,779
Calistoga	35,752,393	15,918	1	1	16,239
Napa	583,654,224	259,853	14	18	265,100
St. Helena	63,791,559	28,401	2	2	28,975
Yountville	25,806,950	11,490	1	1	11,722
Unincorporated County	83,352,463	37,110	2	3	37,859
Total	983,412,417	437,833	24	30	446,673

Notes: VMT = vehicle miles traveled; kWh = kilowatt-hour; MT = metric tons; CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent.

Source: MTC 2022, Brazil, pers. comm., 2022; data compiled by Ascent Environmental 2022.

MTC provided vehicle travel information for the region based on their regional travel demand model under Plan Bay Area 2040. MTC provided average daily weekday VMT estimates in 2019. These were multiplied by annualization factors recommended by MTC (353.29 days per year for all jurisdictions except the City of Napa, which uses 340.84 days per year) to estimate annual VMT to account for lower VMT during weekends, holidays, and summer periods (Brazil, pers. comm., 2022). Emissions from electricity use in electric vehicles were assumed to be included in the building energy inventory.

OFF-ROAD VEHICLES

Based on modeling conducted, off-road vehicles operating in the region emitted approximately 115,548 $MTCO_2e$ in 2019, or 8 percent of the region's 2019 inventory. These emissions were the result of fuel combustion in off-road vehicles and equipment used in construction, industry, and recreation and were available from CARB's OFFROAD2021 model. Unfortunately, the OFFROAD2021 model only provides emissions detail at the State, air basin, or county level. Napa County emissions data from OFFROAD2021 were apportioned to each jurisdiction area using custom scaling factors depending on the off-road equipment type, as shown in Table 18. For example, due to the likely correlation between commercial activity and employment, each jurisdiction's portion of emissions from light commercial equipment in the County is assumed to be proportional to the number of jobs in the region as compared to the County as a whole. On the other hand, emissions from pleasure craft are assumed to occur entirely within the County because the majority of navigable waterways in the County are located in the unincorporated area. Further details on how OFFROAD emissions from each fleet type were scaled to the unincorporated area are discussed below. Note that, although reported by the OFFROAD model, emissions from agricultural equipment included separately in the agriculture sector and are excluded from the off-road vehicles sector.

Emissions from locomotives (e.g., Napa Valley Wine Train) are not included in the OFFROAD model and were also excluded from the regional inventory at this time. The estimated annual emissions and scaling factors were used to apportion the offroad emissions to each jurisdiction are presented in Table 17 below by fleet type.

Table 17 2019 Napa County Regional GHG Inventory: Off-Road Emissions by Fleet Type

Off-Road Fleet Type	$MTCO_2$/yr	$MTCH_4$/yr	MTN_2O/yr	$MTCO_2e$/yr	Percent	Jurisdiction: Countywide Scaling Method
Airport Ground Support	<1	<1	<1	<1	0%	All assumed to occur in the Unincorporated County
Commercial Harbor Craft	135	<1	<1	140	0%	Employment
Construction and Mining	12,250	1	<1	12,294	11%	Service Population
Industrial	5,366	2	<1	5,490	5%	Employment
Lawn and Garden Equipment	23,608	35	15	28,726	25%	Population
Light Commercial Equipment	23,132	6	4	24,282	21%	Employment
Pleasure Craft	26,792	19	6	28,896	25%	All assumed to occur in the Unincorporated County
Portable Equipment	9,721	3	1	10,088	9%	Employment
Railyard Operations	383	<1	0	383	0%	Employment
Recreational Equipment	1,904	5	2	2,687	2%	Population
Transport Refrigeration Units	2,551	<1	<1	2,561	2%	Service Population
Total	105,841	71	28	115,548	100%	

Notes: MT = metric tons; CO_2 = carbon dioxide; CH_4 = CH_4; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas.

Source: Data provided by Ascent Environmental in 2022, based on modeling from OFFROAD2021.

All commercial and industrial off-road emissions were scaled from countywide estimates by the unincorporated percentage of jobs in 2019. Emissions related to lawn and garden and recreational equipment were scaled by population. Countywide emissions from pleasure craft and airport ground support were assumed to entirely occur in the unincorporated areas.

AGRICULTURE

Based on modeling conducted, emissions from the agriculture sector accounted for approximately 103,381 $MTCO_2e$ from agricultural activity such as off-road equipment, diesel-powered agricultural engines (e.g., irrigation pumps), and stationary equipment, direct emissions from livestock, and fertilizer use. Fuel combustion in off-road farm equipment and fertilizer application made up 46 percent and 21 percent of total emissions from the sector, respectively. Other emissions estimated for this sector were from fertilizer use, lime application, and diesel-powered agricultural engines (e.g., irrigation pumps). These emissions are summarized in Table 18 below.

Table 18 2019 Napa County Regional GHG Inventory: Agriculture Emissions by Source

Source	$MTCO_2$/yr	$MTCH_4$/yr	MTN_2O/yr	$MTCO_2e$/yr	Percent
Agricultural Equipment	130	0	0	47,682	46%
Fertilizer Application	452	-	79	21,948	21%
Diesel Engines	15,417	-	-	15,417	15%
Livestock	-	650	1	18,334	18%
Total	15,999	650	80	103,381	100%

Notes: MT = metric tons; CO_2 = carbon dioxide; CH_4 = CH_4; N_2O = nitrous oxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas.

[1] Pesticide application emissions were less than 0.5 MT.

Source: Data compiled by Ascent Environmental in 2022.

GHG emissions associated with farming equipment were obtained from CARB's OFFROAD2021 model. Farming equipment emissions reported for Napa County are assumed to occur entirely within the region. GHG emissions from fertilizers primarily result from their nitrogen content and the application of urea and lime. Data regarding tonnage of nitrogen and lime were obtained from CDFA's *2019 Fertilizer Tonnage Report* (CDFA 2020). Based on this report, 1,718 tons of nitrogen and 1,132 tons of lime were sold in Napa County in 2019. These amounts were used to estimate GHG emissions. These values include a small percentage of non-farm fertilizer sales which were included to allow for complete accounting of fertilizer use as an emissions source in the region. Emissions factors and quantification methods for GHG emissions associated with fertilizer application were obtained from IPCC (IPCC 2006). Using IPCC's methodologies, approximately 21,994 MT CO_2e were emitted from fertilizer application in 2019. A detailed breakdown of fertilizer emissions by type is shown in Table 19.

Table 19 2019 Agricultural Fertilizer Application Emissions in Napa County

Material	Material (Tons)	CO_2e Emissions (MT CO_2e/year)
Nitrogen	1,718	21,496
Liming Materials	1,132	498
Total	2,850	21,994

Notes: CO_2e = carbon dioxide equivalent. Non-farm fertilizer use was excluded. See the Attachment A for more details.

Source: CFDA 2019, Data modeled by Ascent Environmental in 2022.

According to BAAQMD, there were 131 diesel engines with valid permits in 2019 (Henderson, pers. comm., 2022). These engines are primarily remote irrigation or defrosting equipment which either pump or spray water for their respective purposes. To estimate their emissions, emission factors were quantified from a CARB diesel irrigation report, which estimated that, in 2006, there were 147 diesel irrigation pumps operating in Napa County which emitted an average of 28.4 tons of CO_2 per day, or 0.193 tons of CO_2 per day per pump (CARB 2006). Although this reference is 16 years old, CARB has not released more recent descriptions of their methodology in quantifying this sector. Applying this rate to the total number of permitted diesel engines in the county and multiplying it by 365 days per year resulted in an estimate of 15,417 $MTCO_2$ from the operation of diesel irrigation pumps in 2019.

With respect to livestock emissions, CH_4 and nitrous oxide emissions are released through enteric fermentation (a type of digestion process) and exposure of manure produced by these animals. The 2019 Napa County Crop Report provided estimates of total heads of cattle, calves, goats, and sheep and lambs in the county. All livestock-generated GHG emissions were estimated using population-based emission factors and quantification methods identical to those by CARB in the statewide 2019 GHG inventory.

With the exception of agricultural diesel engines, all sources of agricultural emissions were apportioned to each jurisdiction based on relative proportion of agricultural acres in the region. These acres are presented in Table 20. Agricultural diesel engines were scaled to each jurisdiction based on the engine permit location data provided by BAAQMD.

Table 20 Agricultural Acres by Jurisdiction

Jurisdiction	Agricultural Acres
American Canyon	95
Calistoga	168
Napa	392
St. Helena	1,100
Yountville	46
Unincorporated County	52,213
Total	54,014

Source: Malito, pers. comm., 2022.

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Attachment A

Table A-1 2019 Napa County Regional GHG Inventory – Base Activity Data

Emissions Sector	Sub-Sector	Unit	American Canyon	Calistoga	Napa	St. Helena	Yountville	Unincorporated County	Total
Building Energy	Residential	kWh	35,313,687	11,975,343	157,766,535	17,380,692	6,139,033	98,722,653	327,297,943
		therm	5,040,518	1,443,578	24,511,805	2,156,533	858,030	37,797,011	71,807,474
	Non-Residential	kWh	66,049,300	15,944,090	197,452,669	28,196,934	25,641,919	223,643,234	556,928,146
		therm	89,005	31,352	14,872,674	1,731,322	58,152	14,400,058	31,182,562
On-Road Transportation	Countywide	VMT	176,281,057	32,650,803	518,294,070	60,774,785	23,197,949	73,023,186	884,221,850
Solid Waste	Waste Generation	Tons of Waste	68,529	12,519	50,755	14,254	6,533	28,105	180,695
	Waste Generation	Tons of ADC	657	1,092	41,501	1,243	570	761	45,824
	Waste-in-Place (Clover Flat Landfill)	Reported Annual Methane ($MTCH_4$)	0	0	0	0	0	2,574	2,574
	Waste-in-Place (American Canyon Landfill)	Reported Annual Methane ($MTCH_4$)	0	0	0	0	0	1,534	1,534
Off-Road Equipment	See Note 1								
Agriculture	Agricultural Offroad	See Note 1							
	Fertilizer Application	tons of lime	2	4	8	23	1	1,094	1,132
		tons of nitrogen	3	5	12	35	1	1,661	1,718
	Diesel Engines	No. of engines	0	0	7	41	0	193	241
	Livestock	Calves	4	8	18	52	2	2,461	2,546
		Cattle	10	18	42	117	5	5,558	5,750
		Goats	0	1	1	4	0	193	200
		Sheep and Lambs	3	5	12	35	1	1,643	1,700
Wastewater	Centralized WWTP	Population Served	20,996	5,348	79,300	6,094	2,793	618	115,149
	Septic Tanks	Population Served	0	0	0	0	0	24,459	24,459
Imported Water	State Water Project	MG/year	661	154	2,948	191	43	0	3,998

Note: kWh = kilowatt hours, VMT = vehicle miles travelled, ADC = alternative daily cover, $MTCH_4$ = metric tons of methane, WWTP = wastewater treatment plant, MG = million gallons.

[1] Off-road emissions were directly obtained from CARB's OFFROAD 2021 model and apportioned to each jurisdiction.

Source: Ascent Environmental 2022.

Memo

455 Capitol Mall, Suite 300
Sacramento, CA 95814
916.444.7301

Date: September 14, 2022

To: David Morrison and Deborah Elliott (County of Napa)

From: Honey Walters and Brenda Hom (Ascent Environmental, Inc.)

Subject: Napa County Regional Greenhouse Gas Forecast (2019 – 2030)

1 INTRODUCTION

This technical memorandum presents an estimated forecast of communitywide greenhouse gas (GHG) emissions for the Napa County region (region), including forecasts for each of the six jurisdictions: American Canyon, Calistoga, the City of Napa, St. Helena, Yountville, and the unincorporated areas of Napa County (Unincorporated County) under "business-as-usual" (BAU) and legislative-adjusted BAU scenarios for the year 2030. These forecasts are based on the results of the 2019 communitywide GHG emissions inventory, as well as associated methods, assumptions, emissions factors, and data sources used to develop the updated emissions inventory described in the Napa County Region 2019 Community Greenhouse Gas Inventory Update Summary memorandum that was delivered to the County of Napa (County) on June 7, 2022.

This forecast provides an estimate of future GHG levels based on a continuation of current trends in activity, while also accounting for Federal and State legislative actions to reduce emissions in the future. Such that regional departments and agencies may also choose to expand the scope of their individual documents to address climate adaptation, GHG emissions forecasts provide insights to the scale of regional and local reductions needed to achieve GHG emissions reduction targets. Regional activities could include an incorporation of information contained herein into a General Plan, Climate Action Plan, or other planning document.

1.1 ORGANIZATION OF THIS MEMORANDUM

This memorandum consists of three parts:

- **Section 1:** Summary of Inventory Results presents an overview of the region's 2019 GHG emissions inventories for each jurisdiction.
- **Section 2:** Communitywide GHG Emissions Forecasts summarizes the forecasted GHG emissions under BAU and legislative-adjusted BAU scenarios for 2030. The first scenario, called the BAU scenario, does not account for GHG emissions reductions resulting from laws and regulations adopted by local, regional, State, or federal agencies; it illustrates how much emissions would increase due to population and economic growth if no actions to reduce emissions were taken. The second scenario, a legislative-adjusted BAU scenario, shows emissions reductions from laws and regulations enacted by regional, State, and federal agencies; it does not reflect region's actions to reduce GHG emissions. This section will also describe the data, methods, and assumptions used to quantify the forecasted emissions.
- **Section 3:** GHG Emissions Forecast by Jurisdiction summarizes the regional GHG emissions forecasts by each jurisdiction. This section presents the results for each jurisdiction only without additional detail related to the data, methods, and assumptions, except those that are unique to the jurisdiction.

2 SUMMARY OF INVENTORY RESULTS

2.1 2019 REGIONAL GHG INVENTORY RESULTS

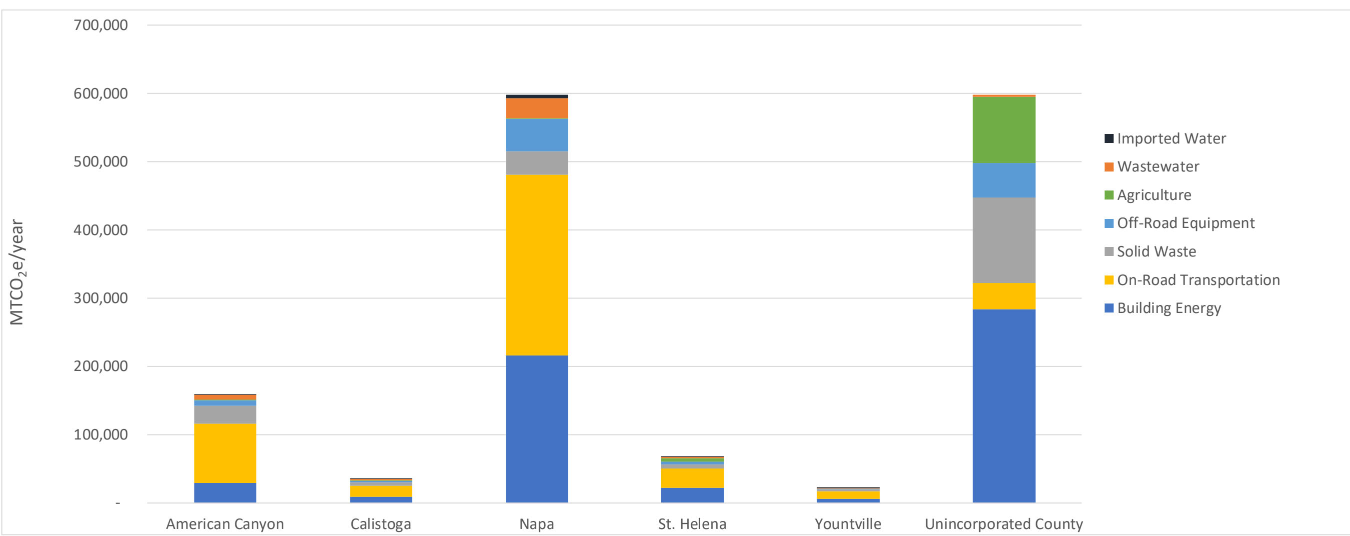
Based on the modeling conducted, regional communitywide sources generated 1,464,007 metric tons of carbon dioxide equivalent ($MTCO_2e$) in 2019. Major emissions sectors for the region included building energy use and on-road transportation. Emissions tend to be proportional to the level of economic activity in a jurisdiction (e.g., agricultural activity in the Unincorporated County, job and population centers in the City of Napa). Table 1 and Figures 1 and 2 present the region's 2019 GHG emissions inventory by jurisdiction and by sector.

