Appendix E

Greenhouse Gas Emissions Forecast Update Memorandum

Photo Credit: City of Calistoga

Memo

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Date: December 9, 2024

To: David Morrison, Brian Bordona, Jamison Crosby, and Ryan Melendez (County of Napa); and Deborah Elliott (City of Napa)

From: Brenda Hom, Erik de Kok, and Honey Walters (Ascent, Inc.)

Subject: Napa County RCAAP: Revised Final Greenhouse Gas Emissions Forecast Update (2019 – 2045)

1 INTRODUCTION

In 2022, Ascent completed Napa County's regional greenhouse gas (GHG) emissions inventory for 2019 and a forecast for the year 2030. In December 2023, the six jurisdictions in the Napa County region (region) (i.e., City of American Canyon, City of Calistoga, City of Napa, City of St. Helena, Town of Yountville, and County of Napa [County]) hired Ascent to prepare the Napa County Regional Climate Action and Adaptation Plan (RCAAP), a comprehensive plan for all jurisdictions in the region to reduce GHG emissions and adapt to climate change. The RCAAP scope of work includes updates to the forecast through calendar year 2045.

This memorandum updates the Final Napa County Regional Greenhouse Gas Forecast (2019 – 2030) that was delivered to the County on November 29, 2022 (referred to herein as "2022 forecast memo").

1.1 ORGANIZATION OF THIS MEMORANDUM

This memorandum consists of eight parts:

- Section 1: Introduction presents the background and purpose behind the GHG emissions forecast update.
- Section 2: BAU Greenhouse Gas Emissions Forecast Summary presents an overview of the region's "business-as-usual" (BAU) emissions projections for years 2030, 2035, and 2045.
- Section 3: Legislative-Adjusted Emissions Forecast Summary presents an overview of the region's legislative-adjusted emissions forecasts for years 2030, 2035, and 2045.
- Section 4: A CEQA Qualified RCAAP presents the requirements of a CEQA-qualified GHG reduction plan per CEQA Guidelines §15183.5.
- Section 5: Short-Lived Climate Pollutants and Carbon Stock Considerations
- Section 6: Forecast Methodology by Sector summarizes the forecast methodology used to estimate GHG emissions under BAU and legislative-adjusted scenarios for years 2030, 2035, and 2045.
- Section 7: Greenhouse Gas 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.

1.2 SUMMARY OF UPDATES FROM THE PREVIOUS 2030 GHG FORECAST

Updated forecasts of communitywide GHG emissions for the region as a whole are presented in this memorandum, along with a breakdown of forecasted emissions in each of the six jurisdictions in the region, under both "business-as-usual" (BAU) and legislative-adjusted BAU scenarios for the years 2030, 2035, and 2045.

Under the BAU scenario, forecasts provide an estimate of future GHG levels based on a continuation of current trends in activity and anticipated growth. Under the legislative-adjusted BAU scenario, the forecasts are adjusted to account for Federal, State, and regional legislative actions to reduce emissions in the future.

GHG forecasts are calculated based on emission sources addressed in the 2019 communitywide GHG emissions inventory, found in the Napa County Region 2019 Community Greenhouse Gas Inventory Update Summary memorandum that was delivered to the County on June 7, 2022. Any information, methodology, and background related to the 2019 GHG inventory and descriptions of the emissions sectors may be found in the 2022 inventory memorandum.

Many of the methods used to forecast the previous 2030 forecast remain unchanged, though there are significant differences in this update. The following is a summary of the primary methodological and data-related updates from the previous forecast completed in 2022.

- Updated Population, Employment, and Housing Growth through 2045
  - New demographic forecasts for the region through 2030 were available from the jurisdictions. These demographic forecasts (e.g., population, employment) impact overall growth forecasts in the building energy, off-road vehicle, water, wastewater, and waste emissions sectors. Overall, growth rates are generally lower than in the 2022 forecast memo, which had estimated that the countywide population would grow by 18 percent from 2019 to 2030. With the updated growth forecasts, the countywide population is estimated to grow by up to 12 percent by 2030.
  - For demographic forecasts beyond 2030, the cities of Napa, St. Helena, and Yountville provided estimates for population and employment forecasts through 2045. These cities account for 66 percent of the region's population. For other jurisdictions in the region, forecasts beyond 2030 were not available. Thus, for Calistoga, American Canyon, and the Unincorporated County, forecast data were derived from the Metropolitan Transportation Commission's (MTC) Plan Bay Area 2050 (PBA 2050) planning document. Based on this combination of sources, the region is expected to grow by 18 percent from 2019 to 2045. In contrast, the population trends from 2010 to 2024 have generally declined. Between 2010 and 2020, the population in the county rose by 1.1 percent, and between 2020 and 2024, the county's population fell by two percent from 2020 to 2024 (Department of Finance [DOF] 2021, DOF 2024). The forecasted increase in population is a product of MTC's anticipation of strong economic growth and lower housing prices due to increased housing supply in the future in the Bay Area (MTC 2023). While recently declining trends in the region's population may differ from forecasted population growth in adopted plans, relying on trends in adopted plans is still appropriate to ensure that GHG emissions associated with potential future growth identified in adopted regional and local plans are captured in the analysis, as discussed further under Section 4 (CEQA-Qualified RCAAP).
- Updated On-Road Vehicle Activity Forecasts
  - Forecasted on-road activity was updated to reflect the latest transportation modeling conducted in PBA 2050, which includes vehicle miles traveled (VMT) forecasts through 2050 for individual districts across the Bay Area. These differ from the previous forecasts which were based on MTC's Plan Bay Area 2040. Under Plan Bay Area 2040, countywide VMT was expected to decline by 33 percent from 2019 to 2030. With the updated modeling under PBA 2050, countywide VMT is expected to remain relatively unchanged from 2019, varying only by a few percent through 2030 and 2045 from 2019 levels. This applies to both BAU and legislative-adjusted BAU scenarios.

- Updated On-Road Emission Factors
  - New emission factors from 2030, 2035, and 2045 were taken from the California Air Resources Board's (CARB) EMissions FACtor model (EMFAC 2021) model and additionally adjusted to account for Zero Emission Vehicle mandates under the Advanced Clean Cars II (ACCII) and Advanced Clean Fleets (ACF) programs. While the 2022 forecast memo included the ACCII, the ACF program is new and additional years are now taken into account.
- Updated Off-Road Legislative-Adjusted Forecasts
  - Off-road vehicle and equipment legislative-adjusted BAU emissions forecasts were updated from CARB's OFFROAD2021 model version 1.0.1 to version 1.0.5. The primary updates reflect the effect of 2022 amendments to the Off-Road Regulation on construction, mining, industrial, and oil equipment emissions.
  - Regionwide off-road activity and emission forecasts are no longer scaled by demographic growth but are based on CARB's forecasts for the region through individual equipment trend analysis that is built into OFFROAD2021.
  - This forecast update accounts for new emission factors for small off-road engines for 2030, 2035, and 2045 as per the prohibition of emissions from new small off-road engines from 2024.
  - Additionally, OFFROAD2007 is no longer being used to quantify methane (CH_4) and nitrous oxide (N_2O) emissions or emissions from equipment that are not included in the OFFROAD2021 model. This was done to be consistent with State forecasts for the off-road sector, for which CARB has done extensive research in terms of the trends in off-road activity and applied legislative reductions.
  - Modeling now accounts for AB 1346, approved in late 2021, which requires new small off-road engines under 25 horsepower to be electric or zero emissions starting in 2024.
- New Electricity Legislative-Adjusted BAU Emission Factors and Energy Use
  - This forecast update accounts for new emission factor estimates for 2035 and 2045 that account for the net zero emission retail electricity requirements by 2045 under Senate Bill 1020.
  - The forecast update also accounts for the Bay Area Air Quality Management District's (BAAQMD's) zero nitrogen oxides (NOx) appliance rule.
  - Modeling of building energy use in new construction now accounts for the 2022 Title 24 Energy Efficiency standards, revising from the previous 2019 standard.
- Re-adjusted Agricultural Lands Forecast
  - The jurisdictions adjusted their forecasts of how agricultural (crop and rangeland) lands would change through 2045. Most notably, based on data received from the County for the unincorporated areas, which account for over 90 percent of agricultural land in the region, the County anticipates a four percent reduction in range/pastureland between 2019 and 2045. The previous forecast relied on forecasting from historical trends, which resulted in a 34 percent reduction in agricultural lands between 2019 and 2030.
  - This forecast update for the Agriculture sector also accounts for reduced emissions from agricultural offroad equipment as per the prohibition of emissions from new small off-road engines from 2024.

2 BAU GREENHOUSE GAS EMISSIONS FORECAST SUMMARY

Under the BAU forecast, regional GHG emissions are generally expected to remain constant due to a combination of increased growth and expected slight reductions in VMT. Table 1 shows the baseline emissions in 2019 and BAU emissions forecasts for 2030, 2035, and 2045. Under the BAU forecast, regional emissions are anticipated to increase

by four percent from 2019 to 2045. This is lower than the previous 12 percent forecast by 2030 primarily due to forecasted reductions in VMT under PBA 2050. Although most sectors would grow under the BAU scenario, MTC forecasts an overall reduction in VMT in the future.

Table 1 Napa County Regional GHG Emissions Inventory and BAU Forecasts ($MTCO_2e$)

Sector	2019	2030	2035	2045
Agriculture	103,381	105,244	106,690	109,538
Building Energy	279,592	326,969	324,880	327,387
Imported Water	5,943	6,793	6,845	7,174
Off-Road Equipment	115,548	118,539	118,318	119,557
On-Road Transportation	472,677	450,387	438,275	430,763
Solid Waste	198,862	217,407	215,942	216,139
Wastewater	45,858	52,621	52,772	54,585
Total	**1,221,861**	**1,277,959**	**1,263,720**	**1,265,143**
Percent Change from 2019				
Agriculture	NA	2%	3%	6%
Building Energy	NA	17%	16%	17%
Imported Water	NA	14%	15%	21%
Off-Road Equipment	NA	3%	2%	3%
On-Road Transportation	NA	-5%	-7%	-9%
Solid Waste	NA	9%	9%	9%
Wastewater	NA	15%	15%	19%
Total	NA	5%	3%	4%

Notes: VMT = vehicle miles traveled, NA = not applicable, $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: Ascent Inc. in 2024.

BAU emissions forecasts are generally estimated proportionally with activity growth. For building energy, on-road transportation, off-road transportation, water, and solid waste generation sectors, the emissions forecasts were scaled by demographic and VMT projections from 2019 to 2045. Population and employment projections were based on demographic forecasts provided by the cities of Napa, St. Helena, and Yountville along with growth estimates provided by MTC's PBA 2050 growth forecasts for the remaining jurisdictions (MTC 2021). Additionally, service population, which is the sum of population and employment, was used as a growth factor for specific sectors and sub-sectors (e.g., wastewater, construction off-road equipment) for which activities depend on growth in both population as well as employment. For the agricultural sector, emissions were scaled by forecasted changes in agricultural land cover in the region from 2019 through 2045, as provided by the Cities of St. Helena, Napa, Yountville, and the County for the unincorporated areas[1]. Future waste-in-place emissions were scaled by the decomposition of waste accumulated at each landfill within the region. All growth factors were applied based on the percent change from 2019 activity levels for each target year. The applied growth, or scaling, factors for each sector are described in Section 7. The demographic forecasts projected by each jurisdiction and MTC can be found in Attachment 1 and Attachment 2, respectively.

[1] Agricultural acreages and forecasts were unavailable from Calistoga and American Canyon. American Canyon reported no agricultural acres within city limits, despite some discrepancies with GIS data provided by the County from the previous inventory and forecast effort.

Throughout the region, population and employment are expected to increase by 18 and 13 percent, respectively, from 2019 to 2045. These growth factors were used to forecast emissions for all emission sectors. Annual VMT projections were developed using data from MTC's VMT Data Portal, which uses data from PBA 2050's VMT data (See Attachment 2) (MTC 2021) and developed based on the origin-destination method. Annual VMT in the region is projected to increase by two percent by 2030 and decrease by one percent by 2045 from 2019 levels. 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 through 2045. Refer to Table 22 for demographic and VMT forecasts by jurisdiction.

Table 2 Napa County Regional Demographic and Vehicle Miles Traveled Forecasts

Forecast Factor	2019	2030	2035	2045
Population	139,608	156,842	157,066	164,054
Employment	97,452	114,219	112,868	110,335
Service Population[1]	237,060	271,061	269,934	274,389
Annual VMT	1,015,777,139	997,701,261	975,172,318	958,480,083
Percent change from 2019				
Population	NA	12%	13%	18%
Employment	NA	17%	16%	13%
Service Population[1]	NA	14%	14%	16%
Annual VMT	NA	-2%	-4%	-6%

Notes: VMT = vehicle miles traveled, NA = not applicable

[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. See Attachment 1 for demographic forecasts from each jurisdiction.

For agricultural emissions under the BAU scenario, livestock and non-livestock emissions (i.e., fertilizer application and irrigation pumps) were scaled by the anticipated change in rangeland and cropland, respectively. Between 2019 and 2045, the County anticipates that rangeland acreage would decline by four percent (See Attachment 1). Over the same time, cropland acreage regionwide is anticipated to see a net increase of nine percent, with nearly all of that change occurring in the unincorporated region. BAU agricultural off-road emissions were anticipated to also change directly in proportion to cropland acreage in the region. See Attachment 1 for the agricultural land forecasts from each jurisdiction.

3 LEGISLATIVE-ADJUSTED EMISSIONS FORECAST SUMMARY

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. These adjusted 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 to meet GHG targets. A summary of the legislative reductions applied is provided in Table 3.

Table 3 Legislative Reductions Summary

Source	Legislative Reduction	Description	Sectors Applied
Regional	Marin Clean Energy Power Procurements	MCE aims to continue to procure 95 percent of energy from GHG-free sources (MCE 2021:7).	Building Energy
Regional	BAAQMD Zero NOx Appliance Rule	Prohibits the sale and installation of NOx-emitting water heaters by 2027, furnaces by 2029, and large commercial water heaters by 2031 in BAAQMD's jurisdiction. Currently, the only technology available to meet these rules are electric.	Building Energy
State	California's Building Energy Efficiency Standards (2019 Title 24, Part 6)[1]	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	SB 1020 (Clean Energy, Jobs, and Affordability Act)	Requires that 90% of retail electricity is procured from zero-carbon sources by 2035 and 100% renewable electricity is procured to serve all State agencies by December 31, 2035 (this affects water imported from the Department of Water Resources).	Imported Water
State	AB 1346 (Small Off-road Engines)	Prohibits exhaust or evaporative emissions from new small off-road engines with less than 25 hp to By January 1, 2024. Bill requires CARB to provide funding for commercial rebates or similar incentives through local air districts.	Off-Road Vehicles and Equipment
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	Advanced Clean Cars II (ACCII)	Assumes that 100 percent of new light-duty vehicles would be either ZEV or PHEV by model year 2035. Requirements begin at a 35 percent ZEV or PHEV for the 2026 model year. (CARB 2022a)	On-Road Vehicles
State	Advanced Clean Fleet (ACF)	Establishes zero-emissions targets for heavy-duty vehicles (such as utility trucks with a gross vehicle weight of over 8,500 pounds, dump trucks, and haulers) in fleets operating in California.	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: BAAQMD = Bay Area Air Quality Management District; I = Corporate Average Fuel Economy; CEC = California Energy Commission; EPA = U.S. Environmental Protection Agency; GHG = greenhouse gas; MCE = Marin Clean Energy; SB = Senate Bill; ZEV = zero emission vehicle; PHEV = plug-in hybrid electric vehicle; hp = horsepower; ZEV = zero emission vehicle

[1] Although the 2022 standards have been in place since 2023, the methodology used in this memorandum depends on building energy assumptions in CalEEMod, which have not yet been updated to reflect the 2022 standards. See the discussion in Section 7.1.