Table 1 2019 Napa County Regional Greenhouse Gas Inventory by Jurisdiction and Sector ($MTCO_2e$/year)

Emissions Sector	American Canyon	Calistoga	Napa	St. Helena	Yountville	Unincorporated County	Total
Building Energy	29,045	8,388	216,026	21,535	5,500	283,843	564,336
On-Road Transportation	86,779	16,239	265,100	28,975	11,722	37,859	446,673
Solid Waste	25,938	4,981	34,236	5,676	2,601	125,429	198,862
Off-Road Equipment	8,998	2,880	47,238	4,502	1,328	50,602	115,548
Agriculture	154	274	1,086	4,415	75	97,378	103,381
Wastewater	7,822	1,992	29,542	2,270	1,040	3,191	45,858
Imported Water	983	229	4,383	285	65	0	5,943
Total	159,719	34,982	597,610	67,657	22,332	598,302	1,480,602

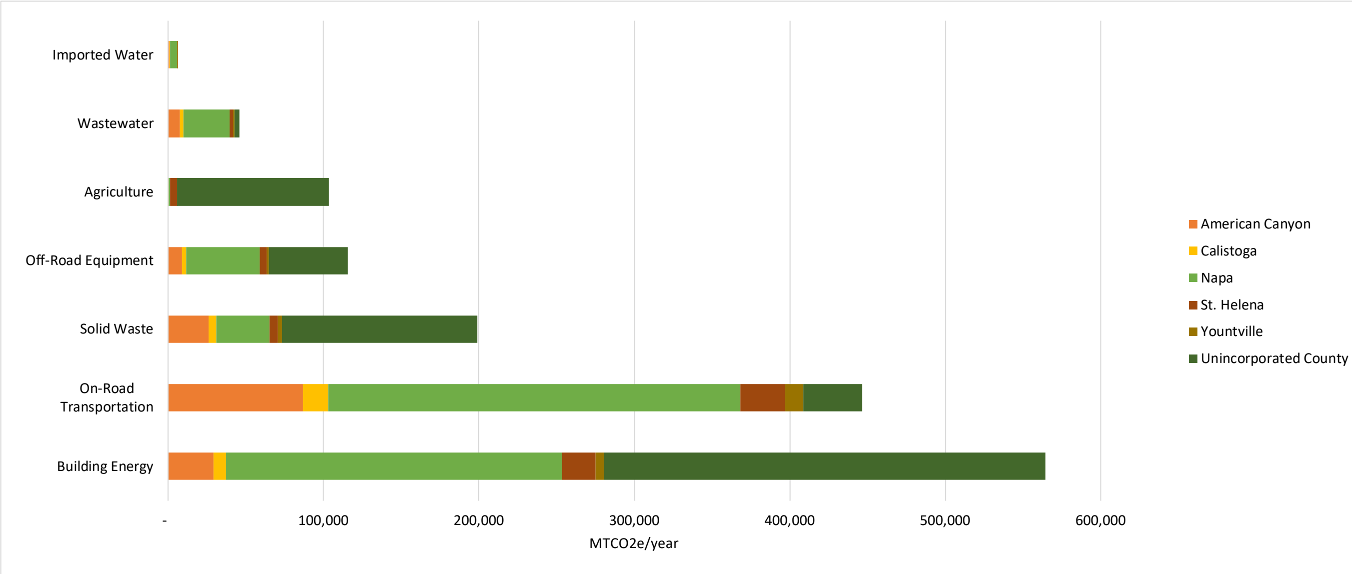
Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.

Source: Prepared by Ascent Environmental in 2022.



Source: Prepared by Ascent Environmental in 2022.

Figure 1 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Jurisdiction and Sector ($MTCO_2e$/year)



Source: Prepared by Ascent Environmental in 2022.

Figure 2 2019 Napa County Regional Greenhouse Gas Emissions Inventory by Sector and Jurisdiction ($MTCO_2e$/year)

3 COMMUNITYWIDE GREENHOUSE GAS EMISSIONS FORECAST

The following BAU GHG emissions forecasts provide an assessment of how emissions generated by community activities will change over time without further local, State, or federal action. In addition to accounting for the region's growth under a BAU scenario, a legislative-adjusted BAU forecast was prepared, which includes adopted legislative and regulatory actions at the local, State, federal levels that would affect emissions without any additional action. These include regulatory requirements to increase vehicle fuel efficiency and increase renewable energy sources in local grid electricity portfolios. It is important to note that the legislative-adjusted BAU emissions forecasts only include emissions reductions associated with implementation of adopted federal, State, and local legislation and regulations and do not include goals established by executive orders or targets established by federal or State agencies. These forecasts provide the region with the information needed to focus efforts on emissions sectors and sources that have the greatest opportunities for GHG emissions reductions. The GHG emissions forecasts for 2030 are aligned with various legislative actions, as shown in Table 4, such as those supporting Senate Bill (SB) 32's target to reduce statewide emissions to 40 percent below 1990 levels by 2030.

For most emissions sectors, except for agriculture and waste-in-place emissions, the regional growth associated with both forecast scenarios were based on demographic and vehicle miles traveled (VMT) projections from 2019 to 2030. Population and employment projections are based on data provided by the cities of American Canyon, Calistoga, the City of Napa, St. Helena, and Yountville along with the County for the unincorporated area using forecasts from the California Department of Finance and local General Planning documents. Additionally, service population, which is the sum of population and employment, was used as a growth factor for specific sectors and sub-sector (e.g., wastewater) whose activities depend on growth in both population as well as employment. Agricultural emissions were scaled by extrapolated trends in historical agricultural land cover in Napa County over the last decade, as tracked by the county's crop reports (County of Napa 2021). Waste-in-place emissions were scaled by the decomposition of waste accumulated at each landfill within the region. All growth factors, except for those used for waste-in-place, were applied based on the percent change from 2019 activity levels for each target year. The applied growth rates for each sector are described in Section 4.

Throughout the region, population and employment are expected to increase by 18 and 17 percent, respectively, from 2019 to 2030. These growth factors were used to forecast emissions for most sectors. Annual VMT projections were developed using the origin-destination method using data from MTC's VMT Data Portal, which uses data from Plan Bay Area 2040 as Plan Bay Area's 2050 VMT data is not readily available by jurisdiction at this time (August 31, 2022). Annual VMT in the region is projected to increase by 11 percent from 2019 by 2030. VMT projections were used to scale emissions from the on-road transportation sector. Table 2 shows growth in population, employment, and annual VMT from 2019 to 2030. Refer to Table 18 for demographic and VMT forecasts by jurisdiction.

Table 2 Napa County Regional Demographic and Vehicle Miles Traveled Forecasts

Forecast Factor	2019	2030	Percent Change (2019-2030)
Population	139,608	164,666	18%
Households	48,908	63,178	29%
Employment	97,452	114,307	17%
Service Population[1]	237,060	278,973	18%
Annual VMT	795,545,462	884,221,850	11%

Notes: VMT = vehicle miles traveled.

[1] Service population is equal to the sum of population and employment.

Sources: Cooper, pers. comm., 2022.; DOF 2021; Mitchem, pers. comm., 2022.; City of Napa, 2022: 2-21.; City of St. Helena, 2022: 2-78.; Shelton, pers. comm., 2022; County of Napa 2008.; U.S. Census Bureau, 2019; MTC VMT Data Portal.

Table 3 shows baseline emissions in 2019 and BAU emissions forecasts for 2030. Under the BAU forecast, regional emissions are anticipated to increase by 16 percent from 2019 to 2030.

Table 3 Napa County Regional GHG Emissions Inventory and BAU Forecasts ($MTCO_2e$)

Sector	2019	2030	Percent Change	Difference
Agriculture	103,381	100,078	-3%	-3,303
Building Energy	564,336	690,404	22%	126,068
Imported Water	5,943	6,794	14%	851
Off-Road Equipment	115,548	140,634	22%	25,086
On-Road Transportation	446,673	496,462	11%	49,789
Solid Waste	198,862	224,520	13%	25,658
Wastewater	45,858	53,095	16%	7,237
Total	**1,480,602**	**1,711,987**	**16%**	**231,385**

Notes: Total may not sum exactly due to independent rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

3.1 LEGISLATIVE-ADJUSTED EMISSIONS FORECASTS

Legislative-adjusted BAU emissions forecasts were prepared using the same BAU growth rates while also accounting for local, State, and federal laws and regulations that would affect regional emissions. These forecasts provide an understanding of future community emissions to inform the identification of emissions reduction measures developed to meet GHG targets. A summary of the legislative reductions applied is provided in Table 4.

Table 4 Legislative Reductions Summary

Source	Legislative Reduction	Description	Sectors Applied
Local	Marin Clean Energy Power Procurements	By 2023, MCE aims to procure 95 percent of energy from GHG-free sources (MCE 2021:7).	Building Energy
State	California's Building Energy Efficiency Standards (2019 Title 24, Part 6)	Requires all new buildings in California to comply with energy efficiency standards established by CEC. Accounts for the energy efficiency gains associated with lighting, heating, cooling, ventilation, and water heating improvements, as well as onsite solar photovoltaic requirements for low-rise residential.	Building Energy
State	SB 100 (Renewables Portfolio Standard)	Requires California energy utilities to procure 60 percent of electricity from renewable sources by 2030 and 100 percent carbon-free electricity by 2045.	Building Energy
State	Advanced Clean Car Standards	Establishes GHG emission reduction standards for model years 2017-2025 that are more stringent than federal CAFE standards.	On-Road Vehicles
State	Truck and Bus Regulation	Requires diesel trucks and buses that operate in California to be upgraded to reduce GHG emissions.	On-Road Vehicles
Federal	Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles	Establishes fuel efficiency standards for medium- and heavy-duty engines and vehicles.	On-Road Vehicles
Federal	EPA Off-Road Compression-Ignition Engine Standards	Establishes standards for phasing of EPA diesel engine tiers for off-road compression-ignition equipment.	Off-Road Vehicles and Equipment

Notes: CAFE = Corporate Average Fuel Economy; CEC = California Energy Commission; EPA = U.S. Environmental Protection Agency; GHG = greenhouse gas; MCE = Marin Clean Energy; SB = Senate Bill.

Source: Ascent Environmental in 2022.

The region's legislative-adjusted BAU emissions would have a modest increase compared to the BAU scenario, increasing by approximately 5 percent between 2019 and 2030, as shown below in Table 5 and Figure 3. Figure 3 also shows the emissions trend that would occur without anticipated legislative reductions, accounting mainly for population, employment, and VMT changes (i.e., BAU emissions). Without the legislative reductions, emissions would be 16 percent higher by 2030. Emissions forecasts for each sector are discussed in detail in the following sections.

Table 5 Napa County Regional GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$)

Sector	2019	2030	Percent Change	Difference
Agriculture	103,381	91,545	-11%	-11,836
Building Energy	564,336	652,690	16%	88,353
Imported Water	5,943	4,529	-24%	-1,414
Off-Road Equipment	115,548	130,620	13%	15,072
On-Road Transportation	446,673	391,761	-12%	-54,913
Solid Waste	198,862	224,520	13%	25,658
Wastewater	45,858	53,095	16%	7,237
Total	**1,480,602**	**1,548,761**	**5%**	**68,159**

Notes: Total may not sum exactly due to independent rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

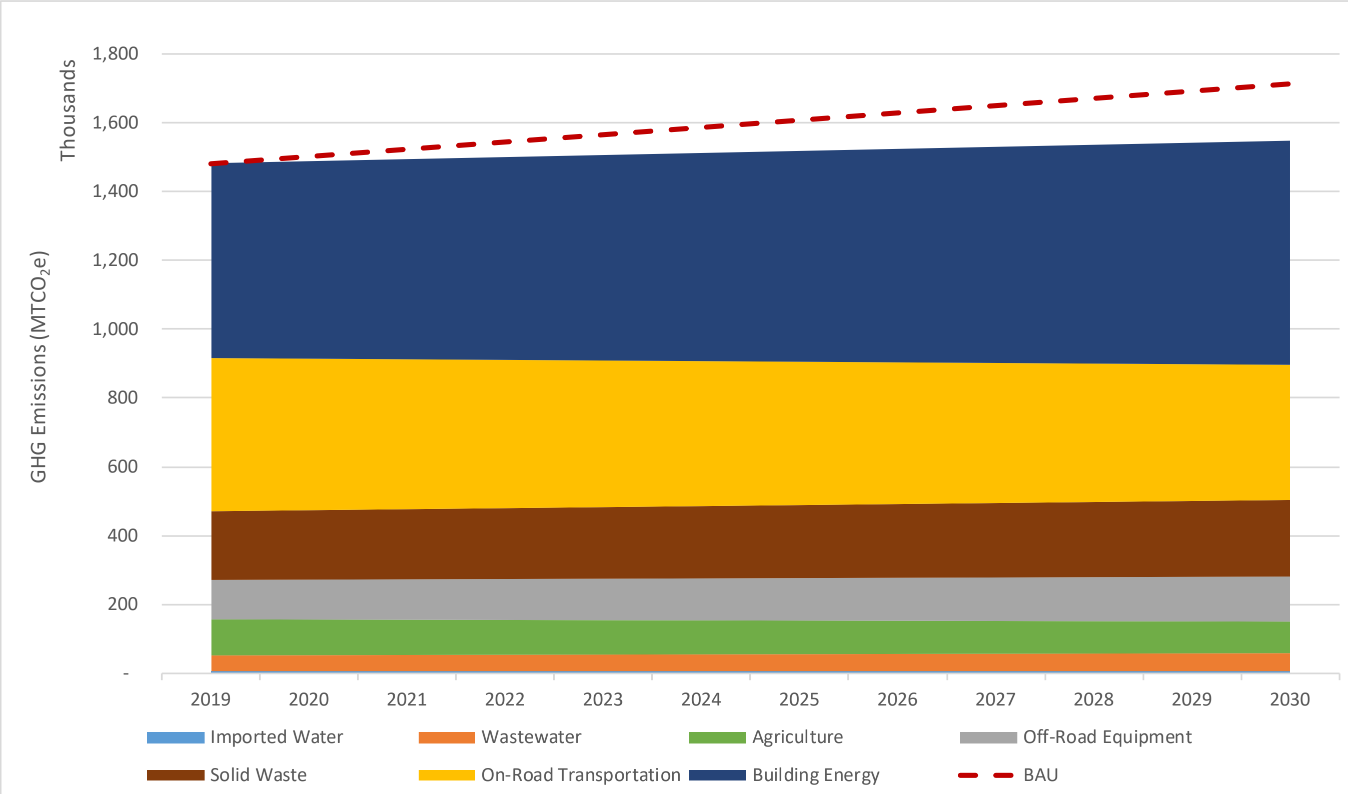


Figure 3 Napa County Regional GHG Emissions Forecasts

3.2 BUILDING ENERGY

Building Energy Assumptions

Building energy emissions in the region result directly from onsite combustion of natural gas and indirectly from electricity consumption. Pacific Gas & Electric (PG&E) is the main electricity and natural gas provider in Northern California. Marin Clean Energy (MCE) is a community choice aggregation (CCA) program which provides renewable electricity options to several northern Bay Area counties, including Napa County. MCE customers are automatically enrolled in a default energy service option, Light Green, or they may elect either the Deep Green or Local Sol service options for an extra fee to increase to 100 percent renewable energy, or opt out of MCE altogether to maintain service with PG&E. Refer to the Inventory memorandum for detailed discussion of the assumptions used to estimate the 2019 building energy emissions.