Source: Ascent Inc. in 2024.

With the application of currently adopted legislation, future emissions in the region would decline by 55 percent from 2019 to 2045, as shown below in Table 4 and Figure 1. On-road transportation emissions are anticipated to have the

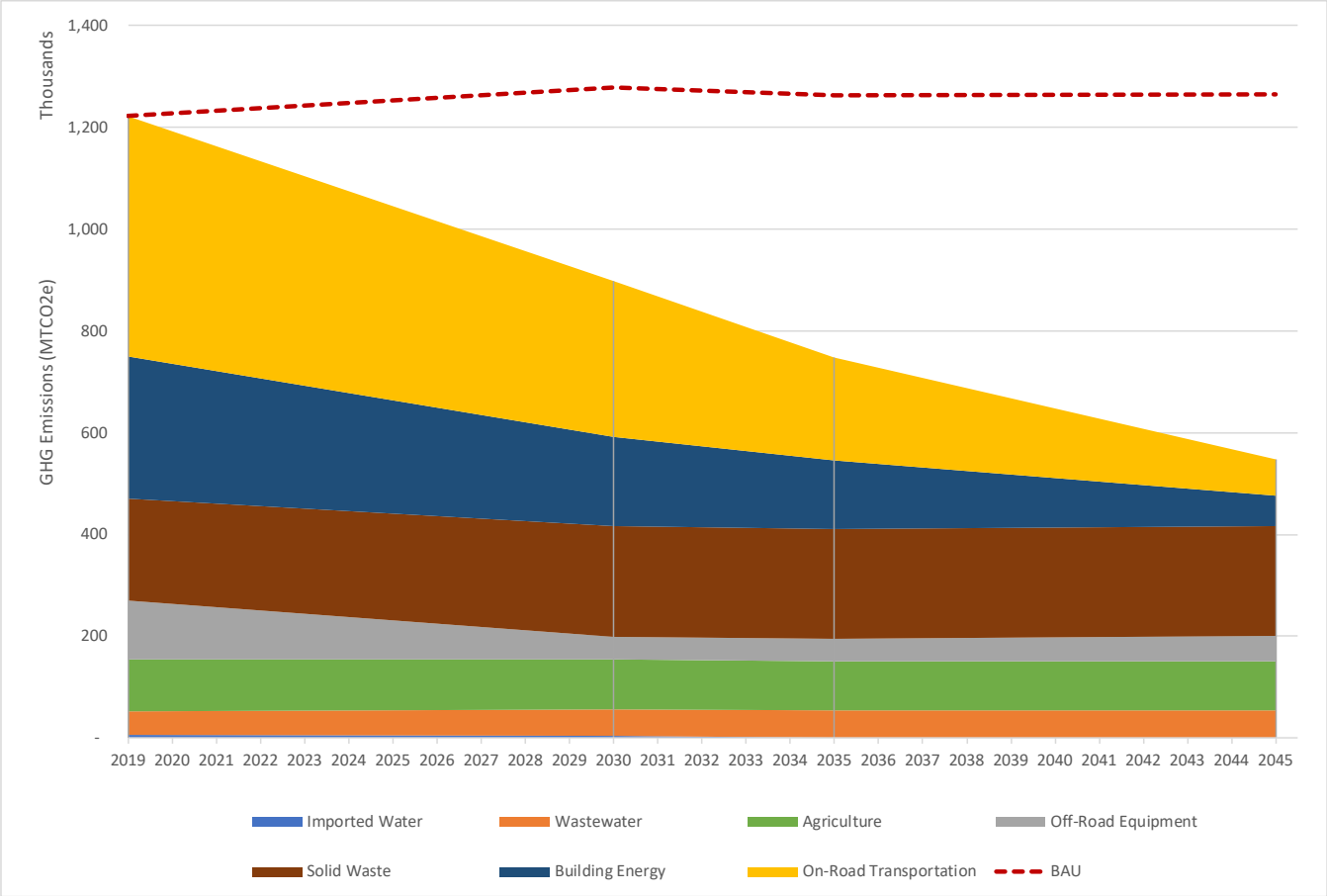
greatest reduction across all sectors with legislative reductions, with an 85 percent reduction in emissions from 2019 to 2045. With the reduction of on-road transportation emissions, other sectors naturally become a greater portion of the region's total emissions. By 2030, building energy, solid waste and agriculture would account for 55 percent of the region's emissions. These sectors are anticipated to account for 60 percent of regional emissions by 2045. With State and Federal efforts, emissions would decline by 55 percent from 2019 through 2045. Additional local actions would be needed to achieve further reductions. This highlights the importance of regional building decarbonization/electrification efforts, organic waste diversion and recycling, and efforts to reduce methane emissions from the solid waste sector, in addition to promoting regional transportation and land use efficiency and VMT-reducing actions that complement federal and State legislative reductions.

Table 4 Napa County Regional GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$)

Sector	2019	2030	2035	2045
Agriculture	103,381	99,240	98,018	96,070
Building Energy	279,592	174,638	134,828	59,733
Imported Water	5,943	3,296	707	0
Off-Road Equipment	115,548	43,886	43,767	49,694
On-Road Transportation	472,677	307,817	201,923	71,157
Solid Waste	198,862	217,407	215,942	216,139
Wastewater	45,858	52,621	52,772	54,585
Total	**1,221,861**	**898,904**	**747,956**	**547,378**
Percent of Total				
Agriculture	8%	11%	13%	18%
Building Energy	23%	19%	18%	11%
Imported Water	0%	0%	0%	0%
Off-Road Equipment	9%	5%	6%	9%
On-Road Transportation	39%	34%	27%	13%
Solid Waste	16%	24%	29%	39%
Wastewater	4%	6%	7%	10%
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-4%	-5%	-7%
Building Energy	NA	-38%	-52%	-79%
Imported Water	NA	-45%	-88%	-100%
Off-Road Equipment	NA	-62%	-62%	-57%
On-Road Transportation	NA	-35%	-57%	-85%
Solid Waste	NA	9%	9%	9%
Wastewater	NA	15%	15%	19%
Total	**NA**	**-26%**	**-39%**	**-55%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.



Source: Ascent Inc. in 2024.

Figure 1 Updated Napa County Regional GHG Emissions Forecasts (2019-2045)

In addition to the expected growth in the region's service population, there are three primary reasons for the emissions trends shown:

- Emissions from **on-road transportation**, currently the largest emissions sector, are expected to decrease by 85 percent from 2019 levels, primarily due to the State's efforts to transition vehicle technology to zero-emission vehicles under ACCII and ACF alongside modest declines in VMT as forecasted by MTC.
- **Building energy** is the second largest sector and would decline by 14 percent from 2019 to 2045. Although the State is aiming to have net zero emission retail electricity by 2045 under SB 100 and SB 1020, the majority of electricity use in the region is already zero emissions under Marin Clean Energy (MCE), and natural gas usage is anticipated to increase with population under current legislation.
- **Solid waste** is the third largest emissions sector and would increase with population. Even as emissions from American Canyon landfill continue to decline since its closure in 1995, Clover Flat Landfill serves the majority of the northern county and surrounding areas and would not close until 2056. Additionally, waste generated by the county would continue to increase with population and employment.

With the reductions anticipated from the on-road transportation sector and electricity use, natural gas use in buildings, solid waste, and agricultural emissions will become increasingly important to meet GHG reduction targets.

4 A CEQA-QUALIFIED RCAAP

The six jurisdictions in the region are considering the use of the RCAAP as a qualified climate action plan (CAP), from which future discretionary projects developed in the region could tier with respect to the assessment of their project impacts on GHGs and climate change. Under CEQA Guidelines §15183.5, the Napa jurisdictions can unlock CEQA tiering benefits that streamline environmental review of future projects under each jurisdiction's authority. Projects that demonstrate consistency with the RCAAP's emissions forecasts and incorporate all applicable GHG reduction measures may be able to conclude that they cause no additional significant environmental effects to GHG emissions and climate change in their CEQA review. According to §15183.5,

> a) *Lead agencies may analyze and mitigate the significant effects of greenhouse gas emissions at a programmatic level, such as in a general plan, a long-range development plan, or a separate plan to reduce greenhouse gas emissions. Later project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review.[…]*
>
> b) *Public agencies may choose to analyze and mitigate significant greenhouse gas emissions in a plan for the reduction of greenhouse gas emissions or similar document. A plan to reduce greenhouse gas emissions may be used in a cumulative impacts analysis as set forth below. Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.*

Additionally, under §15183.5, a CEQA-qualified GHG reduction plan must consist of the following attributes:

- Quantifies GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- Establishes a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
- Identifies and analyzes GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- Specifies measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified levels; and
- Is adopted in a public process following preparation and adoption of CEQA documentation.
- Projects that do not demonstrate consistency may, at each jurisdiction's discretion, include a more comprehensive project-specific analysis of GHG emissions consistent with CEQA requirements.

This memorandum addresses the first of these required attributes: the GHG forecast, which combined with the GHG inventory previously prepared, is essential for the RCAAP to address the first attribute identified under the first bullet above. As noted previously, projected emissions in this memo are based on activities associated with potential growth assumed in adopted local or regional plans. This approach represents a conservative, "worst case" scenario and accounts for potential new development projects and associated new GHG emissions.

5 STATE SHORT-LIVED CLIMATE POLLUTANTS AND CARBON STOCK CONSIDERATIONS

In 2024, Ascent drafted a memorandum addressing the short-lived climate pollutants (SLCP) emissions inventory (Napa County Regional 2019 Greenhouse Gas Short-Lived Climate Pollutant Inventory) as well as a carbon stock report for the region (Regional Carbon Stock Inventory Report for Napa County) for 2019 (County of Napa 2024, 2023). Both sectors influence the region's impact on climate change. The following addresses how these sectors inform the region's forecast.

5.1 NAPA COUNTY REGIONAL 2019 GREENHOUSE GAS SHORT-LIVED CLIMATE POLLUTANT INVENTORY

The SLCP inventory addressed the region's emissions of fugitive methane, hydrofluorocarbons (HFCs), perfluorinated compounds (PFCs), sulfur hexafluoride (SF_6), and black carbon. HFCs, PFCs, and SF_6 are also considered high global warming potential (GWP) gases. Fugitive methane emissions are generated from leakage from industrial, oil and gas, and utility pipelines and landfills. Some emissions, such as methane from landfills and other methane resulting from the combustion of fossil fuels, are already included in the main regional GHG inventory and forecast. However, other SLCPs, such as high-GWP gases and black carbon are excluded from the inventory and forecast for the following reasons.

- High-GWP gases are highly regulated by CARB, such as through the State's Refrigerant Management Program, which aims to set maximum GWP levels for refrigerants in the future.
- Black carbon is not included in the State's GHG inventory and target setting to meet the statewide climate goals under SB 32 or AB 1279. Black carbon emissions are heavily tied to wood, fossil fuel combustion, and industrial processes. The 2022 Scoping Plan notes that the share of black carbon emissions from transportation is currently declining at a rapid pace due to CARB's air quality programs targeting exhaust emissions (e.g., Clean Truck Check, ACF, ACC) and is expected to continue to do so through 2030 (CARB 2022b: 60).
- Black carbon emissions are also highly variable and can be substantially skewed in a year with high levels of wildfire activity. In 2017, wildfires accounted for 98 percent of the total black carbon emissions in the region with over 60,000 acres burned (Kirk 2022). 2019 was a relatively mild year for wildfires in Napa County with about 640 acres burned (CAL FIRE 2019) accounting for 38 percent of the total black carbon emissions. However, in 2020, the region experienced one of its most severe wildfire years under the LNU Lightning Complex fire, which burned over 300,000 acres in the county (CAL FIRE 2020). CARB addresses these variabilities by presenting black carbon from forestry (i.e., wildfires and prescribed burning) in ten-year averages. Forecasting wildfire activity is highly speculative and depends on a variety of factors, many of which (e.g., climate events, arson) are not under the region's control.

As shown in Table 5 in 2019, SLCPs in the region accounted for 1.1 million $MTCO_2e$, based on a 20-year GWP factor, and approximately 396,000 $MTCO_2e$ based on a 100-year GWP factor. In comparison, the region's share of SLCP emissions and population indicates that the region has a 50 percent higher rate of SLCP emissions than the rest of the state on a per-capita basis. This is due to the large share of methane emissions, most of which are generated from solid waste. At the state level, methane accounts for nearly 25 percent of SLCP emissions (CARB 2022b). Conversely, methane accounts for nearly 70 percent of SLCP emissions in the region. According to the *Napa County Regional 2019 Greenhouse Gas Short-Lived Climate Pollutant Inventory*, 75 percent of "Other Methane", shown in Table 5, comes from solid waste, including from decomposing accumulated waste at regional landfills and annual waste generated by the region (County of Napa 2024: Table 4). Methane is 81 times more potent than CO_2 as a GHG over 20 years and 28 times more potent over 100 years, significantly contributing to SLCP emissions. (See the *Napa County Regional 2019 Greenhouse Gas Short-Lived Climate Pollutant Inventory* for further information).

Table 5 2019 Napa County Regional GHG SLCP Inventory by Pollutant ($MTCO_2e$/year) [1] and comparison with State SLCP emissions

Pollutant	2019 Emissions using 20-year GWP factors ($MTCO_2e$/year)	2019 Emissions using 100-year GWP factors ($MTCO_2e$/year)	Percentage Share (20-year GWP factors)	Percentage Share (100-year GWP factors)
Other Methane[2]	774,410	266,084	-70%	-67%
Hydrofluorocarbon	189,896	85,927	-17%	-22%
Black Carbon	132,804	37,351	-12%	-9%
Fugitive Methane	15,953	5,481	-1%	-1%
Sulfur Hexafluoride	615	847	<1%	<1%
Perfluorinated compounds	2	0.78	<1%	<1%
Total	**1,113,680**	**395,691**	**100%**	**100%**
SLCP Emissions Per-capita – Napa County Region	7.98	2.83	NA	NA
SLCP Emissions Per-capita – State	5.15	1.86	NA	NA
Black Carbon Emissions from Wildfire[3] – **Napa County Region**	81,771	22,998	NA	NA

Notes: $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year; NA= Not applicable.

[1] Totals may not add up due to rounding.

[2] Other methane emissions generated from energy consumption, transportation (on-road vehicles and off-road equipment), landfills, wastewater processes, and agriculture (livestock and farming practices). These are estimated in the Napa County Regional 2019 Community Greenhouse Gas Inventory.

[3] Black carbon emissions from wildfires are not included in the total SLCP emissions estimates. These are added here for informational purposes only because wildfires are a big contributor to non-anthropogenic black carbon emissions in the region.

Source: County of Napa 2024.

Although most SLCPs are excluded from the region's forecast and not quantified, the information on SLCP sources and sectors can support the process of identifying opportunities for additional GHG reduction alongside the development of the RCAAP's measures. For example, the RCAAP plans to include climate adaptation measures that guide the region to improved wildfire resilience. Because wildfire could account for over half of SLCP emissions depending on the severity of wildfires in a given year, wildfire resilience measures that reduce the extent or severity of fire hazards could also have the co-benefit of reducing SLCPs associated with wildfire. Additionally, the RCAAP's measures would reduce some SLCPs such as methane emissions from fossil fuel combustion and landfills.