2030 ELECTRICITY EMISSIONS FACTORS

PG&E's carbon dioxide (CO_2) emissions factor for 2030 was calculated by interpolating 2020 emission factors (160.05 pounds [lb] of CO_2/megawatt-hour [MWh]) available from PG&E's Power Content Label, available from the California Energy Commission (CEC), and a zero emissions factor for 2045 (CEC 2021). This latter assumption assumes that PG&E would achieve carbon neutrality (i.e., 100 percent GHG-free electricity) by 2045, per SB 100. Methane (CH_4) and nitrous oxide (N_2O) emission factors were calculated in a similar way. However, because these factors were not available for PG&E, 2020 California-specific electricity emissions factors for CH_4 and N_2O were obtained from the U.S. Environmental Protection Agency's (EPA's) Emissions & Generation Resource Integrated Database for the CAMX region (eGRID) (EPA 2021). Thus, the 2030 CH_4 and N_2O emission factors were also interpolated between eGRID factors for 2020 and a zero emissions factor for 2045. In 2030, PG&E's average emissions factor is expected to be 97.5 lb CO_2e/MWh.

MCE's 2030 emissions factor is based on MCE's plan to achieve a 95 percent GHG-free energy portfolio for its Light Green service option starting in 2023 and continuing through 2030, as reported in MCE's 2021 Impact Report (MCE 2021:7). The other five percent is assumed to be sourced from "unspecified sources of power," consistent with MCE's current Power Content Label (MCE 2020). The emission factors for the "unspecified sources of power" were assumed to be equal to the average emission factors for the state via eGRID for the CAMX region. The 2030 eGRID emission factors were interpolated between 2019 reported factors and a zero-emission factor in 2045, per the carbon neutrality targets under SB 100. Based on this approach, in 2030, MCE's average emissions factor for the Light Green service option is expected to be 16.2 lb CO_2e/MWh. Deep Green and Local Sol options are anticipated to continue to have a zero emissions factor through 2030.

To put the impact of PG&E and MCE emission factors into context, 85 percent of electricity use in the region are related to subscriptions to MCE's service options, as of 2019. Out of the residential electricity usage, 88 percent are subscribed to MCE. Of the non-residential electricity usage, 83 percent are subscribed to MCE (Herrick, pers. comm., 2022). This makes the overall regional emission factors more heavily weighed and dependent on changes to MCE's energy profile.

2030 NATURAL GAS EMISSIONS FACTORS

2030 natural gas emission factors would remain unchanged from 2019. These are based on emissions factors obtained from The Climate Registry's (TCR's) 2020 Default Emission Factors, which are estimated to be 5.3 kilograms of carbon dioxide per therm (kg CO_2/therm) (TCR 2020). Emissions factors associated with natural gas combustion are not anticipated to change over time, as there are no legislative actions that would reduce the carbon intensity of natural gas. Refer to Table 10 of the previous inventory memorandum for further details.

ENERGY EFFICIENCY

Energy intensity factors were adjusted to reflect increased stringency under California's Building Energy Efficiency Standards (California Code of Regulations Title 24 Part 6, hereafter referred to as "Title 24"). Title 24 standards apply to new construction. The 2019 Title 24 standards apply to projects constructed after January 1, 2020, and the next standards will apply after January 1, 2023. To estimate the energy efficiency from Title 24 requirements in new construction, an adjustment factor was calculated from the difference in the average energy use in residential and non-residential buildings between those built to 2019 Title 24 standards and those built to "historical" standards. Both energy efficiency rates (e.g., kilowatt hours (kWh) and therms per square foot (SF)) were estimated using the California Air Pollution Control Officers Association California Emissions Estimator Model (CalEEMod) Version 2020.4.0. In addition to accounting for Title 24 requirements by land use type, it also has estimates for energy usage rates by climate zone, and Napa County's climate zone (Zone 4) was selected for this analysis. This adjustment factor was then applied to the BAU growth in energy use, to determine the energy consumption and associated GHG emissions of future development with legislative adjustments.

BUILDING ENERGY RESULTS

Emissions from future electricity and natural gas use were estimated by multiplying anticipated energy use by forecasted emissions factors. Future energy use was forecasted in two parts. First, energy use was scaled by population and employment growth factors detailed above. Second, energy emissions factors were adjusted to reflect current regulations and adopted targets. PG&E electricity emissions factors are assumed to decline linearly to 100 percent GHG-free electricity by 2045 based on RPS targets pursuant to SB 100. MCE's electricity emissions factors are also anticipated to decrease based on MCE's goal to be 95 percent GHG-free by 2023 for its Light Green service option (MCE 2021). The assumptions for future electricity emissions factors are described below. Table 6 summarizes the scaling factors and legislative reductions used to forecast building use by energy type.

Table 6 Building Energy Emissions Forecast Methods by Energy Type

Energy Type	Forecast Methods	
	Scale Factor	Applied Legislative Reductions
Electricity	Scaled by population growth for residential building energy; scaled by employment growth for nonresidential building energy.	SB100 scheduled targets (i.e., 100 percent renewable by 2045) applied to PG&E's electricity emissions factors. MCE's 95% GHG-free target for Light Green was applied to MCE's Light Green electricity emissions factors. Deep Green/Local Sol factors remain at 100% GHG-free. Accounts for Title 24 energy efficiency gains in new construction based on the best available data for average building energy efficiency.
Natural Gas		

Notes: MCE = Marin Clean Energy; RPS = Renewables Portfolio Standard; PG&E = Pacific Gas & Electric.

Source: Ascent Environmental 2022.

Residential Building Energy

Between 2019 and 2030, electricity and natural gas emissions from residential buildings would increase by approximately 17. percent from 388,309 to 452,453 $MTCO_2e$ with legislative adjustments. Table 7 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the residential building energy sector by fuel type for 2030.

Table 7 Regional Residential Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts ($MTCO_2e$/ year)

Fuel Type	2019	2030	Percent Change	Difference
Electricity	6,160	5,647	-8%	-513
Natural Gas	382,148	446,806	17%	64,658
Total	**388,309**	**452,453**	**17%**	**64,145**

Notes: Totals may not sum exactly due to independent rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Nonresidential Building Energy

Between 2019 and 2030, electricity and natural gas emissions from nonresidential buildings would increase by approximately 14 percent from 176,028 to 200,237 $MTCO_2e$ with legislative adjustments, generally in line with anticipated overall employment growth of approximately 17 percent over the same time. Table 8 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions for the nonresidential building energy sector by fuel type for 2030.

Table 8 Regional Nonresidential Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Fuel Type	2019	2030	Percent Change	Difference
Electricity	10,079	10,736	7%	656
Natural Gas	165,949	189,501	14%	23,552
Total	**176,028**	**200,237**	**14%**	**24,209**

Notes: Totals may not sum exactly due to independent rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

3.3 TRANSPORTATION

ON-ROAD TRANSPORTATION

Between 2019 and 2030, GHG emissions from on-road vehicles would decrease by approximately 12 percent from 446,673 to 391,761 $MTCO_2e$, accounting for an increase in VMT of approximately 11 percent and future vehicle emissions factors modeled in California Air Resources Board's (CARB's) EMissions FACtor (EMFAC2021) model. VMT projections were developed using the origin-destination method and data from MTC's VMT Data Portal for 2030. With respect to the legislative adjustments included in this forecast, State and federal laws and regulations incorporated in the on-road transportation sector include the Pavley Clean Car Standards, Advanced Clean Car (ACC) Standards, and fuel efficiency standards for medium- and heavy-duty vehicles. These policies, including those that are expected to increase the number of electric vehicles in the county in the future, are included in EMFAC2021's emissions factor estimates and forecasts. The Low Carbon Fuel Standard was excluded in EMFAC2021 forecasts because the emissions benefits originate from upstream fuel production and do not directly reduce vehicle tailpipe emissions that affect the city's GHG emissions forecasts. Table 9 summarizes the scaling factors and legislative reductions used to forecast on-road transportation emissions.

Table 9 On-Road Transportation Emissions Forecast Methods

Source	Forecast Methods	
	Growth Factor	Applied Legislative Reductions
On-Road Transportation	Scaled by VMT estimates provided by MTC.	EMFAC2021 forecasts vehicle fleet distributions by vehicle type and the emissions factors anticipated for each vehicle category based on both vehicle emissions testing and approved legislative reductions. EMFAC2021's forecasts incorporate the effects of the ACC Standards, federal CAFE standards, and fuel efficiency standards for medium- and heavy-duty vehicles, as well as truck and bus regulations. Legislative actions that are anticipated to impact the number of electric vehicles in the future are incorporated into the emissions factors obtained from EMFAC2021.

Notes: ACC = Advanced Clean Cars; CAFE = Corporate Average Fuel Economy; EMFAC2021 = California Air Resources Board's EMisson FACtor 2021 model, MTC = Metropolitan Transportation Commission

Source: Ascent Environmental 2022.

Table 10 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from on-road transportation for 2030.

Table 10 Regional On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	Percent Change	Difference
Commercial	147,981	139,105	-6%	-8,876
Non-Commercial	298,693	252,656	-15%	-46,037
Total	**446,673**	**391,761**	**-12%**	**-54,913**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

Between 2019 and 2030, emissions associated with off-road vehicles and equipment used in the region would increase by 13 percent from 115,548 to 130,620 $MTCO_2e$, with legislative adjustments applied and overall growth in various demographics. Emissions were obtained primarily from CARB's latest off-road emissions model, OFFROAD2021, as well as from CARB's OFFROAD2007 model. With respect to the legislative adjustments in the off-road vehicle sector, the OFFROAD2021 was used, which incorporates regulatory actions such as reformulated fuels and more stringent emissions standards. However, some off-road vehicle and equipment sources that are included in the OFFROAD2007 model are excluded from OFFROAD2021. For these sectors, with the exception of entertainment equipment, emissions were obtained from OFFROAD2007. (Entertainment equipment emissions were excluded because OFFROAD2021 does not include forecasts for this source and the emissions from this source account for less than one percent of total offroad emissions.) In addition, OFFROAD2021 provides CO_2 emissions but does not provide emissions from CH_4 and N_2O. Ratios of CH_4 and N_2O to CO_2 reported in OFFROAD2007 were calculated and applied to CO_2 data from OFFROAD2021 to calculate CH_4 and N_2O emissions, as recommended by CARB.

Napa County-level emissions from off-road vehicles and equipment were scaled using changes in city-specific demographic factors. Table 11 summarizes the scaling factors and legislative reductions used to forecast off-road vehicle and equipment emissions.

Table 11 Off-Road Vehicles and Equipment Forecast Methods by Source

Source	Forecast Methods	
	Growth Factor	Applied Legislative Reductions
Airport Ground Support	Population	OFFROAD2021 emissions factor considerations include EPA off-road compression-ignition engine standards implementation schedule.
Commercial Harbor Craft	Employment	
Construction and Mining	Service Population	
Industrial	Employment	
Lawn and Garden Equipment	Population	
Light Commercial Equipment	Employment	
Pleasure Craft	All assumed to occur in the Unincorporated County	
Portable Equipment	Employment	
Railyard Operations	Employment	
Recreational Equipment	Population	
Transport Refrigeration Units	Service Population	

Notes: EPA = U.S. Environmental Protection Agency; OFFROAD2021 = California Air Resources Board's OFFROAD2021 model. Excludes Entertainment equipment off-road sources, for which OFFROAD 2021 does not have forecasts.

Source: Ascent Environmental 2022.

Table 12 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the off-road vehicles and equipment sector for 2030.

Table 12 Regional Off-Road Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/year)

Source	2019	2030	Percent Change	Difference
Industrial	5,490	6,479	18%	989
Airport Ground Support	0	0	18%	0
Commercial Harbor Craft	140	166	18%	25
Construction and Mining	12,294	15,378	25%	3,085
Lawn and Garden Equipment	28,726	35,014	22%	6,288
Light Commercial Equipment	24,282	15,437	-36%	-8,845
Pleasure Craft	28,896	39,691	37%	10,796
Portable Equipment	10,088	11,911	18%	1,823
Railyard Operations	383	450	17%	66
Recreational Equipment	2,687	3,343	24%	656

Transport Refrigeration Units	2,561	2,751	7%	190
Total	**115,548**	**130,620**	**13%**	**15,072**

Notes: Totals may not sum exactly due to independent rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

3.4 AGRICULTURE

Between 2019 and 2030, emissions generated from agricultural activities in the region would decrease by approximately 11 percent from 103,381 to 91,545 $MTCO_2e$, accounting for the change in historical agricultural land cover as reported in the County's historical agricultural crop reports. Livestock emissions were assumed to change in proportion to changes in rangeland and pastureland and were subsequently scaled by the extrapolated historical change in rangeland and pastureland as reported in the county's crop reports. Between 2009 and 2021, rangeland and pastureland acreage decreased by 32 percent. Based on this historical trend, rangeland and pastureland acreage, along with livestock emissions, are anticipated to decline by 38 percent from 2019 to 2030.

For other emissions (i.e., agricultural offroad equipment, fertilizer application, and irrigation pumps), these were assumed to change in proportion to the change in non-rangeland and pastureland (e.g., fruit and nut crops, hay, olives, vegetables). Although some of this activity may be associated with livestock operations, it is assumed that the majority of this activity is associated with non-livestock operations. Between 2009 and 2021, non-rangeland acreage increased by six percent. Based on this historical trend, non-rangeland acreage, along with non-livestock emissions, are anticipated to increase by four percent from 2019 to 2030.

These two agricultural acreage trends stand in contrast to the overall population growth of approximately 18 percent over the same time. The only legislative adjustment made in this sector is for the agricultural offroad equipment, which are subject to the same legislative adjustments as discussed in Section 4.2. The decrease in agricultural offroad emissions are primarily due to changes in equipment emission regulations and not due to growth. Table 13 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the agriculture sector for 2030.

Table 13 Regional Agriculture GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	Percent Change	Difference
Agricultural Offroad	47,682	41,211	-14%	-6,471
Fertilizer Application	21,948	22,897	4%	949
Irrigation Pumps	15,417	16,084	4%	667
Livestock	18,334	11,354	-38%	-6,980
Total	**103,381**	**91,545**	**-11%**	**-11,836**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

3.5 SOLID WASTE

Waste Generation and Waste-in-Place

The ICLEI Community Protocol recommends that community GHG inventories include emissions from both solid waste facilities located in the community (i.e., "waste-in-place") and waste generated by the community (ICLEI 2019). Waste-in-place CH_4 emissions from landfill gas (LFG) generated at solid waste facilities located within the unincorporated area accounted for approximately 58 percent of emissions from the solid waste sector in 2019. Between 2019 and 2030, waste generation emissions were scaled to 2030 levels based on change in population in the region.

Waste-in-place emissions were calculated based on the existing and future waste tonnages at two landfills located within the region: Clover Flat Landfill and American Canyon Landfill. Both landfills are located in the Unincorporated County. Open from 1966 to 1995, the American Canyon Landfill's methane emissions likely peaked around 1996, after its closure, and will continue to decline into the future through 2030 based the decay model available in CARB's Landfill Gas Tool and annual disposal tonnage reports from EPA (CARB 2021, EPA 2022). Clover Flat Landfill, on the other hand, is an active landfill that has been open since 1963 and plans to close in 2056. Assuming average annual disposal rates between 2010 and 2019 continue through 2056, waste-in-place emissions from Clover Flat will continue to rise through 2030 and likely peak around 2057, as modeled in the Landfill Gas Tool. Although emissions from the American Canyon Landfill are expected to decline by six percent, emissions from Clover Flat Landfill would be twice as high given its greater capacity and is also expected to increase by 17 percent.

Between 2019 and 2030, solid waste emissions generated from community activities in the region would increase by approximately 19 percent from 84,243 to 100,400 $MTCO_2e$ per year, accounting for overall population growth of approximately 18 percent over the same time. Solid waste generation emissions include CH_4 emissions from the decay of waste generated annually, which were scaled by population growth within the region between 2019 and 2030.

Total solid waste emissions, including both community-generated waste and waste-in-place emissions, would increase by 13 percent from 198,862 to 224,520 $MTCO_2e$ per year. Table 14 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the solid waste sector for 2030.

Table 14 Regional Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	Percent Change	Difference
Community-Generated Solid Waste	84,243	100,400	19%	16,157
Waste-in-Place Emissions	114,619	124,121	8%	9,502
American Canyon Landfill	*42,800*	*40,084*	*-6%*	-2,715
Clover Flat Landfill	*71,819*	*84,036*	*17%*	12,217
Total	**198,862**	**224,520**	**13%**	**25,658**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

3.6 IMPORTED WATER

Between 2019 and 2030, imported water emissions generated from community activities in the region would be decrease by 24 percent from 5,943 to 4,529 $MTCO_2e$. These emissions include upstream emissions from electricity generation use to extract, convey, treat, and distribute imported water to the region. For local water supply sources , the electricity usage associated with extracting, conveying, treating, and distributing water is captured in the building energy sector because these activities take place within the community. The reduction in emissions is largely attributed to improvements in the renewable portfolio in the state. Average electricity emissions factors were obtained for the state using EPA's eGRID database for the CAMX region. Electricity usage associated with water consumption is subject to RPS targets, pursuant to SB 100 requirements, which is expected to reach carbon neutrality (i.e., a zero emissions rate) by 2045. Based on these assumptions and the 2019 eGRID emission factors, the average GHG emissions factor is anticipated to decline by 33 percent between 2019 and 2030.

Table 15 summarizes the scaling factor and legislative reduction used to forecast water supply emissions.

Table 15 Imported Water Forecast Methods and Legislative Reductions by Source

Source	Forecast Methods	
	Scale Factor	Applied Legislative Reductions
Imported Water	Scaled by population growth.	Assumes electricity use for extraction, conveyance, distribution, and treatment aligns with the trajectory toward the 2045 carbon-free electricity requirements under SB100.

Source: Ascent Environmental in 2022.

Table 16 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the water supply sector for 2030.

Table 16 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/year)

Source	2019	2030	Percent Change	Difference
Imported Water	5,943	4,529	-24%	-1,414

Notes: BAU = business-as-usual; $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year.

Source: Ascent Environmental in 2022.

3.7 WASTEWATER TREATMENT

Between 2019 and 2030, community wastewater emissions would increase by 16 percent from 45,858 to 53,095 $MTCO_2e$. This change reflects an increase in wastewater generation resulting from population growth within the region of approximately 18 percent over the same time. Wastewater-related emissions are generated from centralized wastewater treatment plants (WWTPs) and septic systems for the region. Table 17 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from wastewater treatment sources for 2030.

Table 17 Regional Wastewater Treatment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	Percent Change	Difference
Septic Systems	2,961	3,841	30%	880
Centralized WWTPs	42,897	49,254	15%	6,357
Total	**45,858**	**53,095**	**16%**	**7,237**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; WWTP = wastewater treatment plant.

Source Ascent Environmental 2022.

3.8 DISCUSSION

The community BAU emissions would increase by approximately 16 percent between 2019 and 2030, while legislative-adjusted BAU emissions would only increase five percent between 2019 and 2030. The relatively lower increase under the legislative-adjusted BAU forecast scenario, despite growth, is associated with reductions that would be achieved from several legislative actions, including:

- a greater renewable mix in PG&E’s and State electricity supply (60 percent by 2030 and 100 percent by 2045);
- carbon-free electricity supplied by MCE;
- improved building energy efficiency through compliance with Title 24 standards;
- reductions in on-road vehicle emissions factors from State vehicle standards as forecasted in EMFAC2021; and

- reductions in off-road vehicle and equipment emissions factors forecasted in OFFROAD2021.

Without future legislative actions and despite future growth, emissions would decline from 2019 through 2045. Going forward, new legislative actions that would affect emissions may be adopted by State and federal agencies; however, because information regarding these regulatory changes is currently unavailable or not final, emissions reductions from future potential legislative actions are not quantified in this memorandum. Where new State regulations or programs are imminent and reasonably foreseeable, they can be incorporated as complementary actions to locally based GHG reduction measures.

4 GREENHOUSE GAS EMISSIONS FORECAST BY JURISDICTION

Various demographic factors were used to estimate future activity levels for each emissions sector and are shown in Table 18. Demographic and VMT projections were used to inform the emissions forecasts for each jurisdiction.

Table 18 Napa County Regional Community Demographic and Vehicle Miles Traveled Forecasts

Forecast Factor	2019	Data Source	2030	Data Source	Percent Change
American Canyon					
Population	20,996	DOF 2021	26,829	Cooper, pers. comm., 2022	28%
Households	5,955	DOF 2021	7,811	Cooper, pers. comm., 2022	31%
Employment	6,200	Plan Bay Area 2040	8,642	Cooper, pers. comm., 2022	39%
Annual VMT	154,556,520	MTC 2015	176,281,057	MTC 2015	14%
Calistoga					
Population	5,348	Mitchem, pers. comm., 2022	5,508	Mitchem, pers. comm., 2022	3%
Households	2,413	Mitchem, pers. comm., 2022	2,511	Mitchem, pers. comm., 2022	4%
Employment	2,811	Mitchem, pers. comm., 2022	3,333	Mitchem, pers. comm., 2022	19%
Annual VMT	28,922,407	MTC 2015	32,650,803	MTC 2015	13%
Napa					
Population	79,300	Walker, pers. comm., 2022	88,676	Walker, pers. comm., 2022	12%
Households	30,700	Walker, pers. comm., 2022	34,786	Walker, pers. comm., 2022	13%
Employment	51,200	Walker, pers. comm., 2022	56,857	Walker, pers. comm., 2022	11%
Annual VMT	472,155,386	MTC 2015	518,294,070	MTC 2015	10%
St. Helena					
Population	6,094	DOF 2021	6,655	Derosa, pers. comm., 2022	9%
Households	2,420	Derosa, pers. comm., 2022	2,620	Derosa, pers. comm., 2022	8%
Employment	5,762	Derosa, pers. comm., 2022	5,820	Derosa, pers. comm., 2022	1%
Annual VMT	51,605,089	MTC 2015	60,774,785	MTC 2015	18%
Yountville					
Population	2,793	DOF 2021	3,385	Shelton, pers. comm., 2022	21%
Households	1,754	U.S. Census, 2020	2,126	Scaled by Population[1]	21%
Employment	1,100	Bureau of Labor Statistics	1,333	Scaled by Population[1]	21%
Annual VMT	20,876,900	MTC 2015	23,197,949	MTC 2015	11%

Forecast Factor	2019	Data Source	2030	Data Source	Percent Change
Unincorporated County					
Population	25,077	DOF 2021	33,613	County of Napa 2008	34%
Households	5,666	County of Napa 2008	13,325	County of Napa 2008	135%
Employment	30,379	County of Napa 2008	38,322	County of Napa 2008	26%
Annual VMT	67,429,161	MTC 2015	73,023,186	MTC 2015	8%
Total					
Population	139,608	Calculated	164,666	Calculated	18%
Households	48,908	Calculated	63,178	Calculated	29%
Employment	97,452	Calculated	114,307	Calculated	17%
Annual VMT	795,545,462	Calculated	884,221,850	Calculated	11%

Notes: VMT = vehicle miles traveled, MTC = Metropolitan Transportation Commission, DOF = Department of Finance

[1] Forecasts for these metrics were not readily available and were subsequently scaled in proportion to the relative growth in population.

Sources: Cooper, pers. comm., 2022.; DOF 2019; Mitchem, pers. comm., 2022.; City of Napa, 2022: 2-21.; City of St. Helena, 2022: 2-78.; Shelton, pers. comm., 2022; County of Napa 2008.; U.S. Census Bureau, 2019; MTC 2015.

4.1 AMERICAN CANYON

Emissions Summary

Table 19 shows a summary of American Canyon's emissions inventory and legislative-adjusted forecast. American Canyon's emissions are anticipated to increase by six percent between 2019 and 2030. As shown in Table 19, on-road transportation will continue to remain the target sector in American Canyon's inventory in the future although emissions will decrease by 10 percent based on VMT forecasts from MTC for American Canyon (MTC 2015). Emissions from on-road transportation are also anticipated to have the greatest decrease between 2019 and 2030 across all sectors.

Table 19 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: American Canyon ($MTCO_2e$/year)

Sector	2019	2030	Percent Change	Difference
Agriculture	154	132	-14%	-22
Building Energy	29,045	35,168	21%	6,123
Imported Water	983	854	-13%	-129
Off-Road Equipment	8,998	11,278	25%	2,280
On-Road Transportation	86,779	78,103	-10%	-8,676
Solid Waste	25,938	33,145	28%	7,206
Wastewater	7,822	10,202	30%	2,380
Total	159,842	168,882	6%	9,163

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, American Canyon's building energy-related emissions are anticipated to increase by 21 percent between 2019 and 2030.

Table 20 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: American Canyon ($MTCO_2e$/ year)

Energy Type	2019	2030	Percent Change
Residential			
Electricity	661	664	0%
Natural Gas	26,825	31,973	19%
Subtotal	27,486	32,637	19%
Non-Residential			
Electricity	1,085	1,907	76%
Natural Gas	474	624	32%
Subtotal	1,559	2,531	62%
Total	29,045	35,168	21%

Notes: Totals may not sum due to rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

ON-ROAD TRANSPORTATION

American Canyon's on-road transportation emissions are anticipated to decrease by 10 percent between 2019 and 2030, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, CARB's ZEV mandate, and other adopted regulations as discussed in Section 4.2, which reduce average vehicle GHG emissions per mile.

Table 21 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: American Canyon ($MTCO_2e$/year)

Trip Type	2019	2030	Percent Change
Commercial Trips	28,749	27,732	-4%
Non-Commercial Trips	58,029	50,370	-13%
Total	**86,779**	**78,103**	**-10%**

Notes: Totals may not sum exactly due to independent rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

American Canyon's off-road equipment emissions are anticipated to increase by 25 percent between 2019 and 2030, consistent with various growth forecasts (e.g., population, employment) that best match each off-road equipment category, as shown in Table 11. Additionally, legislative adjustments, such as emissions standards for off-road equipment, were also considered, via factors available in CARB's OFFROAD 2021 model. In particular, most sectors are anticipated to increase by 30-40 percent except for light commercial equipment, pleasure craft, airport ground support equipment, and transportation refrigeration units. There are no pleasure craft or airports within American Canyon.

Table 22 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts, American Canyon ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Industrial	349	492	41%
Airport Ground Support	0	0	0%
Commercial Harbor Craft	9	13	41%
Construction and Mining	1,410	1,956	39%
Lawn and Garden Equipment	4,320	5,794	34%
Light Commercial Equipment	1,545	1,174	-24%
Pleasure Craft	0	0	0%
Portable Equipment	642	907	41%
Railyard Operations	24	34	39%
Recreational Equipment	404	558	38%
Transport Refrigeration Units	294	350	19%
Total	**8,998**	**11,278**	**25%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

AGRICULTURE

As an incorporated city, American Canyon does not have a substantial presence of agricultural activity within its jurisdiction. Table 23 shows that the limited agricultural activities in the city (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline between 2019 and 2030 by 10 percent, in proportion with regional trends in the reduction in agricultural acres over the last decade. Emissions from irrigation pumps were excluded as no irrigation pump permits were identified in American Canyon.

Table 23. Agricultural GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: American Canyon ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Agricultural Offroad Equipment	84	68	-18%
Fertilizer Application	38	38	-1%
Livestock	32	32	-1%
Total	**154**	**138**	**-10%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

SOLID WASTE

Waste Generation

American Canyon generated approximately 68,259 tons of solid waste in 2019 which generated 25,938 MTCO2e in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that waste generation emissions are proportional to amount of waste generated, both American Canyon's waste disposal and related emissions are anticipated to increase by 28 percent from 2019 to 2030, commensurate with population growth.

Table 24 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: American Canyon ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Annual waste tonnage delivered from jurisdiction (tons)	68,529	87,567	28%
Solid Waste Generation Emissions ($MTCO_2e$/year)	25,938	33,145	28%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Waste-in-Place

American Canyon does not have any landfills located within its jurisdiction. Thus, there are no waste-in-place emissions attributable to this jurisdiction.

IMPORTED WATER

American Canyon is anticipated to increase its usage of imported water by 30 percent by 2030 from 2019 levels, commensurate with population growth. However, emissions from imported water are expected to decline by 13 percent over the same period. This is due to the change in emissions factors associated with the electricity used for pumping imported water (i.e., from the state water project). The average California electricity emissions factors, available from EPA's eGRID database for the CAMX region, are anticipated to decline by 33 percent between 2019 and 2030. Emissions associated with locally sourced water are captured in the building energy sector.

Table 25 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: American Canyon ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Imported Water Usage (MG/year)	661	862	30%
Imported Water Emissions ($MTCO_2e$/year)	983	854	-13%

Notes: MG = million gallons; BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

WASTEWATER

American Canyon's emissions from wastewater are anticipated to increase by proportionally with service population. These emissions would primarily come from central wastewater treatment plants. There are no knowns septic systems operating within American Canyon.

Table 26 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: American Canyon ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Population served by WWTP	27,196	35,471	30%
WWTP Process Emissions	7,822	10,202	30%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

4.2 CALISTOGA

Emissions Summary

Table 27 shows a summary of Calistoga's emissions inventory and legislative-adjusted forecast. Calistoga's emissions are anticipated to decline by five percent between 2019 and 2030. As shown in Table 27, on-road transportation will continue to remain the target sector in Calistoga's inventory in the future although emissions will decrease by 11percent based on VMT forecasts from MTC for Calistoga (MTC 2015). Emissions from on-road transportation are also anticipated to have the greatest decrease between 2019 and 2030.