5.2 REGIONAL CARBON STOCK INVENTORY REPORT FOR NAPA COUNTY

Napa County's carbon stock report, the *Regional Carbon Stock Inventory Report For Napa County*, presented the carbon stock within the entire region as of 2019. While it neither forecasted carbon stock nor was it included as part of the region's GHG inventory, the carbon stock report can help identify opportunities for GHG reductions through carbon sequestration or limiting carbon stock losses in the future (e.g., habitat restoration, conservation, carbon farming practices, tree planting). The carbon stock report also includes a snapshot of the county's carbon storage inventory across land cover types, including agriculture and forests/woodland, which account for seven and 70 percent of the county's carbon stock in 2019, respectively. With forests and woodlands accounting for the majority of the county's carbon stock, the county's future carbon stock county would heavily depend on two main factors affecting

forests and woodlands: land use change (e.g., conversion of woodlands to agriculture) and wildfire. Additionally, changes to land use management (e.g., carbon farming) could also impact carbon storage on agricultural lands.

However, as noted in the carbon stock report, forecasting carbon stock in the region has many challenges. One of the challenges is the lack of forecasted land use data. Although the county's population is expected to grow by 18 percent from 2019 to 2045, growth is expected to be focused primarily on infill with minimal expansion on undeveloped lands. In addition, based on the projections from regional jurisdictions, as shown in Attachment 1, the region's total agricultural lands are expected to decline by less than one percent between 2019 and 2045. It is not clear from these projections whether the loss of agricultural lands is to conversion of these lands to urban areas or conversion to other uses. Another challenge is that climate-related impacts such as wildfire can be expected to impact existing carbon stock and future sequestration opportunities. Predicting future wildfire severity and locations would require extensive modeling and analysis that is outside the scope of this effort. Additional discussion of the forecast considerations can be found in Section 3.1.1 of the carbon stock report (County of Napa 2023).

6 FORECAST METHODOLOGY BY SECTOR

6.1 BUILDING ENERGY

Building Energy Assumptions

Building energy emissions in the region result directly from onsite combustion of natural gas and indirectly from electricity consumption. Although Pacific Gas & Electric (PG&E) is the main electricity and natural gas provider in Northern California, 85 percent of the region's electricity use in 2019 was supplied by MCE. MCE is a community choice aggregation (CCA) program that 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 2022 Inventory memorandum for detailed discussion of the assumptions used to estimate the 2019 building energy emissions.

2030-2045 ELECTRICITY EMISSIONS FACTORS

PG&E Emission Factors

PG&E's carbon dioxide (CO_2) emissions factors for 2030 and 2035 were calculated by first estimating the non-renewable portion of the 2022 emission factors (56 pounds [lb] of CO_2/megawatt-hour [MWh]) available from PG&E's 2022 Power Content Label (PCL) (PG&E 2023). PG&E's 2022 PCL also indicated that their energy mix was 95 percent GHG-free, or from zero-carbon sources (e.g., hydroelectric, nuclear, solar). For 2030 and 2035, it was assumed that PG&E would continue to have the same emissions factor as in 2022 because they are already meeting their requirements under SB 1020 to achieve a 90 percent zero-carbon electricity rate by 2035. For 2045, PG&E emission factors were assumed to have zero carbon emissions, per SB 100. Additionally, because PG&E's 2019 emission factors are provided in carbon dioxide equivalents, it is assumed that PG&E's emission factors include methane (CH_4) and nitrous oxide (N_2O) emission factors. PG&E's emission factors are summarized in Table 9.

MCE Emission Factors

Similar to the accelerated trends of the PG&E energy portfolio, MCE also achieved its SB 1020 requirements before 2035 with a 99.5 percent GHG-free mix for its Light Green Power Mix in 2022 (California Energy Commission [CEC] 2023). Thus, MCE's 2030 and 2035 Light Green emissions factors are assumed to be the same as in 2022 (44 lb of

CO2/MWh). Deep Green and Local Sol options are anticipated to continue to have a zero emissions factor through 2035. All power mix options were assumed to have zero carbon emission factors by 2045 under SB 100. Additionally, because MCE's 2022 emission factors are provided in carbon dioxide equivalents, it is also assumed that MCE's emission factors include CH4 and N2O. MCE's emission factors are summarized in Table 7.

To put the impact of PG&E and MCE emission factors into context, 85 percent of electricity use in the region is related to subscriptions to MCE's service options, as of 2019. For residential electricity usage, 88 percent of residential accounts are subscribed to MCE. Of the non-residential electricity usage, 83 percent of accounts 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.

2030-2045 NATURAL GAS EMISSIONS FACTORS

Future 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 equivalents per therm (kg CO_2e/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 2022 inventory memorandum for further details.

ENERGY EFFICIENCY

For existing buildings, energy intensity factors were adjusted to account for the turnover of natural gas appliances to electric under the Bay Area Air Quality Management District's (BAAQMD) NOx emission standards, which were amended in 2023, to require zero emission appliances starting in 2027. For new construction, 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 efficiency gains under the 2022 Title 24 standards are assumed to apply to projects constructed after January 1, 2023. The 2025 Title 24 standards are currently being developed by the CEC and the details related to their impact on future building construction is not yet available.

Existing Buildings

The BAAQMD Zero NOx emission standards would effectively stop the installation and sale of natural gas water heaters, furnaces, and large commercial water heaters and replace them with electric equivalents by 2027, 2029, and 2031, respectively (BAAQMD 2023a). This rule applies to all BAAQMD jurisdictions, including Napa County, and would gradually result in the electrification of a majority of natural gas use in existing buildings as existing eligible appliances are replaced with electric counterparts over time. According to BAAQMD's emissions inventory, space and water heating account for 81 percent of natural gas use across residential and commercial buildings in the Bay Area (pers. comm., Henderson 2024).

To account for this new rule in the legislative-adjusted forecast, estimates of natural gas reduction and corresponding increases in electricity use compared to baseline levels, adjusted for Napa's 2019 inventory year, were used to approximate a scaling factor to adjust the electricity and natural gas use in existing buildings in future years. These estimates were derived from BAAQMD's staff report and supporting appendices that evaluate the impact of the Zero NOx standard on electricity demand and NOx emissions. Because NOx emissions from these appliances are primarily a result of natural gas combustion, it was assumed that changes in NOx under the rule would be proportional to changes in natural gas use. Consistent with the assumptions used in BAAQMD's modeling, these reductions were only assumed to apply to the existing building stock. (Energy and Environmental Economics 2022:12, BAAQMD 2023b:22-23).

Based on BAAQMD's documentation, the rule would reduce Bay Area's electricity use by approximately four percent by 2030 and up to 13 percent by 2045 and decrease natural gas use by approximately 45 percent by 2030 and up to 90 percent by 2045 compared to 2019 levels. These reductions could not be disaggregated between residential and non-residential land uses, thus final forecast results are aggregated across these land use types. Table 6 shows the estimated future adjustment factors for existing buildings in future years per BAAQMD's Zero NOx standard. Detailed calculations of these factors are available in Attachment 3 to this memorandum.

Table 6 Percent Change in Building Energy Use in Existing Buildings under BAAQMD's Zero NOx Appliance Standards by Fuel Type (Percent change from 2019)

Fuel Type	2030	2035	2045
Electricity	4%	8%	13%
Natural Gas	-45%	-64%	-90%

Source: Compiled by Ascent in 2024.

New Construction

Future energy use was adjusted to reflect increased emissions-intensity 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 residential and nonresidential construction. The 2022 Title 24 standards apply to projects constructed after January 1, 2023, and the 2025 Title 24 standards would apply after January 1, 2026.

Adjustment factors were calculated using data available from the California Energy Commission (CEC) that were developed for the 2022 Title 24 standards. Two separate methodologies were for residential and non-residential land uses due to the difference in the availability of energy efficiency data between the two land use types. For residential land uses, to estimate adjusted future energy consumption resulting from Title 24 requirements in new construction, electricity- and natural gas-specific adjustment factors were calculated using the difference in the average energy use in residential buildings between existing buildings and those built to 2022 Title 24 standards. CEC's data included estimated annual energy use per housing unit by climate zone (Zone 2 for Napa County) and by residential land use type (i.e., multifamily and single-family) under the 2022 Title 24 standards.

For non-residential buildings, electricity- and natural gas-specific adjustment factors were calculated using the difference in the average energy use in nonresidential buildings between those built to 2019 Title 24 standards and those built to 2022 Title 24 standards. Unlike the detailed approach for residential buildings, CEC only provided total statewide energy use under the 2019 and 2022 standards. Additionally, climate zone-specific data for non-residential buildings were unavailable; therefore, nonresidential adjustment factors relied on statewide averages. The lack of comparison to existing factors for non-residential buildings is expected to result in a slightly conservative forecast because existing non-residential buildings are likely less efficient than those built to 2019 standards.

The resulting adjustment factors (specific to both land use type and energy type) were applied to the BAU growth in energy use to estimate the energy consumption and associated GHG emissions of future development with legislative adjustments. The adjustment factors are shown in Table 7. They are presented either in terms of the percent change in energy use for buildings compliant with the 2022 Title 24 standards compared to existing buildings for residential land uses or compared to those built to meet the 2019 Title 24 standards, for non-residential land uses. Positive values indicate an anticipated increase in energy use, while negative values indicate an anticipated decrease in energy use. It is important to note that although average electricity use in new residential buildings is anticipated to rise (due to an increase in electrical demand associated with electric appliances installed instead of natural gas appliances), emissions from new residential buildings are expected to be lower than they would be under existing or 2019 Title 24 as a result of overall lower building emissions intensities (due to lower emissions factors associated with electricity compared to natural gas). Detailed calculations of these factors are available in Attachment 3 to this memorandum.

Table 7 Title 24 Building Energy Adjustment Factors for 2022 Standards

Building Type	Electricity	Natural Gas	Percent Change Relative to
Residential Buildings	0%	-40%	Energy Use per Dwelling Unit in 2019
Nonresidential Buildings	-9.5%	-11%	2019 Building Energy Efficiency Standards

Source: Ascent Inc. in 2024.

Based on this analysis, it was estimated that, across the county, new residential buildings would use about the same electricity and 40 percent less natural gas than existing residential buildings and new non-residential buildings would use 9.5 percent less electricity and 11 percent less natural gas than existing non-residential buildings.

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, legislative reductions from Title 24 energy efficiency standards were applied to the net future growth. Finally, energy emissions factors, adjusted to reflect current regulations and adopted targets as discussed above, were applied to the forecasted energy use. Table 8 summarizes the scaling factors and legislative reductions used to forecast building use by energy type.

Table 8 Building Energy Emissions Forecast Methods by Energy Type

Energy Type	Forecast Methods	
	Growth Factor	Applied Legislative Reductions
Electricity	Scaled by population growth for residential building energy by jurisdiction; scaled by employment growth for nonresidential building energy by jurisdiction.	BAAQMD Zero NOx emissions standards on space and water heating applied to existing building energy use. 2022 Title 24 energy efficiency gains in new construction based on the best available data for average building energy efficiency. SB100 scheduled targets (i.e., 100 percent renewable by 2045) applied to PG&E and MCE 2045 electricity emissions factors. PG&E and MCE's Light Green 2022 emission factors applied to 2030 and 2035 because they already meet SB 1020 requirements. MCE's Deep Green/Local Sol factors remain at 100% GHG-free.
Natural Gas		

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

Source: Ascent Inc. in 2024.

Building Energy Forecasts

Between 2019 and 2045, electricity and natural gas emissions from buildings would decrease by approximately 79 percent from 279,592 to 59,733 $MTCO_2e$ with legislative adjustments. By 2045, all emissions would be from natural gas use as electricity-related emissions go to zero. Table 9 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the residential building energy sector by fuel type for 2030, 2035, and 2045. Note that PG&E's emission factors were especially low in 2019 due to greater than normal contributions from hydroelectric and nuclear sources that year (CEC 2020).

Table 9 Projected GHG Emissions from Building Energy Through 2045

Calendar Year	Fuel Type	Utility Provider	Energy Use	Fuel Unit	Emissions Factor	GHG Emissions (MT CO_2e)
2019	Electricity	PG&E	138,054	MWh	21 lb CO_2e/MWh	1,295
2019	Electricity	Light Green MCE	746,172	MWh	197 lb CO_2e/MWh	66,676
2019	Electricity	Deep Green/Local Sol MCE	42,435	MWh	0 lb CO_2e/MWh	0
2030	Electricity	PG&E	187,377	MWh	56 lb CO_2e/MWh	4,760
2030	Electricity	Light Green MCE	1,003,408	MWh	44 lb CO_2e/MWh	20,026
2030	Electricity	Deep Green/Local Sol MCE	54,547	MWh	0 lb CO_2e/MWh	0
2035	Electricity	PG&E	192,722	MWh	56 lb CO_2e/MWh	4,895
2035	Electricity	Light Green MCE	1,022,562	MWh	44 lb CO_2e/MWh	20,408
2035	Electricity	Deep Green MCE	56,763	MWh	0 lb CO_2e/MWh	0
2045	Electricity	PG&E	200,041	MWh	0 lb CO_2e/MWh	0
2045	Electricity	Light Green MCE	1,045,575	MWh	0 lb CO_2e/MWh	0
2045	Electricity	Deep Green MCE	60,308	MWh	0 lb CO_2e/MWh	0
2019	Natural Gas	PG&E	39,764,729	therms	5.3 kg CO_2e/therm	211,622
2030	Natural Gas	PG&E	28,157,884	therms	5.3 kg CO_2e/therm	149,852
2035	Natural Gas	PG&E	20,580,190	therms	5.3 kg CO_2e/therm	109,525
2045	Natural Gas	PG&E	11,224,162	therms	5.3 kg CO_2e/therm	59,733

Notes: PG&E = Pacific Gas & Electric, MCE = Marin Clean Energy, MWh = mega watt-hours, kg = kilograms, CO_2e = carbon dioxide equivalent, MT = metric tons.

Source: Ascent Inc. in 2024

6.2 TRANSPORTATION

ON-ROAD TRANSPORTATION

Between 2019 and 2045, GHG emissions from on-road vehicles would decrease by approximately 85 percent from 472,677 to 71,157 $MTCO_2e$, accounting for a slight decrease in VMT of approximately six percent, future vehicle emissions factors, and adjusted for the latest vehicle regulations. VMT projections were developed using the origin-destination method and data from MTC's PBA 2050 VMT Data Portal for 2030 and 2045 and interpolated for 2035 (MTC 2022). MTC's data were provided for non-commercial VMT only. To estimate commercial VMT, EMFAC 2021 was used to estimate the ratio of non-commercial (e.g., light duty vehicles) to commercial (e.g., heavy-duty vehicles) for each forecast year. This ratio was then applied to the non-commercial VMT forecasts to calculate VMT from commercial sources.

Vehicle emission factors were forecasted through a combination of using EMFAC2021 model (Version 1.0.2) and additional off-model calculations to account for Advanced Clean Cars II and Advanced Clean Fleets State programs. While the current version of EMFAC2021 does not yet account for these latter two legislative actions, it does account for other State and federal laws and regulations such as the Pavley Clean Car Standards, the pre-existing Advanced Clean Car (ACC) Standards, and fuel efficiency standards for medium- and heavy-duty vehicles. These policies, especially ACCII and ACF, are expected to increase the number of zero-emission vehicles in the county into the future and lower fleet-wide emission factors. 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 region's GHG emissions forecasts. Table 10 summarizes the scaling factors and legislative reductions used to forecast on-road transportation emissions.

Table 10 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 pre-existing ACC Standards (ACC I), 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. Emission factors were further adjusted to account for the phasing in of ZEV/PHEV requirements under ACCII and ACF.

Notes: ACC = Advanced Clean Cars; ACF = Advanced Cleanlet; CAFE = Corporate Average Fuel Economy; EMFAC2021 = California Air Resources Board's EMisson FACtor 2021 model; MTC = Metropolitan Transportation Commission; ZEV = zero emission vehicle; PHEV = plug-in hybrid electric vehicle.

Source: Ascent Inc. in 2024.

Table 11 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from on-road transportation for 2030 through 2045.

Table 11 Regional On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts

Year	Annual Commercial VMT	Annual Non-Commercial VMT	Total Annual VMT	Average Vehicle Emission Factor (g CO_2e/mile)	GHG Emissions ($MTCO_2e$)
2019	220,231,676	795,545,463	1,015,777,139	465.34	472,677
2030	182,832,099	814,869,162	997,701,261	308.53	307,817
2035	174,020,478	801,151,840	975,172,318	207.06	201,923
2045	171,016,644	787,463,439	958,480,083	74.24	71,157
Percent Change from 2019					
2030	-17%	2%	-2%	-34%	-35%
2035	-21%	1%	-4%	-56%	-57%
2045	-22%	-1%	-6%	-84%	-85%

Notes: BAU = business-as-usual; VMT = vehicle miles traveled; GHG = greenhouse gas; g = grams; $MTCO_2e$ = metric tons of carbon dioxide equivalent.

Source: MTC 2024. Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Between 2019 and 2045, emissions associated with off-road vehicles and equipment used in the region would decrease by 57 percent from 115,548 to 49,694 $MTCO_2e$, with legislative adjustments applied and the state's expected growth in off-road activity in the county. Emissions were obtained from CARB's latest off-road emissions model, OFFROAD2021 (Version 1.0.5). For the legislative adjustments in the off-road vehicle sector, modeling incorporated regulatory actions such as reformulated fuels and more stringent emissions standards and reduced emissions from small off-road engines as per AB 1346, which prohibits emissions from new fossil-fueled small off-road equipment starting in 2024. This effectively phases out fossil-fuel -powered off-road equipment in favor of zero-emission alternatives, such as electric or battery-operated equipment. The county-level emissions forecasts from off-road vehicles and equipment were scaled to each jurisdiction using changes in jurisdiction-specific demographic factors. Table 12 summarizes the scaling factors and legislative reductions used to forecast off-road vehicle and equipment emissions.

Table 12 Off-Road Vehicles and Equipment Forecast Methods by Source

Source	Forecast Methods		
	Jurisdictional Scaling Factors	Activity Growth	Applied Legislative Reductions
Airport Ground Support	Population	Based on OFFROAD2021 forecasts for the Napa County region	OFFROAD2021 emissions factor considerations include Off-Road Diesel Regulations and the implementation schedule of the EPA off-road compression-ignition engine standards. Additional off-model adjustments were made to account for AB1346.
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.

Source: Ascent Inc. in 2024.

Table 13 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the off-road vehicles and equipment sector through 2045. As modeled in OFFROAD2021, emissions from railyard operations are expected to decline to zero. This transition is due to the amendment to CARB's existing Cargo Handling Equipment regulation to transition diesel cargo handling equipment at rail yards to zero-emissions (CARB 2024). Following railyard operations, lawn and garden equipment and light commercial equipment are expected to have the most reductions, with nearly 100 and 95 percent emissions reduction respectively from 2019 through 2045. This reduction is due to the adoption of AB 1346. The significant decline in emissions from the three off-road emissions sources reflects an increasing trend toward the decarbonization of the off-road sector (CARB 2020:1). Following these three sources, the next biggest decline in emissions is from pleasure craft (65 percent), reflecting the anticipated reduction in overall pleasure craft activity in the region through 2045 (CARB 2014:9).

Table 13 Regional Off-Road Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Commercial Harbor Craft	140	135	135	135
Construction and Mining	12,294	11,166	11,184	11,009
Industrial	5,490	6,501	5,199	7,018
Lawn and Garden Equipment	28,726	290	149	12
Light Commercial Equipment	24,282	2,367	1,553	1,208
Pleasure Craft	28,896	8,174	8,793	10,116
Portable Equipment	10,088	12,056	13,311	16,226
Railyard Operations	383	0	0	0
Recreational Equipment	2,687	712	749	788
Transport Refrigeration Units	2,561	2,486	2,694	3,182
Total	**115,548**	**43,886**	**43,767**	**49,694**
Percent Change from 2019				
Commercial Harbor Craft	NA	-4%	-4%	-4%
Construction and Mining	NA	-9%	-9%	-10%
Industrial	NA	18%	-5%	28%
Lawn and Garden Equipment	NA	-99%	-99%	-100%
Light Commercial Equipment	NA	-90%	-94%	-95%
Pleasure Craft	NA	-72%	-70%	-65%
Portable Equipment	NA	20%	32%	61%
Railyard Operations	NA	-100%	-100%	-100%
Recreational Equipment	NA	-74%	-72%	-71%
Transport Refrigeration Units	NA	-3%	5%	24%
Total	**NA**	**-62%**	**-62%**	**-57%**

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; NA = not applicable

Source: Ascent Inc. in 2024.

6.3 AGRICULTURE

Between 2019 and 2045, emissions generated from agricultural activities in the region would decrease by approximately seven percent from 103,381 to 96,070 $MTCO_2e$, accounting for the change in future agricultural land cover as reported by each jurisdiction and in changes in agricultural off-road emissions.

Livestock and non-livestock emissions (i.e., fertilizer application, and irrigation pumps) were scaled by the anticipated change in rangeland and cropland, respectively. Between 2019 and 2045, the County anticipates that rangeland acreage would decline by four percent. Over the same time, cropland acreage regionwide is anticipated to set a net increase of nine percent, with nearly all of that change occurring in the unincorporated region. Agricultural off-road emissions forecasts follow the same methodology as the off-road sector, relying on forecasts from the OFFROAD

model for the region that are then scaled to each jurisdiction by cropland acreage. See Attachment 1 for the agricultural land forecasts from each jurisdiction.

The only legislative adjustment made in this sector is for the agricultural off-road equipment, which is subject to the same legislative adjustments as discussed in Section 6.2 (off-road equipment). The agricultural off-road emissions modeling incorporated regulatory actions such as reformulated fuels and more stringent emissions standards and reduced emissions from small off-road engines as per AB 1346, which prohibits emissions from new fossil-fueled small off-road equipment starting in 2024. With these regulations, emissions from agricultural offroad equipment are expected to decline by 20 percent from 2019 through 2045. Table 14 summarizes the forecast methodologies, and Table 15 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the agriculture sector through 2045.

Table 14 Agricultural Emissions Forecast Methods by Source

Source	Forecast Methods	
	Growth Factor	Applied Legislative Reductions
Agricultural Offroad	Based on OFFROAD2021 forecasts for the Napa County region	OFFROAD2021 emissions factor considerations include Off-Road Diesel Regulations and EPA off-road compression-ignition engine standards implementation schedule. Additional adjustments were made to account for AB1346.
Fertilizer Application	Scaled by Change in Cropland by jurisdiction	None applied
Irrigation Pumps	Scaled by Change in Cropland by jurisdiction	None applied
Livestock	Scaled by Change in Rangeland by jurisdiction	None applied

Table 15 Regional Agriculture GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	2035	2045
Agricultural Offroad	47,682	42,981	41,211	38,194
Fertilizer Application	21,948	22,661	23,076	23,899
Irrigation Pumps	15,417	15,616	15,852	16,303
Livestock	18,334	17,982	17,879	17,674
Total	**103,381**	**99,240**	**98,018**	**96,070**
Percent Change from 2019				
Agricultural Offroad	NA	-10%	-14%	-20%
Fertilizer Application	NA	3%	5%	9%
Irrigation Pumps	NA	1%	3%	6%
Livestock	NA	-2%	-2%	-4%
Weighted Total	**NA**	**-4%**	**-5%**	**-7%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

6.4 SOLID WASTE

Waste Generation and Waste-in-Place

The ICLEI Community Protocol recommends that community GHG inventories include emissions from both waste generated by the community and solid waste facilities located in the community (i.e., "waste-in-place") (ICLEI 2019). Waste generated by the region is expected to increase nearly in proportion to population (17 percent from 2019 to 2045). Waste-in-place CH_4 emissions from landfill gas (LFG) generated at solid waste facilities located within the region accounted for approximately 58 percent of emissions from the solid waste sector in 2019.

Between 2019 and 2045, solid waste emissions generated from community activities in the region would increase by approximately 17 percent from 84,243 to 98,263 $MTCO_2e$ 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.

Waste-in-place emissions forecasts were calculated based on the existing and future anticipated waste disposal tonnages at two landfills located within the region: Clover Flat Landfill and American Canyon Landfill. Both landfills are located in the unincorporated area of the county. Open from 1966 to 1995, the American Canyon Landfill's methane emissions likely peaked around 1996, after its closure. The landfill's emissions would continue to decline into the future through 2045 based on the decay model available in CARB's Landfill Gas Tool and annual disposal tonnage reports from the U.S. Environmental Protection Agency (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 would continue to rise through 2045 and likely peak around 2057, as modeled in the Landfill Gas Tool. Although emissions from the American Canyon Landfill are expected to decline by 31 percent by 2045, emissions from Clover Flat Landfill would increase by 23 percent and also be nearly three times higher than American Canyon Landfill given its greater capacity and longevity.

Total solid waste emissions, including both community-generated waste and waste-in-place emissions, would increase by nine percent from 198,862 to 216,139 $MTCO_2e$ per year. Although SB 1383 is anticipated to reduce emissions of methane from the solid waste sector, it starts by requiring local jurisdictions to separately collect organic waste statewide by 2022. However, waste collection services in the region have already begun to collect organics separately. Because of the bill's reliance on local participation, the impact of SB 1383 is excluded from the legislative-adjusted BAU forecasts for the region.

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

Table 16 Regional Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	2035	2045
Community-Generated Solid Waste	84,243	97,027	96,511	98,263
Waste-in-Place Emissions	114,619	120,380	119,431	117,876
American Canyon Landfill	*42,800*	40,085	36,270	29,695
Clover Flat Landfill	*71,819*	80,295	83,161	88,181
Total	**198,862**	**217,407**	**215,942**	**216,139**
Percent from 2019				
Community-Generated Solid Waste	NA	15%	15%	17%

Waste-in-Place Emissions	NA	5%	4%	3%
American Canyon Landfill	*NA*	*-6%*	*-15%*	*-31%*
Clover Flat Landfill	*NA*	*12%*	*16%*	*23%*
Weighted Total	NA	9%	9%	9%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

6.5 IMPORTED WATER

Imported water refers to water imported from outside the region into the region (e.g., water from the State Water Project). Between 2019 and 2045, imported water emissions generated from community activities in the region would decrease by 100 percent from 5,943 to 0 $MTCO_2e$. Imported water use is expected to increase in proportion to each jurisdiction's service population. These emissions include upstream emissions from electricity generation used to extract, convey, treat, and distribute imported water to the region. For local water supply sources within the region, the electricity usage associated with extracting, conveying, treating, and distributing local water is assumed to be captured in the building energy sector because these activities take place within the community. For 2030, electricity emission factors were interpolated between the average 2022 emission factors for the State and the 95 percent zero-carbon targets for 2035 under SB1020. The State average electricity emissions factors for 2022 were obtained for the State using EPA's eGRID2022 database for the CAMX region, which reported an average emission factor of 497.4 MT CO_2 per MWh which reflects a 46 percent zero-carbon energy mix (EPA 2024). In 2045, all electricity generation is assumed to be zero-carbon under SB100. Based on these assumptions and the 2022 eGRID emission factors, the average GHG emissions factor is anticipated to decline by 52 percent from 2019 to 2030, 90 percent by 2035, and 100 percent by 2045.

Table 17 summarizes the scaling factor and legislative reduction used to forecast water supply emissions.

Table 17 Imported Water Forecast Methods and Legislative Reductions by Source

Source	Forecast Methods	
	Growth Factor	Applied Legislative Reductions
Imported Water	Scaled by service population growth by jurisdiction	Assumes electricity use for extraction, conveyance, distribution, and treatment aligns with the trajectory toward the 2045 carbon-free electricity requirements under SB100 and SB1020.

Source: Ascent Environmental in 2024.

Table 18 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from the water supply sector for 2030, 2035, and 2045.

Table 18 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/year)

Sector	2019	2030	2035	2045
Imported Water	5,943	3,296	707	0
Percent Change from 2019				
Total	NA	-45%	-88%	-100%

Notes: BAU = business-as-usual; $MTCO_2e$/year = metric tons of carbon dioxide equivalent per year; NA = not applicable

Source: Ascent Environmental in 2024.

6.6 WASTEWATER TREATMENT

Between 2019 and 2045, community wastewater emissions would increase by 19 percent from 45,858 to 54,585 $MTCO_2e$. 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 19 shows the 2019 inventory and legislative-adjusted BAU forecasted emissions from wastewater treatment sources for 2045.

Table 19 Regional Wastewater Treatment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts ($MTCO_2e$/ year)

Source	2019	2030	2035	2045
Septic Systems	2,961	3,423	3,278	2,987
Centralized WWTPs	42,897	49,198	49,494	51,598
Total	**45,858**	**52,621**	**52,772**	**54,585**
Percent Change from 2019				
Septic Systems	NA	16%	11%	1%
Centralized WWTPs	NA	15%	15%	20%
Total	**NA**	**15%**	**15%**	**19%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; WWTP = wastewater treatment plant.; NA = not applicable

Source: Ascent Inc. in 2024.

6.7 DISCUSSION

The community BAU emissions would increase by approximately four percent between 2019 and 2045, while legislative-adjusted BAU emissions would decrease by 55 percent between 2019 and 2045. The overall reduction 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 MCE's, PG&E's, and State's average electricity supply under SB 100 and SB 1020;
- carbon-free electricity supplied by MCE and PG&E;
- improved building energy efficiency through compliance with Title 24 standards;
- reduction in emissions due to the electrification of natural gas building appliances under BAAQMD's Zero NOx appliance rule;
- reductions in small off-road engine emissions due to AB 1346;
- reductions in on-road vehicle emissions factors from State vehicle standards as forecasted in EMFAC2021 and anticipated under ACCII and ACF; and
- reductions in off-road vehicle and equipment emissions factors forecasted in OFFROAD2021.

With these reductions, the building energy and transportation sectors are anticipated to go from making up 62 percent to 24 percent of the region's emissions. The legislative adjustments from AB 1346 would balance the growth in population and employment that affect offroad emissions, which are anticipated to remain at nine percent of the region's emissions by 2045. Other sectors also grow in importance as building energy and transportation emissions decline and even as some of their own emissions decline. Agricultural emissions are anticipated to decline by seven

percent by 2045, but with the reduction in other sectors, it is anticipated to account for 18 percent of the region's emissions by the same year. For solid waste, these emissions are anticipated to increase with population in the county by 18 percent, resulting in this sector accounting for the majority of emissions by 2045 (39 percent). Wastewater emissions, like solid waste, would grow with population and are anticipated to account for 10 percent of total emissions by 2045. Imported water emissions would be reduced to zero with the carbon-free electricity expected by 2045 under SB 100 and SB 1020.

Without future legislative actions and with future growth, emissions would increase from 2019 through 2045. Going forward, new legislative actions that would affect emissions may be adopted by State, federal, and regional 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 or through an update to the RCAAP.

7 GREENHOUSE GAS EMISSIONS FORECAST BY JURISDICTION

This section provides a summary of the activity data used to prepare the GHG emissions forecasts for the region, as well as snapshots of baseline and forecasted emissions in each jurisdiction.

7.1 ACTIVITY DATA SUMMARY

Various demographic factors (i.e., population, employment, and service population), VMT, and agricultural acreages were used to estimate future activity levels for most emissions sectors and are shown in Table 20. These factors were developed based on data received from individual jurisdictions in the region, as well as from sources such as the California Department of Finance (DOF) and MTC. See Attachment 1 for detailed responses to data requests received from individual jurisdictions.