Table 27 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Calistoga ($MTCO_2e$/year)

Sector	2019	2030	Percent Change	Difference
Agriculture	274	235	-14%	-39
Building Energy	8,388	8,420	0%	32
Imported Water	229	165	-28%	-64
Off-Road Equipment	2,880	2,825	-2%	-54
On-Road Transportation	16,239	14,466	-11%	-1,773
Solid Waste	4,981	5,130	3%	149
Wastewater	1,992	2,159	8%	167
Total	**34,982**	**33,400**	**-5%**	-1,582

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, Calistoga's building energy-related emissions are anticipated to remain relatively unchanged between 2019 and 2030.

Table 28 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Calistoga ($MTCO_2e$/ year)

Energy Type	2019	2030	Percent Change
Residential			
Electricity	225	177	-21%
Natural Gas	7,682	7,841	2%
Subtotal	7,907	8,018	1%
Non-Residential			
Electricity	314	210	-33%
Natural Gas	167	192	15%
Subtotal	481	402	-16%
Total	**8,388**	**8,420**	**0%**

Notes: Totals may not sum due to rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

ON-ROAD TRANSPORTATION

Calistoga's on-road transportation emissions are anticipated to decrease by 11 percent between 2019 and 2030, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, CARB's ZEV mandate, and other adopted regulations as discussed in Section 4.2, which reduce average vehicle GHG emissions per mile.

Table 29 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga (MTCO$_2$e/year)

Trip Type	2019	2030	Percent Change
Commercial Trips	5,380	5,137	-5%
Non-Commercial Trips	10,859	9,330	-14%
Total	**16,239**	**14,466**	**-11%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; MTCO$_2$e = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

Consistent with various growth forecasts (e.g., population, employment) that best match each off-road equipment category (refer to Table 11), Calistoga's off-road equipment emissions are anticipated to decrease by 2 percent between 2019 and 2030, as shown in Table 30 below. Additional legislative adjustments, such as emissions standards for off-road equipment, were also taken into account via factors available in CARB's OFFROAD 2021 model. Most sectors are anticipated to increase by 15-19 percent except for airport ground support, pleasure craft, equipment, and transportation refrigeration units. There are no pleasure craft or airports within Calistoga.

Table 30 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga (MTCO$_2$e/year)

Source	2019	2030	Percent Change
Industrial	158	189	19%
Airport Ground Support	0	0	0%
Commercial Harbor Craft	4	5	19%
Construction and Mining	423	487	15%
Lawn and Garden Equipment	1,100	1,139	4%
Light Commercial Equipment	700	450	-36%
Pleasure Craft	0	0	0%
Portable Equipment	291	347	19%
Railyard Operations	11	13	19%
Recreational Equipment	103	107	4%
Transport Refrigeration Units	88	87	-1%
Total	**2,880**	**2,825**	**-2%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; MTCO$_2$e = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

AGRICULTURE

Calistoga does not have a substantial presence of agricultural activity within its jurisdiction. Table 31 shows that the limited agricultural activities in the city (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline between 2019 and 2030 by 10 percent, in proportion with regional trends in the reduction in agricultural acres over the last decade. Emissions from irrigation pumps were excluded as no irrigation pump permits were identified in Calistoga.

Table 31 Agricultural GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Agricultural Offroad Equipment	148	121	-18%
Fertilizer Application	68	68	-1%
Livestock	57	56	-1%
Total	274	245	-10%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

SOLID WASTE

Waste Generation

Calistoga generated approximately 12,513 tons of solid waste in 2019 which generated 4,981 $MTCO_2e$ in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that waste generation emissions are proportional to amount of waste generated, both Calistoga's waste disposal and related emissions are anticipated to increase by three percent from 2019 to 2030, commensurate with population growth.

Table 32 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga

Source	2019	2030	Percent Change
Solid Waste Generation Tonnage	12,513	12,887	3%
Solid Waste Generation Emissions	4,981	5,130	3%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Waste-in-Place

Calistoga does not have any landfills located within its jurisdiction. Thus, there are no waste-in-place emissions attributable to this jurisdiction.

IMPORTED WATER

Calistoga is anticipated to increase its usage of imported water by 8 percent by 2030 from 2019 levels, commensurate with population growth. However, emissions from imported water are expected to decline by 28 percent over the same period. This is due to the change in emissions factors associated with the electricity used for pumping imported water (i.e., from the state water project). The average California electricity emissions factors, available from EPA's eGRID database for the CAMX region, are anticipated to decline by 33 percent between 2019 and 2030. Emissions associated with locally sourced water are captured in the building energy sector.

Table 33 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Imported Water Usage (MG/year)	154	167	8%
Imported Water Emissions ($MTCO_2e$/year)	229	165	-28%

Notes: MG = million gallons; BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

WASTEWATER

Calistoga's emissions from wastewater are anticipated to increase proportionally with service population. These emissions would primarily come from central wastewater treatment plants. There are no knowns septic systems operating within Calistoga.

Table 34 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Service population served by WWTP	8,159	8,841	8%
WWTP Process Emissions	1,992	2,159	8%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

4.3 CITY OF NAPA

Emissions Summary

Table 35 shows a summary of the 2019 emissions inventory and legislative-adjusted forecast for the City of Napa. Napa's emissions are anticipated to decline by two percent between 2019 and 2030. As shown in Table 35, on-road transportation will remain the highest emitting sector in Napa's inventory in the future although emissions will decrease by one percent based on VMT forecasts from MTC for Napa (MTC 2015). Emissions from imported water will decrease the most (30 percent) between 2019 and 2030. Emissions from on-road transportation are also anticipated to have the greatest decrease between 2019 and 2030.

Table 35 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Napa ($MTCO_2e$/year)

Sector	2019	2030	Percent Change	Difference
Agriculture	1,086	1,014	-7%	-71
Building Energy	216,026	233,783	8%	17,757
Imported Water	4,383	3,258	-26%	-1,125
Off-Road Equipment	47,238	46,949	-1%	-289
On-Road Transportation	265,100	229,634	-13%	-35,466
Solid Waste	34,236	38,283	12%	4,048
Wastewater	29,542	32,945	12%	3,403
Total	597,610	585,867	-2%	-11,743

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, City of Napa's building energy-related emissions are anticipated to increase by eight percent between 2019 and 2030.

Table 36 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Napa ($MTCO_2e$/ year)

Energy Type	2019	2030	Percent Change
Residential			
Electricity	2,974	2,504	-16%
Natural Gas	130,448	141,103	8%
Subtotal	133,422	143,606	8%
Non-Residential			
Electricity	3,454	3,963	15%
Natural Gas	79,150	86,214	9%
Subtotal	82,604	90,177	9%
Total	**216,026**	**233,783**	**8%**

Notes: Totals may not sum due to rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

ON-ROAD TRANSPORTATION

Consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards per CARB's ZEV mandate, and other adopted regulations which can reduce average vehicle GHG emissions per mile Napa's on-road transportation emissions are anticipated to decrease by 13 percent between 2019 and 2030, see Table 37.

Table 37 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Trip Type	2019	2030	Percent Change
Commercial Trips	87,826	81,538	-7%
Non-Commercial Trips	177,274	148,096	-16%
Total	**265,100**	**229,634**	**-13%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

Table 38 displays inventory and legislative adjusted forecasts for off-road equipment for Napa. As shown in Table 37, Napa's off-road equipment emissions are anticipated to decrease by one percent between 2019 and 2030. Emissions generated from light commercial equipment are expected to decrease the most (40 percent) with consideration of future emission standards for off-road equipment from CARB's OFFROAD 2021 model. Most off-road equipment sources are anticipated to increase 11-16 percent except construction and mining equipment, recreational equipment, transportation refrigeration units, and light commercial equipment.

Table 38 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Industrial	2,884	3,217	12%
Airport Ground Support	0	0	0%
Commercial Harbor Craft	74	82	11%
Construction and Mining	6,768	8,020	19%
Lawn and Garden Equipment	16,317	18,631	14%
Light Commercial Equipment	12,758	7,664	-40%
Pleasure Craft	0	0	0%
Portable Equipment	5,300	5,910	11%
Railyard Operations	201	224	11%
Recreational Equipment	1,526	1,766	16%
Transport Refrigeration Units	1,410	1,435	2%
Total	**47,238**	**46,949**	**-1%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

AGRICULTURE

As an incorporated city, Napa does not have a substantial presence of agricultural activity within its jurisdiction. Table 39 shows that the limited agricultural activities in the city (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline between 2019 and 2030 by six percent, in proportion with regional trends in the reduction in agricultural acres over the last decade. Emissions from irrigation pumps were excluded as no irrigation pump permits were identified in Napa.

Table 39 Agricultural GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Agricultural Offroad Equipment	346	283	-18%
Fertilizer Application	159	157	-1%
Irrigation Pumps	448	443	-1%
Livestock	133	132	-1%
Total	**1,086**	**1,015**	**-6%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

SOLID WASTE

Waste Generation

The City of Napa generated approximately 50,755 tons of solid waste in 2019 which generated 34,236 $MTCO_2e$ in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that waste generation emissions are proportional to amount of waste generated, both Napa's waste disposal and related emissions are anticipated to increase by 12 percent from 2019 to 2030, commensurate with population growth..

Table 40 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Solid Waste Generation Tonnage	50,755	56,756	12%
Solid Waste Generation Emissions	34,236	38,283	12%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Waste-in-Place

Napa does not have any landfills located within its jurisdiction. Thus, there are no waste-in-place emissions attributable to this jurisdiction.

IMPORTED WATER

The City of Napa is anticipated to increase its usage of imported water by 12 percent by 2030 from 2019 levels, commensurate with population growth. However, emissions from imported water are expected to decline by 26 percent over the same period. This is due to the change in emissions factors associated with the electricity used for pumping imported water (i.e., from the state water project). The average California electricity emissions factors, available from EPA's eGRID database for the CAMX region, are anticipated to decline by 33 percent between 2019 and 2030. Emissions associated with locally sourced water are captured in the building energy sector.

Table 41 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Imported Water Usage (MG/year)	2,948	3,288	12%
Imported Water Emissions ($MTCO_2e$/year)	4,383	3,258	-26%

Notes: MG = million gallons; BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

WASTEWATER

Napa's emissions from wastewater are anticipated to increase by proportionally with service population. These emissions would primarily come from central wastewater treatment plants. There are no knowns septic systems operating within Napa.

Table 42 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Service population served by WWTP	130,500	145,533	12%
WWTP Process Emissions	29,542	32,945	12%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

4.4 ST. HELENA

Emissions Summary

Table 43 shows a summary of the 2019 emissions inventory and legislative-adjusted forecast for the City of St. Helena. St. Helena's emissions are anticipated to decrease by two percent between 2019 and 2030, largely due to the increase in building energy and solid waste emissions. As shown in Table 43, on-road transportation will remain the highest emitting sector in St. Helena inventory in the future although emissions are anticipated to decrease by seven percent based on VMT forecasts from MTC for St. Helena (MTC 2015). Emissions from on-road transportation are also anticipated to have the greatest decrease between 2019 and 2030.

Table 43 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: St. Helena ($MTCO_2e$/year)

Sector	2019	2030	Percent Change	Difference
Agriculture	4,415	4,273	-3%	-141
Building Energy	21,535	22,211	3%	676
Imported Water	285	200	-30%	-85
Off-Road Equipment	4,502	4,079	-9%	-423
On-Road Transportation	28,975	26,927	-7%	-2,048
Solid Waste	5,676	6,199	9%	523
Wastewater	2,270	2,389	5%	119
Total	**67,657**	**66,277**	**-2%**	**-1,380**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, St. Helena's building energy-related emissions are anticipated to increase by three percent between 2019 and 2030.

Table 44 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: St. Helena ($MTCO_2e$/ year)

Energy Type	2019	2030	Percent Change
Residential			
Electricity	332	253	-24%
Natural Gas	11,477	12,207	6%
Subtotal	11,809	12,459	6%
Non-Residential			
Electricity	512	463	-10%
Natural Gas	9,214	9,289	1%
Subtotal	9,726	9,752	0%
Total	21,535	22,211	3%

Notes: Totals may not sum due to rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

ON-ROAD TRANSPORTATION

Consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards per CARB's ZEV mandate, and other adopted regulations which can reduce average vehicle GHG emissions per mile Napa's on-road transportation emissions are anticipated to decrease by 7 percent between 2019 and 2030, see Table 45.

Table 45 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Trip Type	2019	2030	Percent Change
Commercial Trips	9,599	9,561	-0.4%
Non-Commercial Trips	19,375	17,366	-10%
Total	**28,975**	**26,927**	**-7%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

Table 46 displays inventory and legislative adjusted forecasts for off-road equipment for St. Helena. As shown in Table 46, St. Helen's off-road equipment emissions are anticipated to decrease by 9 percent between 2019 and 2030. Emissions generated from light commercial equipment are expected to decrease the most (46 percent) with consideration of future emission standards for off-road equipment from CARB's OFFROAD 2021 model. Most off-road equipment sources are anticipated to increase by less than 10 percent except construction and mining, lawn and garden equipment, recreational equipment, transportation refrigeration units, and light commercial equipment.

Table 46 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Industrial	325	329	1%
Airport Ground Support	0	0	0%
Commercial Harbor Craft	8	8	1%
Construction and Mining	615	687	12%
Lawn and Garden Equipment	1,254	1,392	11%
Light Commercial Equipment	1,436	782	-46%
Pleasure Craft	0	0	0%
Portable Equipment	596	603	1%
Railyard Operations	23	23	1%
Recreational Equipment	117	132	12%
Transport Refrigeration Units	128	123	-4%
Total	**4,502**	**4,079**	**-9%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

AGRICULTURE

St. Helena does not have a substantial presence of agricultural activity within its jurisdiction. Table 47 shows that the limited agricultural activities in the city (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline by five percent between 2019 and 2030, in proportion with regional trends in the reduction in agricultural acres over the last decade.

Table 47 Agricultural GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Agricultural Offroad Equipment	971	796	-18%
Fertilizer Application	447	442	-1%
Irrigation Pumps	2,623	2,595	-1%
Livestock	373	370	-1%
Total	4,415	4,203	-5%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

SOLID WASTE

Waste Generation

St. Helena generated approximately 14,258 tons of solid waste in 2019 which generated 5,676 $MTCO_2e$ in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that waste generation emissions are proportional to amount of waste generated, both St. Helena's waste disposal and related emissions are anticipated to increase by nine percent from 2019 to 2030, commensurate with population growth.

Table 48 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Solid Waste Generation Tonnage	14,258	15,571	9%
Solid Waste Generation Emissions	5,676	6,199	9%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Waste-in-Place

St. Helena does not have any landfills located within its jurisdiction. Thus, there are no waste-in-place emissions attributable to this jurisdiction.

IMPORTED WATER

St. Helena is anticipated to increase its usage of imported water by 5 percent by 2030 from 2019 levels, commensurate with population growth. However, emissions from imported water are expected to decline by 30 percent over the same period. This is due to the change in emissions factors associated with the electricity used for pumping imported water (i.e., from the state water project). The average California electricity emissions factors, available from EPA's eGRID database for the CAMX region, are anticipated to decline by 33 percent between 2019 and 2030. Emissions associated with locally sourced water are captured in the building energy sector.