Table 20 Activity Forecast Factors by Jurisdiction

Jurisdiction/Factor	2019	2030	2035	2045
American Canyon				
Population[1]	20,996	26,829	26,021	24,405
Employment	6,200	8,642	8,636	8,624
Service Population[2]	27,196	35,471	34,657	33,029
Annual VMT[3]	154,556,520	195,038,276	199,833,553	204,605,943
Agricultural Acres (Cropland)	95	99	99	99
Agricultural Acres (Rangeland)	0	0	0	0
Calistoga				
Population	5,348	5,508	5,457	5,355
Employment	2,811	3,333	3,104	2,646
Service Population	8,159	8,841	8,561	8,002
Annual VMT	28,922,407	25,846,983	25,888,713	25,935,126
Agricultural Acres (Cropland)	168	175	175	175
Agricultural Acres (Rangeland)	0	0	0	0
Napa				

Jurisdiction/Factor	2019	2030	2035	2045
Population	79,301	88,677	89,311	97,201
Employment	51,200	56,857	58,805	62,700
Service Population	130,500	145,533	148,116	159,900
Annual VMT	472,155,386	452,494,878	436,120,895	419,780,510
Agricultural Acres (Cropland)	625	620	610	560
Agricultural Acres (Rangeland)	0	0	0	0
St. Helena				
Population	6,094	6,655	6,715	6,800
Employment	5,762	5,820	5,820	5,980
Service Population	11,856	12,475	12,535	12,780
Annual VMT	51,605,089	52,874,585	52,910,225	52,954,357
Agricultural Acres (Cropland)	1,100	1,000	1,000	1,000
Agricultural Acres (Rangeland)	0	0	0	0
Yountville				
Population	2,793	3,385	3,450	3,535
Employment	1,100	1,245	1,230	1,210
Service Population	3,893	4,630	4,680	4,745
Annual VMT	20,876,900	17,423,793	17,423,793	17,424,457
Agricultural Acres (Cropland)	92	76	76	76
Agricultural Acres (Rangeland)	0	0	0	0
Unincorporated County				
Population	25,077	25,789	26,112	26,759
Employment	30,379	38,322	35,273	29,175
Service Population	55,456	64,111	61,385	55,933
Annual VMT	67,429,161	71,190,648	68,974,660	66,763,045
Agricultural Acres (Cropland)	56,119	58,124	59,229	61,440
Agricultural Acres (Rangeland)	179,000	175,441	174,404	172,331
Total				
Population	139,609	156,842	157,066	164,055
Employment	97,452	114,219	112,868	110,335
Service Population	237,060	271,061	269,934	274,389
Annual VMT	795,545,462	814,869,162	801,151,840	787,463,439
Agricultural Acres (Cropland)	58,199	60,094	61,189	63,350
Agricultural Acres (Rangeland)	179,000	175,441	174,404	172,331

Notes: VMT = vehicle miles traveled. See the 2019 Inventory report for a description of the sources of the 2019 metrics. See Attachment 1 for demographic data provided by each jurisdiction.

[1] For existing population data that were not available from the jurisdictions, 2019 data from Table E-4 from the California Department of Finance was used in its place (DOF 2021). For future population forecasts that were not available from the jurisdictions, MTC PBA 2050

household forecasts were used and interpolated between 2015 and 2050 estimates (See Attachment 2) (MTC 2022). Household growth is assumed to be proportional to population growth.

[2] Service Population is the sum of population and employment.

[3] Forecasted annual VMT was obtained interpolated from MTC's Plan Bay Area 2050 Data Portal (MTC 2022). No changes were made to the 2019 VMT from the previous inventory.

Source: Compiled by Ascent Inc. in 2024.

7.2 AMERICAN CANYON

Emissions Summary

Table 21 shows a summary of American Canyon's share of the regional emissions inventory and legislative-adjusted forecast. American Canyon's emissions are anticipated to decrease by 57 percent between 2019 and 2045. Much of this reduction is due to reductions in the on-road transportation sector. As shown in Table 21, on-road transportation emissions would rapidly decline from 49 percent of the city's emissions to only 23 percent of the city's emissions. With decline in on-road transportation emissions, building energy and solid waste would make up nearly 60 percent of the city's emissions by 2045. Building energy use emissions reflect continued natural gas use in buildings under the legislative-adjusted BAU scenario. Solid waste emissions are scaled directly with population growth in the city, which is estimated to increase by 28 percent by 2030 and decline to 12 percent over 2019 levels by 2045. Off-road and wastewater emissions are expected to account for 5 percent and 12 percent of American Canyon emissions in 2045, respectively. As an urban area, there are minimal emissions from agriculture in American Canyon. No imported water-related emissions would be generated by 2045 due to the zero-carbon electricity requirements under SB100.

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

Sector	2019	2030	2030	2045
Agriculture	157	147	144	139
Building Energy	53,431	43,740	34,584	18,070
Imported Water	983	622	129	-
Off-Road Equipment	8,301	3,774	3,672	3,922
On-Road Transportation	91,830	73,676	50,366	18,489
Solid Waste	25,938	33,145	32,146	30,150
Wastewater	7,822	10,202	9,968	9,499
Total	**188,462**	**165,305**	**131,009**	**80,269**
Percent of Total				
Agriculture	0%	0%	0%	0%
Building Energy	28%	26%	26%	23%
Imported Water	1%	0%	0%	0%
Off-Road Equipment	4%	2%	3%	5%
On-Road Transportation	49%	45%	38%	23%
Solid Waste	14%	20%	25%	38%
Wastewater	4%	6%	8%	12%

Sector	2019	2030	2030	2045
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-7%	-8%	-11%
Building Energy	NA	-18%	-35%	-66%
Imported Water	NA	-37%	-87%	-100%
Off-Road Equipment	NA	-55%	-56%	-53%
On-Road Transportation	NA	-20%	-45%	-80%
Solid Waste	NA	28%	24%	16%
Wastewater	NA	30%	27%	21%
Total	**NA**	**-12%**	**-30%**	**-57%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

BUILDING ENERGY

Accounting for population and employment growth, trends toward zero-carbon electricity, BAAQMD's Zero NOx appliance rule, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, American Canyon's building energy-related emissions are anticipated to decrease to four percent below 2019 levels by 2045. With the implementation of SB100, by 2045, all building energy emissions would be generated from the combustion of natural gas.

Proportional to forecasted job growth in American Canyon, the jurisdiction is projected to see an increase in non-residential energy use. According to the City of American Canyon, the city is forecasted to have a 39 percent growth in employment between 2019 and 2030 (See Attachment 1). It is assumed this growth would be met by 2030 and plateau through 2045. American Canyon has the highest forecasted job growth rate in the region. However, due to the State and regional emission legislative reductions, emissions from building energy are expected to decline from 2019 through 2045. American Canyon has the third highest building energy emissions in the region.

Table 22 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: American Canyon ($MTCO_2e$/ year)

Energy Type	2019	2030	2035	2045
Electricity	6,929	3,281	3,348	-
Natural Gas	46,502	40,460	31,236	18,070
Total	**53,431**	**43,740**	**34,584**	**18,070**
Percent Change from 2019				
Electricity	NA	51%	54%	57%
Natural Gas	NA	-13%	-33%	-61%
Total	**NA**	**38%**	**22%**	**-4%**

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

Source: Ascent Inc. in 2024.

ON-ROAD TRANSPORTATION

American Canyon's on-road transportation emissions are anticipated to decrease by 80 percent between 2019 and 2045, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, ACCII, ACF, and other adopted regulations as discussed in Section 3, which increase the percentage of zero-emission vehicles on the road and improve fuel economy, reducing average fleetwide GHG emissions per mile.

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

Trip Type	2019	2030	2035	2045
Commercial Trips	33,801	26,167	18,970	9,073
Non-Commercial Trips	58,030	47,509	31,396	9,415
Total	91,830	73,676	50,366	18,489
Percent Change from 2019				
Commercial Trips	NA	-23%	-44%	-73%
Non-Commercial Trips	NA	-18%	-46%	-84%
Total	**NA**	**-20%**	**-45%**	**-80%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Based on the scaling factors used to scale countywide off-road emissions to each jurisdiction (e.g., population, employment) that best match each off-road equipment category (refer to Table 12), and with emissions reduction due to State regulations, American Canyon's off-road equipment emissions are anticipated to decrease by 59 percent between 2019 and 2035, and then slightly increase by 3 percent compared to 2019 levels by 2045, resulting in an overall decline by 56 percent from 2019 through 2045. In particular, the greatest reductions would occur from the lawn and garden and light commercial equipment sectors which are anticipated to see emissions decline by approximately 5,000 $MTCO_2e$ by 2030 and through 2045 compared to 2019 levels. This accounts for more than 60 percent of American Canyon's off-road emission in 2019 and nearly all of the reductions through 2045. Additionally, emissions from the railyard operations sector are expected to decline to zero.

CARB anticipates a statewide trend toward increased electric adoption in lawn and garden and light commercial equipment due to State regulations and advances in battery technology supported with lawn and garden equipment exchange programs (CARB 2020; BAAQMD 2024). While the BAAQMD exchange programs are currently closed, the lasting effect of these programs and current marketplace offerings are expected to influence future overall consumer choices in purchasing electric equipment for these two equipment categories.

Table 24 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts, American Canyon ($MTCO_2e$/year)

Equipment Category	2019	2030	2035	2045
Commercial Harbor Craft	9	10	10	11
Construction and Mining	1,410	1,461	1,436	1,325
Industrial	349	492	398	549
Lawn and Garden Equipment	4,320	114	57	4
Light Commercial Equipment	1,545	179	119	94

Equipment Category	2019	2030	2035	2045
Portable Equipment	642	912	1,018	1,268
Railyard Operations	24	-	-	-
Recreational Equipment	404	280	288	288
Transport Refrigeration Units	294	325	346	383
Total	**8,998**	**3,774**	**3,672**	**3,922**
Percent Change from 2019				
Commercial Harbor Craft	NA	14%	16%	18%
Construction and Mining	NA	4%	2%	-6%
Industrial	NA	41%	14%	57%
Lawn and Garden Equipment	NA	-97%	-99%	-100%
Light Commercial Equipment	NA	-88%	-92%	-94%
Portable Equipment	NA	42%	59%	98%
Railyard Operations	NA	-100%	-100%	-100%
Recreational Equipment	NA	-31%	-29%	-29%
Transport Refrigeration Units	NA	11%	18%	30%
Total	**NA**	**-58%**	**-59%**	**-56%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

AGRICULTURE

As an incorporated city, American Canyon does not have a substantial presence of agricultural activity within its jurisdiction. Agriculture accounts for less than one percent of the jurisdiction's emissions. Agricultural acreage forecasts were not available from the City; thus it was assumed that any agricultural lands within the city would remain unchanged through 2045. Table 25 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 2045 by 10 percent. CARB's OFFROAD2021 model forecasts a reduction across agricultural offroad emissions countywide due to an anticipated decline in the amount of equipment operating and State regulations to prohibit emissions from small engines. The majority of these reductions are from agricultural off-road equipment. Fertilizer and livestock-related emissions, in proportion to agricultural acreage, would remain the same through 2045.

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

Source	2019	2030	2035	2045
Agricultural Offroad Equipment	84	76	73	69
Fertilizer Application	38	38	38	38
Livestock	32	32	32	32
Total	**154**	**147**	**144**	**139**
Percent Change from 2019				
Agricultural Offroad Equipment	NA	-9%	-12%	-18%

Fertilizer Application	NA	0	0	0
Livestock	NA	0	0	0
Total	**NA**	-5%	-7%	-10%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

SOLID WASTE

Waste Generation

American Canyon generated approximately 68,259 tons of solid waste in 2019 which generated 25,938 $MTCO_2e$ 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 American Canyon's waste disposal and related emissions are anticipated to increase by 16 percent from 2019 to 2045, commensurate with population growth.

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

Source	2019	2030	2035	2045
Annual waste tonnage delivered from jurisdiction (tons)	**68,529**	**87,567**	**84,930**	**79,655**
Solid Waste Generation Emissions ($MTCO_2e$/year)	25,938	33,145	32,146	30,150
Percent Change from 2019				
Annual waste tonnage delivered from jurisdiction	NA	28%	24%	16%
Solid Waste Generation Emissions	NA	28%	24%	16%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

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 21 percent by 2045 from 2019 levels, commensurate with population growth trends. However, emissions from imported water are expected to be reduced completely by 2045 with the statewide implementation zero-carbon electricity under SB100 which would also apply to imported water conveyance and delivery. Emissions associated with locally sourced water, including groundwater pumping, are captured in the building energy sector.

Table 27 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: American Canyon ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Imported Water Usage (MG/year)	661	862	842	803
Imported Water Emissions ($MTCO_2e$/year)	983	622	129	0
Percent Change from 2019				
Imported Water Usage	NA	30%	27%	21%

Imported Water Emissions	NA	-37%	-87%	-100%

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

Source: Ascent Inc. in 2024.

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

Source	2019	2030	2035	2045
WWTP Process Emissions	7,822	10,202	9,968	9,499
Percent Change from 2019	NA	30%	27%	21%

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

Source: Ascent Inc. in 2024.

7.3 CALISTOGA

Emissions Summary

Table 29 shows a summary of Calistoga's share of the regional emissions inventory and legislative-adjusted forecast. Calistoga's emissions are anticipated to decline by 72 percent between 2019 and 2045. Much of this reduction is due to reductions in the on-road transportation sector. As shown in Table 29, based on the modeling conducted, on-road transportation emissions would rapidly decline from 41 percent of the city's emissions to only 20 percent of the city's emissions. With decline in on-road transportation emissions, building energy and solid waste would make up 52 percent of the city's emissions by 2045. Building energy use emissions reflect continued natural gas use in buildings under the legislative-adjusted BAU scenario. Solid waste emissions are scaled directly with population growth in the city, which is estimated to increase by 22 percent over 2019 levels by 2045. Off-road and wastewater emissions are expected to account for 9 percent and 17 percent of Calistoga's emissions in 2045, respectively. As an urban area, there are minimal emissions from agriculture in Calistoga. No imported water-related emissions would be generated by 2045 due to the zero-carbon electricity requirements under SB100.

Table 29 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Calistoga ($MTCO_2e$/year)

Sector	2019	2030	2030	2045
Agriculture	278	260	256	247
Building Energy	14,450	8,775	5,911	1,178
Imported Water	229	120	25	-
Off-Road Equipment	2,702	1,141	1,068	1,068
On-Road Transportation	17,184	9,764	6,525	2,344
Solid Waste	4,981	5,130	5,083	4,988
Wastewater	1,992	2,159	2,091	1,954

Sector	2019	2030	2030	2045
Total	**41,818**	**27,349**	**20,958**	**11,778**
Percent of Total				
Agriculture	1%	1%	1%	2%
Building Energy	35%	32%	28%	10%
Imported Water	1%	0%	0%	0%
Off-Road Equipment	6%	4%	5%	9%
On-Road Transportation	41%	36%	31%	20%
Solid Waste	12%	19%	24%	42%
Wastewater	5%	8%	10%	17%
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-7%	-8%	-11%
Building Energy	NA	-39%	-59%	-92%
Imported Water	NA	-48%	-89%	-100%
Off-Road Equipment	NA	-58%	-60%	-60%
On-Road Transportation	NA	-43%	-62%	-86%
Solid Waste	NA	3%	2%	0%
Wastewater	NA	8%	5%	-2%
Total	**NA**	**-35%**	**-50%**	**-72%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, BAAQMD's Zero NOx appliance rule, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, Calistoga's building energy-related emissions are anticipated to decrease by four percent from 2019 to 2030, and further by 66 percent below 2019 levels by 2045. With the implementation of SB100, by 2045, all building energy emissions would be generated from the combustion of natural gas.

Table 30 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Calistoga ($MTCO_2e$/ year)

Energy Type	2019	2030	2035	2045
Electricity	2,340	738	737	-
Natural Gas	12,110	8,037	5,175	1,178
Total	**14,450**	**8,775**	**5,911**	**1,178**
Percent Change from 2019				
Electricity	NA	30%	30%	25%
Natural Gas	NA	-34%	-57%	-90%
Total	**NA**	**-4%**	**-27%**	**-66%**

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

Source: Ascent Inc. in 2024.

ON-ROAD TRANSPORTATION

Calistoga's on-road transportation emissions are anticipated to decrease by 86 percent between 2019 and 2045, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, ACCII, ACF, and other adopted regulations as discussed in Section 3, which increase the percentage of zero-emission vehicles on the road and improve fuel economy, reducing average fleetwide GHG emissions per mile.

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

Trip Type	2019	2030	2035	2045
Commercial Trips	6,325	3,468	2,458	1,150
Non-Commercial Trips	10,859	6,296	4,067	1,193
Total	**17,184**	**9,764**	**6,525**	**2,344**
Percent Change from 2019				
Commercial Trips	NA	-45%	-61%	-82%
Non-Commercial Trips	NA	-42%	-63%	-89%
Total	**NA**	**-43%**	**-62%**	**-86%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Based on the scaling factors used to scale countywide off-road emissions to each jurisdiction (e.g., population, employment) that best match each off-road equipment category (refer to Table 12), and with emissions reduction due to State regulations, Calistoga's off-road equipment emissions are anticipated to decrease by 63 percent between 2019 and 2045. In particular, the greatest reductions would occur from the lawn and garden and light commercial equipment sectors which are anticipated to see emissions decline by over 1,700 $MTCO_2e$ by 2030 and through 2045 compared to 2019 levels. This accounts for more than half of Calistoga's off-road emissions in 2019 and nearly all of the reductions through 2045. Additionally, emissions from the railyard operations sector are expected to decline to zero.

CARB anticipates a statewide trend toward increased electric adoption in lawn and garden and light commercial equipment due to State regulations and advances in battery technology supported with lawn and garden equipment exchange programs (CARB 2020; BAAQMD 2024). While the BAAQMD exchange programs are currently closed, the lasting effect of these programs and current marketplace offerings are expected to influence future overall consumer choices in purchasing electric equipment for these two equipment categories.

Table 32 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga ($MTCO_2e$/year)

Equipment Category	2019	2030	2035	2045
Commercial Harbor Craft	4	4	4	3
Construction and Mining	423	364	355	321
Industrial	158	190	143	168

Equipment Category	2019	2030	2035	2045
Lawn and Garden Equipment	1,100	23	12	1
Light Commercial Equipment	700	69	43	29
Portable Equipment	291	352	366	389
Railyard Operations	11	-	-	-
Recreational Equipment	103	58	60	63
Transport Refrigeration Units	88	81	85	93
Total	2,880	**1,141**	**1,068**	**1,068**
Percent Change from 2019				
Commercial Harbor Craft	NA	-3%	-8%	-20%
Construction and Mining	NA	-14%	-16%	-24%
Industrial	NA	20%	-10%	6%
Lawn and Garden Equipment	NA	-98%	-99%	-100%
Light Commercial Equipment	NA	-90%	-94%	-96%
Portable Equipment	NA	21%	26%	34%
Railyard Operations	NA	-100%	-100%	-100%
Recreational Equipment	NA	-44%	-41%	-39%
Transport Refrigeration Units	NA	-8%	-3%	5%
Total	**NA**	**-60%**	**-63%**	**-63%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

AGRICULTURE

As an incorporated city, Calistoga does not have a substantial presence of agricultural activity within its jurisdiction. Agriculture accounts for less than one percent of the jurisdiction's emissions. Agricultural acreage forecasts were not available from the City; thus it was assumed that any agricultural lands within the city would remain unchanged through 2045. Table 33 shows that emissions due to agricultural activities in the city (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline between 2019 and 2045 by 10 percent. CARB's OFFROAD2021 model forecasts a reduction across agricultural offroad emissions countywide due to an anticipated decline in the amount of equipment operating and State regulations to prohibit emissions from small engines. The majority of these reductions are from agricultural off-road equipment. Fertilizer and livestock-related emissions, in proportion to agricultural acreage, would remain the same through 2045.

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

Source	2019	2030	2035	2045
Agricultural Offroad Equipment	148	135	130	122
Fertilizer Application	68	68	68	68
Livestock	57	57	57	57
Total	**274**	**260**	**256**	**247**

Source	2019	2030	2035	2045
Percent Change from 2019				
Agricultural Offroad Equipment	NA	-9%	-12%	-18%
Fertilizer Application	NA	0	0	0
Livestock	NA	0	0	0
Total	**NA**	**-5%**	**-7%**	**-10%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

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 and return to 2019 levels by 2045, commensurate with anticipated population growth trends.

Table 34 Solid Waste GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga

Source	2019	2030	2035	2045
Annual waste tonnage delivered from jurisdiction (tons)	12,513	12,887	12,768	12,530
Solid Waste Generation Emissions ($MTCO_2e$/year)	4,981	5,130	5,083	4,988
Percent Change from 2019				
Annual waste tonnage delivered from jurisdiction	NA	3%	2%	0%
Solid Waste Generation Emissions	NA	3%	2%	0%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

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 21 percent by 2045 from 2019 levels, commensurate with population growth trends. However, emissions from imported water are expected to be reduced completely by 2045 with the statewide implementation zero-carbon electricity under SB100 which would also apply to imported water conveyance and delivery. Emissions associated with locally sourced water, including groundwater pumping, are captured in the building energy sector.

Table 35 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Calistoga ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Imported Water Usage (MG/year)	154	167	162	151
Imported Water Emissions ($MTCO_2e$/year)	229	120	25	0
Percent Change from 2019				
Imported Water Usage	NA	8%	5%	-2%
Imported Water Emissions	NA	-48%	-89%	-100%

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

Source: Ascent Inc. in 2024.

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

Source	2019	2030	2035	2045
WWTP Process Emissions	1,992	2,159	2,091	1,954
Percent Change from 2019	NA	8%	5%	-2%

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

Source: Ascent Inc. in 2024.

7.4 CITY OF NAPA

Emissions Summary

Table 37 shows a summary of the City of Napa's share of the regional emissions inventory and legislative-adjusted forecast. City of Napa's emissions are anticipated to decline by 67 percent between 2019 and 2045. Much of this reduction is due to reductions in the on-road transportation sector. As shown in Table 37, based on the modeling conducted, on-road transportation emissions would rapidly decline from 48 percent of the city's emissions to only 22 percent of the city's emissions. With decline in on-road transportation emissions, building energy and solid waste would make up 39 percent of the city's emissions by 2045. Building energy use emissions reflect continued natural gas use in buildings under the legislative-adjusted BAU scenario. Solid waste emissions are scaled directly with population growth in the city, which is estimated to increase by 16 percent over 2019 levels by 2045. Off-road and wastewater emissions are expected to account for 10 percent and 11 percent of the City of Napa's emissions in 2045, respectively. As an urban area, there are minimal emissions from agriculture in the City of Napa. No imported water-related emissions would be generated by 2045 due to the zero-carbon electricity requirements under SB100.

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

Sector	2019	2030	2030	2045
Agriculture	1,097	1,047	1,020	923

Sector	2019	2030	2030	2045
Building Energy	125,346	75,559	59,238	32,444
Imported Water	4,383	2,372	514	-
Off-Road Equipment	44,614	17,813	18,138	22,242
On-Road Transportation	280,533	170,930	109,920	37,932
Solid Waste	34,236	38,283	38,557	41,963
Wastewater	29,542	32,945	33,530	36,197
Total	**519,750**	**338,949**	**260,917**	**171,703**
Percent of Total				
Agriculture	0%	0%	0%	1%
Building Energy	24%	22%	23%	19%
Imported Water	1%	1%	0%	0%
Off-Road Equipment	9%	5%	7%	13%
On-Road Transportation	54%	50%	42%	22%
Solid Waste	7%	11%	15%	24%
Wastewater	6%	10%	13%	21%
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-5%	-7%	-16%
Building Energy	NA	-40%	-53%	-74%
Imported Water	NA	-46%	-88%	-100%
Off-Road Equipment	NA	-60%	-59%	-50%
On-Road Transportation	NA	-39%	-61%	-86%
Solid Waste	NA	12%	13%	23%
Wastewater	NA	12%	13%	23%
Total	**NA**	**-35%**	**-50%**	**-67%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, BAAQMD's Zero NOx appliance rule, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, the City of Napa's building energy-related emissions are anticipated to decrease by three percent from 2019 to 2030 and by 16 percent below 2019 levels by 2045. With the implementation of SB100, by 2045, all building energy emissions would be generated from the combustion of natural gas.

Table 38 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Napa ($MTCO_2e$/ year)

Energy Type	2019	2030	2035	2045
Electricity	26,583	9,708	10,203	-
Natural Gas	98,763	65,851	49,035	32,444

Energy Type	2019	2030	2035	2045
Total	**125,346**	**75,559**	**59,238**	**32,444**
Percent Change from 2019				
Electricity	NA	30%	37.12%	50.94%
Natural Gas	NA	-33%	-50%	-67%
Total	**NA**	**-3%**	**-13%**	**-16%**

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

Source: Ascent Inc. in 2024.

ON-ROAD TRANSPORTATION

The City of Napa's on-road transportation emissions are anticipated to decrease by 86 percent between 2019 and 2045, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, ACCII, ACF, and other adopted regulations as discussed in Section 3, which increase the percentage of zero-emission vehicles on the road and improve fuel economy, reducing average fleetwide GHG emissions per mile.

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

Trip Type	2019	2030	2035	2045
Commercial Trips	103,259	60,708	41,401	18,615
Non-Commercial Trips	177,275	110,222	68,519	19,317
Total	**280,533**	**170,930**	**109,920**	**37,932**
Percent Change from 2019				
Commercial Trips	NA	-41%	-60%	-82%
Non-Commercial Trips	NA	-38%	-61%	-89%
Total	**NA**	**-39%**	**-61%**	**-86%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Based on the scaling factors used to scale countywide off-road emissions to each jurisdiction (e.g., population, employment) that best match each off-road equipment category (refer to Table 12), and with emissions reduction due to State regulations, the City of Napa's off-road equipment emissions are anticipated to decrease by 62 percent between 2019 and 2035, and then slightly increase by 9 percent through 2045 compared to 2019 levels, resulting in an overall decline by 53 percent between 2019 and 2045. In particular, the greatest reductions would occur from the lawn and garden and light commercial equipment sectors which are anticipated to see emissions decline by over 25,000 $MTCO_2e$ by 2030 and through 2045 compared to 2019 levels. This accounts for more than half of the City of Napa's off-road emissions in 2019 and nearly all of the reductions through 2045. Additionally, emissions from the railyard operations sector are expected to decline to zero.

CARB anticipates a statewide trend toward increased electric adoption in lawn and garden and light commercial equipment due to State regulations and advances in battery technology supported with lawn and garden equipment exchange programs (CARB 2020; BAAQMD 2024). While the BAAQMD exchange programs are currently closed, the

lasting effect of these programs and current marketplace offerings are expected to influence future overall consumer choices in purchasing electric equipment for these two equipment categories.

Table 40 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Equipment Category	2019	2030	2035	2045
Commercial Harbor Craft	74	67	70	77
Construction and Mining	6,768	5,995	6,137	6,416
Industrial	2,884	3,236	2,709	3,988
Lawn and Garden Equipment	16,317	-	-	-
Light Commercial Equipment	12,758	1,178	809	687
Portable Equipment	5,300	6,002	6,935	9,221
Railyard Operations	201	-	-	-
Recreational Equipment	1,526	-	-	-
Transport Refrigeration Units	1,410	1,335	1,478	1,855
Total	**47,238**	**17,813**	**18,138**	**22,242**
Percent Change from 2019				
Commercial Harbor Craft	NA	-9%	-5%	4%
Construction and Mining	NA	-11%	-9%	-5%
Industrial	NA	12%	-6%	38%
Lawn and Garden Equipment	NA	-100%	-100%	-100%
Light Commercial Equipment	NA	-91%	-94%	-95%
Portable Equipment	NA	13%	31%	74%
Railyard Operations	NA	-100%	-100%	-100%
Recreational Equipment	NA	-100%	-100%	-100%
Transport Refrigeration Units	NA	-5%	5%	32%
Total	**NA**	**-62%**	**-62%**	**-53%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

AGRICULTURE

As an incorporated city, Napa does not have a substantial presence of agricultural activity within its jurisdiction. Agriculture accounts for less than one percent of the jurisdiction's emissions. Table 41 shows that emissions due to the limited agricultural activities in the city (e.g., agricultural offroad equipment, irrigation pumps, use of fertilizers, and limited livestock presence) would decline between 2019 and 2045 by 15 percent. The city forecasts a 10 percent reduction in cropland acreage between 2019 and 2045. Forecasts of fertilizer and irrigation pump use are directly proportional to cropland forecasts. (Napa is one of few cities in the region where irrigation pumps operate.) CARB's OFFROAD2021 model forecasts a reduction across agricultural offroad emissions countywide due to an anticipated decline in the amount of equipment operating and State regulations to prohibit emissions from small engines. Additionally, although some livestock emissions were allocated to the city in the 2019 inventory, the city did not report any rangeland acres. Thus, it was assumed that livestock emissions would remain unchanged through 2045.

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

Source	2019	2030	2035	2045
Agricultural Offroad	346	312	294	246
Fertilizer Application	159	158	155	143
Irrigation Pumps	448	444	437	401
Livestock	133	133	133	133
Total	1,086	**1,047**	**1,020**	**923**
Percent Change from 2019				
Agricultural Offroad	NA	-10%	-15%	-29%
Fertilizer Application	NA	-1%	-2%	-10%
Irrigation Pumps	NA	-1%	-2%	-10%
Livestock	NA	0%	0%	0%
Total	**NA**	**-4%**	**-6%**	**-15%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

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 23 percent from 2019 to 2045, commensurate with population growth.

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

Source	2019	2030	2035	2045
Annual waste tonnage delivered from jurisdiction (tons)	50,755	56,756	57,162	62,212
Solid Waste Generation Emissions ($MTCO_2e$/year)	34,236	38,283	38,557	41,963
Percent Change from 2019				
Annual waste tonnage delivered from jurisdiction	NA	12%	13%	23%
Solid Waste Generation Emissions	NA	12%	13%	23%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

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 23 percent by 2045 from 2019 levels, commensurate with population growth trends. However, emissions from imported water are expected to be reduced completely by 2045 with the statewide implementation zero-carbon electricity under SB100 which would also apply to imported water conveyance and delivery. Emissions associated with locally sourced water, including groundwater pumping, are captured in the building energy sector.

Table 43 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Imported Water Usage (MG/year)	2,948	3,288	3,346	3,612
Imported Water Emissions ($MTCO_2e$/year)	4,383	2,372	514	0
Percent Change from 2019				
Imported Water Usage	NA	12%	13%	23%
Imported Water Emissions	NA	-46%	-88%	-100%

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

Source: Ascent Inc. in 2024.

WASTEWATER

Napa'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 Napa.

Table 44 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Napa ($MTCO_2e$/year)

Source	2019	2030	2035	2045
WWTP Process Emissions	29,542	32,945	33,530	36,197
Percent Change from 2019	NA	12%	13%	23%

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

Source: Ascent Inc. in 2024.