Table 49 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Imported Water Usage (Gallons/year)	191	201	5%
Imported Water Emissions	285	200	-30%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

WASTEWATER

St. Helena's emissions from wastewater are anticipated to increase by proportionally with service population. These emissions would primarily come from central wastewater treatment plants. There are no knowns septic systems operating within St. Helena.

Table 50 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Service population served by WWTP	11,856	12,475	5%
WWTP Process Emissions	2,270	2,389	5%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

4.5 YOUNTVILLE

Emissions Summary

Table 51 shows a summary of the 2019 emissions inventory and legislative-adjusted forecast for the Town of Yountville. Yountville's emissions are anticipated to remain relatively constant between 2019 and 2030. As shown in Table 51, on-road transportation will remain the highest emitting sector in Yountville's inventory in the future although emissions are anticipated to decrease by 12 percent based on VMT forecasts from MTC for Yountville (MTC 2015). The decrease in on-road transportation emissions is balanced by the increase in emissions from other sectors (e.g., solid waste, building energy, wastewater).

Table 51 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Yountville ($MTCO_2e$/year)

Sector	2019	2030	Percent Change	Difference
Agriculture	75	65	-14%	-11
Building Energy	5,500	6,032	10%	532
Imported Water	65	52	-19%	-13
Off-Road Equipment	1,328	1,501	13%	172
On-Road Transportation	11,722	10,278	-12%	-1,444
Solid Waste	2,601	3,153	21%	551
Wastewater	1,040	1,261	21%	221
Total	22,332	22,342	<1%	10

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, Yountville's building energy-related emissions are anticipated to increase by 10 percent between 2019 and 2030.

Table 52 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Yountville ($MTCO_2e$/ year)

Energy Type	2019	2030	Percent Change
Residential			
Electricity	117	100	-15%
Natural Gas	4,566	5,235	15%
Subtotal	4,684	5,335	14%
Non-Residential			
Electricity	507	335	-34%
Natural Gas	309	362	17%
Subtotal	817	698	-15%
Total	**5,500**	**6,032**	**10%**

Notes: Totals may not sum due to rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

ON-ROAD TRANSPORTATION

Consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards per CARB's ZEV mandate, and other adopted regulations which can reduce average vehicle GHG emissions per mile Yountville's on-road transportation emissions are anticipated to decrease by 12 percent between 2019 and 2030, see Table 53.

Table 53 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Trip Type	2019	2030	Percent Change
Commercial Trips	3,883	3,649	-6%
Non-Commercial Trips	7,838	6,629	-15%
Total	**11,722**	**10,278**	**-12%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

Table 54 displays inventory and legislative adjusted forecasts for off-road equipment for Yountville. As shown in Table 54, Yountville's off-road equipment emissions are anticipated to increase by 13 percent between 2019 and 2030. Most off-road equipment sources are anticipated to increase by 21-26 percent except construction and mining, recreational equipment, transportation refrigeration units, and light commercial equipment. Emissions generated from light commercial equipment are expected to decrease the most (46 percent) due to future emission standards for off-road equipment from CARB's OFFROAD 2021 model.

Table 54 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Industrial	62	76	22%
Airport Ground Support	0	0	0%
Commercial Harbor Craft	2	2	22%
Construction and Mining	202	260	29%
Lawn and Garden Equipment	575	723	26%
Light Commercial Equipment	274	180	-34%
Pleasure Craft	0	0	0%
Portable Equipment	114	139	22%
Railyard Operations	4	5	21%
Recreational Equipment	54	69	29%
Transport Refrigeration Units	42	47	11%
Total	**1,328**	**1,501**	**13%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

AGRICULTURE

Yountville does not have a substantial presence of agricultural activity within its jurisdiction. Table 55 shows that the limited agricultural activities in the town (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline by 10 percent between 2019 and 2030, in proportion with regional trends in the reduction in agricultural acres over the last decade. Emissions from irrigation pumps were excluded as no irrigation pump permits were identified in Yountville.

Table 55 Agricultural GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Agricultural Offroad Equipment	41	33	-18%
Fertilizer Application	19	19	-1%
Livestock	16	16	-1%
Total	75	67	-10%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

SOLID WASTE

Waste Generation

Yountville generated approximately 6,535 tons of solid waste in 2019 which generated 2,601 $MTCO_2e$ in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that waste generation emissions are proportional to amount of waste generated, both Yountville's waste disposal and related emissions are anticipated to increase by 21 percent from 2019 to 2030, commensurate with population growth.

Table 56 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Solid Waste Generation Tonnage	6,535	7,920	21%
Solid Waste Generation Emissions	2,601	3,153	21%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Waste-in-Place

The Town of Yountville does not have any landfills located within its jurisdiction. Thus, there are no waste-in-place emissions attributable to this jurisdiction.

IMPORTED WATER

Yountville is anticipated to increase its usage of imported water by 21 percent by 2030 from 2019 levels, commensurate with population growth. However, emissions from imported water are expected to decline by 19 percent over the same period. This is due to the change in emissions factors associated with the electricity used for pumping imported water (i.e., from the state water project). The average California electricity emissions factors, available from EPA's eGRID database for the CAMX region, are anticipated to decline by 33 percent between 2019 and 2030. Emissions associated with locally sourced water are captured in the building energy sector.

Table 57 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Imported Water Usage (Gallons/year)	43	53	21%
Imported Water Emissions	65	52	-19%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

WASTEWATER

Yountville's emissions from wastewater are anticipated to increase by proportionally with service population. These emissions would primarily come from central wastewater treatment plants. There are no knowns septic systems operating within Yountville.

Table 58 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Service population served by WWTP	3,893	4,718	21%
WWTP Process Emissions	1,040	1,261	21%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; WWTP = wastewater treatment plants

Source: Ascent Environmental 2022.

4.6 UNINCORPORATED NAPA COUNTY

Emissions Summary

Table 59 shows a summary of the 2019 emissions inventory and legislative-adjusted forecast for the Unincorporated County. The Unincorporated County emissions are anticipated to increase by 12 percent between 2019 and 2030 based on demographic and employment forecasts from the County's General Plan estimates and legislative adjustments (County of Napa 2008). As shown in Table 59, building energy will remain the highest emitting sector in the County's inventory. Emissions from agriculture are also anticipated to have the greatest decrease between 2019 and 2030, with a 12 percent reduction.

Table 59 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Unincorporated County ($MTCO_2e$/year)

Sector	2019	2030	Percent Change	Difference
Agriculture	97,378	85,826	-12%	-11,552
Building Energy	283,843	347,075	22%	63,232
Off-Road Equipment	50,602	63,989	26%	13,387
On-Road Transportation	37,859	32,353	-15%	-5,506
Solid Waste	125,429	138,611	11%	13,181
Wastewater	3,191	4,140	30%	948
Total	**598,302**	**671,993**	**12%**	**73,691**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, the Unincorporated County's building energy-related emissions are anticipated to increase by 22 percent between 2019 and 2030.

Table 60 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Unincorporated County ($MTCO_2e$/year)

Energy Type	2019	2030	Percent Change
Residential			
Electricity	1,850	1,949	5%
Natural Gas	201,150	248,448	24%
Subtotal	203,000	250,397	23%
Non-Residential			
Electricity	4,208	3,857	-8%
Natural Gas	76,635	92,820	21%
Subtotal	80,843	96,677	20%
Total	**283,843**	**347,075**	**22%**

Notes: Totals may not sum due to rounding. BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

ON-ROAD TRANSPORTATION

Consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards per CARB's ZEV mandate, and other adopted regulations which can reduce average vehicle GHG emissions per mile on-road transportation emissions in the county are anticipated to decrease by 15 percent between 2019 and 2030, see Table 61.

Table 61 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County $MTCO_2e$/year)

Trip Type	2019	2030	Percent Change
Commercial Trips	12,543	11,488	-8%
Non-Commercial Trips	25,317	20,866	-18%
Total	**37,859**	**32,353**	**-15%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

OFF-ROAD EQUIPMENT

Table 62 displays inventory and legislative adjusted forecasts for off-road equipment for unincorporated Napa County. As shown in Table 61, off-road equipment emissions in the county are anticipated to increase by 26 percent between 2019 and 2030. Most off-road equipment sources are anticipated to increase by 26-38 percent except lawn and garden equipment, light commercial equipment, recreational equipment, and transportation refrigeration units. Emissions generated from light commercial equipment are expected to decrease the most (31 percent) due to future emission standards for off-road equipment (CARB 2021).

Table 62 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Industrial	1,711	2,176	27%
Airport Ground Support	<1	<1	18%[1]
Commercial Harbor Craft	44	56	27%
Construction and Mining	2,876	3,967	38%
Lawn and Garden Equipment	5,160	7,336	42%
Light Commercial Equipment	7,569	5,187	-31%
Pleasure Craft	28,896	39,691	37%
Portable Equipment	3,145	4,005	27%
Railyard Operations	120	151	26%
Recreational Equipment	483	711	47%
Transport Refrigeration Units	599	710	18%
Total	**50,602**	**63,989**	**26%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

[1] This represents a change from 163 to 192 grams of CO_2e per year, per outputs from OFFROAD2021 and the region's population growth.

Source: Ascent Environmental 2022.

AGRICULTURE

Most agricultural activity within the region takes places in the unincorporated county. Table 63 shows that agricultural activities in the county (e.g., agricultural offroad equipment, use of fertilizers, and livestock) would decline between 2019 and 2030 by 12 percent, in proportion with regional trends in the reduction in both rangeland and non-rangeland agricultural acres over the last decade. The greatest decline is anticipated in the livestock category (38 percent decrease), which is proportional to the anticipated decline in rangeland and pastureland acreage. Emissions from agricultural offroad equipment, although adjusted for growth in non-rangeland acreage, would have the next sharpest decline (14 percent decrease), primarily resulting from improvements in offroad emissions standards and requirements, as modeled in OFFROAD2021. Emissions from other agricultural sources (i.e., fertilizer application and irrigation pumps) are anticipated to increase by four percent, commensurate with historical trends of growth in non-rangeland agricultural land (e.g., fruit and nut crops, olives, hay, vegetables).

Table 63 Agricultural GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County (MTCO$_2$e/year)

Source	2019	2030	Percent Change
Agricultural Offroad	46,092	39,837	-14%
Fertilizer Application	21,216	22,134	4%
Irrigation Pumps	12,347	12,880	4%
Livestock	17,723	10,975	-38%
Total	**97,378**	**85,826**	**-12%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; MTCO$_2$e = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

SOLID WASTE

Solid waste emissions in the Unincorporated County are anticipated to increase by 11 percent from 2019 to 2030 from 125,428 to 138,611 MTCO$_2$e/year, largely due to the expected increases in waste-in-place emissions at the two landfills located within the area.

Waste Generation

Unincorporated Napa County generated approximately 28,105 tons of solid waste in 2019 which generated 10,810 MTCO$_2$e in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that waste generation emissions are proportional to amount of waste generated, both the Unincorporated County's waste disposal and related emissions are anticipated to increase by 34 percent from 2019 to 2030, commensurate with population growth.

Table 64 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County (MTCO$_2$e/year)

Source	2019	2030	Percent Change
Solid Waste Generation Tonnage	28,105	37,671	34%
Solid Waste Generation Emissions	10,810	14,490	34%

Notes: BAU = business-as-usual; GHG = greenhouse gas; MTCO$_2$e = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

Waste-in-Place

Two major landfills are located within the Unincorporated County: Clover Flat Landfill and American Canyon Landfill. Table 65 shows that emissions from waste-in-place from both landfills are anticipated to increase by eight percent from 2019 to 2030. Section 3.5 describes the methodology used to quantify these forecasts.

Table 65 Waste in Place GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County ($MTCO_2e$/year)

Source	2019	2030	Percent Change
American Canyon Landfill	42,800	40,084	-6%
Clover Flat Landfill	71,819	84,036	17%
Total	**114,619**	**124,121**	**8%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

IMPORTED WATER

Unincorporated Napa County did not utilize imported water in 2019, thus this sector was not further evaluated for 2030 forecasts.

WASTEWATER

Emissions from wastewater are anticipated to increase proportionally with service population in the unincorporated county. These emissions would primarily come from septic systems as the majority of the population in the Unincorporated County resides in rural areas. A smaller proportion of the population are location near the incorporated cities and have access to central wastewater treatment plants.

Table 66 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County ($MTCO_2e$/year)

Source	2019	2030	Percent Change
Service population served by septic systems	24,459	31,797	30%
Service population served by WWTP	618	803	30%
Septic Process Emissions	2,961	3,841	30%
WWTP Process Emissions	230	299	30%
Total Emissions	**3,191**	**4,140**	**30%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Environmental 2022.

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Napa County Regional GHG Inventory Update 2019

Presented by Ascent Environmental

September 23, 2022

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Outline

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- GHG Emissions by Sector
- GHG Emissions by Jurisdiction
- Forecasts
- SLCP and Carbon Sequestration
- Next Steps/Questions

GHG Emissions by Sector

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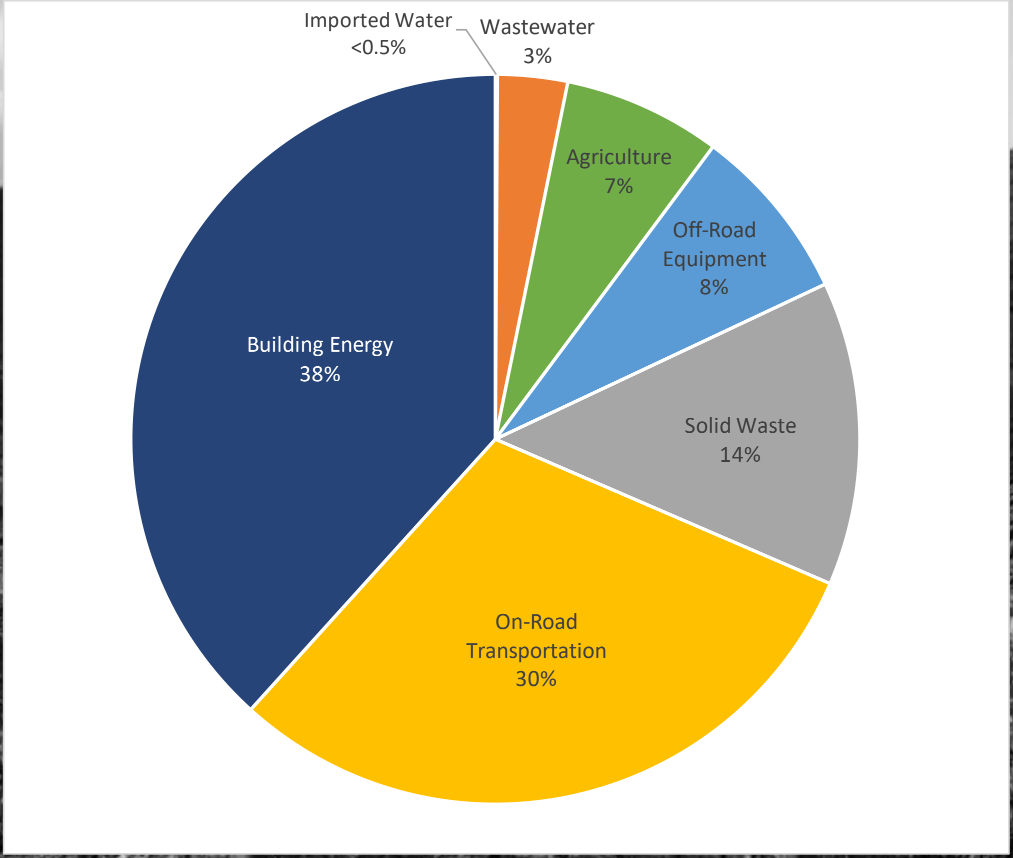

Emissions Sector	2019 ($MTCO_2e$/ year)
Building Energy	564,336
On-Road Transportation	446,673
Solid Waste	198,862
Off-Road Equipment	115,548
Agriculture	103,381
Wastewater	45,858
Imported Water	5,943
Total	**1,480,602**
Emissions per capita	**10.6**

GHG Emissions by Sector

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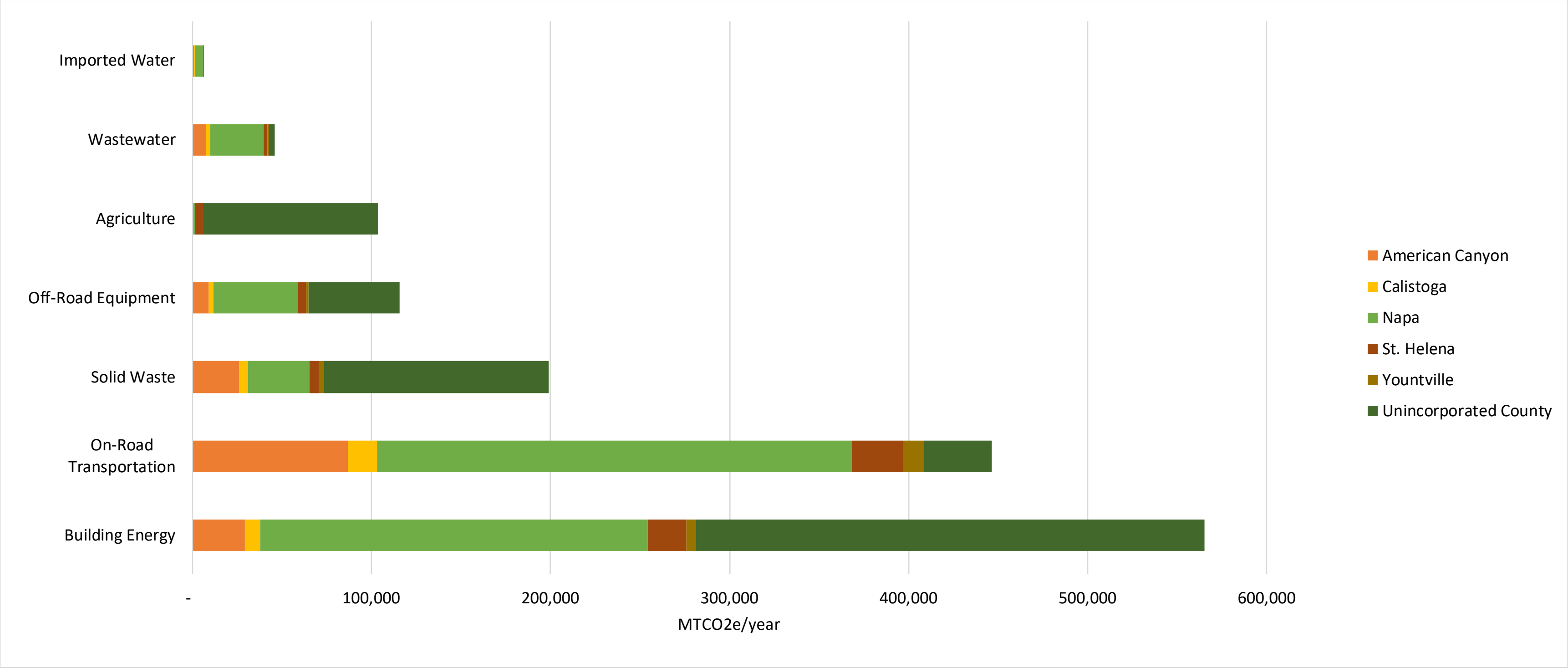
2019 Napa County Regional Greenhouse Gas Emissions Inventory by Sector and Jurisdiction ($MTCO_2e$/year)



Building Energy

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- Data Source: Electricity and natural gas use data from MCE and PG&E
- Methodology: 2019 emission factors, accounts for Deep Green and Light Green MCE participation
- 85% of residents and businesses use MCE
  - 5% use MCE Deep Green
  - 80% use MCE Light Green
- 97% of emissions are from natural gas.
- Emissions in 2019: 564,336 $MTCO_2e$/year

On-Road Transportation

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- Data Source: MTC VMT Data Portal
- Methodology: Emission factors from CARB's EMFAC2021 model
- 67% of emissions from commercial vehicles
- 33% of emissions from non-commercial vehicles
- Average passenger VMT per capita: 5,698 mi/yr
- Average truck VMT per capita: 1,346 mi/yr
- Emissions in 2019: 446,673 $MTCO_2e$/year

Solid Waste

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- Data Source: CalRecycle (waste generated), EPA FLIGHT Database (waste-in-place at landfills)
- Methodology: Emissions per ton of municipal waste generated, Direct emissions from EPA
- All waste-in-place emissions from the Unincorporated County
- Waste-in-Place includes decaying waste from past years and other jurisdictions.
- 42% of emissions from waste generation
- 58% of emissions from waste-in-place
- Emissions in 2019: 198,862 $MTCO_2e$/year

Off-Road Equipment

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- Data Source: CARB's OFFROAD2021 model
- Methodology: Direct emissions from OFFROAD, apportioned to each jurisdiction by population, jobs, agricultural acres, or service population, depending on equipment type
- 25% of emissions from lawn and garden equipment
- 25% of emissions from pleasure craft
- 11% of emissions from construction
- Emissions in 2019: 115,548 $MTCO_2e$/year

Agriculture

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- Data Source: Crop Report, CDFA Fertilizer Tonnage Report, BAAQMD, OFFROAD2021
- Methodology: Livestock and diesel irrigation pump emission factors from CARB, Fertilizer emissions formulas from ICLEI's Community Protocol
- 46% of emissions from agricultural off-road equipment
- 21% of emissions from fertilizer application
- Emissions in 2019: 103,381 $MTCO_2e$/year

Wastewater

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- Data Source: Population served by WWTP vs septic
- Methodology: Population-based formulas for WWTP and septic treatment systems from ICLEI's Community Protocol.
- 94% of emissions from population served by WWTP
- Emissions in 2019: 45,858 $MTCO_2e$/year

Imported Water

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- Data Source: Imported water volumes from each jurisdiction by source
- Methodology: Energy intensity factors for water sourced from the State Water Project, Average California electricity emission factors
- City of Napa imports the most water (74% of county total)
- Emissions in 2019: 28,783 $MTCO_2e$/year

GHG Emissions by Jurisdiction

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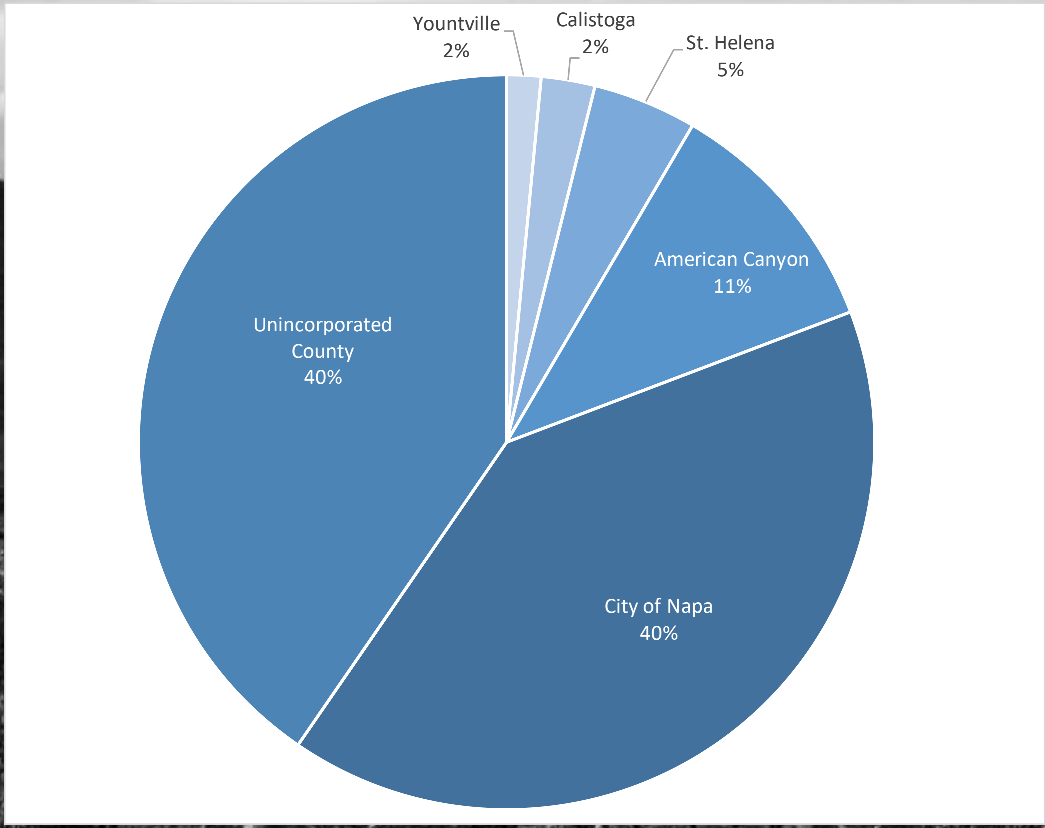

Jurisdiction	2019 ($MTCO_2e$/year)	Percent of Total
Unincorporated County	598,302	40.4%
City of Napa	597,610	40.4%
American Canyon	159,719	10.8%
St. Helena	67,657	4.6%
Calistoga	34,982	2.4%
Yountville	22,332	1.5%
Total	1,480,602	100.0%

GHG Emissions by Jurisdiction

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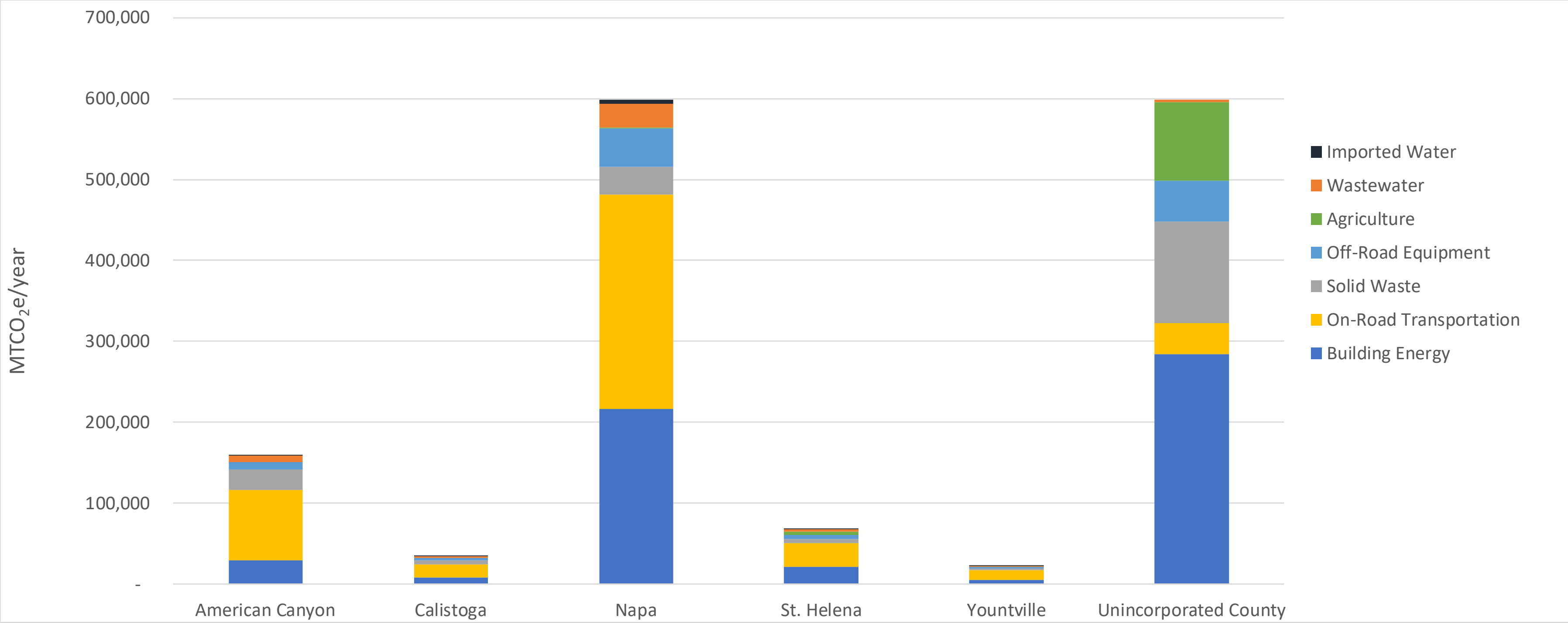
2019 Napa County Regional Greenhouse Gas Emissions Inventory by Jurisdiction and Sector ($MTCO_2e$/year)



American Canyon

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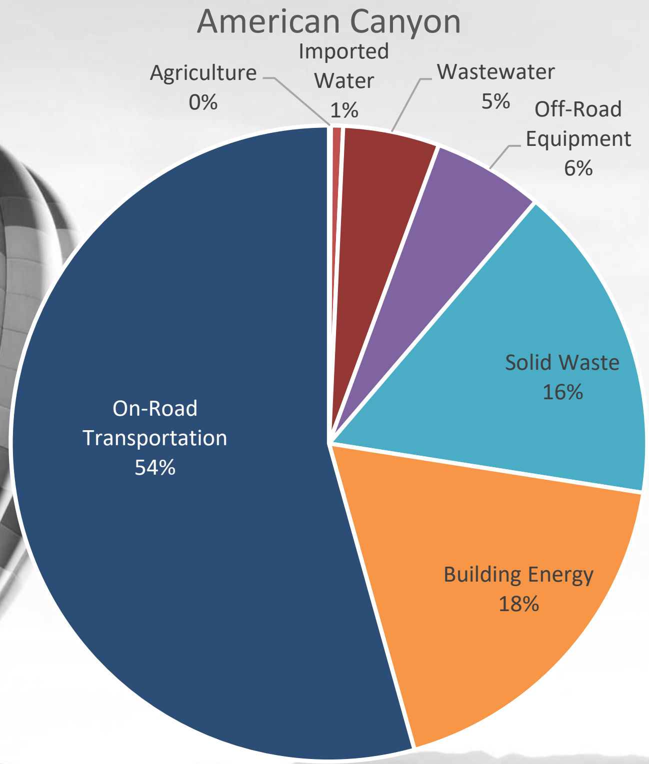
- Most emissions from On-Road Transportation
- Second most populous city
- Proximity to Bay Area
- Emissions per capita
  - 7.6 $MTCO_2e$/capita in 2019
- On-Road Emissions:
  - 4.1 $MTCO_2e$/capita in 2019
- Emissions in 2019:
  - 159,842 $MTCO_2e$