7.5 ST. HELENA

Emissions Summary

Table 45 shows a summary of the City of St. Helena's share of the regional emissions inventory and legislative-adjusted forecast. St. Helena's emissions are anticipated to decline by 68 percent between 2019 and 2045. Much of this reduction is due to reductions in the on-road transportation sector. As shown in Table 45, based on the modeling conducted, on-road transportation emissions would rapidly decline from 48 percent of the city's emissions to 19 percent of the city's emissions. With decline in on-road transportation emissions, building energy and solid waste would make up 58 percent of the city's emissions by 2045. Building energy use emissions reflect continued natural gas use in buildings under the legislative-adjusted BAU scenario. Solid waste emissions are scaled directly with population growth in the city, which is estimated to increase by 12 percent over 2019 levels by 2045. Off-road and

wastewater emissions are expected to account for 7 percent and 15 percent of the St. Helena's emissions in 2045, respectively. As an urban area, there are minimal emissions from agriculture in the St. Helena. No imported water-related emissions would be generated by 2045 due to the zero-carbon electricity requirements under SB100.

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

Sector	2019	2030	2030	2045
Agriculture	4,446	3,967	3,870	3,763
Building Energy	16,766	8,985	6,606	2,192
Imported Water	285	145	31	-
Off-Road Equipment	4,301	1,799	1,775	2,075
On-Road Transportation	30,661	19,973	13,336	4,785
Solid Waste	5,676	6,199	6,255	6,334
Wastewater	2,270	2,389	2,400	2,447
Total	**64,405**	**43,457**	**34,272**	**21,596**
Percent of Total				
Agriculture	7%	9%	11%	17%
Building Energy	26%	21%	19%	10%
Imported Water	0%	0%	0%	0%
Off-Road Equipment	7%	4%	5%	10%
On-Road Transportation	48%	46%	39%	22%
Solid Waste	9%	14%	18%	29%
Wastewater	4%	5%	7%	11%
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-11%	-13%	-15%
Building Energy	NA	-46%	-61%	-87%
Imported Water	NA	-49%	-89%	-100%
Off-Road Equipment	NA	-58%	-59%	-52%
On-Road Transportation	NA	-35%	-57%	-84%
Solid Waste	NA	9%	10%	12%
Wastewater	NA	5%	6%	8%
Total	**NA**	**-33%**	**-47%**	**-66%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, BAAQMD's Zero NOx appliance rule, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, St. Helena's building energy-related emissions are anticipated to decrease by 18 percent from 2019 to 2030, and further by 49 percent below 2019 levels by 2045. With the implementation of SB100, by 2045, all building energy emissions

would be generated from the combustion of natural gas. Notably, St. Helena also has the highest participation rate in the county in MCE's Deep Green option at 24 percent, which translates to low existing electricity emissions.

Table 46 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: St. Helena ($MTCO_2e$/ year)

Energy Type	2019	2030	2035	2045
Electricity	3,556	1,160	1,204	-
Natural Gas	13,209	7,825	5,401	2,192
Total	**16,766**	**8,985**	**6,606**	**2,192**
Percent Change from 2019				
Electricity	NA	22%	26.97%	34.37%
Natural Gas	NA	-41%	-59%	-83%
Total	**NA**	**-18%**	**-32%**	**-49%**

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

Source: Ascent Inc. in 2024.

ON-ROAD TRANSPORTATION

St. Helena's on-road transportation emissions are anticipated to decrease by 86 percent between 2019 and 2045, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, ACCII, ACF, and other adopted regulations as discussed in Section 3, which increase the percentage of zero-emission vehicles on the road and improve fuel economy, reducing average fleetwide GHG emissions per mile.

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

Trip Type	2019	2030	2035	2045
Commercial Trips	11,286	7,094	5,023	2,348
Non-Commercial Trips	19,376	12,880	8,313	2,437
Total	**30,661**	**19,973**	**13,336**	**4,785**
Percent Change from 2019				
Commercial Trips	NA	-37%	-55%	-79%
Non-Commercial Trips	NA	-34%	-57%	-87%
Total	**NA**	**-35%**	**-57%**	**-84%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Based on the scaling factors used to scale countywide off-road emissions to each jurisdiction (e.g., population, employment) that best match each off-road equipment category (refer to Table 12), and with emissions reduction due to State regulations, St. Helena's off-road equipment emissions are anticipated to decrease by 61 percent between 2019 and 2035, and then slightly increase by 6 percent in 2045 compared to 2019 levels resulting in an overall decline by 54 percent from 2019 through 2045. In particular, the greatest reductions would occur from the

lawn and garden and light commercial equipment sectors which are anticipated to see emissions decline by over 2,500 $MTCO_2e$ by 2030 and through 2045 compared to 2019 levels. This accounts for more than half of St. Helena's off-road emissions in 2019 and over 90 percent of the reductions through 2045. Additionally, emissions from the railyard operations sector are expected to decline to zero.

CARB anticipates a statewide trend toward increased electric adoption in lawn and garden and light commercial equipment due to State regulations and advances in battery technology supported with lawn and garden equipment exchange programs (CARB 2020; BAAQMD 2024). While the BAAQMD exchange programs are currently closed, the lasting effect of these programs and current marketplace offerings are expected to influence future overall consumer choices in purchasing electric equipment for these two equipment categories.

Table 48 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Equipment Category	2019	2030	2035	2045
Commercial Harbor Craft	8	7	7	7
Construction and Mining	615	514	519	513
Industrial	325	331	268	380
Lawn and Garden Equipment	1,254	28	15	1
Light Commercial Equipment	1,436	121	80	65
Portable Equipment	596	614	686	879
Railyard Operations	23	-	-	-
Recreational Equipment	117	70	74	80
Transport Refrigeration Units	128	114	125	148
Total	**4,502**	**1,799**	**1,775**	**2,075**
Percent Change from 2019				
Commercial Harbor Craft	NA	-17%	-16%	-12%
Construction and Mining	NA	-16%	-16%	-17%
Industrial	NA	2%	-17%	17%
Lawn and Garden Equipment	NA	-98%	-99%	-100%
Light Commercial Equipment	NA	-92%	-94%	-95%
Portable Equipment	NA	3%	15%	47%
Railyard Operations	NA	-100%	-100%	-100%
Recreational Equipment	NA	-41%	-37%	-32%
Transport Refrigeration Units	NA	-11%	-2%	16%
Total	**NA**	**-60%**	**-61%**	**-54%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

AGRICULTURE

Although it is an incorporated city, 46 percent of St. Helena's General Plan area is made up by agricultural land. As such, it has the most agricultural emissions out of all the incorporated jurisdictions, with agriculture accounting for seven percent of its emissions in 2019. Through 2045, with the reductions in other sectors, the proportion of the city's emission that is from agriculture would increase to account for up to 17 percent of the city's emissions.

Table 49 shows that emissions due to agricultural activities in the city (e.g., agricultural offroad equipment, irrigation pumps, use of fertilizers, and limited livestock presence) would decline between 2019 and 2045 by 15 percent. The city forecasts a nine percent reduction in cropland acreage between 2019 and 2045. Forecasts of fertilizer and irrigation pump use are directly proportional to cropland forecasts. St. Helena is one of few cities in the region where irrigation pumps operate and irrigation pump account for the majority of the city's agricultural emissions, nearly 60 percent in 2019.

With respect to other sources, CARB's OFFROAD2021 model forecasts a reduction across agricultural offroad emissions countywide due to anticipated decline in the amount of equipment operating and State regulations to prohibit emissions from small engines. Additionally, although some livestock emissions were allocated to the city in the 2019 inventory, the city did not report any rangeland acres. Thus, it was assumed that livestock emissions would remain unchanged through 2045.

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

Source	2019	2030	2035	2045
Agricultural Offroad	971	803	705	599
Fertilizer Application	447	406	406	406
Irrigation Pumps	2,623	2,384	2,384	2,384
Livestock	373	373	373	373
Total	4,415	**3,967**	**3,870**	**3,763**
Percent Change from 2019				
Agricultural Offroad	NA	-17%	-27%	-38%
Fertilizer Application	NA	-9%	-9%	-9%
Irrigation Pumps	NA	-9%	-9%	-9%
Livestock	NA	0%	0%	0%
Total	**NA**	**-10%**	**-12%**	**-15%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

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 12 percent from 2019 to 2045, commensurate with population growth.

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

Source	2019	2030	2035	2045
Annual waste tonnage delivered from jurisdiction (tons)	14,258	15,571	15,711	15,910
Solid Waste Generation Emissions ($MTCO_2e$/year)	5,676	6,199	6,255	6,334
Percent Change from 2019				
Annual waste tonnage delivered from jurisdiction	NA	9%	10%	12%
Solid Waste Generation Emissions	NA	9%	10%	12%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

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 eight percent by 2045 from 2019 levels, commensurate with population growth trends. However, emissions from imported water are expected to be reduced completely by 2045 with the statewide implementation zero-carbon electricity under SB100 which would also apply to imported water conveyance and delivery. Emissions associated with locally sourced water, including groundwater pumping, are captured in the building energy sector.

Table 51 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: St. Helena ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Imported Water Usage (MG/year)	191	201	202	206
Imported Water Emissions ($MTCO_2e$/year)	285	145	31	0
Percent Change from 2019				
Imported Water Usage	NA	5%	6%	8%
Imported Water Emissions	NA	-49%	-89%	-100%

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

Source: Ascent Inc. in 2024.

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

Source	2019	2030	2035	2045
WWTP Process Emissions	2,270	2,389	2,400	2,447
Percent Change from 2019	NA	5%	6%	8%

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

Source: Ascent Inc. in 2024.

7.6 YOUNTVILLE

Emissions Summary

Table 53 shows a summary of the Town of Yountville's emissions inventory and legislative-adjusted forecast. Yountville's emissions are anticipated to decline by 68 percent between 2019 and 2045. Much of this reduction is due to reductions in the on-road transportation sector. As shown in Table 53, based on the modeling conducted, on-road transportation emissions would rapidly decline from 48 percent of the town's emissions to 19 percent of the town's emissions. With decline in on-road transportation emissions, building energy and solid waste would make up 58 percent of the city's emissions by 2045. Building energy use emissions reflect continued natural gas use in buildings under the legislative-adjusted BAU scenario. Solid waste emissions are scaled directly with population growth in the town, which is estimated to increase by 27 percent over 2019 levels by 2045. Off-road and wastewater emissions are expected to account for 7 percent and 15 percent of Yountville's emissions in 2045, respectively. As an urbanized area, there are minimal emissions from agriculture in Yountville. No imported water-related emissions would be generated by 2045 due to the zero-carbon electricity requirements under SB100.

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

Sector	2019	2030	2030	2045
Agriculture	77	62	56	50
Building Energy	8,532	4,887	3,836	1,461
Imported Water	65	37	8	-
Off-Road Equipment	1,236	512	506	557
On-Road Transportation	12,404	6,582	4,392	1,575
Solid Waste	2,601	3,153	3,213	3,293
Wastewater	1,040	1,237	1,251	1,268
Total	**25,955**	**16,470**	**13,262**	**8,204**
Percent of Total				
Agriculture	0%	0%	0%	1%
Building Energy	33%	30%	29%	18%
Imported Water	0%	0%	0%	0%
Off-Road Equipment	5%	3%	4%	7%
On-Road Transportation	48%	40%	33%	19%
Solid Waste	10%	19%	24%	40%

Sector	2019	2030	2030	2045
Wastewater	4%	8%	9%	15%
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-19%	-27%	-35%
Building Energy	NA	-43%	-55%	-83%
Imported Water	NA	-43%	-88%	-100%
Off-Road Equipment	NA	-59%	-59%	-55%
On-Road Transportation	NA	-47%	-65%	-87%
Solid Waste	NA	21%	24%	27%
Wastewater	NA	19%	20%	22%
Total	**NA**	**-37%**	**-49%**	**-68%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, BAAQMD's Zero NOx appliance rule, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, Yountville building energy-related emissions are anticipated to decrease by two percent from 2019 to 2030, and further by 34 percent below 2019 levels by 2045. With the implementation of SB100, by 2045, all building energy emissions would be generated from the combustion of natural gas. Notably, Yountville has the second highest participation rate in the county in MCE's Deep Green option at 23 percent, which translates to low existing electricity emissions. The next highest participating jurisdiction in Deep Green is the City of Napa at four percent.

Table 54 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Yountville ($MTCO_2e$/ year)

Energy Type	2019	2030	2035	2045
Electricity	2,749	850	874	-
Natural Gas	5,783	4,037	2,962	1,461
Total	**8,532**	**4,887**	**3,836**	**1,461**
Percent Change from 2019				
Electricity	NA	32%	40%	40%
Natural Gas	NA	-30%	-49%	-75%
Total	**NA**	**2%**	**-13%**	**-34%**

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

Source: Ascent Inc. in 2024.

ON-ROAD TRANSPORTATION

Yountville's on-road transportation emissions are anticipated to decrease by 87 percent between 2019 and 2045, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, ACCII, ACF, and other adopted regulations as discussed in Section 3, which increase the percentage of zero-emission vehicles on the road and improve fuel economy, reducing average fleetwide GHG emissions per mile.

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

Trip Type	2019	2030	2035	2045
Commercial Trips	4,566	2,338	1,654	773
Non-Commercial Trips	7,838	4,244	2,737	802
Total	12,404	6,582	4,392	1,575
Percent Change from 2019				
Commercial Trips	NA	-49%	-64%	-83%
Non-Commercial Trips	NA	-46%	-65%	-90%
Total	**NA**	**-47%**	**-65%**	**-87%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Based on the scaling factors used to scale countywide off-road emissions to each jurisdiction (e.g., population, employment) that best match each off-road equipment category (refer to Table 12), and with emissions reduction due to State regulations, Yountville off-road equipment emissions are anticipated to decrease by 62 percent between 2019 and 2035, with a minor 4 percent increase in 2045 compared to 2019 levels, resulting in an overall decline by 58 percent from 2019 through 2045. In particular, the greatest reductions would occur from the lawn and garden and light commercial equipment sectors which are anticipated to see emissions decline by over 800 $MTCO_2e$ by 2030 and through 2045 compared to 2019 levels. This accounts for more than half of St. Helena's off-road emissions in 2019 and nearly all of the reductions through 2045. Additionally, emissions from the railyard operations sector are expected to decline to zero.

CARB anticipates a statewide trend toward increased electric adoption in lawn and garden and light commercial equipment due to State regulations and advances in battery technology supported with lawn and garden equipment exchange programs (CARB 2020; BAAQMD 2024). While the BAAQMD exchange programs are currently closed, the lasting effect of these programs and current marketplace offerings are expected to influence future overall consumer choices in purchasing electric equipment for these two equipment categories.

Table 56 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Equipment Category	2019	2030	2035	2045
Commercial Harbor Craft	2	1	1	1
Construction and Mining	202	191	194	190
Industrial	62	71	57	77
Lawn and Garden Equipment	575	14	8	1
Light Commercial Equipment	274	26	17	13

Equipment Category	2019	2030	2035	2045
Portable Equipment	114	131	145	178
Railyard Operations	4	-	-	-
Recreational Equipment	54	35	38	42
Transport Refrigeration Units	42	42	47	55
Total	**1,328**	**512**	**506**	**557**
Percent Change from 2019				
Commercial Harbor Craft	NA	-7%	-7%	-7%
Construction and Mining	NA	-6%	-4%	-6%
Industrial	NA	14%	-9%	24%
Lawn and Garden Equipment	NA	-97%	-99%	-100%
Light Commercial Equipment	NA	-91%	-94%	-95%
Portable Equipment	NA	15%	27%	56%
Railyard Operations	NA	-100%	-100%	-100%
Recreational Equipment	NA	-34%	-29%	-23%
Transport Refrigeration Units	NA	1%	11%	31%
Total	**NA**	**-61%**	**-62%**	**-58%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

AGRICULTURE

As an incorporated town, Yountville does not have a substantial presence of agricultural activity within its jurisdiction. Agriculture accounts for less than one percent of the jurisdiction's emissions. Based on data provided by the town, agricultural acres in Yountville are anticipated to decline by 17 percent from 2019 levels by 2030 and through 2045.