Calistoga

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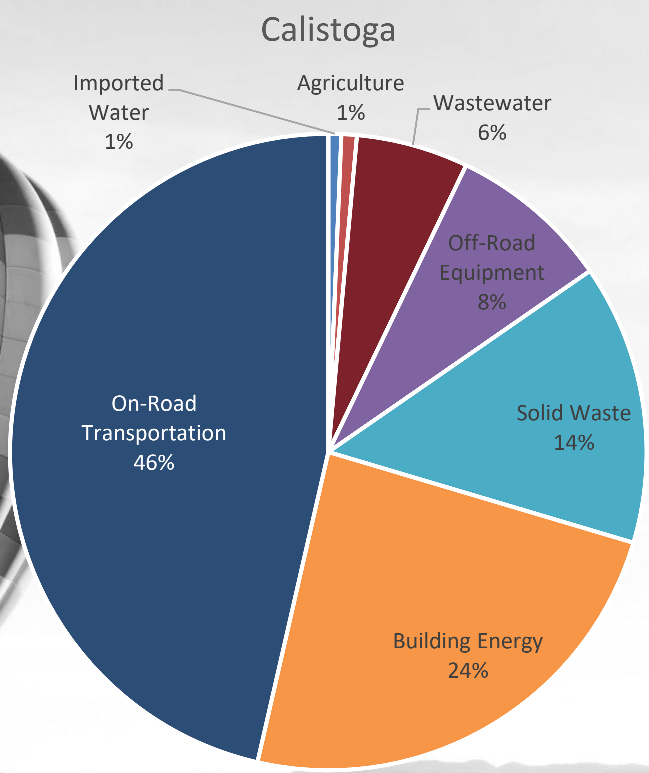
- Most emissions from On-Road Transportation
- Second smallest city by population
- Emissions per capita:
  - 6.5 $MTCO_2e$/capita in 2019
- On-Road Emissions:
  - 3.0 $MTCO_2e$/capita in 2019
- Emissions in 2019:
  - 35,025 $MTCO_2e$



City of Napa

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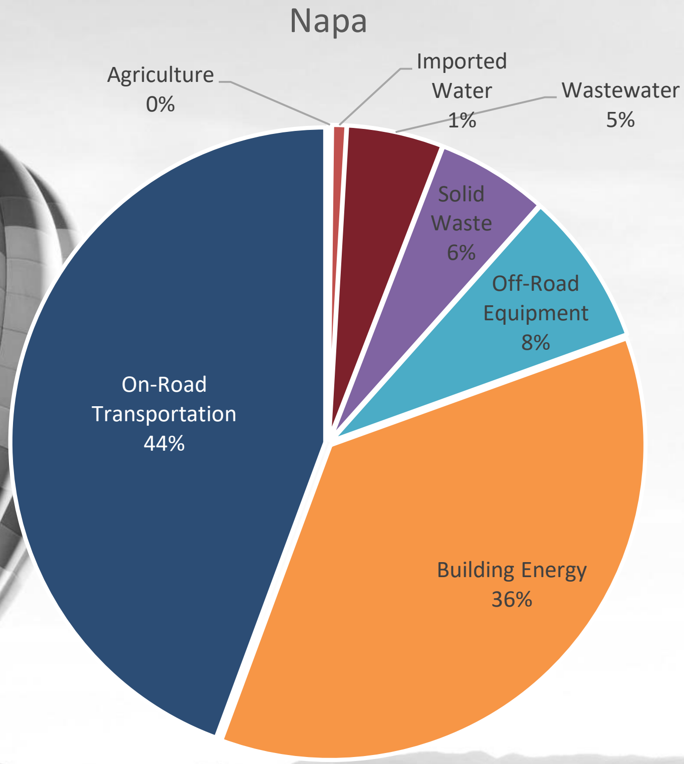
- Most emissions from On-Road Transportation
- Most populous city. Most number of jobs.
- Emissions per capita:
  - 7.5 $MTCO_2e$/capita in 2019
- On-Road Emissions:
  - 3.0 $MTCO_2e$/capita in 2019
- Emissions in 2019:
  - 598,089 $MTCO_2e$ (2nd highest)



St. Helena

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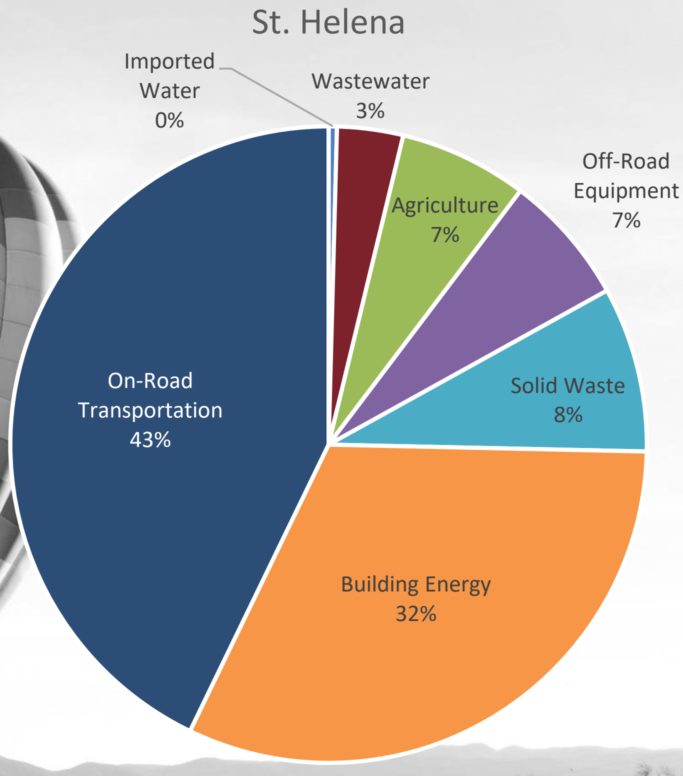
- Most emissions from On-Road Transportation
- Major tourist destination and large commercial presence
- Emissions per capita:
  - 11.1 $MTCO_2e$/capita in 2019
- On-Road Emissions:
  - 4.2 $MTCO_2e$/capita in 2019
- Emissions in 2019:
  - 67,720 $MTCO_2e$



Yountville

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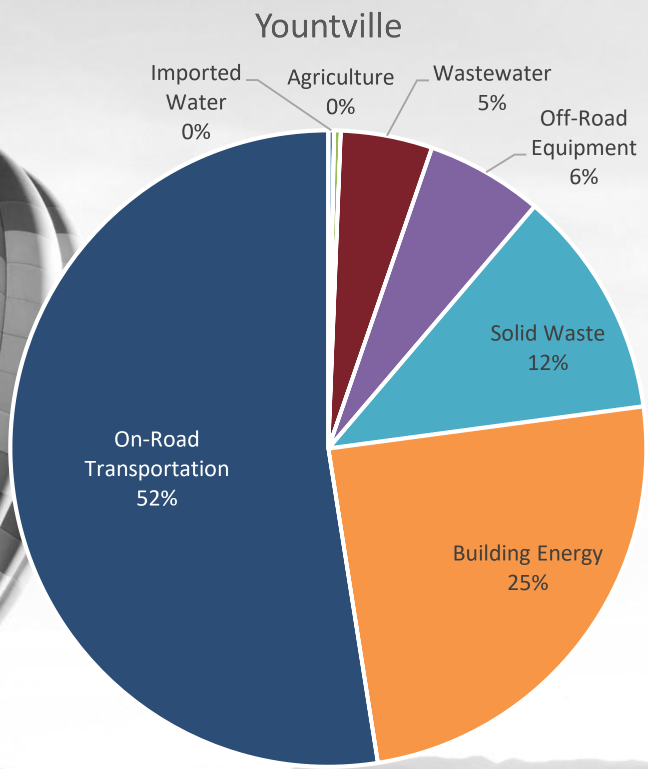
- Most emissions from On-Road Transportation
- Least populous jurisdiction
- Emissions per capita:
  - 8.0 $MTCO_2e$/capita in 2019
- On-Road Emissions:
  - 4.2 $MTCO_2e$/capita in 2019
- Emissions in 2019:
  - 22,382 $MTCO_2e$ (lowest)



Unincorporated County

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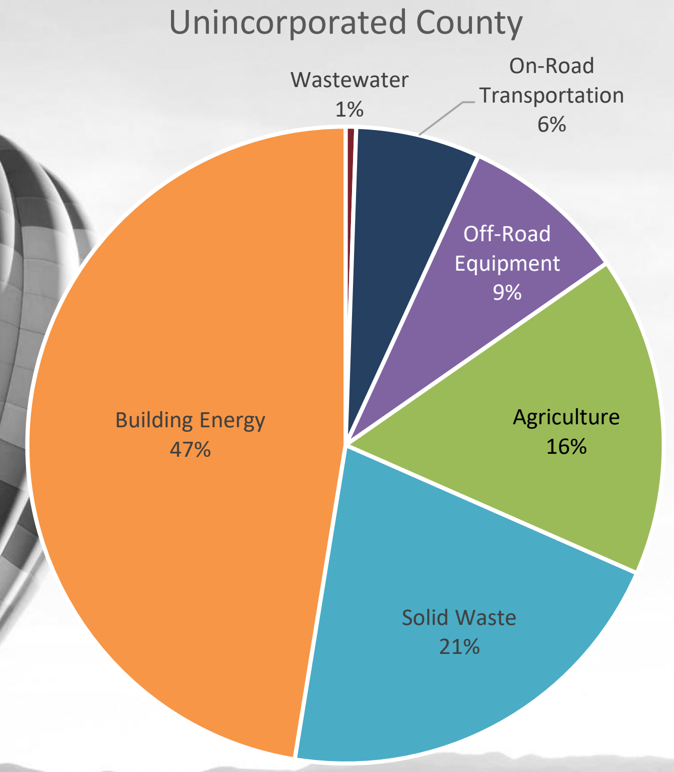
- Most emissions from Building Energy
- Majority of ag emissions here
- Both landfills located here
- Emissions per capita:
  - 23.9 $MTCO_2e$/capita in 2019
- On-Road Emissions:
  - 1.5 $MTCO_2e$/capita in 2019
- Emissions in 2019:
  - 598,772 $MTCO_2e$ (highest)



Forecasts

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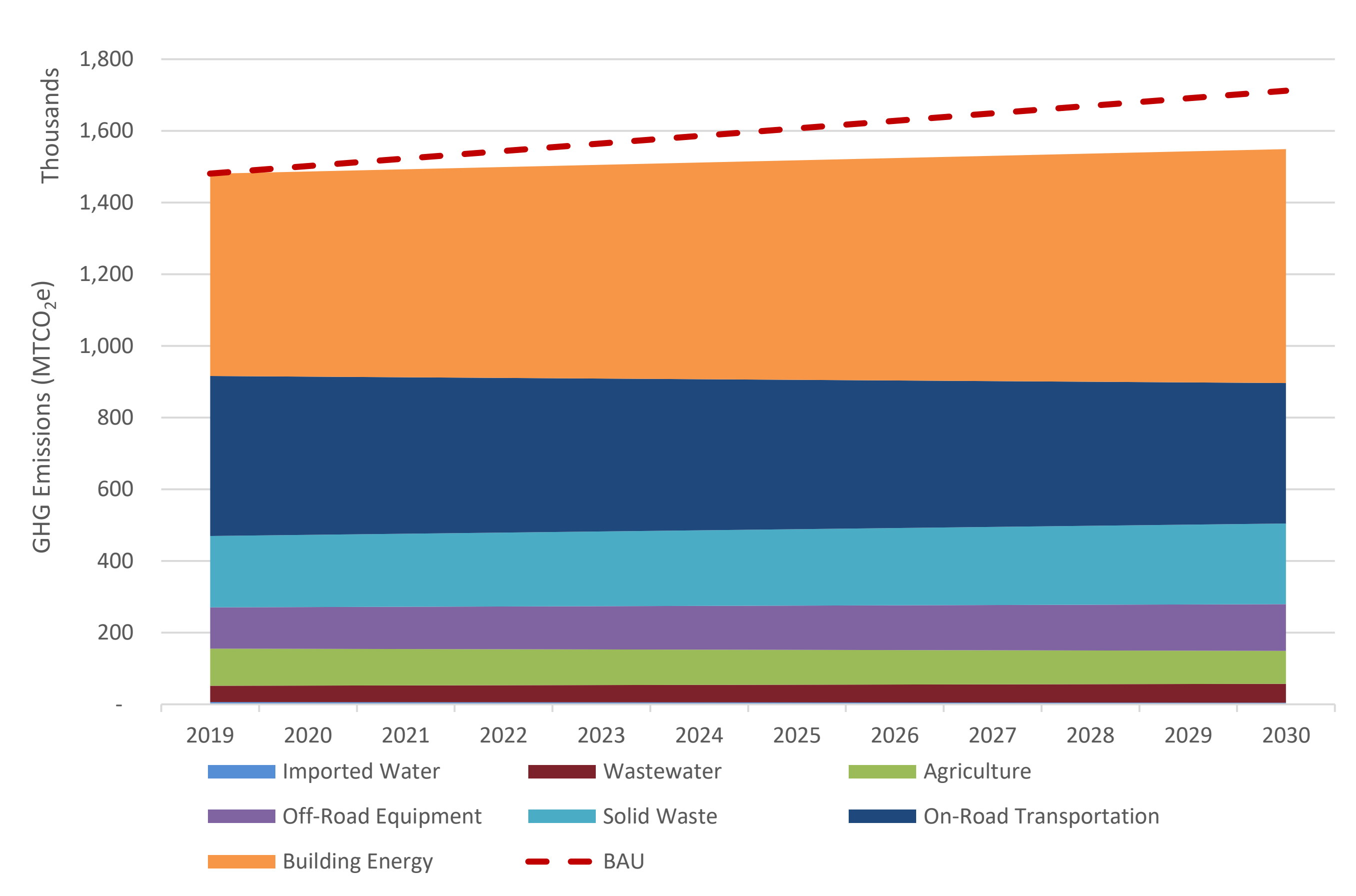
Napa County Regional GHG Emissions Forecasts (2019-2030)



- BAU increases by 16%
- Legislative-Adjusted BAU increases by 5%
- Forecasts scaled by population, jobs, ag acres, livestock pop, VMT, etc.
- Leg-Adjustments include:
  - MCE plans
  - SB100
  - Vehicle emissions standards
  - Title 24

SLCP and Carbon Sequestration

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- Short Lived Climate Pollutants (SLCP)
  - Some SLCPs already accounted for
    - E.g., methane emissions from livestock and solid waste
  - Currently reviewing other sources of SLCPs
- Carbon Sequestration
  - Currently reviewing carbon storage data sources
- Anticipated Completion: Early 2023

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Questions

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2019 Napa County Regional Greenhouse Gas Inventory by Jurisdiction and Sector (MTCO$_2$e/year)

Emissions Sector	American Canyon	Calistoga	Napa	St. Helena	Yountville	Unincorporated County	Total
Building Energy	29,168	8,431	216,505	21,599	5,551	284,313	565,567
On-Road Transportation	86,779	16,239	265,100	28,975	11,722	37,859	446,673
Solid Waste	25,938	4,981	34,236	5,676	2,601	125,429	198,862
Off-Road Equipment	8,998	2,880	47,238	4,502	1,328	50,602	115,548
Agriculture	154	274	1,086	4,415	75	97,378	103,381
Wastewater	7,822	1,994	29,542	2,270	1,040	3,191	45,858
Imported Water	983	229	4,383	285	65	-	5,943
Total	159,842	35,025	598,089	67,721	22,382	598,772	1,481,832
Emissions per capita	7.6	6.5	7.5	11.1	8.0	23.9	10.6
Emissions per SP	5.9	4.3	4.6	5.7	5.7	10.8	6.3
Transportation Emissions per capita	4.1	3.0	3.3	4.8	4.2	1.5	3.2