With this change, Table 57 shows that emissions due to the agricultural activities in the town (e.g., agricultural offroad equipment, use of fertilizers, and limited livestock presence) would decline between 2019 and 2045 by 33 percent. CARB's OFFROAD2021 model forecasts a reduction across agricultural offroad emissions countywide due to an anticipated decline in the amount of equipment operating. The majority of these reductions are from agricultural off-road equipment and State regulations prohibiting emissions from small engines. Fertilizer emissions would decline in proportion to agricultural acres. Additionally, although some livestock emissions were allocated to the town in the 2019 inventory, the Town did not report any rangeland acres.

Thus, it was assumed that livestock emissions would remain unchanged through 2045.

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

Source	2019	2030	2035	2045
Agricultural Offroad Equipment	41	31	24	19
Fertilizer Application	19	16	16	16
Livestock	16	16	16	16
Total	**75**	**62**	**56**	**50**

Source	2019	2030	2035	2045
Percent Change from 2019				
Agricultural Offroad Equipment	NA	-25%	-40%	-54%
Fertilizer Application	NA	-17%	-17%	-17%
Livestock	NA	0%	0%	0%
Total	**NA**	**-18%**	**-26%**	**-33%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

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 27 percent from 2019 to 2045, commensurate with population growth.

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

Source	2019	2030	2035	2045
Annual waste tonnage delivered from jurisdiction (tons)	6,535	7,920	8,072	8,271
Solid Waste Generation Emissions ($MTCO_2e$/year)	2,601	3,153	3,213	3,293
Percent Change from 2019				
Annual waste tonnage delivered from jurisdiction	NA	21%	24%	27%
Solid Waste Generation Emissions	NA	21%	24%	27%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

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 22 percent by 2045 from 2019 levels, commensurate with population growth trends. However, emissions from imported water are expected to be reduced completely by 2045 with the statewide implementation zero-carbon electricity under SB100 which would also apply to imported water conveyance and delivery. Emissions associated with locally sourced water, including groundwater pumping, are captured in the building energy sector.

Table 59 Imported Water GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Imported Water Usage (MG/year)	43	52	52	53
Imported Water Emissions ($MTCO_2e$/year)	65	37	8	0
Percent Change from 2019				
Imported Water Usage	NA	19%	20%	22%
Imported Water Emissions	NA	-43%	-88%	-100%

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

Source: Ascent Inc. in 2024.

WASTEWATER

Yountville's emissions from wastewater are anticipated to increase proportionally with the service population. These emissions would primarily come from central wastewater treatment plants. No known septic systems are currently operating within Yountville.

Table 60 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Yountville ($MTCO_2e$/year)

Source	2019	2030	2035	2045
WWTP Process Emissions	1,040	1,237	1,251	1,268
Percent Change from 2019	NA	19%	20%	22%

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

Source: Ascent Inc. in 2024.

7.7 UNINCORPORATED NAPA COUNTY

Emissions Summary

Table 61 shows a summary of the unincorporated county's share of the regional 2019 emissions inventory and legislative-adjusted forecasts in the unincorporated areas. Overall, the unincorporated county's emissions are anticipated to decline by 33 percent between 2019 and 2045. Currently, agriculture and solid waste make up 59 percent of the jurisdiction's emissions, followed by building energy, off-road transportation, and on-road transportation which together account for 40 percent of emissions. With the anticipated legislative reductions, building energy, off-road equipment, and on-road transportation are expected to decline by 93, 59, and 85 percent, respectively, from 2019 to 2045.

With the large-scale anticipated reductions in building energy, on-road transportation, and off-road equipment, the proportion of agricultural and solid waste emissions could increase to 36 and 51 percent of the area's total emissions by 2045. While agriculture is a major economic sector in the unincorporated area, solid waste emissions from the Clover Flat Landfill and American Canyon Landfill would continue to be the majority of the unincorporated county's emissions through 2045 – more than 15 percent higher than agricultural emissions in 2045. These emissions are primarily from methane generated from accumulated waste-in-place at the two county landfills.

Table 61 Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Unincorporated County ($MTCO_2e$/year)

Sector	2019	2030	2030	2045
Agriculture	98,879	93,757	92,673	90,947
Building Energy	61,068	32,691	24,653	4,388
Off-Road Equipment	48,683	18,847	18,607	19,830
On-Road Transportation	40,063	26,892	17,384	6,033
Solid Waste	125,429	131,497	130,687	129,411
Wastewater	3,191	3,689	3,533	3,219
Total	**377,314**	**307,374**	**287,538**	**253,829**
Percent of Total				
Agriculture	26%	31%	32%	36%
Building Energy	16%	11%	9%	2%
Off-Road Equipment	13%	6%	6%	8%
On-Road Transportation	11%	9%	6%	2%
Solid Waste	33%	43%	45%	51%
Wastewater	1%	1%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**
Percent Change from 2019				
Agriculture	NA	-5%	-6%	-8%
Building Energy	NA	-46%	-60%	-93%
Off-Road Equipment	NA	-61%	-62%	-59%
On-Road Transportation	NA	-33%	-57%	-85%
Solid Waste	NA	5%	4%	3%
Wastewater	NA	16%	11%	1%
Total	**NA**	**-19%**	**-24%**	**-33%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent; NA = not applicable

Source: Ascent Inc. in 2024.

BUILDING ENERGY

Accounting for population and employment growth, changes in utility emission factors, BAAQMD's Zero NOx appliance rule, and greater efficiencies in newer construction per Title 24 Building Energy Efficiency Standards, the unincorporated county's building energy-related emissions are anticipated to decrease by three percent from 2019 to 2030, and further by 61 percent below 2019 levels by 2045. With the implementation of SB100, by 2045, all building energy emissions would be generated from the combustion of natural gas.

The unincorporated county has the highest rate of reductions in building energy emissions across the region. This is likely because the unincorporated county uses much more electricity than natural gas per BTU compared to other jurisdictions. In 2019, electricity use in the unincorporated county accounted for 62 percent of total energy use. This profile is assumed to continue. In contrast, the incorporated cities' energy use is almost exactly the inverse, with 62 percent of energy consumption from electricity and 38 percent from natural gas. This could be due to the greater

presence of wineries and agriculture processing in the unincorporated county that use a higher percentage of electricity for their operations as compared to natural gas.

Table 62 Building Energy GHG Emissions Inventory and Legislative-Adjusted BAU Emissions Forecasts: Unincorporated County ($MTCO_2e$/ year)

Energy Type	2019	2030	2035	2045
Electricity	25,814	9,049	8,938	-
Natural Gas	35,254	23,642	15,715	4,388
Total	**61,068**	**32,691**	**24,653**	**4,388**
Percent Change from 2019				
Electricity	NA	36%	35%	27%
Natural Gas	NA	-33%	-55%	-88%
Total	**NA**	**3%**	**-21%**	**-61%**

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

Source: Ascent Inc. in 2024.

ON-ROAD TRANSPORTATION

The unincorporated county's on-road transportation emissions are anticipated to decrease by 85 percent between 2019 and 2045, consistent with the VMT forecasts provided by MTC and anticipated improvement in vehicle emissions standards, ACCII, ACF, and other adopted regulations as discussed in Section 3, which increase the percentage of zero-emission vehicles on the road and improve fuel economy, reducing average fleetwide GHG emissions per mile.

Table 63 On-Road Transportation GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County $MTCO_2e$/year)

Trip Type	2019	2030	2035	2045
Commercial Trips	14,746	9,551	6,548	2,961
Non-Commercial Trips	25,317	17,341	10,837	3,072
Total	**40,063**	**26,892**	**17,384**	**6,033**
Percent Change from 2019				
Commercial Trips	NA	-35%	-56%	-80%
Non-Commercial Trips	NA	-32%	-57%	-88%
Total	**NA**	**-33%**	**-57%**	**-85%**

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; NA = not applicable.

Source: Ascent Inc. in 2024.

OFF-ROAD EQUIPMENT

Table 64 displays inventory and legislative-adjusted forecasts for off-road equipment for the unincorporated county. Based on the scaling factors used to scale countywide off-road emissions to each jurisdiction (e.g., population, employment) that best match each off-road equipment category (refer to Table 12), and with emissions reduction due to State regulations, the unincorporated county's off-road equipment emissions are anticipated to decrease by

63 percent between 2019 and 2035, and increase slightly by 2 percent by 2045, resulting in an overall decline by 61 percent from 2019 through 2045.

Like other jurisdictions, the greatest reductions would occur from the lawn and garden and light commercial equipment sectors which are anticipated to see emissions decline by over 11,500 $MTCO_2e$ by 2030 and through 2045 compared to 2019 levels. The pleasure craft which are anticipated to see emissions decline by over 70 percent or around 20,000 $MTCO_2e$ by 2030 and 65 percent or around 18,500 $MTCO_2e$ by 2045 compared to 2019 levels. Additionally, emissions from the railyard operations sector are expected to decline to zero. Together, these four sectors account for more than 82 percent of the unincorporated county's off-road emissions in 2019 and more than half of the reductions through 2045. CARB anticipates a gradual population decline of the outboard fleet through 2045 based on long-term forecasts of survival rates and forecasted annual sales (CARB 2014:9).

CARB anticipates a statewide trend toward increased electric adoption in lawn and garden and light commercial equipment due to State regulations and advances in battery technology with the support from lawn and garden equipment exchange programs (CARB 2020; BAAQMD 2024). While the BAAQMD exchange programs are currently closed, the lasting effect of these programs and current marketplace offerings are expected to influence future overall consumer choices in purchasing electric equipment for these two equipment categories.

Agricultural off-road forecasts are discussed in the next subsection.

Table 64 Off-Road Transportation Vehicles and Equipment GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County ($MTCO_2e$/year)

Equipment Category	2019	2030	2035	2045
Airport Ground Support	<1	-	-	-
Commercial Harbor Craft	44	45	42	36
Construction and Mining	2,876	2,641	2,543	2,244
Industrial	1,711	2,181	1,625	1,856
Lawn and Garden Equipment	5,160	110	57	5
Light Commercial Equipment	7,569	794	485	320
Pleasure Craft	28,896	8,174	8,793	10,116
Portable Equipment	3,145	4,045	4,160	4,291
Railyard Operations	120	-	-	-
Recreational Equipment	483	269	289	315
Transport Refrigeration Units	599	588	613	649
Total	**50,602**	**18,847**	**18,607**	**19,830**
Percent Change from 2019				
Airport Ground Support	NA	-100%	-100%	-100%
Commercial Harbor Craft	NA	4%	-4%	-18%
Construction and Mining	NA	-8%	-12%	-22%
Industrial	NA	27%	-5%	8%
Lawn and Garden Equipment	NA	-98%	-99%	-100%
Light Commercial Equipment	NA	-90%	-94%	-96%
Pleasure Craft	NA	-72%	-70%	-65%
Portable Equipment	NA	29%	32%	36%
Railyard Operations	NA	-100%	-100%	-100%

Equipment Category	2019	2030	2035	2045
Recreational Equipment	NA	-44%	-40%	-35%
Transport Refrigeration Units	NA	-2%	2%	8%
Total	**NA**	**-63%**	**-63%**	**-61%**

AGRICULTURE

Most agricultural activity within the region takes place in the unincorporated county, accounting for approximately 30 percent of the jurisdiction's emissions. Table 65 shows that emissions due to the agricultural activities in the county (e.g., agricultural offroad equipment, use of fertilizers, and livestock) would decline between 2019 and 2045 by seven percent, scaled according to the forecasted change in both rangeland and cropland acres and anticipated changes in off-road activity. CARB's OFFROAD2021 model forecasts a reduction across agricultural offroad emissions countywide due to the anticipated decline in the amount of equipment operating and State regulations to prohibit emissions from small engines.

The greatest decline is anticipated in the off-road category (22 percent reduction by 2045), which also accounts for nearly all the reductions in this sector for the unincorporated area. Fertilizer and irrigation pump emissions are scaled by the forecasted change in cropland. Livestock emissions are scaled by the reduction in rangeland of four percent between 2019 and 2045, based on data provided by the County of Napa (See Attachment 1).

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

Source	2019	2030	2035	2045
Agricultural Offroad	46,092	41,625	39,983	37,140
Fertilizer Application	21,216	21,974	22,392	23,228
Irrigation Pumps	12,347	12,788	13,031	13,517
Livestock	17,723	17,370	17,268	17,062
Total	**97,378**	**93,757**	**92,673**	**90,947**
Percent Change from 2019				
Agricultural Offroad	NA	-10%	-13%	-19%
Fertilizer Application	NA	4%	6%	9%
Irrigation Pumps	NA	4%	6%	9%
Livestock	NA	-2%	-3%	-4%
Total	**NA**	**-4%**	**-5%**	**-7%**

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

Source: Ascent Inc. in 2022.

SOLID WASTE

Solid waste emissions in the unincorporated county are anticipated to increase by three percent from 2019 to 2045 from 125,428 to 129,411 $MTCO_2e$/year, largely due to the expected increases in waste-in-place emissions at the two landfills located within the area.

Waste Generation

The unincorporated county generated approximately 28,105 tons of solid waste in 2019 which generated 10,810 $MTCO_2e$ in emissions. Solid waste generation is anticipated to grow proportionally to population growth. Given that

waste generation emissions are proportional to the amount of waste generated, both the unincorporated county's waste disposal and related emissions are anticipated to increase by seven percent from 2019 to 2045, commensurate with population growth.

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

Source	2019	2030	2035	2045
Annual waste tonnage delivered from jurisdiction (tons)	28,105	28,902	29,264	29,989
Solid Waste Generation Emissions ($MTCO_2e$/year)	10,810	11,117	11,256	11,535
Percent Change from 2019				
Annual waste tonnage delivered from jurisdiction	NA	3%	4%	7%
Solid Waste Generation Emissions	NA	3%	4%	7%

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

Waste-in-Place

Two major landfills are located within the unincorporated county: Clover Flat Landfill and American Canyon Landfill. Table 67 shows that emissions from waste-in-place from both landfills are anticipated to increase by three percent from 2019 to 2045. Section 7.4 describes the methodology used to quantify these forecasts.

Table 67 Waste in Place GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County ($MTCO_2e$/year)

Source	2019	2030	2035	2045
American Canyon Landfill	42,800	40,085	36,270	29,695
Clover Flat Landfill	71,819	80,295	83,161	88,181
Total	**114,619**	**120,380**	**119,431**	**117,876**
Percent Change from 2019				
American Canyon Landfill	NA	-6%	-15%	-31%
Clover Flat Landfill	NA	12%	16%	23%
Total	**NA**	**5%**	**4%**	**3%**

Notes: BAU = business-as-usual; GHG = greenhouse gas; $MTCO_2e$ = metric tons of carbon dioxide equivalent, NA = not applicable

Source: Ascent Inc. in 2024.

IMPORTED WATER

The unincorporated county did not utilize imported water in 2019, thus this sector was not further evaluated for forecasts trough 2045.

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 located near the incorporated cities and have access to central wastewater treatment plants.

Table 68 Wastewater GHG Emissions Inventory and Legislative-Adjusted BAU Forecasts: Unincorporated County ($MTCO_2e$/year)

Source	2019	2030	2035	2045
Service population served by septic systems	24,459	28,276	27,074	24,669
Service population served by WWTP	618	715	684	624
Percent change in service population from 2019 (applies to both sources)	NA	16%	11%	1%
Septic Process Emissions	2,961	3,423	3,278	2,987
WWTP Process Emissions	230	266	255	232
Total Emissions	3,191	3,689	3,533	3,219
Percent Change in WWTP Emissions from 2019				
Septic Process Emissions	NA	16%	11%	1%
WWTP Process Emissions	NA	16%	11%	1%
Total Emissions	NA	16%	11%	1%

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

Source: Ascent Inc. in 2022.

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